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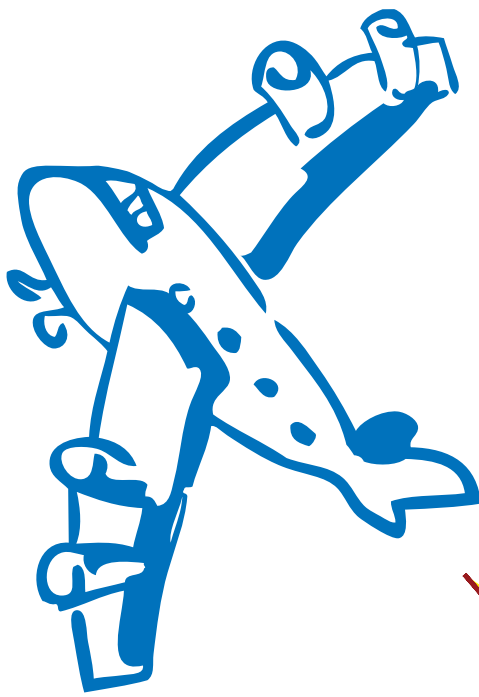
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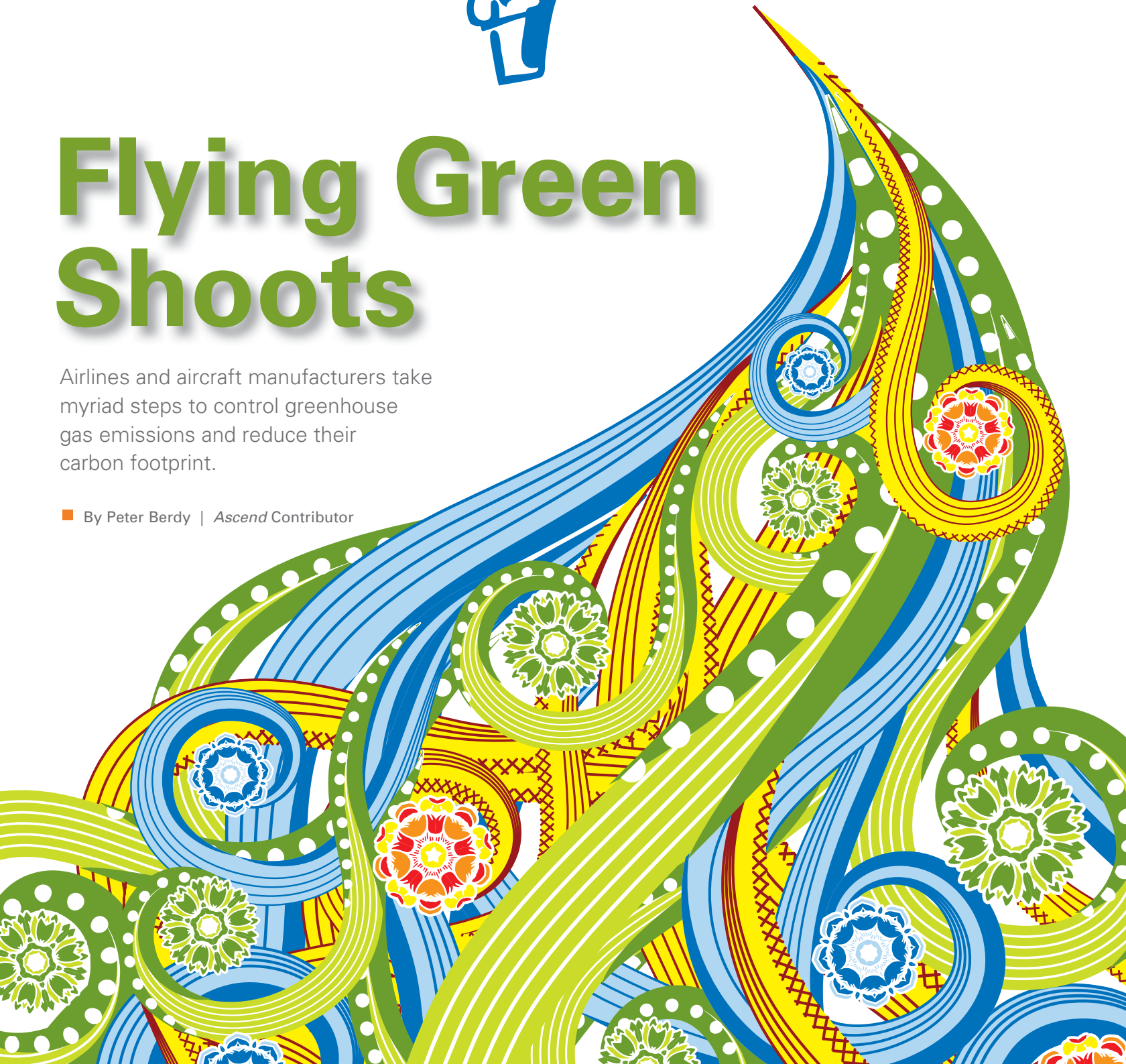
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# Flying Green Shoots

