



# Flightpath to a Sustainable Future

THE RIO+20 GLOBAL BIOFUELS INITIATIVE



REVIEW

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Toronto

Montreal

Mexico City

São Paulo



RIO+20

## MESSAGE FROM THE SECRETARY GENERAL

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### AN INSPIRING ACHIEVEMENT

Although there may have been more direct routes to the Rio+20 conference than the one chosen under our 'Flightpath to a Sustainable Future' global initiative, the series of commercial biofuel flights connecting Montreal, Toronto, Mexico City, São Paulo and Rio de Janeiro afforded me the opportunity to highlight one of our sector's very important environmental initiatives.

It also served to demonstrate the high level of cooperation that has always underscored significant moments in global aviation progress, and I would therefore wish to thank at the outset of this message the airlines, airports, aircraft and engine manufacturers, fuel suppliers and other partners whose commitment to more responsible environmental stewardship made this journey possible.

ICAO and its Member States share this commitment and are steadfastly seeking agreement on practical, global solutions supporting the sustainable future of international civil aviation. We are doing so in cooperation with the industry stakeholders, mentioned above, sister United Nations agencies and Non-Governmental Organizations, clearly recognizing that only an effort of this nature will enable us to meaningfully reduce our sector's carbon footprint as it enables and facilitates global economic and social development.

Rio+20 helped focus world attention on critical issues such as access to sustainable energy, sustainable transport and the relationship of these important aspirations to complimentary UN poverty eradication and sustainable development goals. It is our responsibility now to continue to stress how the role and impact of international aviation is central to all of these concerns.

ICAO therefore welcomed the agreement reached at Rio+20, and in particular we took note the provisions relevant to our role as a UN specialized agency leading all fields relating to international civil aviation. Our work within the UN system contributes to the overall political commitment for sustainability, the green economy in the context of sustainable development and poverty eradication, transport and energy, financing and implementation issues.

**Raymond Benjamin**  
ICAO Secretary General

## MESSAGE FROM THE PRESIDENT OF THE ICAO COUNCIL

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As demand for air travel continues to grow, we must work harder to collectively address aviation's environmental impacts while continuing to maximize its social and economic benefits around the world.

For its part, ICAO is closely cooperating with its Member States and industry partners on issues across the sustainability agenda. This report highlights one of our most recent initiatives as part of a wider United Nations conference on sustainable development (UNCSD), the Rio+20 conference.

What made Rio+20 an important moment for ICAO, and indeed the entire aviation community, was the landmark series of connecting commercial flights powered by sustainable alternative fuels which carried ICAO's Secretary General, Raymond Benjamin, from Montréal to Rio.

**This was the first time that such an ambitious operation involving biofuels and ordinary passengers across connecting flight segments has ever been realized and it was an honour for ICAO to be able to share in its success.**

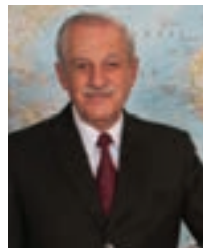
Sustainability is a key issue for aviation and there are a number of important messages which this series of biofuel flights has served to highlight. The first is that aviation is united in its commitment to develop global solutions for the sustainable future of international civil aviation. We are the first sector to agree to an annual fuel efficiency improvement (2%) and to stabilizing our global CO<sub>2</sub> emissions at 2020 levels.

There are presently more than 300 biofuels initiatives underway worldwide and a number of airlines have begun using them for commercial flights, however they are far from being available in suitable quantities and remain expensive. States must therefore seek to ensure that effective policies which create incentives for the further development and deployment of aviation biofuels are established.

The third key point is that through the increased use of low-carbon technology, environmentally friendly materials, new aircraft systems, greener operational measures and sustainable energy sources, the air transport system is making significant advances in further addressing its emissions impacts.

With the 'Flightpath to a Sustainable Future' initiative, ICAO has highlighted the capability of national authorities, aircraft manufacturers, airlines, air navigation service providers, fuel suppliers and other stakeholders to work together to make this pioneering series of biofuel flights possible. It is an excellent demonstration of what can be achieved through our mutual dedication and cooperation and I wish to thank all the 'Flightpath' partners for their tremendous support.

ICAO and its Member States, in collaboration with the aviation industry, will continue to pursue global solutions to address greenhouse gas emission and I can assure you that we will take concrete steps in making further progress so that aviation can continue to fulfill its role as a catalyst for economic and social development in every region of the world.



**Roberto Kobeh González**



## MESSAGE FROM THE CHIEF, ENVIRONMENT BRANCH

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Rarely in my career have I experienced first-hand such a successful initiative as ICAO's 'Flightpath to a Sustainable Future', which put in place a series of connecting flights from Montreal to Rio de Janeiro powered by sustainable alternative fuels.

It was truly remarkable to see an idea, initially dismissed out of hand, become one of the most inspiring and impressive environmental achievements the Organization has ever participated in. The scale of this effort was matched only by its ambitious goal – of reaching out to the 50,000 participants at Rio+20 and showcasing what can be achieved through technology, cooperation and dedication.

Our preparations for delivering aviation's strong message on a sustainable future to Rio+20 began in early 2011, when we conveyed our initial views at meetings with the UN Executive Committee of Economic and Social Affairs. Subsequently, we provided our submission to the conference's consultation process on the expected outcomes. In parallel, ICAO representatives participated in negotiation meetings in 2011/2012 to prepare for the conference.

From the beginning of our preparatory work, the scale of the conference and its themes, as well as the importance of the sustainable energy debate for aviation were clear. As a result, we began consultations with industry partners and others to determine if it might be possible to mark the conference with special event to exceed the expectations and capture the imaginations of the Rio+20 delegates.

We understood that it was important both to accomplish something meaningful and also to demonstrate the capabilities of a large number of aviation partners working together. Thus began the 'ICAO Rio+20 Global Initiative', which is explained in greater detail in the partner statements and messages which follow. These efforts were part of a wider set of events at Rio+20's 'Aviation Day'.

I wish to sincerely thank all of the industry partners for their commitment, time and interest in the 'Flightpath' effort and also to congratulate them on what ultimately was a flawless journey. In particular, we should acknowledge the current high cost of aviation biofuels and recognize the significant investments that were required from Porter Airlines, Air Canada, Aeromexico and GOL. The 'Flightpath' initiative partners, in addition to those associated with the parallel Azul biofuel test flight and KLM commercial flight, set a number of world firsts and records (see results details on pages 4–5).

**A group of approximately 400 people contributed to the 'Flightpath' initiative's planning, logistics, coordination, fuels, flight operations, media and local liaison. Our initiative saved 47 tonnes of CO<sub>2</sub>, or an overall 20% saving. This is a significant result for a single journey. To bring similar savings within reach of the global aviation sector, we need action by governments to reduce regulatory and other policy barriers, and the right initiatives to increase the availability of aviation biofuels and make them more affordable. These goals are realistic and achievable.**

ICAO has a strategic role in facilitating coordination and cooperation among its Member States, the aviation industry and other stakeholders on sustainability as it relates to international civil aviation. Sustainable alternative fuels are key to achieving this goal. The Organization is ready to lead the sector through the sustainable development agenda and to ensure we guarantee access to air transport for generations to come.



