Flightpath.

ICAO 38TH ASSEMBLY
SEPTEMBER 2013

PRODUCED BY ATAG
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WHICH DIRECTION FOR MARKET-BASED MEASURES AT ICAO'S 38TH ASSEMBLY?

PAGE 8

ATAG
AIR TRANSPORT ACTION GROUP

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AIR TRANSPORT ACTION GROUP

2014 GLOBAL SUSTAINABLE AVIATION SUMMIT

The Air Transport Action Group's Aviation & Environment Summit has become the leading global forum for the world's aviation community to discuss sustainability issues. It is where we launched the world's first targets for reducing emissions from a single global sector. And it is where we, as a community, committed to sustainable growth in air transport in 2012.

Mark your diaries now for the next Summit, taking place at the **President Wilson Hotel in Geneva on 29 and 30 April 2014.**

More details will be online soon at **www.atag.org**

See you there!

Inside Flightpath.

Flightpath.

ATAG
AIR TRANSPORT ACTION GROUP

Geneva and Montréal

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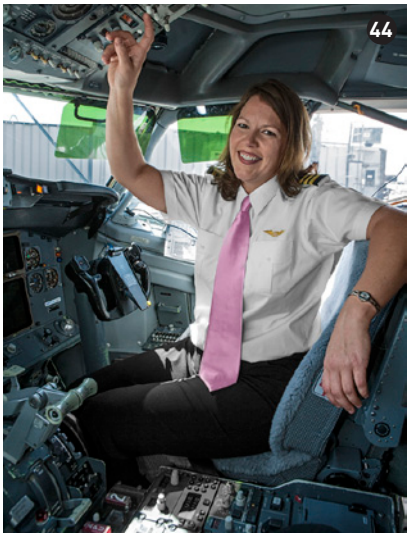


First word.

WE HAVE A UNIQUE OPPORTUNITY THIS YEAR... LET'S SHOW CLIMATE LEADERSHIP

Paul Steele is executive director of the Geneva-based Air Transport Action Group, a coalition of aviation industry bodies focusing on sustainable development of the air transport sector.

Our industry is all about co-operation and collaboration. Every day, around 80,000 flights across the world take off and each of those departures is an act of co-ordinated activity – between airlines, airports, air traffic controllers and the manufacturers who make the aircraft and engines... and a lot more people besides.

It's a simple fact that our industry would not work without co-ordinated action by all parties working to serve the three billion passengers we serve every year, or facilitate over $6 trillion worth of cargo. Aviation helps bring the world together and drives the global economy.

That daily co-ordination also needs to take place at a strategic and policy level. The Air Transport Action Group (ATAG) works to develop this strategic thinking for aviation's sustainable future. Bringing together all partners across the commercial aviation sector, ATAG is able to present a single voice on issues such as climate change and the benefits of air transport to the global economy – over 56 million jobs and $2.2 trillion in economic activity is supported by our industry. You can read about some of the ways that aviation makes a difference in this magazine.

But we also have a responsibility to reduce our environmental footprint. One of the most precious metrics for airframe and engine makers when selling an aircraft to airlines is how fuel-efficient it is. And airlines are not like the normal consumer for more efficient cars or fridges – the decisions they make when buying a new fleet mean that every 0.001% additional fuel-efficiency can make a difference in not only their financial bottom line, but also their environmental impact. It is because of this that the aviation industry has shown some remarkable success in making its activities more efficient since its early days.

Since 2008, brought together by the Air Transport Action Group, the whole industry at a global level has stood firmly behind a set of tough but realistic targets for reducing emissions and a strategy for achieving these, based on new technology, improved operational techniques and more efficient use of infrastructure. The fourth element has always been an effective, global, market-based measure for aviation to fill in any remaining gap between our goals and what the first three pillars can achieve.

This year's ICAO Assembly is an opportunity for us in the aviation community (governments, industry and civil society) to show climate change leadership by agreeing on a full package of measures and committing to a clear way forward to achieve that global market-based measure. It should not be ignored how significant it is for an industry to be asking to be regulated in this way. From the start, we have taken a pragmatic and responsible approach, understanding political realities. Now it is time for governments around the world to work with us – to collaborate as well – to achieve this goal.

Paul Steele
Executive Director
Air Transport Action Group, Geneva

DESPITE THE GROWTH IN AIR TRAFFIC, DOMESTIC AIRLINES IN GERMANY HAVE, SINCE 1990, REDUCED ABSOLUTE CO_2 EMISSIONS BY 14%!

» AIR NAVIGATION

INVESTING IN SPACE

Nav Canada has invested an additional $40 million in Aireon, a joint venture with Iridium Communications increasing Nav Canada's ownership of Aireon to 18.7%.

Aireon's mandate is to take advantage of the Iridium NEXT satellite constellation to deliver global aircraft surveillance through Automatic Dependent Surveillance-Broadcast (ADS-B) receivers on the satellites. Aireon will provide space-based air traffic monitoring services to air navigation service providers (ANSPs) around the world as the new constellation becomes operational, with full capability expected by 2017.

This will extend air traffic surveillance to vast regions of the globe, promising a quantum leap in fuel savings and avoided CO_2 emissions for airlines. The savings stem from the increased ability to use more optimal altitudes and routes, due to the expanded capacity of airspace formerly limited to less efficient procedural separation.

The ADS-B data will enable Nav Canada to deploy this new satellite-based surveillance capability in its North Atlantic airspace operations – the busiest oceanic airspace in the world with some 1,200 flights per day.

Nav Canada estimates customer fuel savings on the North Atlantic alone of over $125 million per year as a result of this new capability, as well as reduced greenhouse gas emissions of 328,000 tonnes of CO_2 equivalents annually.

[ALASKA AIRLINES]

1

» AIRLINES / BIOFUEL

ALASKA AIRLINES IN BIOFUEL DEAL

Alaska Airlines and Hawai'i BioEnergy have signed an agreement for the carrier to purchase sustainable biofuel for its aircraft. Founded in 2006, Hawai'i BioEnergy is a consortium of three of Hawaii's largest landowners and three venture capital companies who plan to use locally grown feedstocks to produce biofuels.

Alaska Airlines is Hawai'i BioEnergy's second customer, and the first airline to sign a contract. Hawai'i BioEnergy will ramp up production of the sustainable fuels within five years of regulatory approval, allowing Alaska Airlines to begin procuring sustainable jet fuel for its Hawaii flights possibly as soon as fall 2018.

"We are pleased to be partnering with Hawai'i BioEnergy to encourage the production and commercial distribution of sustainable fuels," said Keith Loveless, Alaska Air Group's executive vice president and general counsel. "Beyond the environmental advantages, it improves the fuel supply integrity in the state of Hawaii, which will allow for the further growth of our airline operations throughout the Islands."

The feedstock for the biofuel is anticipated to be woody biomass-based and will be consistent with the sustainability criteria established by the Roundtable for Sustainable Biofuels, an international multi-stakeholder initiative concerned with ensuring the sustainability of biomass production and processing.

Alaska Airlines has reduced its carbon footprint intensity by 30% since 2004. In 2011, Alaska Airlines and Horizon Air were the first domestic airlines to fly multiple passenger flights powered by a biofuel blend.

» AIRPORTS

EDI EXCEEDS RECYCLING TARGET

Edinburgh Airport has exceeded the Scottish Government's zero waste targets after recycling 82% of its waste last year.

In 2012, Edinburgh Airport sent an average of 12.3 tonnes of food waste per month to a recycling plant which helps to generate electricity. This is the same amount of waste produced per month by over 900 average households and has increased from 7.7 tonnes in 2011 with the national target being to recycle 75% of all of Scotland's waste by 2025.

Scotland's busiest airport has also been rewarded for its recycling efforts by receiving gold status in the National Recycling Stars Awards for outstanding recycling performance. The airport has also received a grant for over £48,000 from Zero Waste Scotland which has helped with the installation of 75 new recycling bins throughout the terminal.

David Wilson, Edinburgh Airport's chief operating officer, said "We are delighted to be supporting the Recycle for Scotland Campaign, in partnership with Zero Waste Scotland. We are the only Scottish Airport so far to have been awarded funding. Our new recycling bins will improve the quality of recycling and send a clear message to UK and international visitors that Edinburgh Airport and Scotland is serious about recycling".

These new recycling bins will be in busy, public areas to make it easier to recycle on the go at Edinburgh Airport, and we urge visitors to make use of these new facilities."

[EMBRAER]

2

» MANUFACTURERS

SOCIAL INCLUSION THROUGH EDUCATION

Embraer Education and Research Institute inaugurated this year a new unit of the Embraer High School, a model school focused on academic excellence for students from the public school system. All 120 students from the first class attended elementary school in the public system of the region.

The Colégio Embraer – Casimiro Montenegro Filho Unit was built in the city of Botucatu, where Embraer also has its second plant in Brazil. The school's location is 240 km from the capital of São Paulo and its installation required an investment of around $2.5million.

The new school will function like the first unit, in São José dos Campos, which has already graduated 1,800 students since its inception in 2002 and has remained among the best in São Paulo State. Ever since 2008, the school's pupils have regularly achieved 100% approval in Brazilian college entrance exams, with more than 80% of them going to public universities.

» MANUFACTURERS

BOMBARDIER WINS 2013 SAFETY AWARD

The master of the Guild of Air Pilots and Air Navigators has awarded Bombardier Aerospace the Master's North American Award for its industry contributions to air and ground safety practices.

"Following a comprehensive review of several strong candidates, we are delighted to recognise Bombardier Aerospace for its impressive safety management system (SMS): a systematic, explicit and comprehensive lifelong process for managing safety risks beyond regulatory compliance," said Tudor Owen, master.

Bombardier SMS central themes involve active hazard identification, risk management and performance measurement. To ensure a common standard for safety, all employees in Bombardier Aerospace across the globe undergo a safety programme either individually with SMS awareness training, or collectively via aviation safety weeks. To further promote safety culture, individuals and groups are regularly recognised for their contributions to this critically important mission.

1_In 2011, Alaska Airlines and sister carrier Horizon flew 75 flights on biofuel between Seattle and Washington DC and Portland using Boeing 737 and Bombardier Q400 aircraft.

2_The next aerospace engineers? Students at a school established by Embraer, in the Brazilian state of São Paulo.

» AIR NAVIGATION

SAVING EMISSIONS BY FAB

A new report highlights how the UK-Ireland Functional Airspace Block (FAB) has successfully delivered real savings to airline customers as part of the drive towards the Single European Sky.

The report shows that in 2012, the FAB delivered an estimated $35 million of enabled savings to airlines, including 25,000 tonnes of fuel savings, equivalent to 80,000 tonnes of CO_2 emissions.

The Irish Aviation Authority and NATS (UK), as air navigation service providers, are achieving these operational and cost efficiencies through ever closer organisational and technological integration. Constructive engagement with airline and military partners is a crucial factor in the success of the FAB.

Eamonn Brennan, Irish Aviation Authority CEO said "The UK-Ireland FAB is delivering real savings for our airline customers and the environment and is leading the way in the Single European Sky project. We have initiated programmes that are real stepping stones that facilitate ever closer co-operation that in turn enables ever greater savings".

The first FAB to be established, in 2008, the UK-Ireland FAB has to date delivered over $91m of enabled savings to customers, including 232,000 tonnes of CO_2 and 73,000 tonnes of fuel, through innovative airspace enhancements that facilitate more direct aircraft routings.

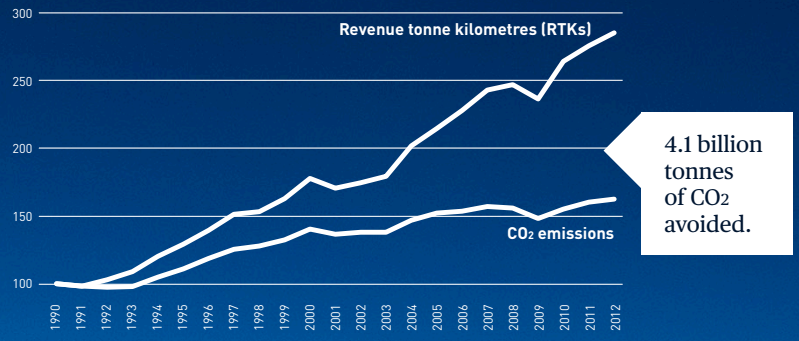
» **www.ukirelandfab.eu**

LUFTHANSA HAS REPLACED ALL ITS 5,600 CARGO CONTAINERS WITH A NEW LIGHTWEIGHT MODEL, SAVING 6,800 TONNES OF CO_2 PER YEAR.

AVIATION: AT THE FOREFRONT OF TACKLING THE CLIMATE CHALLENGE

DE-COUPLING CO_2 EMISSIONS FROM AIR TRAFFIC GROWTH

(Indexed to 1990)



4.1 billion tonnes of CO_2 avoided.

AVIATION INDUSTRY'S TARGETS FOR REDUCING EMISSIONS

(Adopted 2009)

2010
1.5% p/a fuel efficiency
Working towards carbon-neutral growth

»

2020
Carbon-neutral growth
Implementation of global sectoral aproach for MBMs

»

2050
-50% CO_2
Half the net aviation CO_2 of 2005

The average annual fuel efficiency improvement since 2010 has been 2.1%.

AVIATION INDUSTRY'S FOUR-PILLAR STRATEGY

Invest in new **TECHNOLOGY** *(incl. sustainable biofuels)*

Fly using more efficient **OPERATIONS**

Build and use efficient **INFRASTRUCTURE**

Use effective, global, **MARKET-BASED MEASURES**

Few Assemblies of the International Civil Aviation Organization (ICAO) would have had quite so many eyes on them as this year's – the 38th Assembly. The civil aviation-related conference of the world's governments has taken place since 1947 and, while this year's will have the usual agenda items dealing with the growth of air transport, safety, security and economic issues, perhaps the most keenly watched item will be the issue of climate change.

"This September is going to be pivotal in the world of aviation and climate change," says Paul Steele, executive director of the industry-wide Air Transport Action Group. "We have a window of opportunity that is now open to us to provide leadership and establish global policy on aviation and climate change. As an industry, we have provided our suggestions of an approach we think is the most practical and easy to implement. It is now up to governments to set in place the way forward."

In 2012, the world's airlines produced some 689 million tonnes of carbon dioxide (CO_2), the most common greenhouse gas. This is around 2% of the total CO_2 produced by humans each year. But while aviation has shown strong growth for decades, its carbon intensity – the amount of CO_2 released for each unit of productivity, in aviation's case per seat kilometre flown – has reduced substantially. From the first jet aircraft in the early 1950s, to the modern planes entering today's fleet, emissions per seat have fallen by well over 70% through new technology alone. Add to that the operational efficiencies and you have an industry that has been taking reduction in fuel use seriously for a long time, in particular in the last decade. »

AVIATION INDUSTRY'S PREFERRED OPTION

1. GLOBAL CARBON OFFSETTING
2. GLOBAL CARBON OFFSETTING + ADDITIONAL REVENUE COMPONENT
3. GLOBAL EMISSIONS TRADING SCHEME

Industry believes that a global carbon offsetting mechanism is the quickest, easiest, most cost-efficient and politically realistic solution.

Looking back

In 1997, the world's governments agreed the Kyoto Protocol which set the scene for the next 15 years of discussions on climate change. Article 2.2 of the Protocol asks for the issue of aviation emissions to be dealt with at ICAO, because of the unique and international nature of the sector. In fact, the governments meeting at ICAO had already discussed the issue of a market-based measure for aviation emissions the year before Kyoto, but the topic was shelved due to the inability to reach agreement. In 2004 again, the issue of developing a market-based measure was discussed at ICAO without agreement.

The Kyoto Protocol gave developed countries targets for reducing CO_2 emissions below their 1990 levels, with differing degrees of both stringency and success. Looking at aviation emissions since 1990, the efficiency of air transport has increased by some 46%, which means that, despite the strong growth in traffic since that time, the industry has managed to avoid over four billion tonnes of CO_2 from entering the atmosphere. However, the growth in air travel has meant that overall emissions have increased and, in 2008, representatives of the whole industry developed a four-pillar strategy for reducing emissions: using new technology – including sustainable low-carbon alternative fuels; operational efficiency; better infrastructure; and appropriate market-based measures to fill the gap.

This was followed a year later by the first set of global targets for reducing emissions from any global industry, as the aviation sector said it would cap emissions from 2020 and halve emissions by 2050, based on 2005 levels.

Industry position 2013

In June this year, the airline members of the International Air Transport Association (IATA) and the airport members of Airports Council International (ACI) both agreed resolutions supporting the development of a global market-based measure for aviation at the 38th ICAO Assembly.

"Airlines are committed to working with governments to build a solid platform for the future sustainable development of aviation. They have come together to recommend to governments the adoption of a single MBM for aviation as part of an overall package of measures and to provide suggestions on how it might be applied to individual carriers. Now the ball is in the court of governments. We will be strongly supporting their leadership as they seek a global agreement through ICAO at its assembly later this year," said Tony Tyler, IATA's director general and CEO.

ACI's director general, Angela Gittens, said that, worldwide, airports are playing their part on the ground in reducing emissions, aided by "the ACI Airport Carbon Accreditation programme which facilitates and measures real world reduction activities on three continents. But we understand that the industry as a whole must work on political solutions. This is why ACI and our membership enthusiastically support the industry position and urge governments meeting at ICAO this September to do the same."

Civil Air Navigation Services Organisation (CANSO) director general Jeff Poole added, "CANSO and its members have worked with partners across the aviation industry to produce realistic, workable, effective and measurable proposals to mitigate aviation's environmental impact. It is now up to States to seize the opportunity to agree to these measures at the ICAO Assembly in September. This is our best chance of achieving the necessary global agreement."

From those resolutions and with input from the manufacturers through the International Coordinating Council of Aerospace Industries Associations (ICCAIA) and the International Business Aviation Council (IBAC), a full industry position was formed.

The way forward

The aviation industry recommends that, as part of a comprehensive approach to address air transport's climate impacts, a single global market-based measure (MBM) be agreed. The industry points out that any global MBM must be seen as part of a broader package of measures including new technology, more efficient operations and better use of infrastructure. The industry has been a supporter of the ICAO work to develop a CO_2 standard for new aircraft types and is heavily involved in the work to put this standard in place.

Paul Steele says, "our four-pillar strategy is the right approach – it prioritises the reduction of emissions within our own sector, before looking to the most cost-effective way of reducing emissions through offsets in the broader economy."

"When it comes to the fourth pillar in our strategy, there are currently three options being explored by governments meeting at ICAO for the type of MBM that could be developed at a global level. The industry believes that a simple carbon offsetting scheme would be the quickest to implement, the easiest to administer and the »

[ATAG]

1

AVIATION INDUSTRY: ANY GLOBAL MBM SHOULD...

BE CONSIDERED AS PART OF A BROADER SET OF MEASURES	MAXIMISE ENVIRONMENTAL INTEGRITY	BE EASY TO IMPLEMENT AND ADMINISTER
BE COST-EFFECTIVE AND PRESERVE FAIR COMPETITION	CONSIDER SCRC†, WHILST ENSURING EQUAL TREATMENT OF OPERATORS	NOT BE DESIGNED TO RAISE GENERAL REVENUES OR SUPPRESS DEMAND

most cost-efficient," says Steele who also points out that the danger of not agreeing a single, global MBM, which could potentially lead to a patchwork of measures all over the world.

"We already pay over $7 billion a year in emissions-related taxes and charges. For an industry with such tight profit margins as airlines have, this is an ineffective economic burden and, to be frank, an administrative nightmare. We are keen to find a way to account for our emissions, but in a global sector like air transport, the fewer forms airlines have to complete across the world, the better."

In a working paper submitted to governments meeting at the ICAO Assembly by ATAG (on behalf of airlines, airports, manufacturers and air navigation service providers), the industry invites delegates to:

1) Agree a way forward for development of a single global MBM for aviation, to be implemented from 2020, that can be adopted at ICAO's next Assembly in 2016.

2) Agree the principles for development of a global MBM, including:

» the goal of carbon-neutral growth from 2020;
» that aviation emissions should only be accounted for once;
» that a global MBM should take account of different types of operator activity.

3) Ask ICAO to develop, in the meantime, several milestones that could help build the foundation for a single global MBM, including:

» an ICAO standard for monitoring, reporting and verifying emissions from aviation;
» a mechanism to define the quality of verified offset types that could be used in a global MBM for aviation.