Airlines and aircraft manufacturers take myriad steps to control greenhouse gas emissions and reduce their carbon footprint.

■ By Peter Berdy | *Ascend* Contributor



Carbon dioxide has crept into the airline vocabulary faster than the fizz coming out of a favorite carbonated drink. If passengers are not yet aware of CO<sub>2</sub>, they soon will be. British Airways Chief Executive Officer Willie Walsh said airline passengers should pay a global tax on carbon and accept an increase in the cost of flying for the sake of the environment. British Airways is the first airline to propose such a tax and indicated the money raised should be used to combat tropical deforestation and help developing companies adapt to climate change. The proposed tax is no small change: US\$5 billion a year.

Walsh said airlines should be forced to buy permits from 2013 to cover their carbon emissions in a global emissions trading scheme.

"For the industry to play its part, the people who benefit from that industry — the passengers — are going to have to pay," Walsh said. "Airlines can't escape the responsibility of addressing the impact that aviation has on the environment. We accept that our industry has got to improve.

"It could be four or five times the US\$5 billion if the price of carbon goes up," he said. "The critical thing is to cap overall CO<sub>2</sub> and then provide financial incentives to industries that have other fuel sources and technologies to reduce their CO<sub>2</sub> output."

British Airways' stance suggests that airlines should offset their emissions by helping pay for investments in non-aviation industries that use lower carbon technology. In other words, the carbon credits these industries create would be purchased by airlines to offset carbon pollution generated by flying.

Since we are in the "pre-CO<sub>2</sub> tax" era for air travel, it is worth examining what airlines and manufacturers are doing on their own to reduce greenhouse gas, including the steps and investments they are taking for more efficient use of fuel and to be friendlier to the environment. There is a wide range of activities, and by no means is this roundup complete.

### Focus On Fuel Consumption

"Fuel consumption has always been one of the main criteria for airliners," said Christian Dumas, deputy head of Airbus in charge of environmental issues. "Depending on the price of crude, fuel can be up to 40 percent of an airline's operating cost. Efforts to reduce fuel consumption make sense to control costs as well as reduce emissions."

As part of many efforts to reduce fuel consumption, manufacturers Airbus and Boeing are building planes that weigh less by using composite materials such as hi-tech plastics and carbon fiber. The new Airbus A350 and the Boeing 787 are built with a composite material content as high as 50 percent.



Photo courtesy of Airbus



Photo courtesy of Airbus



Photo courtesy of Boeing



Photo courtesy of Boeing

Reducing airplane weight, no matter how small, can help significantly reduce fuel consumption.

“The airlines are really making effort to take weight off the aircraft,” said Paul Steele, head of the Air Transport Action Group, an association for environmental standards.

In addition, there is a concerted drive toward total efficiency that includes better management of air space. Airlines are trying to manage routes to cut flight time and save fuel, and new technology and solutions should soon be deployed by the U.S. Federal Aviation Administration and EUROCONTROL to manage airspace. Boeing has carried out tests in San Francisco, California, for making approach and landing in a straight line rather than in steps as is the current practice.

“This would allow a savings of 40 percent of fuel during landing,” said Billy Glover, head of environmental strategy at Boeing.

There have been attempts to reduce the length of time the engines are operating including tests by Airbus that would mean engines are only switched on when the plane is actually on the runway.

New-generation airplanes, including the Airbus A350, Boeing 787 and Bombardier C-series, will reduce fuel consumption by up to 20 percent compared to those they will replace. According to Raphael Sheffield from Airbus, this new generation of aircraft pushes current understanding of technology about as far as it can go in terms of squeezing more efficiency in fuel consumption.