Jane Hupe

# FLIGHTPATH TO A SUSTAINABLE FUTURE: RESULTS



Toronto

Montréal

Mexico City

São Paulo



ON 18 JUNE 2012, ICAO SECRETARY GENERAL RAYMOND BENJAMIN TRAVELLED FROM MONTRÉAL TO RIO DE JANEIRO FOR THE 2012 UN CONFERENCE ON SUSTAINABLE DEVELOPMENT, ALSO KNOWN AS RIO+20.

BENJAMIN'S ROUTE FROM MONTRÉAL TO RIO WAS A 'FLIGHTPATH TO A SUSTAINABLE FUTURE', ONE THAT SAW HIM TRAVEL ALONGSIDE ACCOMPANYING DIGNITARIES AND ORDINARY PASSENGERS ON THE FIRST EVER SERIES OF SCHEDULED CONNECTING FLIGHTS POWERED BY SUSTAINABLE ALTERNATIVE FUELS.

THIS PIONEERING ACHIEVEMENT WAS MADE POSSIBLE ONLY THROUGH THE ENVIRONMENTAL COMMITMENT AND GENEROUS COOPERATION DEMONSTRATED BY THE AIRLINES, AIRCRAFT MANUFACTURERS, FUEL RESEARCHERS, AIRPORTS AND MANY OTHER AVIATION COMMUNITY STAKEHOLDERS WHO CONTRIBUTED TO EACH LEG OF HIS VOYAGE.

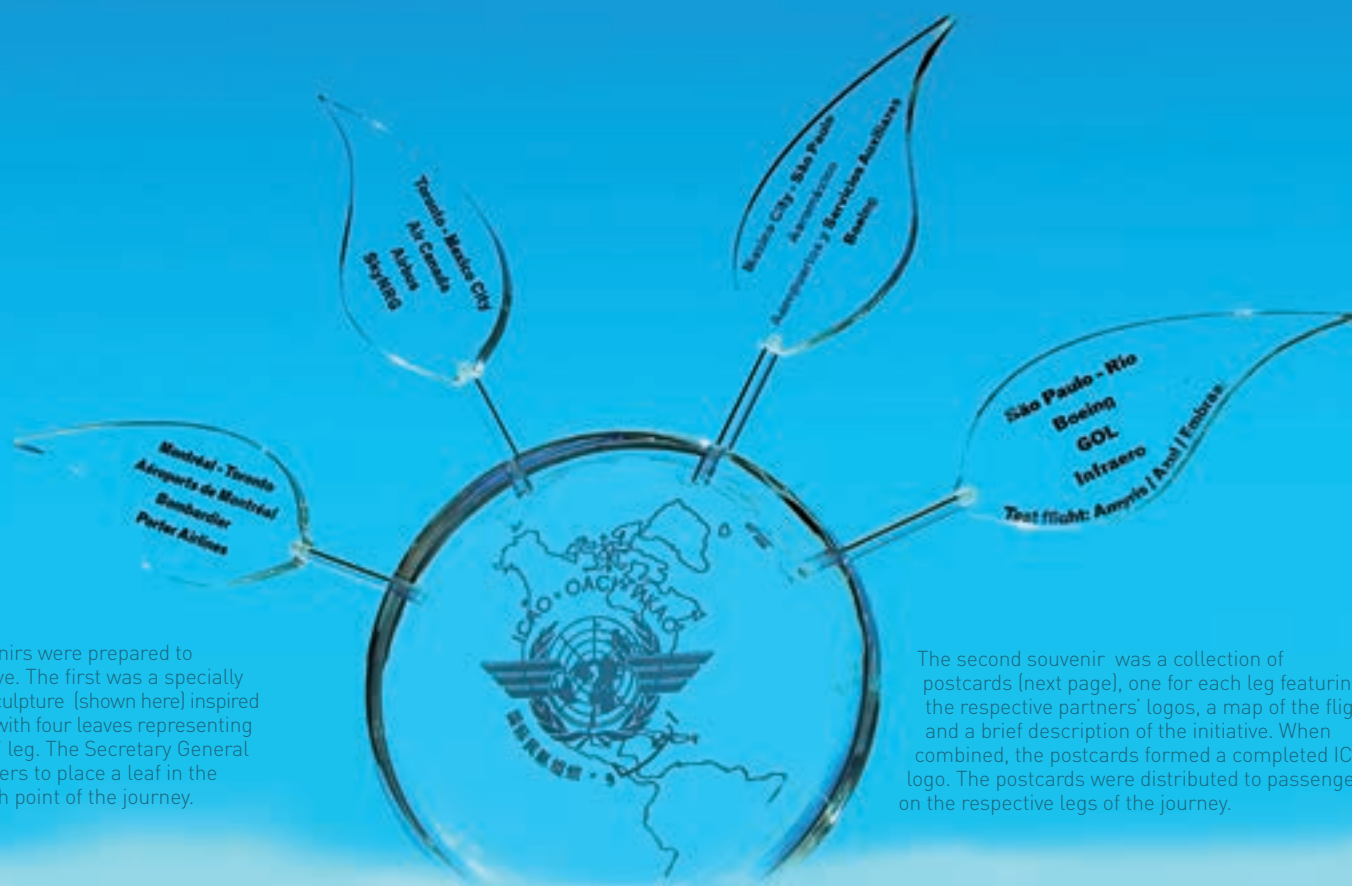
THIS REPORT PRESENTS THE DETAILS OF THIS LANDMARK ACHIEVEMENT AND IS ICAO'S WAY OF SAYING THANK YOU TO THE CONTRIBUTING STATES AND INDUSTRY PARTNERS WHO HELPED REALIZE THIS EFFORT. IT ALSO SERVES TO SHOWCASE GLOBAL AVIATION'S MANY ONGOING INITIATIVES TO ADDRESS ITS SUSTAINABILITY AND ENVIRONMENTAL IMPACT.

THIS IS OUR RESPONSIBILITY TO FUTURE GENERATIONS AND ICAO IS PROUD TO HAVE COLLABORATED ON THIS ACCOMPLISHMENT.

Leg	Airline	Aircraft	Route length (km)	Biofuel blend
MONTREAL – TORONTO	Porter Airlines	Bombardier Q400	494	Camelina
TORONTO – MEXICO CITY	Air Canada	Airbus A319	3,243	Used cooking oil
MEXICO CITY – SÃO PAULO	Aeromexico	Boeing 777	7,423	Used cooking oil, jatropha and camelina
SÃO PAULO – RIO DE JANEIRO	GOL	Boeing 737-800	366	Inedible corn oil and used cooking oil

## FACTS AND RECORDS ASSOCIATED WITH THE INITIATIVE:

- First biofuel flights by Air Canada and GOL.
- First series of connecting international biofuel flights on multiple aircraft.
- First North American commercial biofuel flight using optimized air traffic management.
- First South American biofuel flight using optimized air traffic management.
- First flight using biofuel derived from sugar cane (parallel Azul test flight).
- Greatest number of passengers carried on commercial biofuel flights in 24 hours (388).
- Longest international itinerary using biofuels between Montreal–Rio (11,525 km great circle).