The reaction

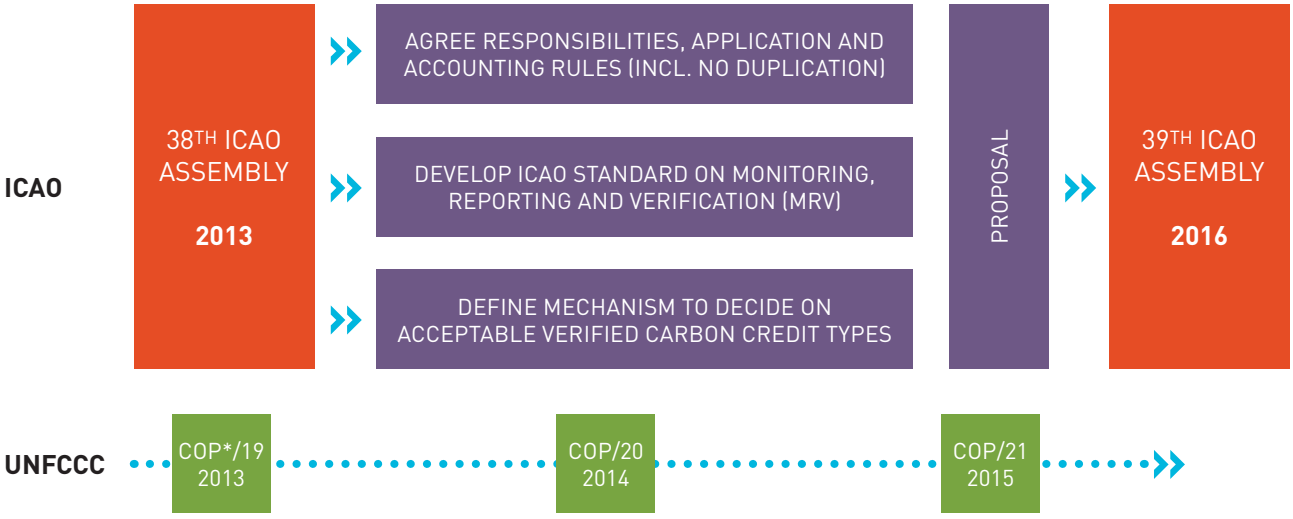
Reactions to the industry's call for action came from a number of different sides. Annie Petsonk, international counsel at the Environmental Defense Fund, said, "IATA has opened the door, now it is time for governments to walk through it this September. This is the signal that governments have been seeking." Her colleague, Jake Schmidt, international climate policy director at Natural Resources Defense Council, said, "It is time for governments to heed the call and act decisively this year to control aviation's carbon pollution."

The United Nations Environment Programme's executive director Achim Steiner said the industry's move could prove to be an important step in the process, "A clear signal from industry that it supports a global market-based mechanism to be agreed at this year's ICAO Assembly has been one that governments have been waiting for."

From the European Union, commissioner for climate action Connie Hedegaard announced via Twitter: "Very strong message that airline industry seems ready to support global MBM. Time for government to match it and deliver in ICAO." And her colleague Siim Kallas, commissioner for transport, sent this message via Twitter: "Warmly welcome the IATA resolution on carbon-neutral growth in aviation. It will definitely help ICAO agree global solution in September."

The presidents and prime ministers of Canada, France, Germany, Italy, Japan, Russia, the UK and USA said, in their final statement from the G8 Summit in Northern Ireland, "We call for the agreement at the [ICAO] Assembly in September 2013 on an ambitious package related to both market-based and non-market based measures to address rising aviation emissions."

AVIATION INDUSTRY'S PROPOSED PATH FROM ICAO ASSEMBLY 38 TO 39



Getting the job done

Tony Tyler says that for governments, finding agreement on MBMs will not be easy. "It was difficult enough for the airlines, given the potential financial implications. Bridging the very different circumstances of fast growing airlines in emerging markets and those in more mature markets required a flexible approach and mutual understanding. But sustainability is aviation's license to grow. With that understanding and a firm focus on the future, airlines found an historic agreement. This industry agreement should help to relieve the political gridlock on this important issue and give governments momentum and a set of tools as they continue their difficult deliberations."

Paul Steele said that agreement to a way forward on market-based measures will benefit all sides at the ICAO Assembly. "It creates regulatory stability and predictability, stimulating investment in effective CO_2 measures; it allows for sustainable growth of aviation, generating socio-economic benefits; promotes the principle of equal opportunities, protecting growth aspirations in all regions; promotes ICAO objectives and affirms its leadership and most importantly provides a way forward for the world to deal with the emissions of an important sector for global growth."

He also notes that the timing is opportune, "With a firm commitment to a way forward out of the 38th Assembly this year, we will have three years in which to agree a strong set of building-blocks towards an agreement in 2016. This will come a year after the UNFCCC is scheduled to agree a successor to the Kyoto Protocol and will allow time for the implementation of a single global MBM for aviation by 2020 – when our goal of carbon-neutral growth begins. Coincidentally, 2020 is also the timeframe for the start of the successor to Kyoto. It would provide a fitting way for aviation to continue being part of the climate solution. But work must start now."

1_At ATAG's 6th Aviation & Environment Summit in 2012, leaders of the aviation industry committed to the declaration "Towards Sustainable Aviation" and re-confirmed the industry's world-leading strategy to reduce its climate change impact.

†_Special circumstances and respective capabilities

*_Conference of the Parties

» AIR NAVIGATION

OPTIMISED TRANSATLANTIC FLIGHT TRIAL BEGINS

A trial of environmentally optimised transatlantic flights has begun as part of the Topflight project being led by air traffic service provider, NATS.

Topflight is part of the SESAR programme, the technical and operational component of the European Community's Single European Sky initiative which aims to modernise and harmonise air traffic management systems across Europe. The project is co-funded by the SESAR Joint Undertaking.

Every element of each trial flight, from push-back time, to climb and descent profile and routing, has been designed to test the SESAR concept, minimise fuel burn and maximise efficiency.

In practice, this means that each flight could save up to half a tonne of fuel – the equivalent to 1.6 tonnes of CO_2.

The trial includes up to 60 British Airways flights over the course of the summer. The first took place at the end of May between Heathrow and Canada following six weeks of cockpit simulation work.

Topflight will test elements of the future SESAR concept in the current operational environment. Some of these elements are already business as usual for NATS controllers, such as the use of continuous climb departures to minimise fuel burn, but others have required new procedures such as giving aircraft an initial oceanic profile before departing Heathrow.

Topflight also provides an opportunity for NATS and the project partners to review and feed back on the feasibility, benefits and scalability of the SESAR concept more widely, as well as saving potentially large amounts of fuel and CO_2.

NATS project manager Joe Baker said, "One-off trials, such as the NATS Perfect Flight project in 2010, have already proven the level of benefit that can be achieved in isolation, but these wider trials are an exciting opportunity to look at how we might implement these ideas for multiple flights in a real life operational environment.

Topflight will therefore develop and assess procedures that assist NATS controllers in providing a service that further minimises the environmental impact of aviation."

As well as NATS and BA, the Topflight consortium consists of Canadian air traffic service provider NavCanada, Airbus ProSky, Boeing and Barco Orthogon. It is also being supported by the Irish Aviation Authority.

The initial Topflight results will be known in the autumn, with further trials planned for the winter to focus on reducing holding at London Heathrow via the use of a cross-border arrival manager, or XMAN. F

» COLLABORATION

A PERFECT FLIGHT ACROSS NORTH AMERICA

On 18 June 2012, Air Canada flight AC991, an Airbus A319, took off from Toronto Pearson Airport bound for Mexico City. It was carrying the secretary general of ICAO, Raymond Benjamin and was the second in a series of four biofuel flights carrying him to Rio de Janerio for the UN's Rio+20 conference. What made this flight special was the extra attention paid to all aspects of the journey, some of which are outlined below. This 'perfect flight' was a joint effort across industry partners, but one that paid off: it had more than a 40% reduction in CO_2 emissions compared to a normal flight on the same route. The question is, how do we turn this from a one-off special to an everyday occurence? F

Airbus and Air Canada jointly won the Air Transport World Eco-Partnership Award 2013 for the perfect flight and ongoing environmental projects.

[AIRBUS / AIR CANADA]

[LUFTHANSA]

1

» SCIENCE

SUPPORTING CLIMATE RESEARCH

The IAGOS (in-service aircraft for a global observing system) project, in which the Lufthansa Group is involved, uses commercial aircraft to obtain atmospheric data at cruising altitudes. Up to now, such data could only be obtained on a piecemeal basis and at great expense by using special research aircraft. According to the scientific panel appointed to oversee the project, IAGOS will close an important knowledge gap, resulting in more accurate climate forecasts.

Lufthansa has been involved in IAGOS since July 2011. In co-operation with the Jülich Research Centre, it became the first airline worldwide to launch this innovative project for the long-term observation of the earth's atmosphere during scheduled flight operations. Since then, specially developed measuring instruments installed on the Lufthansa Airbus A340-300 'Viersen' have routinely captured atmospheric trace substances. This provides a broad set of data gathered from all over the world. After each landing, the data is read, processed and analysed.

The Lufthansa Group has co-operated continuously with scientific and research institutions since 1993. The Group provides data to improve and validate climate models and has proved to be an invaluable partner in the field of climate research.

» **The IAGOS project is also being supported by China Airlines, Air France, Cathay Pacific and Iberia Airlines, all of which will have equipment on board aircraft.**

[LUFTHANSA]

2

1_Lufthansa has installed measuring equipment on one of its Airbus A340-300 aircraft.

2_To improve fuel efficiency in flight, Lufthansa is also testing a new aircraft paint with a sharkskin-inspired riblet texture on two Airbus A340-300s. Eight 10 x 10cm test patches have been placed on the fuselage and wings of each aircraft to assess the coating's durability in regular flight operations – a dirt-repellent texture is imprinted into the surface during painting. An initial 12-month trial has been extended after positive results.

» AIRLINES

LIGHTENING THE LOAD AT ETIHAD

Etihad Airways and Jettainer have partnered to launch a new lightweight and double-width Unit Load Device (ULD), known as type ALF.

Compared to traditional double-width ULDs which typically weigh in at 196 kilograms, the new ALF model is almost 34% lighter at 130kg, a potential weight saving of 116kg per flight.

Etihad Airways will take delivery of 250 of the ULDs this year and the airline estimates that the significant weight reduction will result in fuel savings in the order of $350,000 in 2013 and approximately $1.1 million in 2014. Projected reductions in CO_2 emissions are 1,100 tonnes for 2013 and 4,000 tonnes for 2014.

The certified ULDs are manufactured from a range of composite materials which guarantee strength.

David Kerr, Etihad Airways' vice president cargo, said, "Being more efficient in our operations, lowering our fuel burn, reducing our CO_2 impact, and optimising our costs will continue to drive our business in the years ahead, and we look forward to working with Jettainer and its manufacturers to identify further opportunities for weight savings initiatives."

[ETIHAD AIRWAYS]

1

[AMERICAN AIRLINES]

2

» AIRLINES

GOING DIGITAL IN THE COCKPIT

American Airlines has completed the successful rollout of its industry-leading electronic flight bag programme with the discontinuation of paper revisions to terminal charts, making it the first major commercial airline to fully utilise tablets in all cockpits during all phases of flight. In April, American completed testing on its Boeing 757 and 767 aircraft and has secured FAA approval to use the Apple iPad on all of its current fleet types. It is estimated that the move towards the electronic flight bags will reduce CO_2 emissions by 3,800 tonnes.

An electronic flight bag, which replaces more than 15 kilograms of paper-based reference material and manuals that pilots often carried in their carry-on kitbag, offers numerous benefits for American and its pilots.

"Our electronic flight bag programme has a significant positive environmental and cost-savings impact," said David Campbell, American's vice president – safety and operations performance. "In fact, removing the kitbag from all of our planes saves a minimum of 1.5 million litres and $1.2 million of fuel annually based on current fuel prices. Additionally, each of the more than 8,000 iPads we have deployed to date replaces more than 3,000 pages of paper previously carried by every active pilot and instructor. Altogether, 24 million pages of paper documents have been eliminated."

All American pilots now enjoy the benefits associated with replacing their heavy kitbags – one of the airline's biggest sources of pilot injuries – with a 600 gram iPad. The digital format also requires less time to update each of the six or more paper manuals found in each pilot's kitbag, as manual paper revisions take hours to complete every month, compared to the minutes it takes for electronic updates.

As part of the electronic flight bag programme, American's pilots use mobile software and data from Jeppesen, a unit of Boeing Digital Aviation. The FAA-approved Jeppesen mobile terminal chart application is allowed for gate-to-gate use throughout all phases of flight and, with the exception of a few select documents, replaces paper operating manuals with up-to-date electronic information that is easier to access.

American and the Allied Pilots Association began working on the feasibility of using a tablet device as an electronic flight bag in June 2010, and American was the first commercial airline to receive FAA approval to use a tablet during all phases of flight in December 2011, on its Boeing 777 fleet. American has worked closely with its pilots throughout all phases of development that led to the programme's full integration.

» **Other airlines rolling out iPad electronic flight bags for pilots include United Airlines, British Airways, Alaska Airlines, All Nippon Airways, Air Canada, JetBlue and Southwest.**

[ACI]

3

» AIRPORTS

CARBON PROGRAMME NOW ACTIVE ON THREE CONTINENTS

It's been four years since ACI Europe launched its Airport Carbon Accreditation and the programme is reaping real benefits through carbon emissions. The institutionally-endorsed programme independently assesses and recognises airports' efforts to manage and reduce their CO_2 emissions. It certifies airports at four different levels of accreditation (mapping, reduction, optimisation and neutrality). In the 12 months up to June 2013, Airport Carbon Accredited status has been earned by a total of 75 airports in 22 countries in Europe and ten airports in seven countries in Asia-Pacific.

At this year's ACI Europe and World Annual Congress, a special agreement was signed with ACI Africa, extending the programme to airports in that continent. Enfidha Hammamed Airport in Tunisia is the very first African airport to become certified.

Olivier Jankovec, director general of ACI Europe commented, "Year four of Airport Carbon Accreditation has been an epic year. We've seen more airports reducing their CO_2 than ever before, including an entire national airport group becoming carbon neutral. Our colleagues in Asia-Pacific have secured the participation of more than ten airports in Asia-Pacific, including Hong Kong International Airport, certified at the 'optimisation' level. And now year five kicks off with the extension to Africa – that's real momentum for such a young programme."

On Airport Carbon Accreditation's impact in Europe in particular, Jankovec added, "In Europe alone, accredited airports welcome more than 900 million passengers each year and year four has yielded a reduction of over 170,000 tonnes of CO_2 – enough energy to run 71,000 households for a year. This is concrete action that has produced effective, independently-verified results. Within and beyond Europe, airports of all sizes are now engaged in a real efficiency drive to reduce CO_2 emissions that is making a tangible difference to the industry's carbon footprint."

All the airports now certified by Airport Carbon Accreditation collectively represent 22% of global air passenger traffic.

» **For more information: airportcarbonaccreditation.org**

» **Airports currently taking part include: Europe:** Barcelona, Lanzarote, Madrid-Barajas, Malaga, Palma de Mallorca, Toulouse-Blagnac, Leonardo da Vinci-Fiumicino, Rome Ciampino, Lisbon, Faro, Oporto, Horta, Flores, Santa Maria, Ponta Delgada, Beja, Nice Côte d'Azur, Lyon-Saint Exupéry, Charles-de Gaulle, Orly, Le Bourget, Amsterdam Schiphol, Athens, Oslo, Trondheim, Værnes, Kristiansand, Kjevik, Bologna, Brussels, Budapest, Dublin, Cork, Dubrovnik, Düsseldorf, Eindhoven, Helsinki Vantaa, Enontekiö, Ivalo, Kemi-Tornio, Kittilä, Kuusamo, Rovaniemi, Köln/Bonn, Vienna, Frankfurt, Genève, Hamburg, Antalya, Heathrow, Liège, London City, Manchester, Munich, Warsaw Chopin, Prague, Milan-Malpensa, Milan-Linate, Shannon, Stockholm-Arlanda, Stockholm-Bromma, Umea, Göteborg Landvetter, Malmö Airport, Åre Östersund, Lulea, Ronneby, Visby, Kiruna, TAG Farnborough, Lennart Meri Tallinn, Istanbul Atatürk, Ankara Esenboga, Izmir Adnan Menderes, Tirana, Zagreb, Zurich. **Asia-Pacific:** Abu Dhabi, Adelaide, Hong Kong, Queen Alia (Amman), Bangkok Suvarnabhumi, Bengaluru, Singapore Changi, Indira Gandhi, Hyderabad, Rajiv Gandhi, Mumbai, Parafield. **Africa:** Enfidha-Hammamet

1_Etihad's new ULDs will save the airline $1.1 million in fuel next year... and 4,000 tonnes of CO_2.

2_American Airlines' rolling out of iPads will save the airline $1.2 million of fuel and 3,800 tonnes of CO_2 per year.

3_Hong Kong Airport becomes the first airport in Asia-Pacific to achieve 'optimisation' level. Pictured at the certificate ceremony are Stanley Hui, CEO of Airport Authority Hong Kong; Marvin Cheung, chairman of Airport Authority Hong Kong and Patti Chau, regional director, ACI Asia-Pacific.

DELTA AIR LINES REDUCED CO_2 EMISSIONS FROM ITS OPERATIONS: 189,154 TONNES FROM 2011 AND 2012. ITS AVERAGE ANNUAL FUEL-EFFICIENCY GAINS 2009-12: 1.7%

[SAFRAN]

» MANUFACTURERS

ROLLING DOWN THE TAXIWAY WITH A LITTLE HELP FROM ELECTRICITY

Honeywell and Safran have announced they are extending collaboration on the development of the new electric green taxiing system (EGTS) to include Air France.

The MoU signed at the 2013 Paris Air Show will enable Air France to analyse the potential technical, operational and financial benefits of the EGTS. In turn, Air France will provide valuable assistance to Safran and Honeywell in quantifying other operational benefits.

Air France's aircraft use a number of congested airports, and the EGTS can provide a decisive economic advantage at these airports, while also reducing emissions and noise at the terminal. From early analysis, Air France expects to save several percent fuel burn per cycle based on its current operations.

A single aisle aircraft equipped with the EGTS system also reduces NOx emissions by approximately 50% and carbon emissions by approximately 75% during taxiing manoeuvers. Honeywell and Safran are targeting EGTS entry into service on new aircraft in 2016, shortly followed by a retrofit option on existing aircraft.

The EGTS allows aircraft to taxi without requiring the use of aircraft engines by using the Auxiliary Power Unit (APU) generator to power motors in the main wheels. Each of the aircraft's powered wheels is equipped with an electromechanical actuator, while unique power electronics and system controllers give pilots control of the aircraft's speed, direction and braking during taxi operations. The system will reduce, if not remove altogether, the need for aircraft ground equipment to manoeuvre aircraft in and out of stands.

» AIRLINES

REDUCING FUEL BURN AND DELAYS

South African Airways (SAA) has received authorisation to fly new safety-enhancing and fuel-saving instrument departure and approach procedures. The approval, the first in Africa, paves the way for further developments that could enhance safety and increase operational efficiency throughout SAA's route network.

The use of the new technology can further decrease travelling time on trips to and from Cape Town, for instance, by 5 – 10 minutes. SAA is now using the new flight procedures in all weather conditions on flights into and out of Cape Town International Airport. The new procedures, known as required navigational performance – authorisation required, utilise advanced on-board navigation technology and space-based GPS signals to achieve the enhancements in safety and efficiency.

The new procedures will provide an opportunity for immediate benefit with SAA aircraft potentially saving over 600 tonnes of fuel (1,800 tonnes of CO_2) per year.

"This milestone signifies South Africa's readiness for a wider performance based navigation deployment in line with recommendations set out by the International Civil Aviation Organization (ICAO). We are thus grateful for the great support from Quovadis, Airbus and Boeing and look forward to future implementations and procedure design," said Captain Johnny Woods, head of flight operations and chief pilot at SAA.

» AIRLINES

A JUICY LEMON SOLUTION

Austrian Airlines' maintenance team has developed an innovative new use for lemon juice in cleaning aircraft toilets. The innovative system is not only kind to the environment but also saves time and money. For this invention, the maintenance division of Austrian Airlines has now been awarded the Environmental Prize of the City of Vienna.

'Waliclean' is based on a simple principle: a solution of regular citric acid and warm water is circulated through the aircraft's waste line system by means of regulated negative pressure. Once the system has been successfully cleaned, it is rinsed with clear water and emptied. The rinse water can be disposed of easily via the sewage system. In the past, three different maintenance methods had to be employed several times a year to keep the waste line system functioning.

Austrian Airlines will save around 7,165 litres of chemicals per year. This preserves the environment, protects staff and significantly improves storage, transport and disposal requirements.

The weight saving after using Waliclean is about 75kg in the case of a Boeing 777, which amounts to an annual saving of 44 tonnes of jet fuel, or 138 tonnes of CO_2 per aircraft. Using the new cleaning method will also generate substantial financial savings, as Austrian will be able to reduce the man-hours required by more than 4,000 per year.

BIOFUELLING THE FUTURE OF FLIGHT: HOW TO GET THERE?

If you had spoken to aeronautical engineers even seven years ago about the prospect of flying commercial aircraft on biofuels, a great many of them would have dismissed the idea. Back then, biofuels were being used for automobiles and were liquid fuels such as ethanol – this cannot be used in aircraft engines, as it freezes easily which is a problem when you are flying at 35,000 feet and many degrees below freezing. But in early 2008, after a short period of testing, a Boeing 747-400 took off from London's Heathrow Airport on an historic flight, the first to use a new type of advanced biofuel in a commercial jet aircraft.

Since then, the prospect of sustainable biofuel powering the world's fleet of aircraft has become a reality. We received certification from standards agency ASTM in 2010 that biofuels using two processing pathways were safe to use in passenger services and in all, over 1,500 commercial flights have taken place so far. We have several advantages in looking at biofuels for aviation:

» **The fuels we are using and researching are so-called 'drop-in' fuels.** They have a very similar chemical structure to the Jet A-1 fuel we use today. Therefore, no new engines or aircraft are required. We can run on 100% biofuel if needed (and indeed a test flight last year did just that). It also means that we can simply add it to our airport fuel supplies as and when it is available.