In addition to developing new, more-efficient aircraft models, manufacturers have developed modifications for use with current airplanes, such as winglets, to reduce fuel burn by improving the way engines consume fuel. Manufacturers, in partnership with engine companies and others, are helping their customers test new biofuels and are also working with suppliers and with each other on sustainable initiatives.

### Reducing Greenhouse Gas Emissions

Airbus and Boeing publish environmental and corporate responsibility reports where they set forth their track record and commitments related to sustainability and corporate responsibility as well as describe what they are doing to reduce their environmental footprint and bring new technologies to the industry. Many airlines are doing the same.

### Airbus

Airbus is engaged in air-traffic management, developing efficient new airplanes, testing alternative fuels, making improvements to in-service aircraft and developing new processes to decrease fuel consumption and CO<sub>2</sub> emissions.

Airbus’ track record includes fly-by-wire technology, development of composite struc-



Virgin Atlantic, Air New Zealand, Japan Airlines (left) and Continental along with Boeing and engine manufacturers GE Aviation, Rolls-Royce and Pratt & Whitney have performed ground-breaking demonstration test flights on sustainable, plant-based fuels, which have proved the economic and environmental viability of biofuels.

tures, and the use of advanced materials and aerodynamics, all of which have reduced aircraft weight and fuel burn and increased fuel efficiency.

Airbus aircraft painting processes are becoming more environmentally friendly with new techniques and operational changes that improve eco-efficiency. Changes in painting results in a dramatic reduction in paint volume. Airbus also is studying ways to capture and dispose of the paints’ damaging volatile organic compounds, or VOCs, before they present a risk to the environment. The majority of Airbus customers now choose low-VOC paint.

The use of solvents to clean equipment has been reduced by 90 percent, and the quantity of harmful chromate dust generated by the polishing of primer paint will be greatly reduced by new practices as part of the Airbus chromate-free program.

Alternative fuel research is a core tenet of Airbus’ initiatives to reduce the environmental impact of air transport. This offers potential benefits such as lower fuel burn and increased engine reliability and durability as well as improved payload-range performance. Airbus has partnered with Honeywell Aerospace, UOP, the Institute for Aviation and the Environment, and JetBlue Airways to develop renewable energy technology. Biofuels of interest to Airbus include synthetic fuel from biomass (BTL), fast-growing algae and jatropha. The company also sees potential in alternative forms of existing aviation fuel. In addition, Airbus, Shell and Rolls-Royce conducted an Airbus A380 flight test in 2008 that utilized gas-to-liquid kerosene, which is cleaner than the oil-derived jet fuel.

Airbus is a partner to Single European Sky ATM Research, or SESAR, a program to help modernize Europe’s air-traffic management, preventing congestion and reducing aviation’s overall environmental impact.

Manufacturers are looking at a total life-cycle approach to airplanes. Airbus is leading a project called Process for Advanced Management of End-of-Life Aircraft, or PAMELA, for dismantling and recycling retired aircraft. Airbus estimates more than 5,200 aircraft will be retired during the next 20 years. Not only is it being applied to the end-of-life treatment of Airbus aircraft but also taking dismantling and recycling into account in the design of new products.

### Boeing

Boeing’s stated priority is to reduce emissions of CO<sub>2</sub> from operations and their products. The plane maker is focused on three “pathways”:

- Improving the fuel efficiency of new aircraft models. Boeing’s newest aircraft, such as the 787 Dreamliner and 747-8, are about 20 percent more fuel efficient than their predecessors. Boeing has also made improvements to existing airplanes (blended winglets and retrofit performance packages) and developed solutions to increase fuel efficiency and reduce noise during the complete life of the airplane.
- Improving the efficiency of air traffic systems. Boeing, together with airports, air-traffic management systems and airline operations teams, has been working on new methods of air traffic management that are delivering substantial emissions savings, including predictable continuous descent, which improves fuel consumption compared with the current step-down descent. Boeing’s program, called Tailored Descent, has been in use by four airlines at San Francisco International Airport since 2007.
- Improving the life-cycle CO<sub>2</sub> emissions of fuels. Boeing; engine manufacturers; and Virgin Atlantic, Air New Zealand, Continental and Japan Airlines have conducted innova-



Photo courtesy of Embraer

**Copa Airlines reduces noise and greenhouse gas emissions by up to 5 percent by employing sound ecological practices operating a fleet of aircraft equipped with winglets. The carrier also uses several methods to minimize fuel burn.**

go toward preservation and reforestation of tropical forests in Costa Rica. Nature Air flies 74 daily turboprop flights to 17 destinations in Costa Rica. According to the airline, its fleet of DeHavilland Twin Otter Vistaliners and Beechcraft King Air E90s provide “the least intrusive and most enjoyable way to travel through environmentally sensitive areas.”