Two novel souvenirs were prepared to mark the initiative. The first was a specially commissioned sculpture (shown here) inspired by a turbine fan, with four leaves representing each 'Flightpath' leg. The Secretary General invited the partners to place a leaf in the sculpture at each point of the journey.

The second souvenir was a collection of postcards (next page), one for each leg featuring the respective partners' logos, a map of the flight and a brief description of the initiative. When combined, the postcards formed a completed ICAO logo. The postcards were distributed to passengers on the respective legs of the journey.

ACKNOWLEDGING OUR PARTNERS

Montréal–Toronto Leg 1



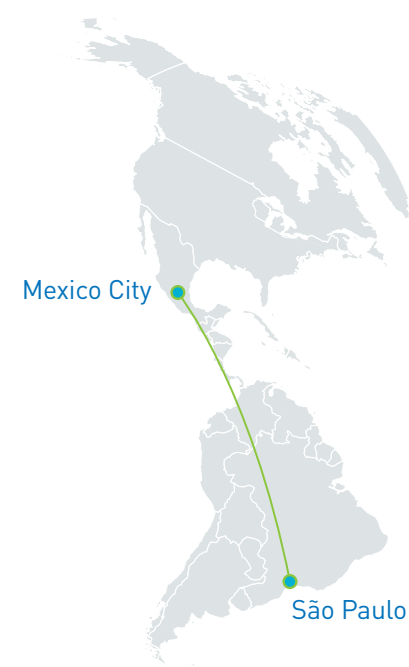
porter

**BOMBARDIER**  
l'évolution de la mobilité

AÉROPORTS DE  
**MONTRÉAL**

Supportée par:  
**ATAG**  
AIR TRANSPORT ACTION GROUP

Mexico City–São Paulo Leg 3



**AEROMEXICO** SKYTEAM

**BOEING**

Aeropuertos y  
Servicios  
Auxiliares

apoyada por:  
**ATAG**  
AIR TRANSPORT ACTION GROUP



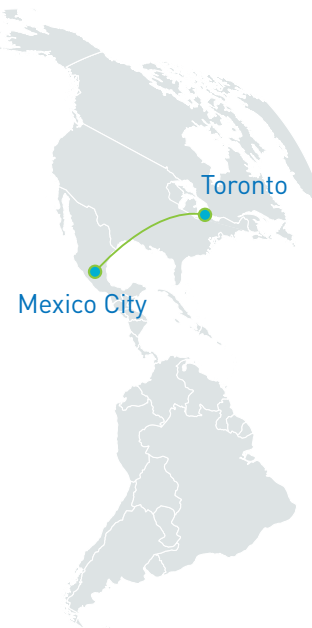
## Leg 2

## Toronto–Mexico City

AIR CANADA 



Supported by:



## Leg 4

## São Paulo–Rio



Supportado por:



## AIRPORT COUNCIL INTERNATIONAL

The aviation industry has set out a roadmap to meet the growing demand for air transport while addressing CO<sub>2</sub> emissions. Sustainable biofuels for aviation, along with technology, operations, infrastructure and market-based measures, all play crucial roles in permitting our sector to meet the ambitious targets of carbon neutral growth from 2020 and cutting net aircraft carbon emissions in half by 2050 relative to 2005.

Sustainability for airports means not only minimizing environmental impacts but also communicating the social and economic benefits of airports and aviation. Without permission to operate and grow from communities near airports and society as a whole, airports will not be able to meet future capacity demand.

When it comes to biofuels, airports can play an important coordination role. In the 2011 U.S.A. project, “Sustainable Aviation Fuels North-West” (SAFN), three airports worked with 40 other stakeholders from universities and agricultural bodies, through Boeing, Alaska Airlines and oil refiners. The project focused on a variety of biomass feedstocks and regional development to deliver biofuels to SeaTac airport.

In the longer term, the distribution of biofuels at airports will be critical. Biofuels must be ‘drop-in’ and will need to be blended upstream of airport fuel farms and hydrant or truck-based delivery systems. Airport infrastructure will not allow separate handling of conventional and biofuels, so recognition of biofuel use will need to be based on fuel purchase agreement, rather than the makeup of fuel physically loaded onto an individual aircraft.

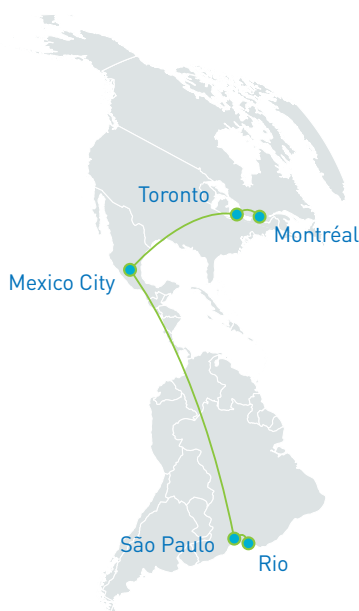


ACI Director General Angela Gittens addressing the press conference and gathered officials at Montréal's Pierre Elliot Trudeau International Airport.

In parallel, airports worldwide will continue to manage and reduce their own greenhouse gas emissions. Energy management is a cornerstone of environmental policy and current initiatives in this regard range from an extensive euro solar park in Athens, solar hot water in Vancouver, geothermal heating in Stockholm, wind power in the Azores islands and electric vehicle recharging at Dallas-Fort Worth.

Airports and ACI will continue to work with our industry partners to help achieve the sustainable development of aviation so that future generations can meet their regional and global mobility needs.

**Angela Gittens**  
Director General  
ACI World  
[www.aci.aero](http://www.aci.aero)



Leg 1

Leg 2

Leg 3

Leg 4

## AIR TRANSPORT ACTION GROUP

The aviation industry can certainly get things done when stakeholders put their minds to it. From conception to delivery in just two months, the 'Flightpath to a Sustainable Future' series of biofuel flights that delivered ICAO Secretary General Raymond Benjamin to Rio de Janeiro for the United Nations Conference on Sustainable Development is a perfect example. But there is a larger lesson from the project, one about collaboration and cooperation between industry partners, supporting ICAO. We were able to bring together a number of airlines, manufacturers, fuel suppliers, airports and air navigation service providers to send a strong signal to the delegates at Rio+20: when we work together, we can achieve great things.