» **We came to the game late.** We were able to learn from the mistakes made previously. For example, the mandate for automobile biofuels introduced in Europe created a ready market, but also forced fuel suppliers to find biodiesel and ethanol from any source, including those that had a truly devastating impact on rainforest, water use, land use change and local communities around the world. We can avoid these issues.

» **We have a very condensed distribution system.** Around 190 airports see 80% of the world's civil air transport. Compare this to 131,000 service stations in Europe alone. We also consume around 10% of the liquid fuel used in transportation. So aviation is a prime candidate for an easy transition for one sector to more non-carbon energy sources.

» **It could reduce aviation CO_2 emissions by up to 80%.** Based on a full carbon lifecycle assessment, researchers have shown that the right aviation biofuels could reduce emissions from our sector by up to 80% compared to traditional jet fuel. This would help go a long way to achieve our industry-driven targets for emissions reduction from aviation.

» **It is our only option.** We will be flying on liquid fuels for the foreseeable future. Unlike other transport modes, we cannot use alternatives such as electricity. Therefore, we are stuck with high-energy liquid fuels. While we have managed to reduce our fuel consumption impressively – modern aircraft are well over 70% more fuel-efficient than the first jets and have a similar per-passenger fuel consumption as small cars – fuel still makes up over 30% of an airline's operating costs.

[EMBRAER]

1

There is a huge amount of research and activity underway around the world on delivering biofuels for aviation from a wide range of sources. Although most passenger flights have taken place on biofuels derived from sources such as used cooking oil so far, this is simply a function of availability. Research is currently underway into biofuels from sources as diverse as algae, sugarcane, grasses such as camelina and salicornia, crops like jatropha, municipal waste and even waste gases from steel production.

While there is a strong desire amongst airlines to use this new fuel, there remains a big barrier: price. Currently, most aviation biofuel is only made as specialist, one-off batch quantities, which means the price is about three to five times that of regular jet fuel. As production ramps up, it will come down, but we need to try and kick-start this process fast, in order to bring down the price until it is comparable with traditional jet fuel.

We are asking governments for assistance to do this. In particular:

1. **Foster research into new feedstock sources and refining processes:** Policy enablers include establishing funding programmes for academic research through existing or new university, research institution or industrial research projects.
2. **De-risk public and private investments in aviation biofuels:** These incremental upfront capital investment costs are a potential barrier to commercialisation. In this context, governments can play a role in reducing this risk through measures such as loan guarantees, tax incentives, grants and co-financing for pilot and demonstration projects.
3. **Provide incentives for airlines to use biofuels from an early stage:** Crafting policies that create a level playing field for biofuels vis-à-vis other energy sources, and aviation vis-à-vis other sectors, is a key element in aviation biofuels commercialisation.
4. **Encourage stakeholders to commit to robust international sustainability criteria:** The development of an accepted set of globally harmonised standards will help ensure that investment is directed at biofuels that meet acceptable sustainability criteria, thus minimising this form of risk.
5. **Understand local green growth opportunities:** By bringing the aviation industry, government, biofuel, agriculture and academic expertise together, analysing the optimum opportunities that exist in your country for aviation biofuel production including the most effective feedstock sources and infrastructure requirements.
6. **Establish coalitions encompassing all parts of the supply chain:** Ensure that partnerships are established and that stakeholders work together to ensure sustainability and economic benefits are felt by all parts of the supply chain.

By following these steps, we can help ensure a sustainable future for aviation, an industry which supports nearly 57 million jobs and 3.5% of the world's GDP, not to mention connectivity and support to exporters and businesses the world over. The aviation industry is committed to bringing down its carbon emissions and biofuels will go a long way to helping us achieve that.

» **www.flyonbiofuels.org**

FLIGHTS TO RIO

For the United Nations Sustainable Development Conference (Rio+20) in 2012, the industry and ICAO worked together to showcase biofuels for aviation by transporting ICAO secretary general Raymond Benjamin on a series of flights from Montréal to Rio de Janeiro:

YUL to **YTZ**
Porter Airlines
Bombardier Q400
Camelina-derived biofuel

YYZ to **MEX**
Air Canada
Airbus A319
Used cooking oil biofuel

MEX to **GRU**
AeroMexico
Boeing 777
Jatropha-derived biofuel

GRU to **SDU**
GOL Airlines
Boeing 737-800
Used cooking oil biofuel

The following biofuelled flights also operated:

SJK to **SDU**
Azul Airlines
Embraer 190
Sugarcane-derived biofuel

AMS to **GIG**
KLM
Boeing 777
Used cooking oil biofuel

1_Embraer and Azul joined forces in 2012 to operate the first test flight of a biofuel made from sugar cane.

2_Air France joins with Total, Safran and Airbus to launch the 'joining our energies' flight at the 2013 Paris Air show.

3_Virgin Atlantic has won an award in the Sustainable Aviation category for its work with LanzaTech on innovative biofuels from steel production.


[AIRBUS]

2

» BIOFUELS

BNE TO BE "BIOPORT"

Virgin Australia, Brisbane Airport Corporation and the global market maker in sustainable jet fuel, SkyNRG, have announced a feasibility study into the creation of Australia's first "bio-port" at Brisbane Airport. The parties will work together towards the ultimate goal of enabling aircraft to be fuelled with sustainable bio jet fuel at Brisbane Airport. The study will involve researching the locally available feedstocks, sustainable and cost-effective methods for transporting them and the most appropriate technology for converting them into biofuel.

» BIOFUELS

UNITED TO FORWARD PURCHASE

United Airlines has executed a definitive purchase agreement with AltAir Fuels for cost-competitive, sustainable, advanced biofuels. With United's strategic partnership, AltAir Fuels will retrofit part of an existing petroleum refinery to become an advanced biofuel refinery near Los Angeles.

United has collaborated with AltAir Fuels since 2009 and has agreed to buy 56 million litres of renewable jet fuel over a three-year period. The airline is purchasing the advanced biofuel at a price competitive with traditional, petroleum-based jet fuel, and AltAir expects to begin delivering 18 million litres of renewable jet fuel per year to United starting in 2014. United will use the biofuel on flights operating out of its Los Angeles hub.

» BIOFUELS

FRENCH PARTNERSHIP TO DEVELOP BIOFUELS ESTABLISHED

At the Paris Air Show 2013, Airbus, Air France, Safran and Total organised the "Joining our Energies – Biofuel Initiative France" flight to illustrate the French industry's technical capacity to integrate aeronautical biofuels.

The four players underlined the need to improve research into the development of sustainable biofuels with a view to creating a French biofuel industry.

As an increasing number of initiatives are being implemented in Europe and worldwide, France has numerous assets for creating an innovative value chain with its world-leading fuel supplier, engine manufacturer, aircraft manufacturer and airline.

For several years now, Airbus, Air France, Safran and Total have been researching, innovating and reflecting on future aviation fuels at national and international levels. They currently propose an innovative industrial approach to guarantee the aeronautical industry a sustainable future.

» BIOFUELS

BIOFUELS AWARD FOR VIRGIN

Virgin Atlantic was delighted to win the 2013 Sustainable Biofuels Award in the Sustainable Aviation sector.

The award follows Virgin Atlantic's ground-breaking work towards the development of a world-first low carbon aviation fuel that is set to achieve 50-60% carbon reductions compared to the standard fossil fuel alternative. The airline's partnership with LanzaTech represents a breakthrough in aviation fuel technology that will see waste gases from industrial steel production being captured, biologically fermented and chemically converted for use as a jet fuel.

The revolutionary fuel production process recycles waste gases that would otherwise be burnt into the atmosphere as carbon dioxide. Richard Branson described this process as "one of the most exciting developments of our lifetime and a major breakthrough in the war on carbon".


[VIRGIN ATLANTIC]

3

FITTING WINGLETS TO ANA'S 767-300 AIRCRAFT HAS REDUCED ANNUAL CO_2 EMISSIONS PER AIRCRAFT BY 2,100 TONNES.

» AIRPORTS

INDIANAPOLIS FLYERS WELCOME THE SUN

Construction of the largest planned airport-based solar farm in North America is ahead of schedule. Official construction began immediately following the March 2013 groundbreaking ceremony at the entrance to Indianapolis Airport.

The 75-acre solar farm will generate annually more than 15 million kilowatt hours of electrical energy, enough to power more than 1,200 average American homes for a year.

The $35-$40 million dollar alternative energy project is a significant public-private partnership including the Indianapolis Airport Authority, the City of Indianapolis and privately-held businesses GES, Telamon Corporation, Johnson Melloh Solutions, Cenergy Power and Indianapolis Power & Light.

All entities involved are committed to finding creative solutions to increase sustainability in Indianapolis while helping diversify generation sources of electric power for Indianapolis business and residential customers.

Once the solar array goes into operation in September 2013, it is expected to prevent around 10,700 tonnes of CO_2 from being emitted each year. The airport's economic impact in Central Indiana is more than $4.5 billion annually, and 10,000 people work at the airport each day. F

» AIRPORTS

DUBAI AIRPORTS TO CUT CO_2 WITH NEW BUILDING

In line with the aviation industry's long-term aim of carbon-neutral growth, Dubai Airports is working towards making Concourse D – which will become the new home of more than 100 airlines when it opens in 2015 – as energy-efficient and sustainable as possible.

Among the initiatives aimed at reducing the carbon footprint of the building is an array of 192 solar panels measuring 450m² to be erected on the roof. This will have the dual benefit of generating power while keeping the building cool by reflecting sunlight.

The solar array is expected to generate 2% of the total power requirement of Concourse D. The use of improved insulation in the construction of the building will help better regulate temperature within the concourse while thermal technology will be used to absorb sunlight in the day and radiate it during the night time hours.

Construction of the new facility includes onsite recycling, reducing the amount of waste being disposed of at landfills.

Recycled materials will also be used in construction and the design requires the use of more efficient lighting systems, which include daylight sensors and less heat-intensive lighting. This not only reduces the energy consumption of the building but cuts the amount of energy needed to cool.

"Designing environmentally friendly terminals is key to limiting our energy consumption and carbon footprint over time and fits in with our broader environmental policy. It also supports our industry's target of carbon-neutral growth by 2020," said Dubai Airports CEO Paul Griffiths. F

1_Concourse A at Dubai International Airport. It will be joined by an energy-efficient Concourse D in 2015.

[DUBAI AIRPORTS]

» AIR NAVIGATION

APEC AIRSPACE AND AIRPORT CAPACITY STUDY

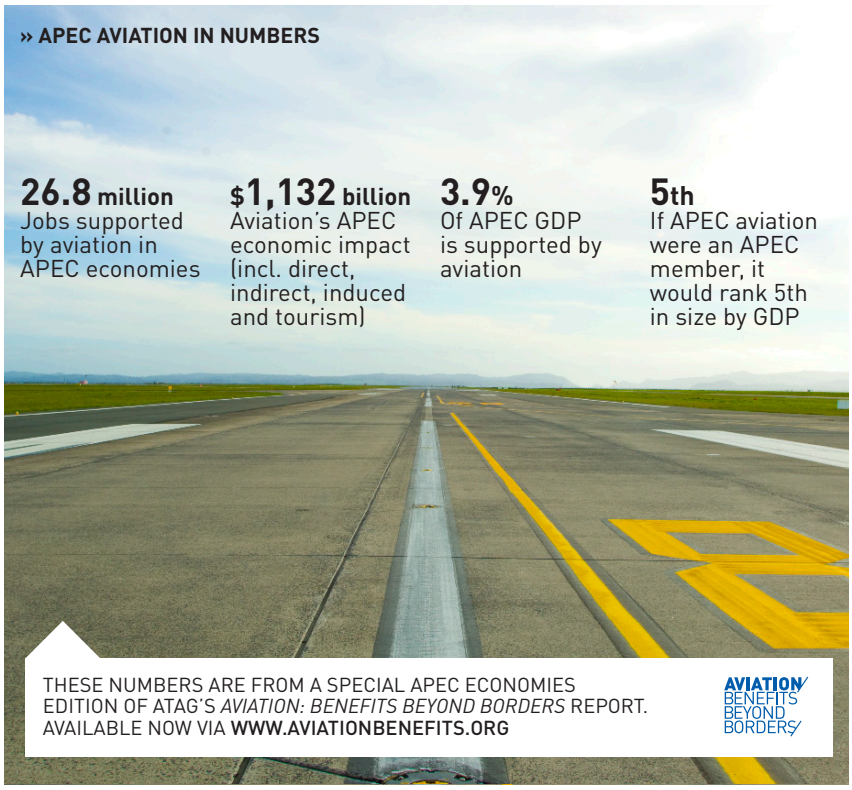
Metron Aviation, an Airbus ProSky company, has been awarded a contract by Asia Pacific Economic Co-operation (APEC) organisation to study the most cost-effective means to reduce aviation emissions in the Asia-Pacific region. Metron Aviation will work closely with APEC, AeroThai Thailand and the Department of Civil Aviation Malaysia to estimate the benefits of optimising traffic flow points of congestion (i.e. airports and airspace).

This study's main objective is to reduce fuel consumption by determining Collaborative Decision Making (CDM) procedures that optimise traffic capacity within infrastructure constraints, reduce airborne delays and balance demand and available capacity at airports and in airspace.

Most APEC economies are experiencing air traffic growth that exceeds the capacity of their major airports and key airspace. The capacity overloading results in airborne traffic delays, unnecessary reroutes and excess fuel consumption. The reduction of greenhouse gases is a global problem and this project provides an opportunity to improve energy efficiency by taking advantage of air traffic management techniques.

According to Donald Ward, APEC project overseer, "This region of Asia is experiencing exponential growth and by balancing the demand with capacity, we will alleviate congestion and reduce emissions, thereby creating a more efficient and seamless airspace."

"APEC has taken a strong position regarding airspace optimisation and emissions reduction in the Asia Pacific region," said Jim Gaughan, CEO, Metron Aviation. "Their region's air traffic growth is one of the fastest in the world, and they are taking measures to ensure capacity meets the rising demand, while actively considering environmental concerns. We fully support APEC's endeavours and are honoured to work with all stakeholders to recommend and implement CDM procedures that enhance capacity and reduce emissions."



[AUCKLAND AIRPORT]

» AIRLINES

QANTAS TURNS ON NEW PLANT

Qantas has launched one of Australia's largest trigeneration power plants, designed to supply the airline's Sydney headquarters with clean energy for electricity, heating and cooling.

Trigeneration is a low-carbon form of energy production that is more than twice as efficient as traditional coal-fired generation. An engine powered by natural gas generates electricity, and the excess heat from the process – which would otherwise be lost – is captured and redirected to provide hot water, refrigeration and air conditioning.

Qantas expects the new plant to help cut carbon emissions by around 14,000 tonnes per year – the equivalent of taking 3,500 cars off the road.

The facility, constructed by 'Grid X' under a build, own, operate and maintain contract, is located adjacent to Qantas' Mascot offices. It has a capacity of eight megawatts. A second, smaller plant with a capacity of four megawatts will be constructed to supply Qantas' Terminal 3 building at Sydney Airport.

Qantas' head of environment, John Valastro, said trigeneration was part of the airline's drive to operate more efficiently. "With the introduction of trigeneration we expect our energy star rating to increase from one and a half stars to five stars, under the government-endorsed NABERS system.

"More than 4,000 employees work in the buildings that will be powered by this new facility. It made perfect sense to introduce trigeneration as part of the broader upgrade of our Mascot campus.

"The facility will supply not just our office buildings but also our catering centre and jet base – and, by the end of 2013, our Sydney domestic terminal as well. We're proud to be one of Australia's first big companies to adopt trigeneration power and we're looking forward to reaping the benefits of this smart, efficient technology."

BRINGING ECO-TECHNOLOGY TO THE SKIES: AEROSPACE CUTTING EMISSIONS

WITH FUEL NOW THE LARGEST PROPORTION OF MOST AIRLINES' COST-BASE, THE PRESSURE IS ON MANUFACTURERS, AS NEVER BEFORE, TO DELIVER NEW GENERATIONS OF INCREASINGLY FUEL-EFFICIENT AIRCRAFT AND ENGINES.

Aircraft entering today's fleet are well over 70% more fuel-efficient than they were in the 1960s and most of the industry's current research and development (R&D) initiatives are dedicated to ensuring this trend will continue for generations to come. The investment is significant. It is estimated that the civil aerospace industries in Europe and North America alone spend over $20 billion each year on R&D, most of which will bring about emissions reductions. Over the next few years, a new range of lean-burning engines will enter the market along with lighter but stronger airframe materials and electrically-driven aircraft systems which will replace today's heavy mechanical and hydraulic power units – lowering fuel costs further. There is an important spin-off to this economy drive – each tonne of fuel saved also means 3.15 tonnes fewer carbon dioxide (CO_2) emissions. In this article, we take a look at the technology developments from the main aircraft and engine manufacturers.

This year saw the first flight of the all-new **Airbus** A350 XWB bringing together the very latest in aerodynamics, design and advanced technologies. Over 70% of the A350 XWB's airframe is made from advanced materials, combining 53% of composite structures with titanium and advanced aluminium alloys. The aircraft's all-new carbon fibre reinforced plastic fuselage results in lower fuel consumption giving a related reduction in emissions.

The A320neo is due to fly in 2014 and will provide 15% savings in fuel burn and CO_2 emissions and will be 50% quieter than current aircraft noise standards. Those A320 family aircraft equipped with 'sharklets', large wing-tip devices, are already providing up to 4% fuel efficiency for airlines.

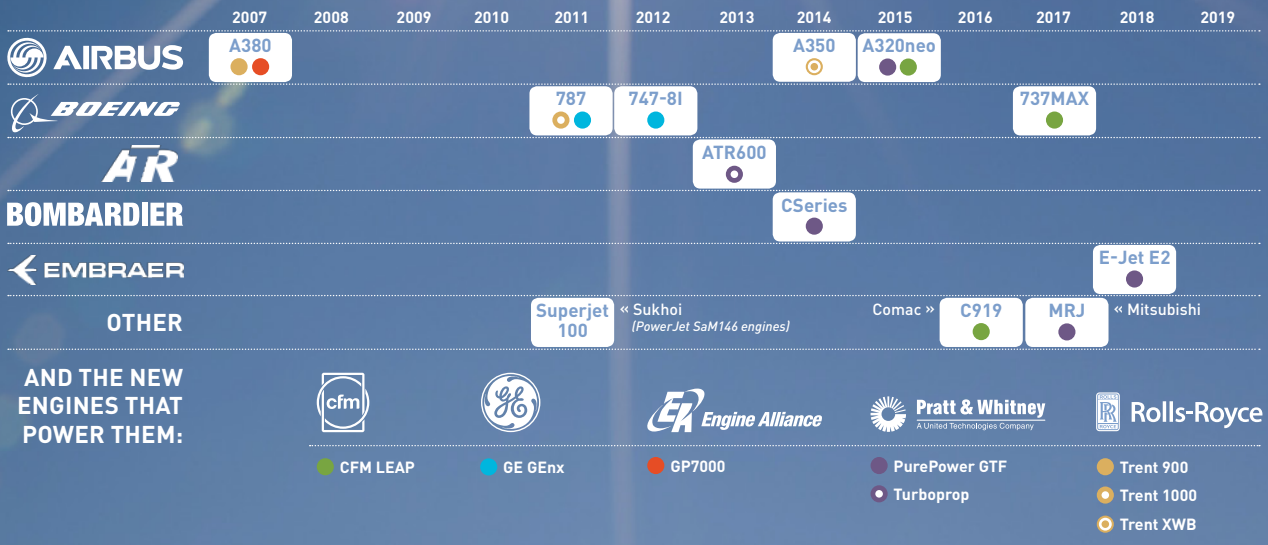
Some potential technologies that could define future aircraft characteristics include advanced aerodynamics, such as Airbus' laminar-flow wing aerodynamics. The laminar-flow aerofoil section could reduce fuel burn by up to 10% in whole-span applications. The target is to reduce the drag of the wing by up to 25% in cruise flight, which would translate to a total aircraft drag reduction of between 5% and 6%. »

1_The Bombardier CSeries 'FTV1' or Flight Test Vehicle 1 sits on the tarmac ahead of its first test flight.

[BOMBARDIER AEROSPACE]

THE NEXT BIG THINGS (WITH SMALL FOOTPRINTS)

An overview of the latest round of new passenger aircraft by the date they have entered, or will enter, service. Each new aircraft type reduces emissions by 15 – 25% below the type it replaces. There is a foreseen demand for around 40,000 new aircraft in the next 20 years, around 40% of which will replace older, less-efficient aircraft in service today.



Airbus considers the integration of multi-functional fuel cells as an alternative energy source in aircraft to be one of the most promising technologies on its way to developing more eco-efficient aircraft. This technology has the potential to make an essential contribution to achieve the targets set by the Advisory Council for Aeronautics Research in Europe which include the development of aircraft by 2020 featuring a 50% reduction in CO_2 emissions and an 80% reduction in nitrous oxide emissions over aircraft and engines in service at the start of the century. Fuel cells combine hydrogen and oxygen to produce electrical energy and allow emission-free and noiseless operation of aircraft on the ground alongside efficiency advantages in the air. Partnering with Parker Aerospace, Airbus is focusing its research efforts on how a multi-functional fuel cell can be used as an auxiliary power unit (APU). This fuel cell technology could deliver a fuel burn reduction on a standard short- to medium-haul mission of 10-15%.