Nature Air is the first airline to run its entire ground operations equipment and fleet of diesel vehicles on biodiesel. The biodiesel formula utilizes recycled vegetable and cooking oils. River pollution is a growing problem in Costa Rica and is mostly due to sewage runoff from homes, hotels and businesses that don't have proper sewage treatment facilities. To help prevent local restaurants and Nature Air employees from flushing cooking oils down sink drains, the carrier pays program participants to collect all recycled or unused cooking oils.

The World Tourism & Trade Council, Rainforest Alliance, Conde Nast Traveler and Virgin Holidays have recognized Nature Air for its sustainability efforts.

### Copa Airlines

Panama-based Copa Airlines applies good environmental practices with its fleet of Boeing 737-700 and 737-800 aircraft outfitted with winglets that reduce noise and greenhouse gas emissions by up to 5 percent.

The carrier also incorporates smart operating practices to reduce fuel consumption, including:

- RNAV satellite navigation (enabling Copa to choose the most direct route to various destinations),
- Optimizing altitude and speed at different stages of operation,
- Optimizing takeoffs and landings,
- Single-engine taxi,

tive demonstration test flights on sustainable, plant-based fuels. These flights proved the economic and environmental viability of biofuels such as jatropha, algae and camelina. In 2008, Boeing, Virgin Atlantic and GE Aviation proved the technical feasibility of using biofuels during the first biofuel flight, followed by a sustainable biofuels test flight with Air New Zealand and Rolls-Royce. In 2009, Boeing conducted another series of evolutionary test flights with Continental Airlines and GE Aviation as well as Japan Airlines and Pratt & Whitney. These flights demonstrated that sustainable biofuels have the potential to be applied to existing airplanes to reduce CO<sub>2</sub> emissions.

In 2008, Boeing and industry stakeholders signed the “Aviation Industry Commitment to Action on Climate Change,” the commercial aviation industry's commitment to pursue carbon-neutral growth and eventually eliminate carbon emissions from products in the long term.

### Continental Airlines

Continental Airlines has created a corporate initiative called Eco-Skies to minimize its carbon footprint and maintain awareness among its employees, suppliers and customers. The airline states that it is 35 percent more fuel efficient per revenue passenger mile versus a decade ago. It has replaced most of the aircraft in its fleet with more energy-efficient planes and operates only twin jet aircraft.

Continental has saved fuel and reduced emissions by nearly 5 percent by installing winglets on most of its Boeing 737s and 757s. The airline focuses on minimizing fuel burn with a new flight planning system. It also has reduced emissions from ground equipment at its hub in

Houston, Texas, by more than 75 percent since 2000. Continental has 13 full-time staff environmentalists working with engine manufacturers, designing green terminals, and tracking carbon emissions and chemical recycling daily. Even all the trash from company headquarters is later sorted for recyclables. *FORTUNE* magazine named Continental one of the top 10 global companies across all industries in the community/environment category in 2007.

### Nature Air

Costa Rica-based Nature Air is the first airline to offset 100 percent of its carbon emissions from flight operations. The airline just embarked on its fifth consecutive year of compensating for its flight emissions, which



Photo supplied by Jupiter Images

**Nature Air, the first airline to offset 100 percent of its carbon emissions from flight operations, supports preservation and reforestation of Costa Rica's tropical forests as a result of its reduces emissions. The carrier is also the first to run its entire ground operations equipment and fleet of diesel vehicles on biodiesel.**



- Using ground power units instead of auxiliary power units at airports with GPU,
- Regular engine cleaning and polishing wing surfaces,
- Reducing weight onboard.