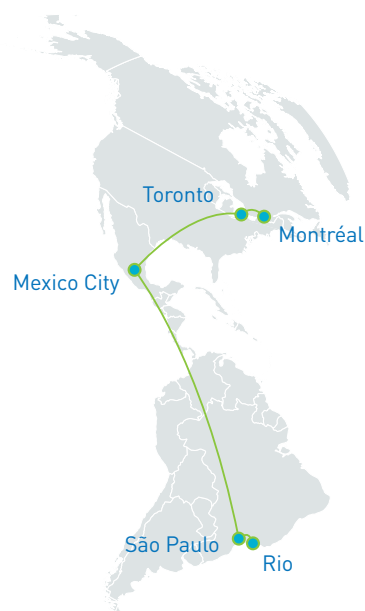
It is this spirit of industry cooperation that brought together aviation leaders in March 2012 to sign our commitment: "Towards Sustainable Aviation". This document, which was delivered to government leaders at Rio+20, outlines the important role aviation plays in bringing together communities and economies around the globe. It is a key enabler of economic growth and social development and provides connectivity and access to markets and tourism. Air transport, currently supporting 56.6 million jobs and over \$2.2 trillion of global GDP with a strong track record of fuel efficiency and CO<sub>2</sub> emissions savings, is a strategic contributor to sustainable development.

While aviation has shown remarkable commitment to working on its environmental responsibility, we also need governments to step up and help craft the sustainable future we all want. Support for research and development of new technologies, sustainable biofuels for aviation and the much-needed improvements in infrastructure are vital for aviation to be able to continue its positive role while minimizing its environmental impact.

The 'Flightpath to a Sustainable Future' was a significant demonstration of what we are able to do and ATAG was very pleased to be able to play a key role in helping ICAO achieve this. It is our hope that governments will now take up the challenge to provide the policy environment needed for our industry to continue making the emissions reductions enabling a sustainable future for aviation.

### Paul Steele

Executive Director  
Air Transport Action Group  
[www.atag.org](http://www.atag.org)



Leg 1

Leg 2

Leg 3

Leg 4

## PORTER AIRLINES

Porter Airlines' participation in the series of ICAO biofuel flights for Rio+20 was the continuation of a commitment to promote and showcase alternative fuel that began three years ago.

The Rio+20 flight was Porter's second biofuel flight in 2012. In April 2012, Porter successfully conducted Canada's first biofuel-powered commercial flight. As the conclusion to a test programme that was launched in 2010, the airline flew one of its Bombardier Q400 turboprops from its base at Billy Bishop Toronto City Airport to Ottawa using a 50/50 blend of biofuel and Jet A1 in one of its engines.

The biofuel is certified to the new American Society for Testing and Materials D7566/D1655 standard and derived from the oilseed crop. The blend was *Camelina sativa* (49%) and *Brassica carinata* (1%). The aircraft's other engine is powered by pure Jet A1.

Other key partners in the biofuel programme include Targeted Growth Canada, producer of the crop of *Camelina sativa*, and Pratt & Whitney Canada, manufacturer of the PW150A engines that power the Q400 aircraft. Funding was provided by the partners, as well as the Green Aviation Research & Development Network (GARDN).



Photo courtesy Porter Airlines

Biofuel used on a regular basis has the potential to make even greater improvements in the future. The opportunity to showcase biofuel raises public awareness, with the ultimate objective being production of enough biofuel so that airlines can seriously consider it as cost-effective, everyday fuel. Porter is proud to contribute to this goal as part of aviation's overall industry efforts.

### Robert Deluce

President and Chief Executive Officer  
Porter Airlines  
[www.flyporter.com](http://www.flyporter.com)





## BOMBARDIER

It was a privilege for Bombardier and its biofuel partners to be invited to support ICAO on this very ambitious and historic event. As a leading aircraft manufacturer Bombardier must act as a role model for the industry where the environment is concerned, not only by designing and building innovative and responsible products, but by working in partnership with the entire industry to find solutions that can benefit us all in the long term.



Hélène V. Gagnon, Vice-President, Public Affairs, Communications and Corporate Social Responsibility, Bombardier Aerospace, addressing the press conference and gathered officials at Montréal's Pierre Elliot Trudeau International Airport.

Just a few years ago the industry was just talking about biofuel and what seemed like a very distant goal, almost a dream. That talk has now turned into action and the entire industry has been involved in a very real way in contributing towards moving this important technology forward.

With biofuels, we can have an impact on all aircraft in service and reduce the environmental impact of aviation as a whole. The challenge that remains is to produce enough biofuels to supply the aviation sector and ensure that prices are lower or equivalent to that of conventional fuel, which is currently far from the case.

Considering the enormous progress we have made in the field of biofuels in recent years, the industry is now working on the next steps to make it all available at competitive pricing in the near future and Bombardier will ensure that it contributes towards driving this forward.

### Hélène V. Gagnon

Vice-President, Public Affairs, Communications and Corporate Social Responsibility,  
Bombardier Aerospace  
<http://csr.bombardier.com/en>



## AIR CANADA

Air Canada was extremely pleased to participate in the ICAO Rio+20 journey. The challenges to arranging the flight became a clear opportunity to incorporate many of our current environmental activities and fuel optimizing initiatives into this one 'perfect flight'.

Along with these activities came a unique opportunity to work closely with and gain invaluable assistance from Airbus, to which we are most grateful. It provided an accelerated learning opportunity for us all.

More than just our first biofuel flight, the maintenance, operational measures, flight optimization and weight reduction initiatives of the Rio+20 journey all coincided with the fundamental elements contained in Canada's action plan for aviation GHG reductions. We believe there was good value in showcasing the combination of all of these elements which are now technically available.

The Air Canada flight achieved an over 40% CO<sub>2</sub> emission reduction, and our post flight analysis will focus on how the various measures contributed to the whole and where continued effort can be most valuable. These efforts include practical implementation

all the way through to advocating more and better policymaking by governments, especially in the area of sustainable aviation biofuel development.



Photo courtesy Air Canada

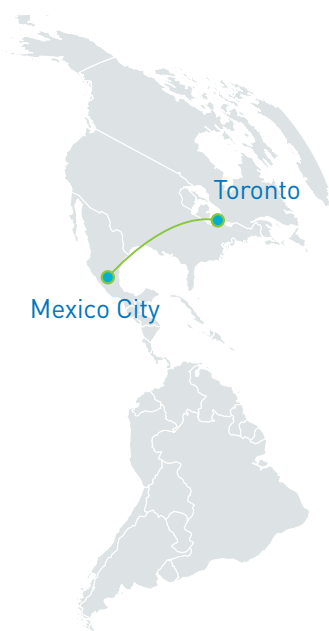
Throughout the Air Canada organization, from Maintenance, Airports, Flight Operations, Fuels, Environmental Affairs and many other departments there emerged a common purpose and extraordinary effort toward creating a successful mission. Air Canada Flight 991 was powered not only by biofuel, but also by a great deal of team spirit.

The Air Canada / Airbus 'Perfect Flight' demonstrated how true collaboration and cooperation among aviation stakeholders is integral to achieving great success in the quest to enhance sustainability for air travel, both here in Canada and around the world.

### **Teresa Ehman**

Director, Environmental Affairs  
Air Canada

[www.aircanada.com/en/environment](http://www.aircanada.com/en/environment)



## AIRBUS

Flying in the most sustainable way possible, with today's available technologies and practices, was the challenge Airbus took up together with Air Canada as part of the series of ICAO / industry biofuel flights en route to Rio+20. Key to success of this 'Perfect Flight', which cut CO<sub>2</sub> emissions by more than 40%, was the collaboration and endorsement of all stakeholders, authorities and industry partners.