Various future engine concepts being studied include open-rotor technology, which could offer the opportunity to reduce fuel burn until aviation has propulsion more efficient than the propeller. For a 2050 timeframe, Airbus is also exploring a hybrid/electrical distributed propulsion system as an intermediate but necessary step towards fully electric propulsion for airliners.

Meanwhile, **Boeing** also continues to pioneer innovative technologies to improve the fuel efficiency and environmental performance of its aircraft; more than 75% of Boeing's commercial aircraft R&D efforts contribute to advancing environmentally progressive innovations.

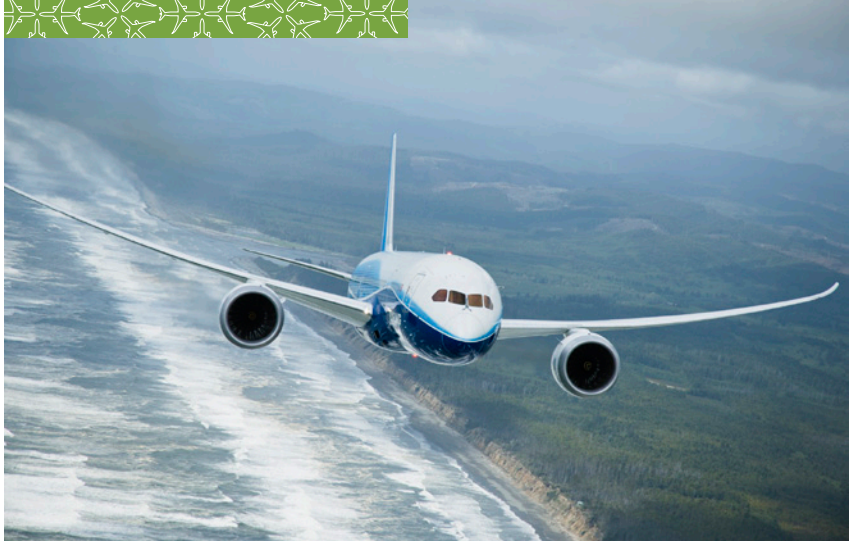
Boeing is continuing its leadership role on global efforts to help the commercial aviation industry achieve the goal of carbon-neutral growth from 2020.

The new 737 MAX will be 13% more fuel-efficient than the Next-Generation 737, with new engines optimised for the aircraft and Boeing's new advanced technology winglet. When compared to a fleet of 100 of today's 737's, the 737 MAX will emit 286,000 fewer tonnes of CO_2 and save nearly 90,000 tonnes of fuel per year, which translates into more than $100 million in cost savings. The airplane's operational noise footprint will be reduced by 40%.

Boeing is already delivering the 787 Dreamliner, which uses 20% less fuel than similarly sized aircraft. It provides exceptional environmental performance, with composite materials making up 50% of the 787's primary structure. In June, Boeing launched the 787-10, which will be 25% more efficient than the aircraft it replaces.

For the 747-8, which offers a double-digit carbon footprint reduction compared to the model it replaces, Boeing is testing improvements to further enhance fuel efficiency by 1.8%. And, in 2012, Boeing completed the first round of flight testing for its ecoDemonstrator programme, which assessed an adaptive trailing edge, regenerative fuel cell and flight trajectory optimisation among other technologies.

[BOEING]



1

[AIRBUS]

2

[GE AVIATION]

3

Boeing continues to work with international partners in China, UAE, Brazil, US and other countries to advance the commercialisation of sustainable aviation biofuel. It is engaged with the global industry to reduce hazardous chemicals used in products and improve the efficiency of the global air traffic network. Boeing has shown its commitment to responsible environmental leadership across a range of its activities – the performance of its products and the way they are built and flown by Boeing's customers.

Other fuel-saving and performance enhancing ideas are being pioneered by Toulouse-based aircraft manufacturer, **ATR**, which makes turboprop-powered regional aircraft. With so many clients flying to airports based in or around city centres, ATR aircraft, from the outset, have featured technologies to reduce fuel consumption while being quiet neighbours for airport communities. The latest propulsion technology combined with good aerodynamic design and a low-drag airframe, means ATR aircraft have a minimal environmental impact – meeting Stage 4 noise requirements with wide margins and allowing day and night operations into airports with specific, stringent local noise regulations.

Some of the technology innovations which have made this possible include decreasing propeller rotational speed, optimising the blade profile and improving engine rotating components. As a result, the noise footprints produced by a modern turboprop affects an area of just 3.5 sq km around an airport compared to 13.5 sq km for a 40-year old turboprop and nearly 30 sq km for a 40-year old jet aircraft.

Other fuel saving and noise alleviating innovations introduced by ATR as a result of detailed studies of local speed and pressure loads on the complete aircraft include the design of an optimised shape of wing, engine nacelles and main landing gear fairings. High structural efficiency is now possible thanks to the use of composite materials, which now account for more than 20% of the primary structure of the aircraft. Continuous research on weight savings by ATR has also resulted in greater comfort and weight optimisation with the new 'Armonia' cabin – including the introduction of light and slim seats providing up to 160kg of weight savings over former designs.

ATR is actively cooperating with its customer base of 190 operators to introduce new operational procedures to save fuel. These include better pre-flight procedures such as optimising fuel-load calculations to minimise the take-off weight, and distributing passengers throughout the cabin to achieve fuel-efficient centre of gravity operations.

In service, airlines can further save fuel by flying the most efficient routings, using one engine to taxi whenever safely possible and increasing the use of propeller brakes. Closely monitoring the fuel efficiency of each aircraft and investigating whether airframe damage or engine performance deterioration is impacting aircraft performance is another important ingredient to improving fuel burn.

[CFM INTERNATIONAL]

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[ATR]

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[EMBRAER]

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1_The Boeing 787 Dreamliner's carbon composite fuselage reduces weight for greater efficiency.

2_Airbus's latest aircraft, the A350 WXB on its first test flight in 2013.

3_GE Aviation's static test bed for new engine technologies.

4_A woven-composite fan blade from a CFM LEAP engine.

5_Embraer has this year launched their next generation of regional jet — the E2 series.

6_The cabin in this new ATR-600 aircraft reduces weight by 160kgs over the previous cabin.

Bombardier Aerospace's belief that an aircraft's environmental impact is determined at the design stage is why it has created and adopted a 'design for environment' approach to its aircraft development programmes. Having made significant progress in both aircraft design and in the use of environmental technologies over the last few years, Bombardier is now poised to validate the latest technologies on its latest commercial aircraft – the CSeries family, now in the flight test phase of the programme.

Specifically designed for the 100- to 149- seat segment, the CSeries aircraft is optimised with a five-abreast fuselage design; a wing configuration that provides a significant reduction in drag and performance flexibility and is powered by Pratt & Whitney's PurePower engine. The CSeries aircraft delivers a 20% CO_2 and 50% NOx emissions advantage to the current regulations, according to the company, and provides a margin of up to 15 EPNdB to the noise regulations coming into effect in 2017.

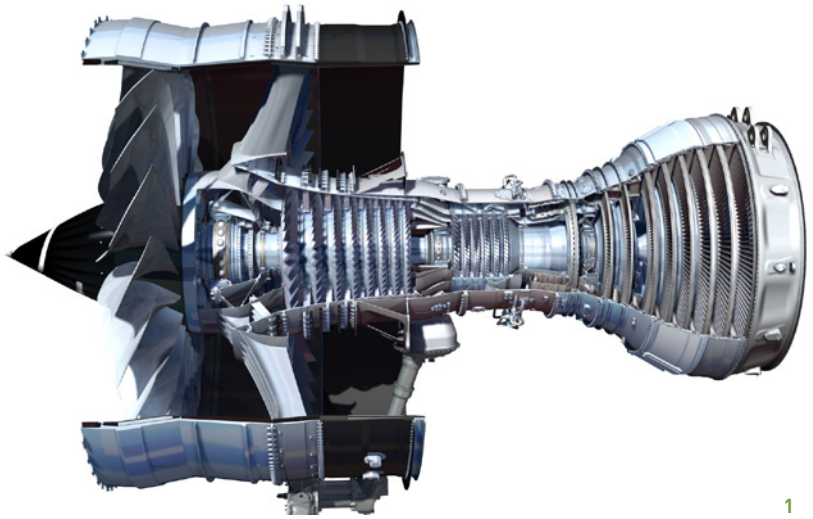
Using the latest aerodynamics and airframe structures and designs, the aircraft's fuselage is made of an advanced light-weight aluminium-lithium alloy; the wing spars and skins are all made of composite structures and the main wing structure is made using a composite resin transfer infusion process developed at Bombardier's Belfast facility. Bombardier has also introduced the latest in fly-by-wire system technology on its new programmes and an advanced flight deck with optimised controls and display functions. These technologies help reduce the overall environmental footprint of the aircraft, by providing weight savings, more direct routings and the elimination of aircraft diversions caused by weather or lower visibilities.

Biofuel research for improving aircraft efficiencies and emission performance is underway by manufacturers around the world. A high-profile trial flight of an **Embraer** E190 between Rio de Janeiro and Campinas, coinciding with the Rio+20 United Nations Conference on Sustainable Development last year, used drop-in fuel derived from fermented Brazilian sugarcane.

The test generated impressive results for Embraer and its biofuel project partners, GE Aviation, Amyris Biotechnologies and Azul Airlines – an 83% reduction in greenhouse gas emissions compared to fossil-based kerosene. The flight was an important milestone for the manufacturer as it develops its next generation of E-Jets that will start flying in 2018. Embraer's E2 jets will be powered by **Pratt & Whitney**'s PurePower geared turbofan engines with double-digit reductions in fuel consumption.

These engines are part of a new generation of power plants which are transforming the fuel efficiency – and environmental performance – of tomorrow's aircraft. The CFM56 engine, for example, the most popular jet engine in civil aviation history, brought step changes across the board when introduced in service in the early 1980s. Today, the LEAP engine, **CFM**'s newest product, will bring these environmental benefits to new heights when it begins commercial flights in »

AMERICAN AIRLINES' 'FUEL SMART' PROGRAMME, WHICH BEGAN IN 2005, HAS SAVED 700 MILLION GALLONS OF FUEL (EQUIVALENT TO 7 MILLION TONNES OF CO_2).



[ROLLS-ROYCE]

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1_Rolls-Royce's latest engine, the TrentXWB will be 15% more fuel-efficient than the first Trent series engine.

2_Pratt & Whitney use this aircraft as a flying testbed for new engines.

3_Auckland Airport has installed these 'crocodile' units to help staff connect ground power to aircraft.

2016. A series of new technologies are enabling the company to push the boundaries of the flight, in terms of eco-friendly propulsion, including revolutionary composite fan blades, ceramic materials, and state-of-the-art combustor technology. The LEAP engine will bring a 15% improvement in fuel efficiency over the current best CFM56 engines which translate to savings of half a litre per 100 kilometres per passenger. For a 150-passenger aircraft, that equates to 22 of those passengers flying without consuming fuel.

The fuel savings will also result in 4,000 tonnes of CO_2 emissions saved each year. When replacing older engines, that number could be as high as 6,000 tonnes per year. If these numbers were applied to the entire CFM56 fleet, this could lead to more than 40 million tonnes of CO_2 emissions saved each year. The LEAP engine will also provide a substantial reduction in noise pollution. Advanced technologies such as the composite fan and other noise reducing features will translate to the engine noise being contained within the boundaries of most airports.

From design to manufacture, and throughout the service life of its products, **Rolls-Royce** encourages responsible thinking and prudent use of resources and views sustainability as a fundamental part of business strategy. A relentless drive to introduce advanced technology into new engine designs has enabled the fuel efficiency of the Rolls-Royce Trent engine family to improve on average by about 1% per year. This culminates in the Trent XWB, which is over 15% more fuel efficient than the first Trent engine. The company's next generation 'Advance' engine programmes will deliver up to 20% fuel-burn reduction compared to today's in-service aircraft. Furthermore, once in production, each Trent engine has benefited from at least one major performance enhancement programme.

To ensure increased demand of finite resources can be met sustainably, almost half of a used aero engine is now reclaimed and reprocessed directly into new engine parts. Every one of Rolls-Royce's manufacturing facilities, in over 100 locations around the world, is part of the company's 'Revert' recycling programme, where the company recovers, recycles and reuses waste manufacturing metals. This saves 20,000 MWh of energy and 9,000 tonnes of CO_2 each year.

Rolls-Royce's new Seletar factory in Singapore produces large jet engines and manufactures fan blades. It was designed with five key 'green' environmental and sustainability criteria in mind: energy efficiency, water efficiency, environmental protection, indoor environmental quality and other green and innovative features that contribute to better building performance.

GE Aviation has, in the last few months, started testing a high pressure compressor module for its next generation of aircraft engine – the GE9X that will power Boeing's 777X aircraft. GE plans on spending $200 million in 2013 on maturation testing of technologies for the new engine which will be the most fuel-efficient engine GE has ever produced on a per-pounds-of-thrust basis, designed to achieve a 10% improved aircraft fuel burn versus the GE90-115B-powered 777-300ER and a 5% improved specific fuel consumption versus any twin-aisle engine at service entry. In addition, the engine will deliver an approximate 10-to-1 bypass ratio, a 60-to-1 overall pressure ratio and margin to Stage 5 noise limits.

[PRATT & WHITNEY]

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[AUCKLAND AIRPORT]

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» AIRPORTS

AMBITION IN SUSTAINABILITY

Auckland Airport sets ambitious targets in all operating areas and sustainability is no exception. The company aims to reduce its energy, water, waste and carbon emissions from ground transport by 20% by the year 2020.

The emissions will be measured against passenger numbers over time and detailed plans are being produced to help achieve this target. An energy plan is first for development, followed by waste and then water. Measuring carbon emissions from ground transport requires the development of a specific methodology, which will be a project for 2014.

The airport's sustainability and environmental manager Martin Fryer says it's an exciting time at the company, particularly considering the opportunity to reduce costs and environmental impact.

"Energy efficiency projects achieved savings of $122,000 last financial year and attracted a similar amount in government funding," Martin says.

The ground power unit pictured above is one such measure, where on-stand aircraft use 70% renewable electricity instead of Jet A1.

In the 2014 financial year, the company's waste costs are expected to come down by 10% and a waste minimisation plan will have been produced. New and improved waste collection and segregation facilities are also planned for that period as well as an expansion of pilot projects.

"Improved data capture means we now understand the true environmental impacts of waste disposal," Martin says. "For example, sending waste from the terminals to landfill rather than recycling, creates the equivalent of 240 tonnes of CO_2 per month. That's an environmental impact we can all do something about.

"In fact the whole airport community can help with these targets by thinking about energy, water, waste and their journey to work and I would be delighted to hear of any bright ideas that could help achieve our goals."

» AIRLINES

GULF AIR'S GREEN IT SOLUTIONS

Bahrain's national carrier Gulf Air is adopting several "green" solutions in its information technology infrastructure and practices. The latest of these is the opening of a state-of-the-art, energy efficient data centre at the airline's headquarters by Maher Salman Al Musallam, Gulf Air's acting chief executive officer.

Jassim Haji, Gulf Air director of information technology said, "The fully revamped data centre has been redesigned with energy-efficient blade technology and virtualisation that cuts the power requirement by 50% and uses 30% less airflow, making it one of the most environmentally-friendly IT centres in the country."

"Similarly, through virtualisation we have reduced a substantial number of physical servers resulting in 80% less energy consumption. Besides cutting down our power and cooling costs and allowing more computing power in less space, these measures also help us to reduce carbon emission in our environment; for example, every server virtualised is equivalent to removing four tonnes of CO_2 from the environment," Haji concluded.

Gulf Air has successfully introduced a range of innovative solutions and practices across its IT domain – from networking to communications systems, desktop management, to IT business support services – which are not only environmentally-friendly but also prove to be cost effective and energy-efficient, resulting in higher productivity.

Forthcoming green measures at Gulf Air include: e-form automation; a SkyMeals application to reduce meal wastage through improved analysis and planning; introduction of wireless communications on the aircraft for 'black box' recorders and replacing magnetic tapes with electronic recordings; online interface for information exchange and reporting; and electronic flight bags that remove the need for paper-based flight plans and manuals.

A SYSTEMATIC APPROACH TO AIRLINE ENVIRONMENTAL MANAGEMENT WITH IEnvA

Although climate change is a key focus of the industry's environmental work, more down-to-earth issues remain.

Many airlines have recognised the benefits of an environmental management system (EMS), but the traditional generic standards and frameworks for an EMS are challenging to implement in an airline context.

The airline business is complex and global, covering activities from flight operations, ground handling, and catering to maintenance, repair and overhaul (MRO) in all manner of surroundings. Even if an airline can measure particular aspects of its environmental performance, the differing reporting requirements add a further layer of confusion.

Many airlines already publish environment, sustainability or social responsibility reports that comply with the recognised international reporting standards or frameworks, such as the Global Reporting Initiative. In addition, however, airlines are subject to increasing pressure to disclose further emissions information from their operations. This can place a real burden on an airline as each methodology has a different scope. A 2011 PriceWaterhouseCoopers report on airline corporate sustainability reporting also highlighted the need for harmonised sector-wide data and reporting standards. A robust and systematic environmental management programme would greatly increase the efficiency of environmental data collection and reporting. And it would ensure the transparency and global standards needed to explain the industry's environmental performance to its stakeholders, including investors, passengers, and employees.

A flexible approach

The IATA Environmental Assessment (IEnvA) programme is a voluntary, sector-wide EMS developed utilising the existing quality systems and processes of IATA's other programmes. It is based on the premise that all airlines can share common solutions. As well as promoting shared best practices, IEnvA meets the rigours and objectives of other international environmental management systems.

One of the key aspects of IEnvA is the flexibility of the programme, allowing airlines to move through it without restrictions. Airlines have the ability to either apply IEnvA to their core operations or expand its scope to additional services that the airline may offer, such as ground operations, catering and MRO.

"Adopting standard IEnvA procedures allows an airline to focus resources on improving its environmental performance rather than designing an EMS from scratch," says Jon Godson, IATA assistant director, aviation environment. "Airlines' environmental policies, performance, and reporting are coming under increasing scrutiny from regulators, passengers, and investors. They need the means to respond in a clear and consistent manner

IEnvA has been developed in conjunction with airlines so that it addresses industry needs and specific concerns. As a result, it brings benefits such as simplified regulatory compliance, a clear demonstration of good governance, and financial savings from the better use of resources.

Although the IEnvA programme provides support and guidance on the key aviation-related topics of air and noise emissions, other subjects such as cabin waste management, water scarcity, biodiversity, and sustainable procurement are also addressed.

"Ensuring compliance with regulations that cut across a number of airline departments is resource-intensive," says Godson. "IEnvA will ensure all of these requirements are taken into account in one place, making the whole process of regulatory compliance far more coherent."

Financial savings can be realised from following environmental best practice in all areas. "An airline that can demonstrate its environmental performance is more attractive to its consumers, its investors, and its staff," believes Godson. "This is good for business. And it will go a long way to ensuring the long-term sustainability of the industry."

How it works

IEnvA incorporates the knowledge and experience gained from other successful IATA programmes, including the IATA Operational Safety Audit and the IATA Safety Audit for Ground Operations. There is an Environmental Standards Manual, guidance and support tools and an independent assessment by an accredited environmental assessment organisation. Registration follows the successful completion of an assessment.

The Environmental Standards Manual includes a thorough review of airline environmental reports and recognised requirements and is reviewed by a core group of airlines.

For those airlines that require »

[IATA]

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them, a number of guidance and support tools are available. An Extranet allows airlines to access the standards, share ideas and solutions, and facilitates the sharing of other relevant information. A legal compliance tool and an airport environmental requirements database provide additional support.

1_Those airlines which have passed stage one of the IEnvA programme already received certificates at the IATA AGM.

2_The IEnvA programme looks at all aspects of an airline's environmental performance, including catering.

How to get started

IEnvA is being introduced in two stages. This allows airlines to achieve notable milestones while recognising that airlines are at different levels in terms of skills and resources.

- **Stage 1:** This is a planning phase that gets all airlines to a common baseline with the implementation of the programme standards, including having an environmental policy and procedures to demonstrate legal compliance.
- **Stage 2:** At this point, airlines will need to demonstrate a functioning EMS. It will involve a more detailed and thorough assessment of the implementation of the EMS within the airline.

The flexibility of IEnvA is furthered by breaking down elements of the scope into a modular approach. These modules fall under two categories; CORE and CORE+. CORE modules include flight operations and corporate activities that all airlines undertake, while CORE+ features the ancillary aspects of an airline's business, such as ground operations.

The assessments are conducted by independent environmental assessment organisations (EAOs). Two EAOs are currently involved, and are also accredited audit organisations for the IOSA programme.

The EAOs will assess against mandatory requirements and recommended practices. Non-conformity with mandatory requirements results in a "Finding". Unlike airline safety management standards, there are relatively few mandatory requirements for IEnvA. The assessment organisation then files a Corrective Action Report to which the airline must respond with a Corrective Action Plan to demonstrate conformity.

Recommended practices involve certain procedures or types of equipment that are considered desirable but not obligatory. Non-conformity with a recommended practice would result in an "Observation" by the EAO, but not a Finding.

Once an airline has established compliance, IEnvA promotes enhanced environmental performance through an iterative process of identifying, assessing, mitigating and monitoring environmental issues.

"South African Airways has found the IEnvA programme to be an excellent method with which to plan an environmental strategy that is relevant, informative, and will affect real change in terms of environmental obligations," says Ian Cruickshank, group environmental affairs, South African Airways. "IEnvA is an important tool that an airline can utilise to minimise environmental impacts and SAA intends pursuing IEnvA and IEnvA Core+ accreditation as a cornerstone of its environmental policy."

The next steps

The governance of IEnvA is provided by an action group comprising 16 airlines. A first meeting was held in March 2012 and a second annual general meeting took place in late February 2013 in Hong Kong, complemented by regular conference calls. The action group will become a formal Working Group by the end of 2013.

As of July 2013, ten airlines had agreed to join the IEnvA programme, with seven having completed a Stage 1 Assessment in December 2012. The types of airlines that have joined the IEnvA programme reflect the diverse nature of IATA membership, ranging from airlines with a long-track record in sustainability through to those just starting on the environmental management path.

"The inclusive and flexible nature of the IEnvA programme means that any airline, regardless of size, experience, and resources, can participate and demonstrably improve their environmental performance," says Godson.

- **Airlines involved in the IEnvA programme so far include: LAN, LAN Cargo, South African Airways, Kenya Airways, Malaysia, Qatar Airways and Finnair.**
- **This article first appeared in the June 2013 issue of *Airlines International*.**
- **More information on the IEnvA programme can be found on the IATA website: www.iata.org**


AVIATION: A GLOBAL

The big picture.

AN AERONAUTICAL ENGINEER INSPECTS AN AIRCRAFT ENGINE IN DUBAI. FORECASTS SUGGEST A NEED FOR 556,000 NEW TECHNICIANS WORLDWIDE BY 2032, NEARLY HALF OF THESE WILL BE BASED IN ASIA AND THE MIDDLE EAST TO ACCOMMODATE INDUSTRY GROWTH IN THOSE REGIONS. THESE SKILLED JOBS WILL HELP BOOST LOCAL ECONOMIES ALONGSIDE THE GROWTH IN AIR TRANSPORT.

IN TOTAL, IT IS EXPECTED THAT BY 2030, AVIATION WILL SUPPORT SOME 82.2 MILLION JOBS WORLDWIDE.

JOBS MACHINE

[EMIRATES ENGINEERING]

[EMIRATES AIRLINE]

» AIRLINES

BOOSTING ECONOMIC IMPACT WITH BIGGER PLANES

Recent analysis by Emirates Airlines has shown the impact that capacity increases can have on the communities served by carriers. Simply by up-sizing the aircraft that serves a city, it can boost jobs and GDP. Two examples below illustrate this phenomenon well. Studies by the National Council of Applied Economic Research in New Delhi and Deloitte Access Economics in Australia looked at the impacts that shifting to larger aircraft on a route or set of routes can have.

Airbus A330: 237 seats

Boeing 777-300ER: 354 seats

Airbus A380: 489 seats

Up-sizing from A330s / A340s to 777-300ERs on all Indian routes (97 weekly services) will bring an $86 million boost to Indian GDP and create 10,528 jobs.

Up-sizing from a 777-300ER to a daily A380 at Sydney Airport has brought $55 million in economic benefits and 700 new jobs. The daily A380 service adds $315 million to Australian GDP.

» AIRLINES

KENYA USES FLIGHTS BETWEEN NAIROBI AND ABU DHABI TO INCREASE TRADE

Kenya Airways has started direct flights to Abu Dhabi in a move which has been seized upon by the Kenyan Government as an opportunity to boost trade and investment.

Kenya's cabinet secretary for transport and infrastructure, Michael Kamau, said the move, which follows the signing of a codeshare agreement between national carrier Kenya Airways and Etihad Airways, will not only favour Kenyan businessmen sourcing goods in the UAE, but also open doors for tourists wishing to travel to Kenya and the rest of the continent through Jomo Kenyatta International Airport.

"We are currently at an advanced stage of modernising and expanding the Jomo Kenyatta Airport, which will significantly boost the capacity to handle more travellers. As you know the airport is already a regional hub through which Kenya Airways is able to connect the world to Africa and vice-versa," he noted during a dinner hosted for customers in Abu Dhabi.

Kamau added, "As part of the Vision 2030, we are also constructing the green field terminal, a new state-of-the-art terminal which will be delinked from the current Jomo Kenyatta International Airport and will be built from scratch. When complete, the new terminal will be the largest single terminal in Africa built on four levels and will be able to handle up to 20 million passengers, annually".

"The inaugural Kenya Airways flight to Abu Dhabi marks the culmination of three years of multilateral discussions and negotiations, to have Kenya Airways and Etihad Airways work together towards the opening of this strategic route", said the Kenya Airways managing director and chief executive officer, Titus Naikuni.

Naikuni added that the introduction of flights to Abu Dhabi fitted in well with Kenya Airways' plans to fly to each African capital by the year 2016, and complements the 10 year strategic plan – Project Mawingu – through which Kenya Airways intends to grow its destinations to 115 and fleet to 119 aircraft by 2021.

He explained, "Abu Dhabi International Airport is a gateway to the Far East and countries such as Australia, which Etihad flies to. We aim to provide the much needed link to customers who intend to travel to African countries through this code share agreement. That's why this calls for a celebration," he said.

Naikuni added that flights to the new destination have been received warmly, with the first two flights nearly filled to capacity and bookings between now and August looking impressive.

Kenya Airways will operate flights to Abu Dhabi, which is the airlines' 61st destination, three times a week. This will complement the ten flights that Kenya Airways has between its hub in Nairobi and Dubai.

[MUNICH AIRPORT]

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» AIRPORTS

MUNICH AIRPORT PRODUCES AN AVERAGE OF 2.5 NEW JOBS A DAY

Despite the difficult economic conditions, Munich Airport has continued to be a jobs machine over the past three years. As the new study *Munich Airport: the Workplace* demonstrates, the number of employees at the airport has increased by nearly 2,800 since the end of 2009 to 32,250 today. Statistically speaking, this means that Munich Airport generates 2.5 new jobs per day.

Every three years, Munich Airport releases its latest workplace survey, summing up key figures on employment trends at the airport. The latest study is based on data provided by 552 companies and public-sector employers operating at the airport. Since the first survey in 1994, the workforce has more than doubled. The biggest employers at Munich Airport are the Lufthansa Group, with 10,800 employees, and Munich Airport, which, with its subsidiaries, employs a total of 8,200 people.

Outpacing even this rapid growth in employment is the rate of increase in training opportunities at the airport. Compared with 1994, the number of apprenticeships and similar positions at the airport has more than tripled, from 233 to 695, and are now being prepared for 39 different occupations. "This shows that Munich Airport not only plays a key role as a workplace, but also as a training location for the entire regional economy" said Michael Kerkloh, CEO of Munich Airport.

In terms of place of residence of airport employees, the biggest increase was seen in the Bavarian state capital of Munich. Approximately 6,800 airport employees live in Munich: an increase of 17%, compared with 2009.

Above-average gains were also seen in the city and district of Freising, which is now home to 7,050 airport employees – an increase of 15%. With 22% of the entire airport workforce, Freising provides the largest share of Munich Airport's personnel. In the city and district of Erding, 5,160 airport employees were counted: 8% more than in 2009. These figures show that 25% of people from Freising and Erding in regular employment has a job at Munich Airport.

The new study also reaffirms not only the quantity of jobs at the airport, but also the quality of employment. More than 90% of those working at the airport are in socially-insured positions – as compared with an average of only about 70% on a state-wide and nation-wide basis. According to the new study, the average gross annual income of airport employees has increased by nearly 16% to approximately $57,000, and is thus $13,000 higher than the average income reported by the German Federal Statistics Office for the entire services sector in 2012.

Munich Airport's performance as an important employment engine can be expected to continue in the coming years. More than two thirds of the companies surveyed said that they expect to have more staff by the end of 2013. The airport operator alone, with its subsidiaries, will hire about 2,500 new employees over the next five years – about half of them to fill new positions, and the other half to replace departing employees.

1_The 16 airport employees seen here don't represent 1/1000th of Munich Airport's total workforce – in fact, they are just half that many. From a ground handler to a cook, a customs officer to an airline captain, a pastor to a master brewer – the range of occupations at the airport is vast.

MONGOLIA LOOKS TO ECO-TOURISM FOR A SUSTAINABLE FUTURE

Only a few hours' drive from Mongolia's capital Ulaanbaatar, where the smokestacks of power plants darken the skyline and cars snarled in traffic honk day and night, there lies a tranquil paradise where such human hustle never intrudes.

This oasis of nature, part of the landscape across which Mongolian herders astride horses have driven their herds for thousands of years, is playing a central role in a drive to shift the world's fast-growing economy to a greener path.

Mongolia grew hard and fast, reaching double digit growth for long periods, on the back of mining its natural resources. This drove a boom in traffic in the capital and the construction of the coal-fired power plants that make Ulaanbaatar one of the world's most polluted cities. Before the mining boom, tourism made up 30% of the country's economy and now accounts for 6% to 10%.

As environment and green development minister Sanjaasuren Oyun puts it, "We are now paying for the pollution that took place during our transition."

Now, however, Mongolia is taking a hard look at its policies. The government is set to pass a new green development strategy that includes an increased focus on renewable energy, sustainable mining and ecotourism.

"Like many developing nations, Mongolia is at the crossroads of a choice between a dirty, short-term development path and a far more sustainable long-term one," says United Nations Environment Programme (UNEP) executive director Achim Steiner. "Mongolia is choosing the sustainable path; that choice is to embrace a green economy pathway which may inspire other developing countries to take this route."

To highlight its commitment to the world, Mongolia played global host to World Environment Day in early June and officials say this is only the beginning.

"Environmental issues have been high on the priority agenda for Mongolia," says Oyun. "I want to see us leapfrogging from a brown economy to a country that is an example of a green economy."

On World Environment Day, Mongolia was announced as one of the first countries in UNEP's Partnership for Action on the Green Economy – a major new initiative to assist the global transition to a green economy.

The World Travel & Tourism Council (WTTC) predicts healthy growth of the tourism sector, in the order of 6%, for the next decade.

Hustai National Park, which currently attracts over 9,000 foreign visitors per year, serves as a model for the ecotourism that will play a crucial part in this new green strategy. More money is being invested to ramp up the number of tourists nationwide.

Visitors to Hustai stay in yurts, the traditional round homes used by nomads as they moved their herd across the plains, and eat organic food that is sourced locally.

"In our camp we use solar power, and this is spreading over Mongolia; we are getting more eco step-by-step," says Tserendeleg Dashpurev, deputy director of Hustai National Park Trust. "We should develop tourism: it is a green economy and can develop green dollars."

One of the key attractions in Hustai is the Przewalski horse, which was reintroduced to the park on World Environment Day in 1992 from captive-bred Dutch stock after becoming extinct in its native land.

"In the 1960s, the last wild population of these horses went extinct," says D. Usukhjargal, the wildlife and wild horse biologist monitoring the horses. "In 1992, we transported 82 horses back and now there are over 280 living in the wild. Our plan is to reach 500."

With such attractions, the park is also providing benefits to herders suffering from the negative effects of climate change.

"Climate change is happening before our eyes: it is getting dryer every year and the winters are getting longer; our pastureland can't support as much livestock and the herders now realise animal husbandry is not the only way to live," says Dashpurev. "They have guest yurts, and can take in paying tourists for a traditional experience. The trust also contributes to the cost of solar panels to provide power and buys produce from them."

For Dashpurev, there is no choice but to start looking to a greener economy that adapts to the changing conditions and does not contribute to climate change through the mining and burning of such resources as coal.

"Promoting ecotourism is not just idealism," says Steiner. "Sustainable tourism, including ecotourism, is the fastest growing part of this market and thus makes not only environmental but social and economic sense."

According to the WTTC, tourism supports around 6% of the Mongolian economy and over 5% of jobs. The country expects to welcome half a million international tourists this year, most arriving by air, with a number also arriving by train via the trans-Siberian railway. To keep up with increasing demand, a new airport is being built with assistance from the Japanese Government outside Ulaanbaatar. This facility, due to open in 2016, will accommodate up to three million passengers a year.

In an interview with the

MONGOLIA

Population (2013)	2,892,876
GDP (total, 2012)	$15 billion
GDP per capita (2012)	$5,371
Capital city (airport)	Ulaanbaatar (ULN)
International visitors (2013F)	500,000
Tourism jobs (total)	54,000
Tourism GDP contribution (total)	5.7%
Airports (with paved runways)	15
Connections from ULN	23
Airlines serving ULN	10

Sources: Mongolia statistics office, IMF, WTTC, IATA, CIA World Factbook

Ulaanbaatar Post, the head of the development said the airport terminal under construction would be able to cope with expected passenger traffic until 2020, "By 2023, annual passengers are expected to reach 4.8 million. Therefore, the airport will be constructed so as to allow smooth expansion and space has been reserved for it."

The national carrier, MIAT Mongolian Airlines, received the first of a series of new aircraft, a Boeing 767-300ER in May 2013, to be followed by two Boeing 737-800 aircraft. F.

» **This article was sourced from UNEP, who hosted 2013's World Environment Day celebrations in Mongolia (www.unep.org) with additional material from ATAG.**

[ROBERT CHURCHILL / ISTOCKPHOTO]

[DOUGSCHNEIDERPHOTO / ISTOCKPHOTO]

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» AIRPORTS

BRINGING CONSTRUCTION JOBS TO NEW YORK CITY

LaGuardia Airport's infrastructure will soon undergo an array of site, building and utility modernisation projects following a $255 million authorisation approved by the Port Authority of New York and New Jersey's Board of Commissioners. The Board's action is the latest in the agency's ongoing programme to upgrade the airport's infrastructure to meet current operational needs and future passenger growth.

The infrastructure improvements will generate 1,500 jobs, $112 million in wages and $364 million in economic activity for the region, with more than 95% of the Port Authority's expenditures reimbursable in federal passenger facility charges.

The action follows previous Board authorisations for design and construction of an East Garage and East End Substation for the airport at an estimated cost of $190 million. Additionally, Delta Air Lines – the airport's largest carrier – has embarked on projects to improve Terminals C and D and upgrade customer service.

"Modernising the infrastructure of the Port Authority's major airports is a top priority for the agency and vital to the region's economic success," said Port Authority chairman David Samson. "With our airports expected to set a new combined record for passengers in 2013, and robust growth projected in the coming decades, it is critical that we advance projects like this today to meet the travel demands of tomorrow."

"These infrastructure projects will help ready LaGuardia Airport for aviation's next generation as it modernises one of New York City's premier gateways," said Port Authority vice chairman Scott Rechler.

Meanwhile, the Port Authority has also announced that four new taxiways will help reduce ground delays on Newark Liberty International Airport's longest runway as part of a $97.3 million rehabilitation slated to begin in early 2014.

Three of the new taxiways will allow multiple aircraft to stage for departure at the end of the runway, reducing takeoff delays, while the other new taxiway will allow arriving planes to exit the runway faster.

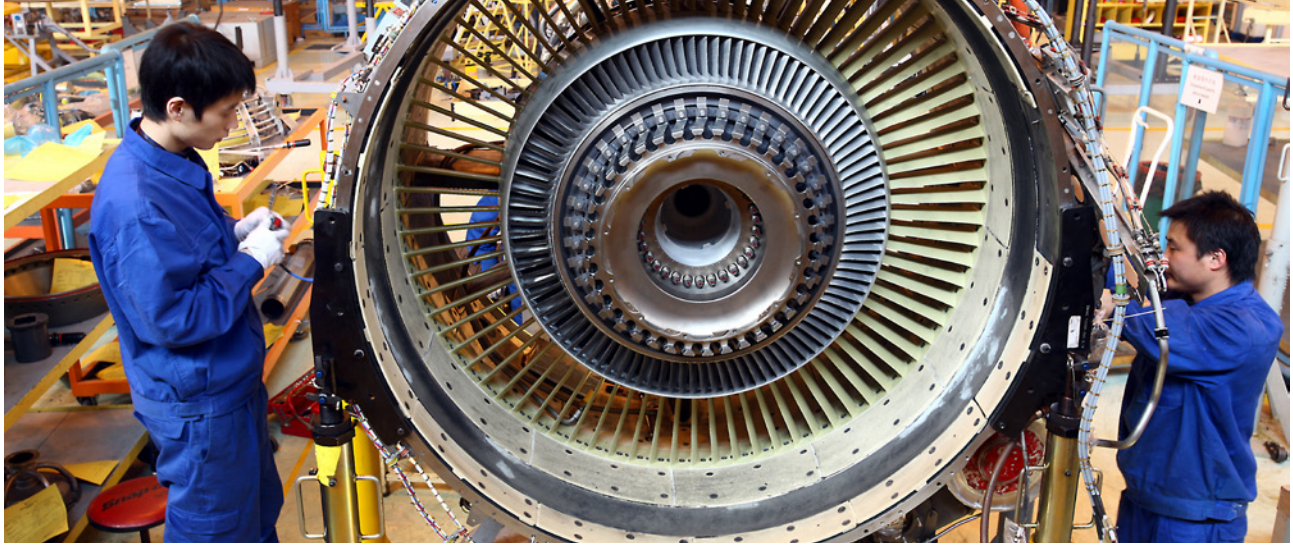
It is estimated the combined impact of these initiatives will mean an average of 30 seconds saved per flight, which has a cumulative effect towards reducing delays during the morning and evening peaks at Newark. The time saved translates to roughly $9.4 million annually in reduced costs for aircraft operations and the value of passengers' time.

Direct and indirect effects of this project means creation of 510 jobs, $34 million in wages and $152 million in regional economic activity over the 16-month work period from February 2014 to June 2015.

» **Globally, airports spent $26 billion on construction projects in 2010 (the latest year for statistics).**

1_An aircraft departs New York's LaGuardia Airport which will soon undergo a substantial modernisation programme. This programme will generate 1,500 jobs in the local economy.

2_CFM International's Sichuan engine overhaul facility, in co-operation with Air China, employs 300 skilled technicians.



[CFM INTERNATIONAL / SNECMA]

2

» MANUFACTURING

CFM: SUSTAINABILITY WITHOUT BOUNDARIES

CFM International is in the unique position of having the largest production rate in the industry, producing more than 1,500 new CFM56 engines each year. At the same time, the company must support an ever-growing fleet that, today, includes more than 25,000 engines delivered to airlines around the globe. The company meets this challenge by working with an international network of partners and suppliers that are helping to drive economic growth worldwide.

CFM continues to invest heavily abroad in support of its belief that a sustainable future also means ensuring that the engines are operated and properly maintained anywhere in the world.

The company has invested in training locations around the world. Just in China, the Aircraft Engine Maintenance Training Center, Guanghan City, has trained more than 10,000 mechanics since it opened in 1996. Through this school, CFM not only supports a highly-skilled Chinese workforce enhancing the country's aviation safety, but also demonstrates that sustainability goes beyond just products and technology.

CFM also provides a showcase with Sichuan Services Aero Engines Maintenance Company (based in Chengdu, China) a world-class engine overhaul facility, in partnership with Air China, on how an aircraft engine business can be a catalyst for global growth. In addition to a highly-skilled 300-person workforce, the facility also supports a network of Chinese sub-contractors. As a result, this one facility is helping Sichuan province build a sustainable future.

The value of future engines is not only measured in terms of price, but also in terms of sustainability. Social and economic impacts are now a new currency that accompanies the life of a product. CFM is an active and responsible stakeholder in the aviation industries' continued efforts to support a more sustainable world.

51% OF INTERNATIONAL TOURISTS TRAVEL BY AIR.

[ALEXRAT / ISTOCKPHOTO]

AIR CARGO... WITH A TWIST!

Whether you like them in a stir-fry, a pie or a gin and tonic, fresh limes are big business for Mexico, the world's second largest producer. And demand is growing fast: in the first nine months of 2012, there was a 44% increase in exports compared with the previous year. The country shipped 492,000 tonnes of the fruit with an export value of $211 million in that period.

With every 20 to 30 tonnes of the fruit grown in Mexico supporting some 120 jobs, the ability for the growers to export to markets such as the USA, the Netherlands, UK, Canada and Japan by air within 48 hours is also a valuable creator of rural employment.