The flight was a great opportunity to underline our commitment to the sustainable future of aviation. The industry has set ambitious targets to reduce emissions – one of them being to cap net CO<sub>2</sub> emissions by 2020 – and with this flight we were able to show the world that as an industry we have taken our responsibility beyond pledges alone, demonstrating technologies and practices that underpin our industry strategy.



Raymond Benjamin, ICAO Secretary General;  
Andrea Debbane, Airbus; Captain Claude Saint-Martin, Air Canada.

Photo courtesy Air Canada

And true collaboration was the spirit in which Airbus and Air Canada prepared for their flight. All possible measures and procedures, such as pre-maintenance preparation and operations and optimized routings, were extensively discussed through an open exchange of expertise. This spirit of open cooperation also extended to the selection and securing of the biofuel supply and the applicable authorities played their part in granting the most direct route and endorsing the performance-based continuous descent procedures employed.

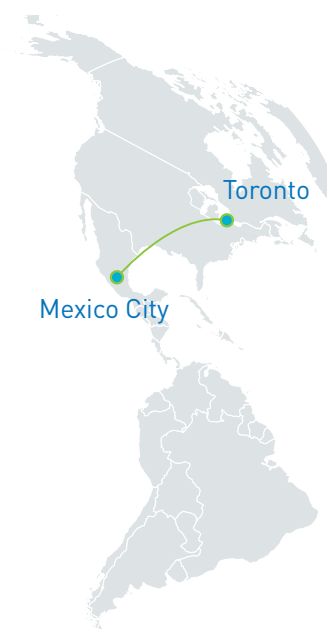
More than 90% of the €2 billion that Airbus spends on research and technology is directed at improving the environmental performance of its aircraft. Airbus is highly involved in Air Traffic Management programmes such as the Single European ATM Research (SESAR) in Europe and NextGen in the United States. Where sustainable alternative fuels are concerned, Airbus' strategy is based on acting as a catalyst in the deployment of sustainable solutions and in supporting more cost-effective commercial production methods.

Challenges still remain, however. A scale-up of the use of sustainable alternative fuels and acceleration of modernization of the Air Traffic Management system are needed for future 'Perfect Flights' to become a commercial reality. What we need is a clear endorsement by governments and aviation stakeholders in allocating proper resources to venture beyond today's limitations and Airbus will continue to work toward this and related goals.

### Andrea Debbane

Vice President of Environmental Affairs  
Airbus

[www.airbus.com/company/environment](http://www.airbus.com/company/environment)



Leg 2

## SKYNRG

SkyNRG and its North American partner Epic Aviation were proud to participate in the first flight by Air Canada using sustainable biofuel on 18 June from Toronto to Mexico. This flight, supported by an Airbus team and with coordination by ICAO, was part of an environmental demonstration coinciding with the Rio+20 United Nations Conference on Sustainable Development.

The fuel type employed in the flight was a 50/50 blend of sustainable biofuel (based on used cooking oil) and conventional jet fuel certified for use in commercial aviation. Its 'life cycle' carbon footprint is approximately 80% smaller than that of conventional jet fuel. This successful project was the result of excellent teamwork by many parties.

SkyNRG has delivered biofuel to more than 16 airlines worldwide in the last year and a half and this project was a prime example of how biofuels can contribute to aviation's sustainable future. We're proud to have been part of this unique and pioneering ICAO event.

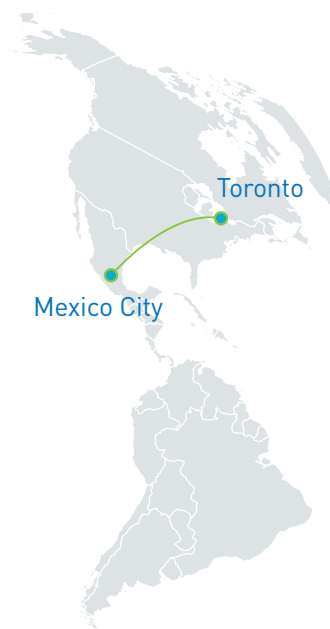
### Dirk Kronemeijer

Managing Director  
SkyNRG  
[www.skynrg.com](http://www.skynrg.com)



Leg 2 team members from Airbus, Air Canada and SkyNRG.

Photo courtesy SkyNRG



### Leg 2





Looks  
like a  
circle

Could  
be the  
key

**Sustainable alternative fuels could unlock the future.**

They are a key element of aviation's strategy in addressing climate change. Global cooperation can lead us closer to this bright new future.

[www.icao.int/act\\_global](http://www.icao.int/act_global)



**ACT>>>  
GLOBAL**

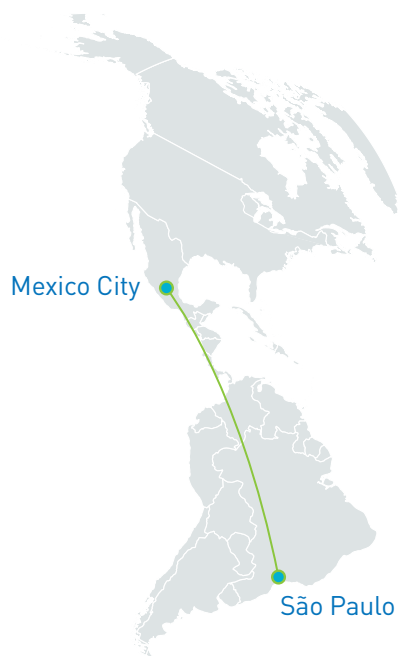
ICAO: UNITING AVIATION ON CLIMATE CHANGE

## AEROMEXICO

On 18 June 2012, Aeromexico operated its first long range biofuel flight in America as part of an array of ICAO and industry initiatives to address the growing and urgent need to reduce aviation CO<sub>2</sub> emissions, while ensuring safe and reliable mobility services that deliver critical social and economic benefits.

One of our Boeing 777-200s completed the Mexico City to São Paulo route minimizing its CO<sub>2</sub> emissions by using a biofuel blend, composed of jet fuel with Bio-derived Synthetic Paraffinic Kerosene (Bio-SPK) made from hydrogenated-used cooking oil. The biofuel blend totalled one-third of the flight's total fuel and was the highest blend (50% of Bio-SPK) permitted by the relevant ASTM 7566-11 specification, allowing us to save significant amounts of CO<sub>2</sub> based on the entire life cycle of the biofuel.

During the flight we also introduced portable electronic devices (iPADS), replacing most of the flight cockpit printed manuals. A number of other fuel efficient procedures like the reduced APU use, no extra fuel, de-rated thrust take-off, and take-off with centre of gravity alternate forward limit were also implemented.



Abraham Zamora - Executive Director of Corporate Affairs and Industry, Aeromexico; Gilberto López Meyer, General Director at Aeropuertos y Servicios Auxiliares; Michiel Vreedenburgh, Deputy Director General ICAO Mexico office.