AIR CARGO BRINGS THE iPHONE TOGETHER

AIR TRANSPORT PLAYS AN INTEGRAL ROLE IN MODERN ELECTRONICS, WITH MANUFACTURERS RELYING ON SUPPLIERS WORLDWIDE AND JUST-IN-TIME DELIVERY OF PARTS TO ASSEMBLY LINES. HERE'S HOW AN iPHONE 4 IS BROUGHT TOGETHER:

1_Memory, Portland

2_Camera, Santa Clara and compass, Santa Clara

3_GPS, WiFi and Bluetooth, Irvine

4_ Audio codec, Austin and touch screen, Dallas

5_Radio frequency, Woburn

6_Accelerometer, Geneva

7_Power management, Naburn and Radio frequency, Neubiberg

8_Display, Seoul

9_Radio modules, Kyoto

10_Assembly of screen and other components, Chinese Taipei

11_ Final assembly, Shenzhen

Global distribution from Hong Kong

Details: operationsbuzz.com

[ALASKA AIRLINES]

1

» AIRLINES

ALASKA SALMON EXPORTS BIG BUSINESS THANKS TO AIR CARGO

Each year, Alaska Air Cargo delivers shipments of Copper River salmon from Alaska to seafood processors in Seattle and restaurants across the United States.

"We're proud to be the first to bring wild and sustainable Copper River salmon to seafood lovers across the country, in many cases within 24 hours after the fish is caught," said Betsy Bacon, managing director of Alaska Air Cargo. "With so much demand for sustainable wild Alaska seafood, airline crews in South-Central and Southeast Alaska will kick into high gear to ship a million kilograms of salmon across our 95-city network."

Copper River salmon shipped by air this season will arrive as fresh as possible to grocery stores and restaurants across the nation, thanks in part to a cool chain training programme required of all Alaska Air employees who handle perishables. Alaska Air Cargo employees are required to adhere to strict seafood quality standards and pass an annual food quality course.

Seafood processors and shippers follow these cool-chain standards to provide a temperature-controlled environment for proper food handling. The goal is to keep seafood moving rapidly throughout its journey on Alaska Airlines and maintain a consistent temperature range from the time it leaves the water to when it arrives at shops and restaurants.

Alaska Airlines plays a significant role in supporting the Alaska seafood industry, which is recognised worldwide for its sustainable fishing practices. The carrier flew nearly 9,000 tonnes of fresh Alaska seafood to the continental United States and beyond last year, including nearly half a million kilograms of Copper River salmon. Copper River salmon alone bring $20 million in direct economic benefits to the Alaskan economy with a further $20 million in related economic activity. F

[ALASKA AIRLINES]

2

1_ Following the arrival of the first fish in 2013, three top Seattle chefs compete to create the best salmon recipe in Alaska Air Cargo's annual "Copper Chef Cook-off." Pat Donahue, executive chef of Anthony's Restaurants and the 2010, 2011 and 2012 Copper Chef winner, competed against executive chefs John Howie of Seastar Restaurant and Raw Bar, and Chris Bryant of Wildfin American Grill. Also competing against the three chefs in the cook-off was Master Sgt. Robert Shulman, a 31-year US Air Force Reserve chef representing the 446th Airlift Wing out of Joint Base Lewis-McChord.

2_ Alaska Airlines transports more than 50 million kilograms of cargo annually, including seafood, mail and freight.

ROLLS-ROYCE'S 'REVERT' PROGRAMME TO RECYCLE WASTE METALS IN THE MANUFACTURING PROCESS SAVES 20,000 MWH OF ENERGY A YEAR (=9,000 TONNES OF CO_2).

TAKING AN HOLISTIC VIEW OF AIRCRAFT ENGINE MANUFACTURING

Pratt & Whitney has launched aggressive goals to further improve the sustainability of its factories, suppliers and products by 2025 and increase efficiencies, create added value for its customers and employees and lead efforts to reduce aviation's environmental impact. Pratt & Whitney's global sustainability goals for 2025 – the company's 100-year anniversary – focus on waste, energy, water, safety and wellness, materials, suppliers and products.

The company's sustainability improvements to date demonstrate a record of leadership, achievement and commitment.

"Pratt & Whitney is proud of its environmental leadership. We will be unmatched in sustainability. Our goal is to be the aerospace sustainability leader," said David Hess, president, Pratt & Whitney. "At Pratt & Whitney, sustainability means integrating environmental and social issues into the business model as part of our commitment to customers, employees and the communities where we live and work. Simply put, we do well by doing good."

The 2025 goals and Pratt & Whitney's achievements to reduce its environmental impact are:

Waste: In factories, P&W will have zero waste – 100% recycled. *Results to date: since 2006, P&W has reduced total industrial process waste by 30%, or six thousand tonnes.*

Energy: Energy use will be optimised and P&W will reduce greenhouse gases by 80%. *Results to date: Since 2006, P&W has reduced greenhouse gases by 30% in factories – 232,000 tonnes of CO_2 (the equivalent of taking more than 45,000 cars off the road). P&W also reduced air emissions from chemicals by 60%.*

Water: None wasted, especially in water-scarce areas, will reduce consumption by 80%. *Results to date: Since 2006, P&W has reduced water use* »

[PRATT & WHITNEY]

by 39% or 1.4 billion litres – equivalent to nearly 15 million 10-minute showers.

Safety and wellness: Employees will be injury-free and will have best-in-class wellness programmes. *Results to date: P&W has an outstanding record in developing measureable programmes to improve safety, reduce injuries, and promote wellness. Since 2006, P&W has decreased injury rates by 57%.*

Materials: Ensure engines are 100% recyclable at the end of their life. Products will maximise the amount of recycled or reverted metals and contain no materials of concern. *Results to date: For more than 15 years, Pratt & Whitney has actively pursued reductions in the use of materials of concern in its products and factories that could negatively impact the environment and successfully executed a technology plan to develop green alternative materials.*

Suppliers: Suppliers will have world class safety rates, will meet aggressive resource conservation targets and will be 100% green certified. *Results to date: P&W suppliers are required to follow a code of conduct that includes resource conservation, ethics, labour guidelines and safe workplace requirements.*

Products: Engines will be the most fuel-efficient and quietest on the market. *Results to date: P&W is well on its way to meeting that goal with its exclusive Geared Turbofan technology that provides up to 16% reduction in fuel burn compared with other modern engines – plus significantly lower emissions, noise and maintenance cost. The PurePower engine family cuts carbon emissions by 3,000 tonnes per aircraft per year, reduces aircraft noise footprints by 50 to 75% (operating 15 to 20dB below today's most stringent standard – ICAO Stage 4), and will surpass the most stringent standards (CAEP/6) by 50% for nitrogen oxides.*

Pratt & Whitney has invested almost $60 million in more than 800 environmental projects since 2006 and demonstrates its leadership in global sustainability through its innovative products and services. Pratt & Whitney collaborates with suppliers and communities to reduce its global environmental footprint and increase natural resource efficiencies in its factories. F

» AIR CARGO

SUPPORTING WORLD HEALTH

For the global pharmaceutical industry, getting vaccines and medicines to where they are needed is a delicate process. Many drugs, particulalrly life-saving vaccines, need to be used quickly and transported in a strict temperature-controlled environment. In fact, around $250 billion worth of temperature-sensitive medicine is sold each year.

Aviation is often the only choice to deliver these supplies where they are needed. The World Health Organization estimates that, by 2015, some 4 – 5 million child deaths a year will be prevented by immunisation programmes. And while patents on a lot of commercial medications are set to expire in the next few years, the generic products that replace them will also require secure and careful transport. F

» AIRLINES

ACTION ON CSR AT DELTA

Delta Air Lines has released its 2012 Corporate Responsibility Report, which details the airline's environmental, employee, community, safety and financial performance throughout last year.

"We made great progress as an airline in 2012, continuing our work to build a business model that will improve Delta's sustainability for the benefit of our customers, employees and shareholders for many years to come," said Delta CEO Richard Anderson.

Significant accomplishments in the 2012 report include:

- Reducing annual aircraft greenhouse gas emissions by 8.4 million tonnes since 2005 (-18.5%).
- Successfully verifying Delta's greenhouse gas emissions from 2005 to 2011 through The Climate Registry, a nonprofit organisation with established standards for calculating, verifying and publicly reporting carbon footprints.
- Rewarding Delta employees with $372 million in profit sharing and $91 million in bonuses for meeting operational goals.
- Reducing the number of 50-seat regional jets the airline operates, replacing them with larger, more fuel efficient, two-class aircraft.
- Growing its award-winning in-flight recycling programme to 29 cities equipped to participate – more than $380,000 has been donated to Habitat for Humanity and Delta's Employee and Retiree Care Fund for recycling rebates, since 2007.

"The 2012 report reflects Delta's ongoing commitment to sustainability and transparency," said Helen Howes, Delta's managing director – safety, health and environment. "We've addressed 11 additional Global Reporting Initiative indicators than in the 2011 report and completed external verification of our 2005-2011 greenhouse gas emissions." F

» **Delta's CSR report can be accessed at www.delta.com/responsibility**

[KENYA AIRWAYS / BORN FREE FOUNDATION]

1

» AIRLINES

KENYA AIRWAYS JOINS WAR AGAINST POACHING

Kenya Airways has joined the war against wildlife poaching in a new partnership with the Born Free Foundation, an international charity.

Under the deal, the two organisations will not only contribute towards anti-poaching campaigns and conservation of wildlife in Africa, but also partner to raise funds for such initiatives.

Kenya Airways Group CEO, Titus Naikuni, said that the airline had entered the partnership to make a contribution towards conservation of African wildlife.

"With the threat facing wildlife, which is our heritage in Africa, it is important for the private sector to get more involved in stopping the vice," Naikuni added.

The partnership comes in the wake of a surge in wildlife poaching across Africa with elephants and rhinos amongst the worst hit. Concern is growing amongst conservationists that the endangered African Elephant is currently grappling with what could be the worst crisis to ever hit them since 1989 when international commercial trade in ivory was prohibited.

A report released by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) indicated that elephant poaching levels were the worst in a decade and recorded ivory seizures are at their highest levels since 1989. In Kenya, which experts consider a key gateway for ivory smuggling rings leaving Africa, there have been several incidents of ivory seizures and recovery of wildlife carcasses recently.

Rhinos have also been hard hit by poaching and only five species remain, out of the original dozens. In South Africa, rhino poaching has been at an all-time high. In 2012, 668 rhinos were killed and a further 57 in January alone.

The founder of the Born Free Foundation, Virginia McKenna, said that it requires joint efforts from different players to mount a successful war against wildlife poaching and other such vices. "The private sector in Africa should take a more critical role in preventing animal suffering and protecting the endangered species." E

» AIRLINES

SOUTH AFRICAN AIRWAYS YOUTH TRAINING

South African Airways (SAA) and SA Express today announced a joint effort to train scores of young South Africans to become qualified commercial pilots.

The two state-owned airlines will pool together their resources to create a jointly managed and resourced national pilot training programme, paying for the trainees' classroom tuition, practical training, flying time, accommodation, travel and other related expenses.

With a combined budget, SA Express and SAA want to ensure that trainees have access to highly qualified instructors, combining the very best of training methods, using purpose-built training facilities and state-of-the-art aircraft that boast some of the best technology available in present day aviation.

SAA CEO Monwabisi Kalawe told attendants at this morning's launch breakfast, "As the national carrier and good corporate citizen, SAA is aligned with South Africa's employment equity objectives to accelerate skills development, extending these exciting programmes to our youth. This is an excellent opportunity for us to develop and empower our country's youth."

SA Express CEO Inati Ntshanga added, "We spent time looking at how best we could contribute towards the task of training much needed pilots for South Africa, and for our continent. This programme is going to make a huge impact in addressing the serious shortage of skills that we are seeing in the South African aviation industry.

"Today I commend the two state-owned airlines, SA Express and SAA for demonstrating their catalytic ability in transforming an industry. It is of key importance that the aviation and aeronautical skills be encouraged as achievable career option to all sectors of our population. This should inspire and instil a sense of immense possibilities that awaits all those young people in townships and villages throughout South Africa that they too can take to the skies and be ambassadors as pilots," said Public Enterprises Minister Malusi Gigaba.

"Furthermore, as a developmental state, we will continue to utilise the state-owned companies to drive the State's transformation agenda, wherein we will ensure that there is skills transfers, human development and job creation for the majority of South Africans." E

1_ Virginia McKenna, Founder and trustee of Born Free Foundation signs the pledge with Kenya Airways CEO Titus Naikuni at Nairobi National Park.

2_Successful participants in the *Get into Airports* programme with co-ordinators: Matthew Weatherby, The Prince's Trust; Laura-Jane Latto, Hotel Chocolat; Muijbur Rahman, London Luton Airport; Sian Pearce, London Luton Airport; Sparkle Lynch, Pandora; and Masooma Kamzi, SSP.

[LUTON AIRPORT]

2

» AIRPORTS

GETTING LOCAL YOUTH ENGAGED IN AIRPORTS

The ground-breaking "Get into Airports" partnership between London Luton Airport and youth charity The Prince's Trust has received a local impact award in the "building stronger communities" category at an industry awards ceremony.

The award, issued by the leading business-led charity of its kind in the UK, Business in the Community, recognises responsible business in action and celebrates best practice from companies who are transforming communities.

The Prince's Trust 'Get into' programmes give unemployed 16-to-25-year-olds hands-on experience in a specific sector, as well as developing their confidence and motivation.

The positive impact that the Get into Airports scheme has on the local community and the important role it plays in helping young people secure work experience, and ultimately employment at the airport, is a key feature of London Luton Airport's new Community Engagement Strategy.

Through the programme, local unemployed young people undertake two weeks of training followed by a two week work placement with an on-airport company. Twenty three young people have secured employment with onsite partners as a result and the airport has ambitious plans to build on the programme going forward.

John O'Reilly, regional director of The Prince's Trust in Central England, said, "We are delighted that our programme with London Luton Airport has been recognised in this way and look forward to continuing to work together to transform even more young lives in the future."

Sian Pearce, community relations and business development executive at London Luton Airport said: "We are thrilled that the work we do with The Prince's Trust has been recognised by Business in the Community. Now in its third year, the programme has helped 85% of participants find employment and is a core part of the airport's community engagement strategy."

Youth charity The Prince's Trust helps disadvantaged young people to get their lives on track. Many of the young people helped by The Prince's Trust are in or leaving care, facing issues such as homelessness or mental health problems, or they have been in trouble with the law. The Trust's programmes give vulnerable young people the practical and financial support needed to stabilise their lives, helping develop self-esteem and skills for work. Three in four young people supported by The Prince's Trust move into work, education or training.

The Prince of Wales's charity has helped more than 700,000 young people since 1976 and supports 100 more each day.

Over 8,000 staff are employed on-site at Luton Airport, which is a key economic driver for the region and a major base for 'low cost' or 'no frills' air travel. F

» MANUFACTURERS

BOEING'S PRODUCTION GAINS FOR THE ENVIRONMENT

[BOEING]

Between 2007 and 2012, despite a 50% increase in aircraft deliveries, a new production facility in South Carolina, and 13,000 new jobs, Boeing has managed to make the following environmental reductions in is manufacturing processes:

- ⏬18% Hazardous waste
- ⏬9% Carbon dioxide
- ⏬3% Energy use
- ⏬2% Water use
- ⏬36% Solid waste (79% of the solid waste produced by Boeing is now diverted from landfills)

» AIRPORTS

CARING FOR NEIGHBOURS IN NEED

Incheon Airport staff visited welfare facilities in the local area to celebrate lunar New Year's Day by delivering necessities such as soap, detergent and toilet paper, which were sent to five welfare facilities in the region, including Boraemae Child Protection Center in Incheon Dong-Ku, and Jamowon, a care center for women located in Incheon Jung-Ku, and Jangbonghyelimwon, a care center for the disabled in Jangbong island.

Also visited during the New Year's holiday season were nearby police stations and military bases, to express the Airport staff 's gratitude for their services towards security, public safety and traffic control at the Airport as well as in the neighbouring areas. F.

» AIRPORTS

AUCKLAND AIRPORT SUPPORTS FUTURE DIRECTORS

Auckland Airport is supporting New Zealand's 'Future Director Scheme', with an aspiring director, Sheridan Broadbent, already experiencing Auckland Airport Board meetings for the 2013 calendar year.

The Future Director Scheme seeks to identify talented young executives with strong potential to succeed in a governance role, and provide them with opportunities to observe and participate in Boardroom discussions.

While the aspiring directors participate in real discussions, they do not have a role in Board decision making, and Auckland Airport has protocols in place that prevent future director participants becoming "deemed directors". F.

[UNITED AIRLINES]

1

» AIRLINES

UNITED CUSTOMERS HELP BRING SMILES TO CHILDREN IN NEED

United Airlines has launched its 2014 United Adventure Bear programme for customers and co-workers to lift the spirits of children in need. United designed a new, limited-edition teddy bear to be delivered by pilots, flight attendants and other airline employees to children across the globe. The new bear's name, Rhonda Globe, was chosen in a contest in which more than 800 United co-workers submitted ideas for the 2014 teddy bear.

"Each year we are overwhelmed by the response from our generous customers and co-workers who participate in this beloved bear programme," said Mark Anderson, United's senior vice president of corporate affairs. "This year we're especially excited to introduce this new programme that extends the opportunities to brighten a child's day to our customers and co-workers not just in the US, but all over the world."

For two months, United invited customers and co-workers to participate in the programme in one of two ways:

1) Make a $50 'Give a Bear, Get a Bear' contribution, in which a donor will receive their own 2014 Adventure Bear, send a second bear to a child in need and make a contribution to the programme through the United Airlines Foundation.

2) Make a 100% tax-deductible contribution to the United Airlines Foundation in support of the Adventure Bear programme.

Proceeds from the programme will benefit organisations that help children and their families during health struggles or economic hardship, including the American Cancer Society and Make-A-Wish. A portion of the funds raised will also benefit organisations at United's hub communities.

United employees and community partners will deliver Rhonda Globe bears to children in communities around the globe in winter 2014. F.

[UNITED AIRLINES]

2

1_ United's 2014 adventure bear programme will deliver teddy bears to children around the world.

2_United employees showed their support for breast cancer awareness in October 2012 by sporting pink uniform items throughout the month. United allows frontline employees to purchase pink items to wear to work — including ties, neck scarves and hats — with proceeds benefitting nonprofit organisations dedicated to breast cancer awareness, greater access to screening services and support services for individuals battling breast cancer. Since 2009, together with employees, this and other United-sponsored efforts have raised more than $2 million.

LAN AIRLINES HELPS CLEAN UP WITH RAPA NUI WASTE REMOVAL

As part of the celebration of World Environment Day and in order to contribute to the care and preservation of Easter Island, more than three tonnes of electronic waste were delivered to the National Cargo Terminal of LAN Airlines at Santiago Airport, carried by the airline. Electronic waste collected will be recycled at the Chilenter Foundation and converted into new computers to be donated to communities without access to technology.

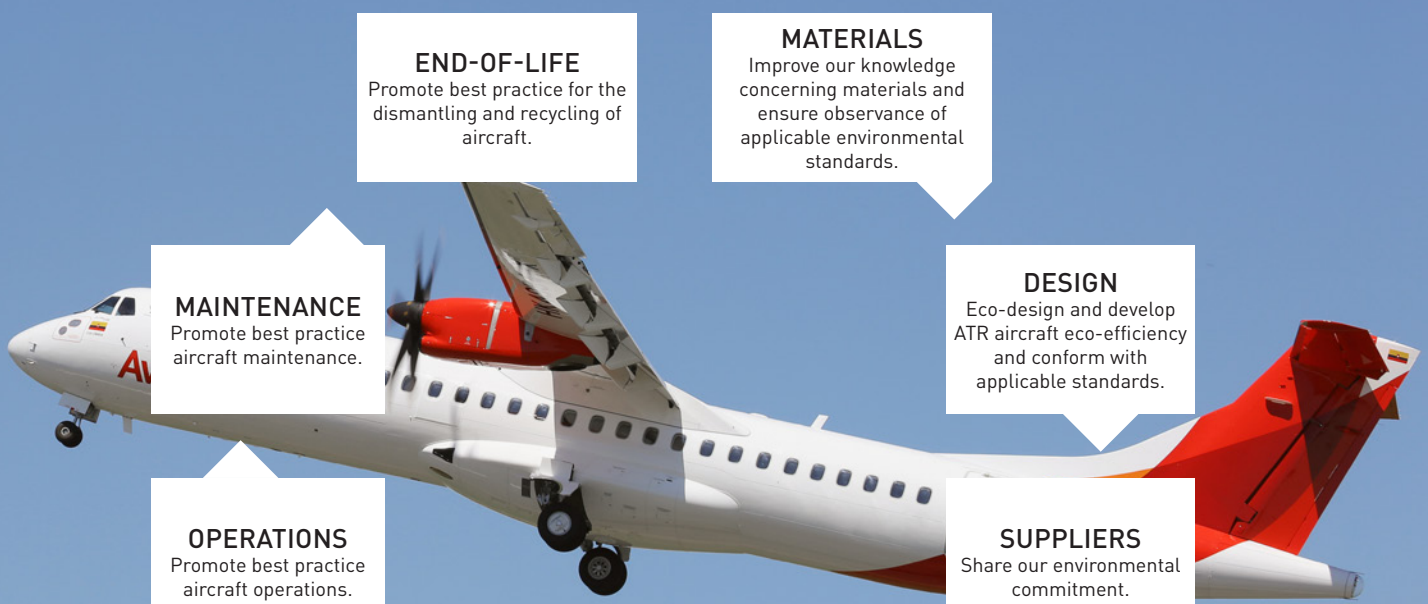
The ceremony was led by the environment minister of Chile, Maria Ignacia Benitez, LAN Airlines' general manager Chile, Enrique Elsaca and the Chilenter Foundation executive director, Sergio Larrain.

Through an appeal made to the Rapa Nui community, more than three tonnes of electronic waste was able to be collected, including computers, laptops, keyboards and mice.

Computers are composed of 25% reusable components, 72% recyclable materials such as plastics, ferrous metals, aluminum, copper, gold, nickel, tin and 3% toxic elements such as lead and mercury. Optimal treatment of these prevents polluting waterways, soil and air. Also, by recycling computer equipment, precious metals are recovered, resulting in savings of up to 80% of the costs of primary production of these, through traditional mining.

A MANUFACTURER'S SUSTAINABILITY CYCLE

ATR has developed this lifecycle approach for their business – looking not only at the products they produce, but their manufacturing environmental footprint as well.



END-OF-LIFE
Promote best practice for the dismantling and recycling of aircraft.

MATERIALS
Improve our knowledge concerning materials and ensure observance of applicable environmental standards.

MAINTENANCE
Promote best practice aircraft maintenance.

DESIGN
Eco-design and develop ATR aircraft eco-efficiency and conform with applicable standards.

OPERATIONS
Promote best practice aircraft operations.

SUPPLIERS
Share our environmental commitment.

TRANSPORTATION
Develop solutions that aremore respectful towards the environment.

MANUFACTURING
Reduce our environmental impact during the manufacturing process.

[ATR]

COLLABORATIVE ACTION TO IMPROVE SAFETY ACROSS THE AFRICAN CONTINENT

Airlines, airports and air navigation service providers from around the world are working together to support a global initiative to help African nations progressively reduce accident rates to the global average by the end of 2015. In 2012, the world's airlines averaged one 'hull loss' for every five million flights on Western-built jet aircraft while the African average was one for every 270,000 flights, according to figures from the International Air Transport Association (IATA). This is more than four times the global average.

The target for improved safety, proposed as part of the IATA/ICAO African Strategic Improvement Action Plan for 2012-2015, was agreed at the African Union's Ministerial Conference on aviation safety held in July 2012 in Abuja, Nigeria and was endorsed by the Union's executive council in Addis Ababa in January 2013. At the Abuja meeting, Africa's civil aviation ministers expressed their concern about the insufficient number of skilled aviation professionals and inadequate financial resources available for ensuring aviation safety in Africa. They set specific targets for safety performance improvements, including a 50% reduction in runway-related accidents by 2015 over 2012 and a further 50% reduction in 'controlled flight into terrain' incidents in the same period.

According to an analysis of air transport accidents in Africa between 2006-2010 conducted by IATA and ICAO, the main contributing factors to the relatively poor safety record in Africa are insufficient regulatory oversight and the lack of safety management system implementation. The introduction of processes such as regular analysis of flight data recordings could have pinpointed precursors to the major accident types, namely runway excursions, controlled flight into terrain and loss of control, said the two organisations. Runway excursions alone accounted for about a quarter of African accidents. The good news is that with the right tools and processes in place, these safety problems can be resolved: the IATA implementation programme for safe operations in Africa has reported that, when airlines adopted flight data analysis tools, there was a 56% reduction in deviations from optimum flight trajectories.

The new safety targets – now formalised as key performance indicators within the Ajuba Declaration – have also been aligned with ICAO's strategic objectives for safety which have been recently introduced into ICAO work programmes.

One of the main challenges to improving safety in the past has been the tendency for different stakeholders to act independently of their colleagues. But now, industry bodies and regulators are developing increasingly co-ordinated responses to the challenge. So IATA, representing the world's main scheduled airlines, Airports Council International (ACI) – the global airport trade body – and the Civil Air Navigation Services Organisation (CANSO), on behalf of the world's ANSPs are now developing more 'joined-up' support strategies to meet the tough safety targets.

IATA is focusing its efforts on persuading more airlines to join its operational safety audit (IOSA) registry. IOSA is an internationally-recognised and accepted evaluation system designed to assess the operational management and control systems of an airline and is a requirement for IATA membership. As a measure of its effectiveness there were no Western-built jet hull-losses among more than 380 airlines on the registry in 2012, including the 25 IATA airlines in sub-Saharan Africa.

"IATA is focusing on improving African safety performance for all carriers and we have a target to bring ten additional African-based airlines into IOSA by 2015. IOSA-registered airlines in Africa, including all IATA members, have a safety record in line with the global average - this shows that IOSA can be a driver in improving African safety," said Mike Higgins, IATA regional vice president, Africa.

For ACI, funding and training have been prioritised. "When Airports Council International was formed in 1991, a strong sense of purpose »

THE AFRICA STRATEGIC IMPROVEMENT ACTION PLAN CALLS FOR THE:

- Establishment of independent and sufficiently funded civil aviation authorities.
- Implementation of effective and transparent safety oversight systems by all African States
- Completion of an IATA Operational Safety Audit by all African carriers.
- Implementation of accident prevention measures focused on runway safety and loss of control.
- Implementation of flight data analysis (FDA).
- Implementation of safety management systems (SMS) by all service providers.

[BRYTTA / ISTOCKPHOTO]

1

1_ Passengers receive a safety briefing from their pilot before departing Kasane Airport in Botswana.

2_Serengeti Airport in South Africa. The whole continent sees around 70 million passengers a year across airports and operators of all sizes — from tiny mud airstrips to large regional hubs. There is now a global effort underway to bring African aviation safety to the levels enjoyed in the rest of the world.

was, 'to leave no airport behind'; the members established an ACI Fund for airports in developing nations in order to provide them, on request, with assistance, help and support, especially with regard to training and the development of human resources," said ACI director general, Angela Gittens. "Members have contributed to the ACI developing nations airports (DNA) assistance programme which uses revenue from ACI's commercial training programmes to provide scholarships and targeted coursework for eligible airports at no charge.

Further, recognising that we could tap into the expertise of our worldwide community of airports, ACI established the APEX in safety programme which is a peer review system where safety partners work with host airports to help them improve their safety performance.

This programme is not limited to airports in developing nations but is open to all airports that seek continuous performance improvement. ACI and the safety partners donate the time of their experts while the host airport reimburses travel and out-of-pocket expenses. The DNA programme will assist host airports that are unable to provide such reimbursement."

The cornerstone of the APEX in safety programme is an airport safety review – a gap analysis of the airport's infrastructure and operational procedures against ICAO standards and industry best practices. This is a peer review process in which ACI organises a team of experts from other airports and ICAO. Under APEX, ACI will organise and dispatch a team of experts to improve safety in specific areas of interest.

Runway operations is one important area where airlines, airports and ANSPs all have key roles to play and where only an industry-wide, collective strategy on safety will be effective. A runway excursion is an event in which an aircraft veers off or overruns the runway surface during either take-off or landing. There are many factors that can cause a runway excursion, including runway contamination, adverse weather conditions, mechanical failure, pilot error and unstable approaches.

ICAO and CANSO organised a joint runway safety event in Cape Town, South Africa, in October 2012 to promote the establishment of runway safety teams, with representatives from all sides of the industry coming together to discuss issues such as hazard identification, mitigation, monitoring and logging, the development of individualised agendas based on risk priorities, developing and formalising safety leadership and executive-level buy-ins. In promoting collaboration among industry players and further promoting safety in the region CANSO supported ICAO in runway safety seminars in Ghana and South Africa and participated in the ACI Africa annual general meeting.

CANSO has been targeting improved runway safety as a key focus for its global ATM safety performance improvement programme. During its June 2013 annual general meeting in Curaçao the organisation launched a global runway safety improvement initiative developed in partnership with regulators, airports, airlines and ANSPs, providing a runway safety checklist for airports, ANSPs as well as key tips for both pilots and air traffic controllers. CANSO's Africa Indian-Ocean (AFI) ANSP members are also focusing on accident and incident reporting, reduced vertical separation minima (RVSM) safety monitoring and investigating the correlation between safety indicators safety performance.

The targets for improving Africa's aviation safety performance are ambitious. But with the industry determined to work together to provide a co-ordinated approach to meeting the challenge there is real optimism among all participants that the targets are achievable.

[HENRIKDB / ISTOCKPHOTO]

2

[ROLLS-ROYCE]

1

» MANUFACTURERS

ROLLS-ROYCE SECURING A FUTURE FOR AEROSPACE THROUGH EDUCATION

Rolls-Royce is one of the most recognised brand names and the company employs 42,000 staff in 50 countries. As you would expect from a world-leading technology and services company, a lot of these people are engineers. As such, Rolls-Royce places great importance on science, technology, engineering and maths (STEM) subjects and believes that promoting study in these areas is crucial to not only its own business, but the future of the aerospace sector as a whole

Rolls-Royce has committed to inspiring young people to pursue rewarding STEM careers and is actively involved in a range of activities with partners in the education sector. "We believe that STEM studies are important for two principal reasons: they provide a source of exciting opportunities for young people, and they are vital for building a strong pipeline of future talent," says Sarah Whitmore, head of Rolls-Royce talent pipeline "But we also recognise the importance of connecting STEM studies in the classroom with how STEM is applied in the world of work. We do this by encouraging better STEM teaching and a higher take-up of pupils studying technical subjects, and we're already providing resources and finances through a range of projects."

These projects include:

» Contributing to Project Enthuse, a partnership between organisations in the research and scientific fields and the UK government. Project Enthuse works to enhance the professional development of STEM subject teachers, through Science Learning Centres in the UK. Sponsoring The Big Bang UK Young Scientist and Engineers fair that attracted over 45,000 delegates last year.

» Providing teachers and students with access to resources through its sponsored online portal Where STEM Can Take You?

» Through the Rolls-Royce science prize, the company has given over $1.2 million to more than 300 UK schools to support science education.

Whitmore added, "Importantly, we are also determined to address the issue of the relatively low numbers of young women and ethnic minorities in STEM university degree programmes. We need them to help us develop a more diverse workforce and deliver some of the very best technology to the world."

Rolls-Royce has also partnered with other aerospace companies such as Airbus, Bombardier and GE which operate in the United Kingdom to launch a new initiative – the Aerospace Growth Partnership. This aims to build on the UK's success as an aviation nation and encourage the development of skills to educate the engineers of the future. The UK is currently the second largest aerospace manufacturing operation in the world, directly employing 100,000 people and generating over $37 million for the economy.

In August, thanks to both Government and industry committing nearly $5 million each, 100 bursaries were awarded to employees and graduates to study masters-level degrees in aerospace engineering. Business Minister Michael Fallon said, "The aerospace masters programme is an excellent example of Government and industry working together to keep the UK competitive as it will help us meet the urgent demand for engineers in this country.

"I am particularly pleased that 19 places have gone to women – well above the average for the sector. It is essential that the aerospace industry recruits from the widest possible talent pool.

"Our decision to base the Aerospace Technology Institute at Cranfield University ensures it can operate with the independence necessary to work with partners from right across industry and academia. It is well situated to serve the needs of the whole UK aerospace sector."

[ACI]

2

» COLLABORATION

ACI & AdM PARTNER TO IMPROVE AIRPORT SAFETY WORLDWIDE

Airports Council International (ACI) and Aéroports de Montréal (AdM) have signed a Memorandum of Co-operation to promote excellence in airport management and operations at airports worldwide through ACI's Airport Excellence (APEX) Programme.

ACI formally launched its APEX in Safety Programme in September 2012. The programme helps airports enhance the safety of their airside operations for the benefit of the flying public. The agreement provides the foundation for specific cooperative initiatives between ACI and AdM under the APEX Programme.

Angela Gittens, director general of ACI stated, "The APEX Programme is strategically important to ACI and our member airports. Since relocating our world office to Montréal in 2011, ACI has forged a closer partnership with the International Civil Aviation Organization (ICAO) to enhance safety worldwide and signed a Memorandum of Co-operation with ICAO, in June 2012. We are now taking the next logical step in formalising this cooperative arrangement with AdM so that the APEX Programme and ACI member airports worldwide can benefit from the airport's expertise. AdM has always been very supportive of the APEX Programme and this agreement takes our co-operation to a new level."

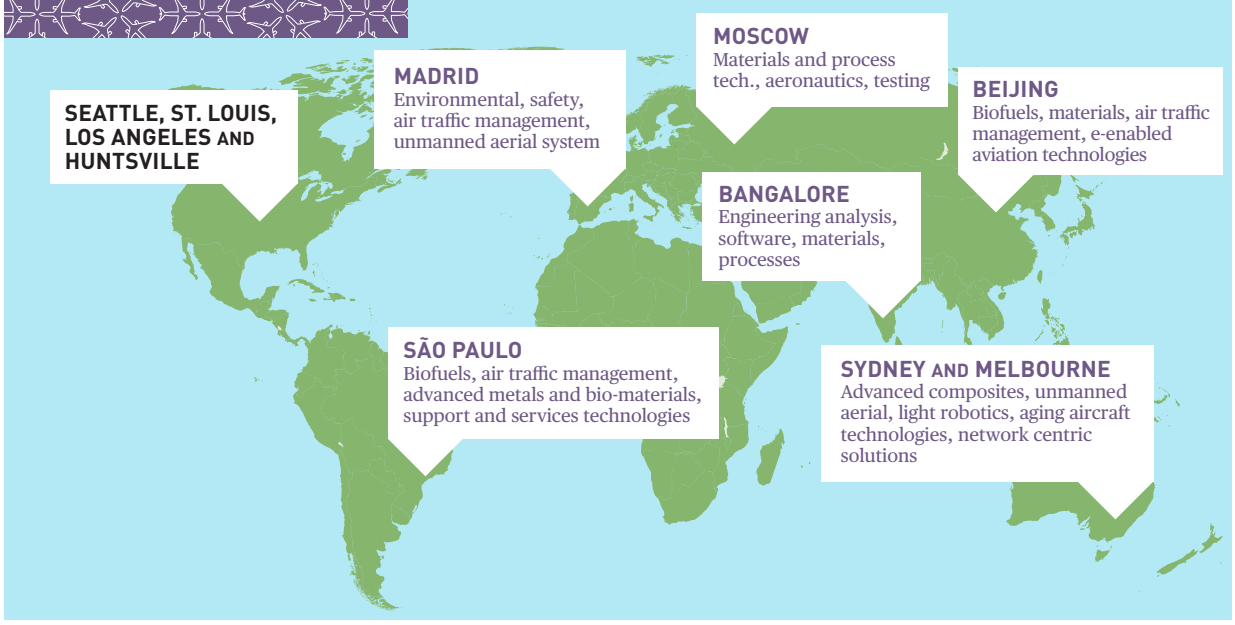
James C. Cherry, president and CEO of Aéroports de Montréal, commented, "I am delighted to formalise this new cooperative relationship with ACI. It is a great opportunity for AdM to share its expertise and leading practices and for AdM staff to further improve their knowledge of global safety practices, foster greater international co-operation and a sense of community."

ACI plans to launch similar programmes in the other disciplines of airport management and this memorandum includes provisions for ACI and AdM to extend their collaboration to these programmes in the future.

» **ACI formally launched its APEX in Safety Programme in September, 2012. APEX aims to help airports enhance the safety of the aviation-related operations at the airport. The cornerstone of the programme is an airport safety review – a gap analysis review of the airport's infrastructure and operational procedures against ICAO standards and industry best practices. This is a peer review process in which ACI organises a team of experts from other airports and ICAO to visit airports, particularly in developing nations. The APEX in Safety Programme is designed for all airports, regardless of their size and location.**

1_Rolls-Royce employs some 42,000 people worldwide and has set itself a mission to encourage the aerospace engineers of the future through supporting science and technology education.

2_Airports Council International director general Angela Gittens and Aéroports de Montréal chief executive James Cherry (both seated) and their staff team up to partner for safety at airports around the world.



1

SUPPORTING RESEARCH AND TECHNOLOGY DEVELOPMENT WORLDWIDE AT BOEING

In addition to its global customer base and supply chain, Boeing has made it a priority to work with international research partners on new technologies that also meet national or local goals for economic and technology development.

Recognising the talent that exists around the world and many countries' interest in expanding citizens' opportunities in the aerospace industry, the company has opened advanced Boeing research and technology centres (BR&T) in six countries and has launched collaborative research projects in many more nations.

Boeing's overall aim is to work with government, private and university research centres to find innovative and affordable technology solutions for current and future aerospace and customer needs.

Boeing says its six international centres – in Australia, Brazil, China, India, Spain and Russia – and projects with other researchers bring mutually beneficial outcomes: new ideas and innovative processes for Boeing and economic benefits for the countries where research is conducted.

In all, BR&T has more than 250 ongoing research and technology projects with more than 340 partners, including many in emerging markets.

BR&T technologists typically work in small teams with partners in areas related to design, manufacturing, advanced structures and materials, environmentally progressive technologies and more.

To take a few examples, in Brazil, Boeing is working with Embraer on biofuel research and with Brazil's Department of Aerospace Science and Technology (DCTA) and National Institute for Space Research (INPE) in flight sciences, energy and the environment.

Boeing and Qatar Computing Research Institute are examining ways to better recognise patterns in massive amounts of data produced by aerospace systems.

And in Turkey, Boeing is working with Istanbul Technical University to research and develop an advanced air-filtration system in commercial aircraft cabins.

[BOEING]

2

1_Boeing's domestic (in black) and international research and technology centres (purple) allow the company to tap into expertise worldwide, and support academic research.

2_Advanced technology concepts such as this blended wing aircraft can be studied through research and technology partnerships.

» AIRLINES

A RACE AGAINST TIME MADE EASIER THANKS TO AIR TRAVEL

According to data from the national transplant centre of the Brazilian Ministry of Health, in total over 7,000 items – organs, tissues, empty special containers, or medical teams – were carried on over 4,000 trips in the country for transplant purposes during 2012. Of this, over 99% was carried by air.

The members of Brazil's national airline association, ABEAR, play a central role in this effort. Avianca, Azul/Trip, Gol, and TAM together carried around 98% of these items, free-of-charge. The project has been supported since 2001, when 15 airlines entered into a co-operation agreement with the Ministry of Health.

Since then, the agreement has been revised to facilitate access to flight schedule information in Brazil and strengthen communication channels between airlines and health authorities.

The organs carried are used in varied and complex surgeries, including procedures involving cardiac, corneas, eyeballs, liver, pancreas, kidneys, spleen, bones, lungs and skin. As soon as availability for donation is announced, often a race against time begins to perform the extraction and re-implantation.

This is where airlines are invaluable, with their ability to shorten distances and save precious minutes, whether by carrying medical teams and supplies to potential donors or by ensuring that organs and tissues reach the recipients. Aircraft used for this purpose are given priority landing and take-off and the special containers with organs are safely carried in the cabin under the care of the chief flight attendant or pilot.

[ABEAR]

ONE-THIRD OF AIRPORTS WORLDWIDE, MAINLY IN REMOTE COMMUNITIES THAT HAVE NO ALTERNATIVE TRANSPORT MEANS, RELY ON TURBOPROP AIRCRAFT FOR SERVICE.

CATHAY PACIFIC COMMUNITY SUPPORT MAKING A DIFFERENCE ACROSS ITS NETWORK

Cathay Pacific Airways and the Hong Kong Committee for UNICEF have announced that nearly $2 million was raised through Change for Good, the airline's inflight fundraising programme, in the 2012 programme period. Since the programme was launched in 1991, more than $17 million has been donated by passengers to support UNICEF programmes that help underprivileged children in more than 150 developing countries around the world.

At a cheque presentation ceremony to UNICEF Hong Kong, Cathay Pacific chief operating officer Ivan Chu stressed that the airline would continue to support UNICEF's good work, "UNICEF HK is Cathay Pacific's long-term charity partner. The 'Change for Good' programme has been a tremendous success. We are grateful to our passengers for the continued generosity they have shown over the past two decades. We would also like to express our gratitude to all Cathay Pacific staff who have contributed to the smooth running of this meaningful programme as well as making their own donations and volunteering in field trips and related work."

Acknowledging the continued support provided by Cathay Pacific, Judy Chen, Chairman of UNICEF HK, said, "The Change for Good programme fully demonstrates the power of pooling resources; it turns spare change into positive change in children's lives worldwide. With support from Cathay Pacific, we will accelerate the child protection efforts in Vietnam next year to save and improve the lives of more vulnerable children, such as street children. We believe that together the goal of 'zero suffering' is achievable."

Most of the money raised through the inflight fundraising programme goes to support UNICEF's projects worldwide for improving the lives of underprivileged women and children. An average of one month's proceeds from the programme is donated to the Cathay Pacific Wheelchair Bank – an initiative set up in 1996 – to improve the mobility of Hong Kong children suffering from severe neuromuscular diseases.

About $300,000 from the Change for Good donations this year will be used to support the child protection programme in four selected provinces in Vietnam. The programme aims to develop a comprehensive child protection system to respond to emerging vulnerabilities due to neglect, abuse, violence, and exploitation at all levels in Vietnam. With the donations it receives, UNICEF will be able to develop Social Work Service Centres and its child protection work across the four provinces and up to national level. The centres will provide direct assistance and services for vulnerable children, in particular street children, child labourers suffering abuse, exploitation and child trafficking.