Photo courtesy Aeropuertos y Servicios Auxiliares / ASA

In order to make biofuels available for the day-to-day operations and a contributing factor to reach ICAO's global climate change goals, a clear and active endorsement by all industry stakeholders is required along with strong political will to promote the proper incentives to scale up biofuel use.

Aeromexico's commitment to advance the adoption and commercialization of sustainable biofuels is central to our corporate citizenship towards a sustainable future for our climate and industry, supporting our nation's economic growth and energy security.

### Hector Edgardo Reyes Muñoz

Vice President of Quality and Corporate Governance  
Aeromexico

[www.aeromexico.com.mx](http://www.aeromexico.com.mx)

## BOEING

It was fitting in an Olympic year that aviation stepped up and worked as a team to carry the industry's delegation and declaration on sustainable growth to the UN meetings on 'Aviation Day'. Boeing continues to demonstrate our commitment with defined actions and hope that government leaders will now do their part to help jumpstart the aviation biofuel sector, but also work toward a broader agreement that supports future industry growth.

The biofuel flights used various percentages of fuels derived from sources that include camelina, used cooking oil, jatropha and inedible corn oil, each blended with traditional jet fuel. In addition to the ICAO Secretary General, they also carried a declaration signed by Boeing Commercial Airplanes President and CEO Jim Albaugh and other industry leaders at the Aviation & Environment Summit earlier this year in Geneva, which outlines the sector's commitment to environmental responsibility.



A large crowd greets the GOL Boeing 737-800 as it lands at Rio's Santos Dumont International Airport. A Boeing 777 was additionally flown by Aeromexico for the third and longest leg of the 'Flighpath' journey, from Mexico City to São Paulo.

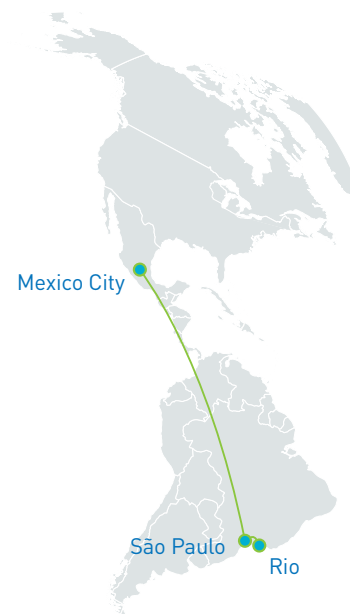
Aeromexico conducted the third flight leg, which employed a Boeing 777-200 fuelled by a blend of biofuel derived from used cooking oil, jatropha and camelina to complete the route from Mexico City to São Paulo. From there, GOL took the baton and used a Boeing Next-Generation 737-800 to carry the delegation from São Paulo to Rio Santos Dumont, using fuel derived from inedible corn oil and used cooking oil supplied by Honeywell's UOP.

Boeing was delighted to be able to participate in the historic flight for GOL Airlines on Leg 4 of the journey, its first flight using sustainable aviation biofuel. The atmosphere was buzzing with excitement before the flight and when the aircraft took off from São Paulo, all onboard clapped and cheered to be a part of the event. Boeing was also pleased to participate in the press conference in Rio de Janeiro culminating the four flight biofuel relay, demonstrating aviation's commitment to reducing its impact on the environment.

Boeing is pleased to have participated in this initiative with partners from across the industry to show our commitment to a sustainable future in aviation.

**Darrin Morgan**, Director of Biofuel Strategy

**Al Bryant**, Vice President  
Research & Technology Brazil  
Boeing  
[www.boeing.com/aboutus/environment](http://www.boeing.com/aboutus/environment)



Leg 3

Leg 4

## AEROPUERTOS Y SERVICIOS AUXILIARES

The fuel used for the Aeromexico flight was blended by Aeropuertos y Servicios Auxiliares (ASA). As a Mexican State-affiliated entity ASA supplies jet fuel throughout the country and began providing alternative fuels just over one year ago.

For this historic Rio+20 flight, ASA supplied 27,000 litres of aviation biofuel composed of 50% regular jet fuel and 50% synthetic paraffinic biokerosene. The latter was made up of 44% used cooking oil, 5% camelina and 1% Mexican jatropha, which are considered second generation biofuel crops. The biofuel was supplied by UOP Honeywell.

The event conferred recognition on the Mexican aviation industry as it was selected to complete the longest leg of the journey using aviation biofuel. The flight from Mexico City to São Paulo covered 7,423km, and was the first to fly the skies of the Americas, North to South, using aviation biofuel.

The undertaking demonstrated a double environmental benefit. On this route alone, significant CO<sub>2</sub> savings were made. In addition, the life cycle of the used cooking oil was shortened by re-use, thus preventing its disposal as a waste product.



Photo courtesy Aeropuertos y Servicios Auxiliares / ASA

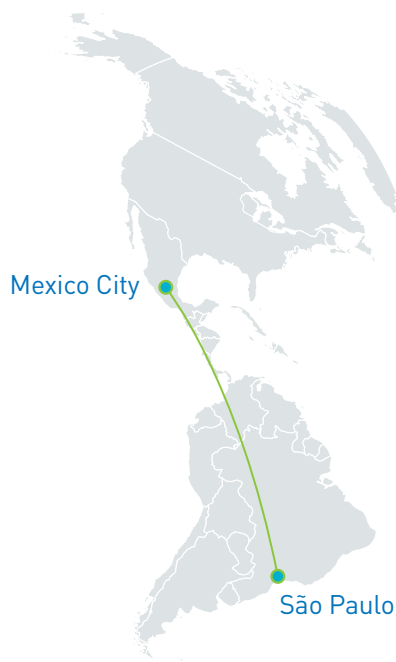
For the first time, a blend of different inputs was used from different sources, thus enhancing ASA's knowledge of aviation biofuels and positioning our state-affiliated enterprise as a major supplier for national and international markets in the future.

### Alejandro Ríos Galván

Director, Fuel Services

Aeropuertos y Servicios Auxiliares

[www.asa.gob.mx](http://www.asa.gob.mx)



Leg 3



## GOL

It was a privilege for GOL to take part in this initiative, which coincided with the successful completion of our first flight using biofuels. This achievement was made possible by our partners, including the Inter-American Development Bank (IDB), Boeing, Curcas and Petrobrás, with the unconditional support of ICAO.

We understood the significance of the timing of the initiative during the Rio+20 conference, where all of Brazil, our companies and GOL specifically reaffirmed our commitment to the sustainability of the planet and the preservation of the beautiful places around us.

fuel consumption and, as a result, the emission of polluting gasses. This is a clear demonstration of our commitment to Brazilian society and the world at large. We know that biokerosene will completely change CO<sub>2</sub> emission levels in the airline industry. That is why we are joining forces, working together, providing support and encouraging research initiatives. All of these initiatives depend on us, responsible human beings, who can apply our will and creativity towards the achievement of continually improving quality of life, remaining focused on advancing the sustainable relationship between man, machine and the environment.

Aviation will continue to grow, bringing people together in safe and intelligent ways, while reducing its impact on the planet. This is what we at GOL believe and continue to strive for.