[ALL IMAGES: CATHAY PACIFIC]

2

3

The programme is a continuation of the support given by 25 Cathay Pacific staff volunteers, who took part in a UNICEF field trip to the Ninh Thuan province of Vietnam earlier this year to see first-hand how passengers' donations are put to good use. They learned about critical issues relating to children's growth and development such as education, malnutrition, insufficient basic healthcare, poor sanitation and child exploitation. Ninh Thuan province will also benefit from the above-mentioned child protection programme.

The airline also operated a special flight that took more than 200 residents from some 80 less-advantaged single-parent families into the skies over Hong Kong for an unforgettable flying experience. The participants ranged in age from four to 68 and came from families that had never flown together before.

The flight, which lasted for around 90 minutes, not only provided participants with a memorable experience, but also gave family members the opportunity to spend some quality time together and strengthen their family bonds.

Cathay Pacific CEO John Slosar was on board and said, "We are honoured to have the opportunity to share the magic of flying with so many first-time fliers today. This is an opportunity for us to come together as a community, united in the desire to enhance life here in Hong Kong. As a father, I know how the demands of everyday life can make it difficult for families to cherish time together. We hope the families on our flight today will enjoy some quality time as part of a very memorable experience."

As an integral part of Hong Kong life, Cathay Pacific always strives to respond to the specific needs of the local community, adding value to Hong Kong and doing everything it can to make it a great place for all. The airline worked with the Hong Kong Council of Social Service and five non-governmental organisations to select participants for the flight.

1_Some excited young participants meet Cathay Pacific chief executive John Slosar before taking their first ever flight.

2_Cathay Pacific has pledged to continue supporting UNICEF's good work through the 'Change for Good' programme.

3_Twenty-five Cathay Pacific staff went on a field trip to Ninh Thuan province of Vietnam earlier this year to see how Change for Good donations are used. They learned about critical issues relating to children's growth and development including education and malnutrition.

The 90-minute adventure took them over the South China Sea and gave everyone the opportunity to catch sight of the stunning bird's eye view of Hong Kong. The participants – many of whom don't have much opportunity to leave the district where they live, let alone take a flight – were excited about being able to visit the airport and enjoy the chance to enjoy the meal time with their families at 25,000 feet.

Passengers were served food and drinks by Cathay Pacific cabin crew and had the chance to try out the inflight entertainment system on the aircraft. Joining the participants were about 50 members of the CX Volunteers, the airline's corporate volunteering team, who helped to take care of the special guests.

One of the participating families, Ms Lau and her daughter Ms Wu, were going on board an aircraft for the first time. "I've been looking forward to this flight for a long time and I can't wait to tell my friends about the experience. The most unforgettable moment was when the cabin crew served my inflight meal," said 10-year-old Wu.

Eight-year-old Ken, who had also never flown before, said: "Being on a plane is even more fun than I had imagined." His mother Elaine was equally gratified by the experience, saying that she hopes to have more opportunities to fly with her son.

Second Officer and veteran CX volunteer Nelson Chang said: "As a pilot I always encounter passengers who are accustomed to flying. On this community flight, I was able to witness the sheer joy and excitement from participants who had never flown before. This will inspire me to look at our passengers in a completely different light."

Rooted in Hong Kong and serving as the city's home carrier for 66 years, Cathay Pacific has a deep commitment to the local community. Leveraging on the uniqueness of the airline business and its people, Cathay Pacific runs a range of unique programmes which include initiatives to help the aged, the youth and the underprivileged in the Tung Chung community. The airline's territory-wide flagship youth programmes nurture young people to build a positive attitude towards learning and to reach for their dreams. Its staff volunteering team now has more than 1,000 participants and provides social services to meet the diverse needs of the community.

This is the third time the airline has operated a community flight, providing a unique experience and memories for citizens of its home city.

ALL-ROUND CORPORATE SOCIAL RESPONSIBILITY AT UNITED

FREE WORKPLACE HEALTH CLINIC

United Airlines has opened a new employee health clinic at O'Hare International Airport. The clinic will serve a broad scope of employees' health needs, such as urgent care for routine illnesses, travel and other immunisations including flu shots, prepackaged medications, job-related physical training and pre-employment physicals, at no cost to employees. The convenient access to these and other health care services is available to all United employees, including the more than 10,000 co-workers in the Chicago area. United also offers health care clinics for its employees at its Cleveland, Houston, Guam and Newark/New York hubs.

BIOFUEL LEADERSHIP

United has been a biofuels pioneer in the USA and has signed a definitive purchase agreement with AltAir Fuels for 15 million gallons of aviation biofuel to be used on flights departing Los Angeles in 2014. The fuel is expected to achieve a 50% reduction in CO_2.

ONE MILLION MILES DONATED TO MAKE-A-WISH

For the second year, United Airlines has donated one million MileagePlus miles to Make-A-Wish Illinois, a donation that will help children with life-threatening illnesses reach their wish destinations. United pledged to match up to one million miles donated by its MileagePlus members during the one-day 'Mileathon'. United employees regularly collaborate with local Make-A-Wish chapters, helping fulfill travel wishes for children with life-threatening illnesses and their families. Through these donations, the airline has helped fulfill more than 3,125 wishes for children with life-threatening medical conditions.

SCHOLARSHIP FUND AWARDS FOR EMPLOYEES' FAMILIES

United has awarded more than $1 million in college scholarships through the United Airlines Scholarship Fund (USF) to 681 employees and their children for the 2013-14 academic year. The scholarship programme is funded entirely by employee contributions and fundraising efforts. Recipients were selected based on a combination of academic record, work experience and community and school involvement. Since 2002, the USF has awarded 2,161 scholarships worth more than $7 million. The fund is a private, non-profit corporation dedicated to support the educational development of United co-workers and their dependents.

(UNITED AIRLINES)

FLEET UPGRADE

United has the following eco-efficient aircraft on order:

- 35 A350-1000s
- 65 787-10s
- 100 Boeing 737-MAX9s
- 50 Boeing 737-900ERs
- 70 Embraer 175s

United Airlines won the ATW Eco-Aviation Gold Award 2013 for its environmental projects.

FIRST CUSTOMER FOR 'SPLIT SCIMITAR' WINGLETS ON THE 737 NEXT-GEN, REDUCING FUEL USE 25% FROM THE 737-500 THEY REPLACE.

UNITED'S SUSTAINABLE PURCHASING

United has launched a sustainable supply chain initiative in an effort to better understand the environmental performance of its suppliers and deepen relationships with its key supply chain partners. "We work with hundreds of suppliers so it's important for us to understand the environmental impact on our supply chain, and this new initiative allows us to be proactive," said Katrina Manning, United's vice president of technical procurement." The programme involves measuring and evaluating the sustainability of the suppliers' products and operations. Through implementation of the programme, United will evaluate whether the use of its suppliers' products or services would reduce the airline's impact on the environment. Jimmy Samartzis, United's managing director of global environmental affairs and sustainability, said, "We will not only incorporate environmental considerations into our purchasing decisions, but will also seek to identify opportunities to collaborate with our suppliers to improve the environmental profile of the products and services we use."

ON TRACK TO SAVE 85 MILLION GALLONS OF FUEL IN 2013

United honoured Earth Month by announcing a new goal to save 85 million gallons of fuel in 2013, equivalent to 828,750 tonnes of CO_2 or $275 million dollars. United has already improved fuel efficiency by 32% since 1994 through programmes such as improved flight planning, single engine taxiing, lighter products onboard, and use of ground power instead of the onboard auxiliary power unit (to save fuel and reduce carbon emissions while aircraft are parked). United has installed winglets (which reduce fuel burn by up to 5%) on more than 300 aircraft, including its entire 737 fleet and many of its 757 and 767 aircraft.

www.united.com/ecoskies

» AIR NAVIGATION

NATS REVEALS BIG GAINS

More efficient air traffic control procedures and the better use of airspace have saved 800,000 tonnes of CO_2 since 2008, a report from NATS shows. The savings equate to cutting $240 million from airline fuel bills.

The UK's leading air traffic control company has released a five year retrospective report on its environment programme, highlighting the initiatives it has introduced to cut airline fuel costs and minimise CO_2.

Since 2008, NATS has pioneered a number of practical and technological changes designed to optimise airspace and aircraft performance.

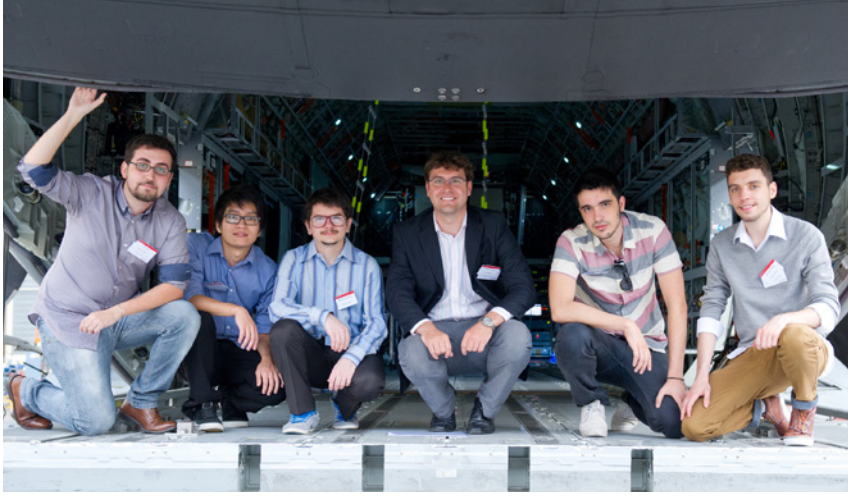
The unique 3Di airspace efficiency metric, introduced in 2012, allows NATS to measure the environmental efficiency of every aircraft under its control, while 125 airspace changes have unlocked more direct routes and further savings.

The introduction of iFACTS alone – NATS' next generation air traffic control tool – is estimated to be saving 10,000 tonnes of fuel, worth $9 million a year. iFACTS gives controllers a view of the future track and trajectory of the aircraft under their control so they can optimise routes for fuel and emissions savings.

Ian Jopson, head of environment and community affairs at NATS, was proud of the company's achievements: "We have made great progress over the past five years, but as we celebrate these successes we must also look to the future.

"Our work towards delivering the next generation of air traffic management infrastructure, tools and operating concepts will provide a step-change in our environmental performance, but this work needs investment and against a backdrop of economic pressures we will need to innovate to continue delivering."

As well as changes in the skies, over the past seven years, NATS has introduced a number of sustainability measures on the ground too. Since 2008, NATS' energy consumption has fallen 29%, with water usage also dropping by 45%. F.



[AIRBUS]

1

» MANUFACTURERS

AIRBUS FLIES THEIR IDEAS FOR THE FUTURE OF AVIATION

UNESCO's patronage of the Airbus Fly Your Ideas competition "reflects the urgent, growing need to attract and nurture future talent." said Lidia Brito, UNESCO's director for science policy and capacity building. "Finding sustainable solutions depends on our capacity to work together and innovate, and Fly Your Ideas gives young people the opportunity to do just this."

This year saw the third edition of this unique competition, attracting over 600 teams from around the world. Each team submitted a proposal responding to one of six challenges set out by Airbus for aviation in the 21st century: energy; energy efficiency; affordable growth; traffic growth; passenger experience; community friendliness.

"At Airbus, we work in a world of *'unobtainiums'*: solutions for seemingly impossible challenges that shape the way we live – like those that made air travel a reality. We want students to adopt that innovative spirit in Fly Your Ideas 2013." Said Charles Champion, executive vice president engineering at Airbus and patron of the Fly Your Ideas competition.

Fly Your Ideas brings together students from around the world and over 200 Airbus employees, involved as assessors, experts and mentors for the teams and enabling the students to develop key skills such as team work and project management. This interaction with Airbus staff also gives students valuable insight into the global aviation industry which currently supports 56.6 million jobs worldwide and is a substantial contributor to global commerce.

Projects shortlisted in 2013 included the development of aircraft fuelled by a blend of sustainably produced liquefied biomethane and liquefied natural gas (Bio-LNG), reduced propulsion noise thanks to jet exhaust shape modification using intelligent materials, an electric/turboprop combination for hybrid propulsion in regional aircraft and a self-sustaining aircraft cabin concept in which excess body heat from seated passengers is used as an alternative source of energy to power small electronics in the cabin.

The winning team, Team Levar from Brazil, convinced the jury with a truly innovative proposal for a luggage loading air cushion solution inspired by hockey tables. According to the students, passengers could collect their luggage 30% faster and luggage handlers would be put under less physical strain.

For Irina Bokova, director-general of UNESCO "The diversity of these students' ideas is a huge source of inspiration. Their talent also serves to remind us of the urgent need to train more engineers, to develop the skills and competences needed to translate ideas into reality and put science into practice. This is UNESCO's ambition and one of the objectives of this partnership with Airbus is to inspire more innovative ideas for our future, in sustainable transportation and even further".

In addition to the prize money, the students now look forward to welcoming experts from Airbus' innovation cell onto their campus for a week of workshops and training later this year. F.

[FedEx]

2

» AIR CARGO

FEDEX MAKES HISTORIC PANDA DELIVERY TO TORONTO ZOO

FedEx in March safely delivered two giant pandas from China to Toronto Zoo following months of preparations and public anticipation.

The giant panda breeding pair, Er Shun (female) and Da Mao (male), made the journey from Chengdu, China, to the FedEx Express Canadian Hub at Toronto Pearson International Airport, aboard a specially branded MD-11 aircraft donated by FedEx.

The pandas arrived in Toronto after an 18 hour trip. FedEx Express, the Toronto Zoo, and the Chengdu Research Base of Giant Panda Breeding collaborated extensively to ensure all necessary precautions were taken to provide a safe and comfortable flight for the pandas. Animal care experts were granted special flight privileges to accompany the pandas onboard the aircraft.

Canadian Prime Minister Stephen Harper was airside to officially sign for Canada's receipt of the giant pandas on a FedEx PowerPad handed to him by Lisa Lisson, president of FedEx Express Canada.

"Today is significant for Canadians as it marks an important symbol of trade and diplomacy between our country and China. As the world's global transportation leader, FedEx understands first-hand the opportunity and potential that comes with strengthened relationships and improved global connectivity–all of which is wrapped into the symbolism of today's delivery," said Lisson. "As excited as we are about facilitating this exchange between Canada and China, I can attest that all our 6,000-strong team of employees, from coast-to-coast, are as eagerly excited about the prospects of a giant panda cub being born on Canadian soil."

Following the arrival of FedEx Panda Express, Er Shun and Da Mao were transported by two FedEx Express trucks to Toronto Zoo where they will begin a five-year stay before transferring to Calgary. The specially-branded FedEx Express trucks will stay in service throughout the giant pandas' stay in Toronto, delivering 600 to 900 kilograms of fresh bamboo supplies two-to-three times a week, courtesy of the Memphis Zoo.

The cooperative conservation agreement with China marked the first time in more than 20 years that a giant panda has been loaned to a Canadian zoo. The agreement also marked the first time the Chinese government has granted a ten-year loan of breeding giant pandas to any international zoo in the world.

Following a brief but mandatory quarantine, the giant pandas will be on view to the public at a newly-constructed exhibit at the Toronto Zoo. The programme will allow the zoo to contribute to international efforts to protect and increase the population of the endangered giant pandas through investments in research and conservation efforts. Currently, conservationists estimate that there are just over 2,000 giant pandas left in the wild.

FedEx Express has successfully transported a number of giant panda pairs, underscoring the company's commitment to safely and securely transporting even the world's most precious cargo.

1_The Airbus *Fly Your Ideas* winning team 2013: team Levar Brazil. Left to right: Caio Reis, Leonard Akamatsu, Marcos Philipson, Felipe De-Castro (Airbus mentor), Henrique Corazza.

2_Canadian Prime Minister Stephen Harper signs for delivery of a Panda from FedEx in Toronto.


[COPENHAGEN AIRPORT]

1

» AIR NAVIGATION

MAJOR RUNWAY SAFETY INITIATIVE LAUNCHED

CANSO, the Civil Air Navigation Services Organisation, has launched a major initiative to improve runway safety at airports. The initiative provides a runway safety checklist for airports and air navigation service providers (ANSPs) as well as key tips for both pilots and air traffic controllers.

Launching the initiative, CANSO director general Jeff Poole said, "Safety is our number one priority and the initiative on unstable approaches aims to reduce the risk of a significant runway incident or accident. By partnering with regulators, airports, airlines and ANSPs, CANSO has developed global safety tools that will make a major contribution to safe flying."

A runway excursion is an event in which an aircraft veers off or overruns the runway surface during either take-off or landing. There are many factors that can cause a runway excursion, including runway contamination, adverse weather, mechanical failure, pilot error and unstable approaches. This CANSO initiative focuses on unstable approaches.

A stable approach is vitally important to the safe conclusion of a flight. The pilot needs to be in a safe position to land. If the aircraft does not meet the criteria for a stable approach, such as being at the wrong height, flying too fast or approaching at the wrong angle, the approach will most likely be an unstable one. According to the International Air Transport Association, an unstable approach was identified as a contributing factor for 17% of accidents between 2008 and 2012.

Poole added, "Air traffic control plays an important role in contributing to safe, stable approaches and reducing the risk of runway excursions. This includes ensuring that controllers appreciate what is required for a pilot to achieve a stabilised approach, issuing proper clearances and providing timely and accurate weather information. We have produced easy-to-read 'key tips' for pilots and air traffic controllers to make sure that aircraft are managed safely in the final stage of flight. We are also focused on ensuring that the right systems are in place to improve runway safety overall through our Runway Safety Maturity Checklist."

As well as the key tips for pilots and controllers, the material that is being launched includes a revised and updated education booklet *Unstable Approaches – ATC Considerations*, as well as an app that can be downloaded to smart devices such as tablets and smartphones. The Runway Safety Maturity Checklist is designed to be used by ANSPs, airlines, airport operators, regulators and ATEL/ANAV providers to benchmark their levels of maturity with regard to managing runway safety risks. The checklist uses a series of questions to assess the maturity of an organisation against each element.

Poole concluded, "CANSO will now work with its industry partners, governments and regulators to roll out these materials and to ensure widespread adoption and awareness across the industry. We urge all organisations to take advantage of the best practices in order to achieve significant improvements in runway safety".

» **www.cansosafety.com**

1_An aircraft touches down safely at Copenhagen Airport. The CANSO initiative aims to eliminate the risk of unstable landings everywhere.

Aviation, a world of facts.

2.977 Bn
Passengers carried by airlines in 2012.

5.5 Tn
Kilometres flown by passengers in 2012.

1,568
Commercial airlines.

34,756
City-pair routes served by airlines.

192
Air navigation service providers.

3,846
Commercial airports.

24,911
Commercial aircraft in service, 80% of which are jets. The rest are propeller aircraft.

689m
Global aviation produced 689 million tonnes of CO_2 in 2012.

70%+
Aircraft today are more than 70% more fuel-efficient than the first jets.

12% of fuel wasted
Industry has been asking European governments to implement the Single European Sky, consolidating air traffic control across Europe. This would reduce CO_2 by 12%.

$209Bn
The amount airlines paid for fuel in 2012 – 33% of costs.

2%
Aviation's share of global CO_2 emissions.

79%
Airlines on average operate with 79% of their seats full – greater than coach (60%), rail (40%) and car (30%) travel.

12%
Aviation accounts for around 12% of all transport emissions.

The number of people living in areas impacted by aircraft noise in the USA reduced from 7 million in 1975 to fewer than 300,000 in 2009, despite the large increase in air traffic.

56.6 m
Jobs supported by aviation: 8.36 million within the industry. The rest are through the supply chain and tourism made possible by aviation.

Lifelines
Air transport provides vital lifelines to communities in remote parts of the world, including island states.

AFRICA: 16,500
MID-EAST: 40,000
ASIA-PAC: 192,300
PILOTS: 498,000
NORTH AMERICA: 85,700
EUROPE: 99,700
LAT-AM: 48,600
CIS: 15,200

Aviation jobs required by 2032

AFRICA: 15,900
MID-EAST: 53,100
ASIA-PAC: 215,300
TECHNICIANS: 556,000
NORTH AMERICA: 97,900
EUROPE: 108,200
LAT-AM: 47,600
CIS: 18,000

SOURCE: 2013 BOEING PILOT AND TECHNICIAN OUTLOOK

Emergency
When disaster strikes, aviation can rapidly move relief supplies disaster zones.

1.5 million
livelihoods in Africa depend on trade in air freighted fruit, vegetables and flowers to the UK alone.

$26 Bn
spent by airports on construction in 2010 – creating jobs and boosting local economies.

3.5 x
Aviation jobs are, on average, 3.5 times more productive than other jobs.

1.7 weeks
of the average Australian wage will buy you the lowest Sydney – London return airfare. In 1945, it took 130 weeks of the average wage.

19TH
If aviation were a country, it would rank 19th by GDP.

$2.2 Tn
of global economic activity is supported by air transport.

35%
Air transport carries around 35% of the value of world trade (that was $6.4 trillion in 2011), but only 0.5% of the volume.

$5 Bn
Cost to the global economy of the week-long shutdown of European aviation due to the icelandic volcano Eyjafjallajökull in 2010.

THE SUBSIDY GIVEN TO AVIATION (USED PRIMARILY FOR PUBLIC SERVICE ROUTES).

$440 m

$58 BILLION
The subsidy given to rail each year by European governments.

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