### Adalberto Bogsan

Technical-Operational Vice President  
GOL Linhas Aereas Inteligentes  
[www.voegol.com.br](http://www.voegol.com.br)



ICAO Secretary General Raymond Benjamin (third from right), joined on his right by Jane Hupe, Chief, ICAO Environment Branch; Arnaldo Vieira de Carvalho, Senior Energy Specialist, Energy Division, Inter-American Development Bank (far left); Al Bryant, Vice President Research & Technology Brazil, Boeing (second from left); Adalberto Bogsan, Technical-Operational Vice President, GOL. (third from left); and Mike Lu, President, Curcas (far right) and Marcelo Pacheco dos Guaranys, Director-President, ANAC (second from right).

Innovation is one of GOL's core values and we believe that humanity must work to find sustainable solutions, be they for civil aviation or other activities. Our doors are open to all those who seek progress in this area.

On 12 May of this year we took another step towards greater sustainability, becoming the first Brazilian airline authorized by the National Civil Aviation Agency (ANAC) to use the RNP-AR approach system at Santos Dumont airport in Rio de Janeiro. The required navigation performance at Santos Dumont airport, which was designed by the Department of Air Space Control (DECEA), reduces noise, flight times,



### Leg 4

## CURCAS

The fourth leg of the ICAO Rio+20 journey was completed by the first flight of GOL Linhas Aéreas Inteligentes using biofuel, coinciding with the launch of the Brazilian Biojetfuel Platform, a collaborative multi-feedstock integrated value chain for the production of biofuel and renewable chemicals in Brazil.

Upon the arrival of the GOL flight, the Brazilian Minister of Development, Industry and Export, Mr. Fernando Pimentel, reiterated the Brazilian Government's support to the biofuel segment. The Hydroprocessed Esters and Fatty Acids (HEFA) fuel, supplied by Honeywell UOP, was produced from used cooking oil and inedible corn oil with import logistics provided by AirBP and local blending with JetA1 by BR Aviation.



Mike Lu, Curcas President (centre), joined by Adalberto Bogsan, Technical-Operational Vice President, GOL (left); and Pedro Rodrigo Scorza, GOL Operations Director (right).

As an additional CO<sub>2</sub> emissions saving measure, the landing at Santos Dumont airport in Rio de Janeiro was conducted under Required Navigation Performance (RNP), a type of precision performance-based navigation which minimizes engine emissions and noise around airports. The flight was sponsored by Boeing, BR Aviation, Curcas and the Inter-American Development Bank (IDB).

**Mike Lu**  
President  
Curcas  
[www.cdieselbr.com.br](http://www.cdieselbr.com.br)



## HONEYWELL UOP

UOP, a Honeywell company, was delighted to take part in the sustainable energy project led by ICAO. UOP's Green Jet Fuel™, produced from its UOP Renewable Jet Fuel process, powered the third and fourth leg flights from Mexico City to the Rio+20 conference in Rio de Janeiro, Brazil.

The third flight, operated by Aeromexico Airlines on a Boeing 777, used Honeywell Green Jet Fuel produced from jatropha and camelina, both inedible plants. Fuel for this flight was blended by Aeropuertos y Servicios Auxiliares (ASA).

In 2011, Aeromexico began using Honeywell Green Jet Fuel on its regular Mexico City to Costa Rica route as part of its Green Flights project, designed to reduce greenhouse gas emissions. This marked one of the first uses of renewable fuels in everyday airplane passenger service.

The fourth flight, operated by GOL Airlines on a Boeing 737, used Honeywell Green Jet Fuel produced from used cooking oil and inedible corn oil. The fuel for the São Paulo to Rio de Janeiro flight was blended locally in Brazil. Each flight used a 50/50 blend of Honeywell Green Jet Fuel with petroleum-based jet fuel.

Honeywell Green Jet Fuel has been proven repeatedly in military and commercial flights to be a practical solution for using alternative fuel sources, as well as meeting increasingly strict emissions standards. With the expected growth in fuel demand and the increasing refining capacity in Latin America over the next several years, we look forward to continuing to provide sustainable energy solutions to support the region.

Honeywell Green Jet Fuel can offer a 65% to 85% reduction in greenhouse gas emissions relative to petroleum-based fuels. When used up to a 50% blend with petroleum-based jet fuel, Honeywell Green Jet Fuel is a drop-in replacement for petroleum-based jet fuel that requires no changes to the aircraft technology and meets all critical specifications for flight. The process technology is fully compatible with existing hydroprocessing technology commonly used in today's refineries to produce transportation fuels.

Honeywell UOP is presently developing a range of processes to produce green fuels from natural feedstocks. In addition to its Renewable Jet Fuel Process technology, the company has commercialized the UOP/Eni Ecofining™ process to produce Honeywell Green Diesel™ from biological feedstocks. It has also a joint venture with Ensyn Corp. in Envergent Technologies LLC, which offers pyrolysis technology for the production of renewable heat, power and transportation fuels.

### Jim Rekoske

Vice President and General Manager of Honeywell's UOP Renewable Energy and Chemicals unit  
[www.uop.com](http://www.uop.com)



Leg 4

## PARALLEL TEST FLIGHT: AZUL / EMBRAER

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The air transport industry is one of the most important contributors to the modern economy. It was therefore with great joy and enthusiasm that Azul's Safety Director, Captain Augusto Nunes, announced to a group of specially invited guests that Viracopos tower had cleared the take-off of the company's first biofuel-powered flight to Rio de Janeiro, where ICAO's Secretary General and Brazil's Civil Aviation Minister, Wagner Bittencourt, enjoyed a flawless landing at Santos Dumont airport.

For this first exercise Azul utilized a DSHC biofuel derived from sugar cane – a biomass that already powers the majority of the Brazilian automobile fleet and a legacy component of the Government projects initiated as a response to the first oil shock in the late 1970s.

We are grateful to Amyris for providing the fuel technology, Embraer for the functionality and compatibility tests, and General electric for the engine test cell runs.

Teamwork, long-term vision and a spirit of bold initiative were the building blocks of this success, cemented with sustainability targets and a longing for the day when flying will be freed from the oil dependence.

All in all this was an example of aviation at its best.

### **Adalberto Febeliano**

Institutional Relations Director  
[www.voeazul.com.br](http://www.voeazul.com.br)

### **Mauro Kern**

Executive Vice President for Technology & Engineering  
Embraer  
[www.embraer.com/en-US/amb-responsability](http://www.embraer.com/en-US/amb-responsability)



Photo courtesy Embraer



## PARALLEL COMMERCIAL FLIGHT: KLM / BOEING / SKYNRG

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KLM operated the longest biofuel flight crossing the Atlantic ocean, departing from Amsterdam to Rio de Janeiro for the Rio+20 conference. Passengers onboard flight KL705 included the Netherlands State Secretary of Infrastructure and the Environment, Mr Joop Atsma. The Boeing 777-200 aircraft used a biofuel derived from used cooking oil.

The fuel was supplied by SkyNRG, a company KLM founded in 2009 with North Sea Group and Spring Associates. SkyNRG is now the world's market leader for sustainable kerosene, supplying more than 16 carriers worldwide.

With this flight, KLM further expanded our pioneering role in the development of sustainable biofuels. We have been working with the World Wide Fund for Nature The Netherlands (WWF-NL) since 2007 and were the first airline to develop a biofuel programme. Using sustainable BioFuel is one of the most important ways to make aviation more sustainable and we can only achieve this with partners who dare to stick their necks out.

Aviation is on the threshold of a small revolution and at times like these it is best to lead from the front. Those who take the pressure off nature today are the winners of tomorrow and the rapid development of alternative, reliable biofuels is a vital step toward this objective.

The KLM BioFuel programme enables companies to join KLM and SkyNRG to demonstrate the leading position they occupy on sustainability. We call upon Dutch businesses to join in to accelerate the development of biofuels and to stimulate a sustainable economy. KLM will do everything in its power to ensure that from 2013 Dutch officials on government business will travel as much as possible on biofuel flights, including the government's own aircraft.

### **Camiel Eurlings**

Managing Director  
KLM

[www.klm.com/csr/en/environment](http://www.klm.com/csr/en/environment)



Photo courtesy SkyNRG



## RIO+20 OVERVIEW

### AVIATION DAY LAUNCH

The launch of 'Aviation Day' began with a well-attended press conference at Santos Dumont International Airport, which took place immediately after the arrival of the Leg 4 GOL flight from São Paulo.

Present at the event were (at head table, from left to right): Al Bryant, VP Research and Technology, Boeing Brazil; Adalberto Bogsan, VP, GOL; Fernando Pimentel, Brazil's Minister of Development, Industry and Foreign Trade; Raymond Benjamin, ICAO Secretary General; Wagner Bittencourt, Chief Minister of Brazil's Civil Aviation Ministry; Marcelo Pacheco dos Guaranys, Director-President, ANAC; and Jane Hupe, Chief, ICAO Environment Branch. Not visible at left: Paul Steele, Executive Director, Air Transport Action Group.



ICAO Environment Branch Chief, Jane Hupe, addressing the Rio+20 Aviation Day press conference held at Santos Dumont International Airport.

### INFORMATION BOOTH

Separately, the ICAO information booth was set up in the pavilion reserved for UN organizations located at the Athlete's Park, an exhibition area adjacent to the RioCentro. The information booth supported the dissemination of ICAO information and allowed on-site distribution to conference participants of outreach material related to the work of ICAO in the field of environmental sustainability. During the 12-day conference period, the ICAO Rio+20 video was showcased at the ICAO booth together with the recently released ICAO carbon calculator iPhone/ iPad application. A library of ICAO reports, as well as media and press releases were also available at the booth.



Jane Hupe with Lorenzo Gavilli, also from the ICAO Environment Branch, at the ICAO Rio+20 information booth.



## RIO+20 OVERVIEW

### ICAO OFFICIAL SIDE EVENT

ICAO's side event focused on "Sustainable aviation for generations to come" and featured presentations by States who gave their perspectives on sustainable alternative fuels for aviation and who shared experiences on developing related initiatives.

Compared to the average participation in similar side events, this event was well attended and provided ICAO with an opportunity to showcase its initiatives for a sustainable aviation. The ICAO Rio+20 publication was distributed outlining aviation's high level messages and the sector's role and contribution to green economy and sustainable development. States representatives from EC, Mexico, Brazil, Canada and representatives from ATAG and WWF, invited to participate as panellists, focused their interventions on concrete actions for the development and deployment of sustainable alternative fuels for aviation. The following speakers interacted with the audience during the side event ensuring a lively debate:



- [ICAO](#) - Mr. Raymond Benjamin, Secretary General and Ms. Jane Hupe, Chief, Environment Branch
- [European Commission](#) - Ms. Laurence Graff, Head of Unit for International Affairs, European Commission's Climate Action Directorate
- [Mexico](#) - Mr. Guillermo Heredia, Coordinator of Business Units, Aeropuertos y Servicios Auxiliares.
- [Brazil](#) - Mr. Marcelo Pachecodos Guarany, ANAC Director & President, National Civil Aviation Authority
- [Canada](#) - Mr. Ron Bonnet, President of the Canadian Federation of Agriculture
- [ATAG](#) - Paul Steele, ATAG Executive Director and IATA Director of Environment
- [WWF](#) - Samantha Smith, Head of Global Climate and Energy Initiative

## RIO+20 OVERVIEW

### RIO+20 CONFERENCE PLENARY AND HIGH LEVEL ROUNDTABLE

On Wednesday, 20 June, the ICAO Secretary General attended the formal opening Plenary of the Conference. Together with 10 Heads of State and Government, 18 Ministers of Foreign Affairs, Finance and Environment, eight UN Agency heads, representatives of seven Major Groups and two Nobel laureates, he also took part in the first High-level Roundtable discussion focused on “Looking at the way forward in implementing the expected outcomes of the Conference”.

The Roundtable, co-chaired by Prince Albert II of Monaco and Emílio Guebuza, President of the Republic of Mozambique, noted that a plan to draft a set of strong, coherent sustainable development goals (SDGs), coupled with mechanisms to hold Member States accountable for implementing them, would ensure that Rio+20 leaves an indelible mark on the development landscape.





## ICAO'S RIO+20

### KEY MESSAGES ON SUSTAINABILITY

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ICAO and its Member States are committed to the development of global solutions for the sustainable future of international civil aviation, in cooperation with industry, sister United Nations agencies and Non-governmental Organizations. While fulfilling its role as a catalyst for economic and social development, air transport is focused on reducing its environmental footprint, under the guidance and leadership of ICAO.



Policymakers must always strike a balance among the three pillars of sustainability – social, economic and environmental. This will allow air transport to grow in an environmentally sustainable manner, while continuing to ensure freedom to travel by air.



The democratization of air travel is one of the wonders of our age. Access to sustainable air transport must be guaranteed for future generations.



Strong policy frameworks are required to address the new energy challenges as we transition to a green economy. Sustainable alternative fuels represent one of the most promising win-win-win solutions for aviation's future. Availability of these fuels must be guaranteed through policies that incentivise their development and their deployment.



Increasing the price of air transport should not be considered as a means to achieve sustainability. The sector is pressing to meet its environmental commitments through its own resources.



Co-ordination of activity at the international level should be further enhanced, duplication of activity between agencies should be eliminated in all areas, we must build upon the work of specialized agencies and existing sustainable development frameworks.



Biofuels have enormous potential to assist the aviation sector reduce its environmental impact, while consolidating its social and economic benefits. However action from policymakers is required to remove national and international barriers to their use, to increase the availability of biofuels and to decrease their cost.



# Appreciation & Thanks

## **Aeromexico**

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## **Aeropuertos y Servicios Auxiliares**

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## **Airport Council International**

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## **Air Transport Action Group**

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Mike Lu

## **Embraer**

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## **GOL**

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Aline Novaes Ferreira  
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