Copa has voluntarily submitted a formal environmental audit plan to the Panamanian regulatory agency. The annual environmental audits ensure the airline follows through on its commitments. The audits are conducted by an external consulting agency certified by Panama's national environmental authority, ANAM.

The carrier collaborates with ANAM in programs that minimize the environmental impact of its operations and improve environmental performance. Its environmental management programs focus on sustainability and support innovation, clean production and a green corporate culture to reduce or offset greenhouse gasses and minimize the environmental impact of the company.

In addition to enhancing general knowledge of environmental problems, especially those related to the impact of aviation on the environment, Copa launched an environmental awareness campaign. It is designed to demonstrate good environmental practices such as reducing and offsetting emissions, using resources wisely, and properly managing residual waste, with an objective to inspire support and participation in the company's environmental programs and successfully integrate environmental responsibility across all sectors.

For example, Copa has a company-wide recycling program. It includes paper, cardboard, cans, glass and oil. It indicates it has reduced the volume of paper it uses by e-ticketing and distributing operating manuals electronically. Copa uses biodegradable products to clean aircraft and offices. The airline has converted ground equipment to run on liquefied natural gas, reducing emissions by 21 percent.

### Japan Airlines

The JAL Group has been conducting a variety of measures that are helping reduce its environmental footprint. It is targeting a 20 percent cut in CO<sub>2</sub> emissions per available ton kilometer of its fleet by next year, compared to 1990 levels. It has already achieved nearly a 16 percent reduction since 1990.

JAL's environment-friendly activities cover a wide range, including:

- Recycling aluminum cans, newspapers and magazines;
- Converting old crew uniforms into noise-reduction and heat-shield materials used in automobiles;
- Fitting specially developed air-sampling equipment on its aircraft to help understand the causes and effects of global warming;
- Recycling plastic sheeting used to protect air freight to make wheel chocks and garden supplies;

- Recycling precious metals, including titanium and nickel from aircraft-engine maintenance plants, to make watch parts;
- Retreading jumbo-jet tires so they can be used again.

JAL operations are focused on initiatives aimed at achieving reductions in CO<sub>2</sub> emissions to lower fuel consumption. Efforts include using new low-emission airplanes, applying direct descent approaches, reducing emissions on the tarmac and reducing weight of its planes, such as unpainted cargo aircraft.

In addition to using newer airplanes that reduce noise, JAL uses a slightly sharper ascent to reduce noise at ground level and delays deploying landing gear and flaps as long as possible.

JAL has reduced pollutants from materials used for washing, painting and maintaining aircraft. In 1990, the carrier established an automatic aircraft-washing facility at Tokyo's Narita International Airport, resulting in reduced use of detergent and water for washing aircraft. Old paint must be removed before the new paint is applied to airplanes, requiring the use of a large amount of paint remover. JAL collects all the paint-remover waste on plastic sheets and chemically processes it to be safely discarded.

JAL also participated in a demonstration flight using second-generation biofuel on a Boeing 747-300 airplane.

### Air New Zealand

General Manager of Operations and Chief Pilot Dave Morgan said Air New Zealand aims to become the world's most environmentally sustainable airline and was proud to have played a role in a biofuel test.

The airline conducted a two-hour test flight using a Boeing 747-400 with a 50/50 blend of jatropa-based fuel and standard jet fuel last December. By extrapolating results from this test, Air New Zealand said that using this fuel in a 12-hour flight using a Boeing 747 could reduce fuel burn by 1.2 percent and CO<sub>2</sub> emissions by 60 percent to 75 percent on average.

"We remain committed to our ambition of having 10 percent of our fuel needs by 2013 met by alternative fuels but appreciate that there are many more steps to be taken by experts in other areas to deliver biofuel as a commercial aviation fuel source," Morgan said.

### Lufthansa

Lufthansa plans to have 10 percent of its fuel derived from alternative sources within 12 years. Like many other airlines testing biofuels, Lufthansa aims to power its aircraft with energy derived from a sustainable source of plants or algae in combination with conventional airplane fuel.

The carrier recently equipped an Airbus A340 with a 1.5-ton mobile laboratory to track gases and compounds. It forecasts that it will have cut CO<sub>2</sub> emissions by 25 percent by 2020

compared to 2006, and it will have cut nitrogen oxide levels by 80 percent from its 2000 mark.

### Virgin Atlantic

Virgin Atlantic completed the world's first flight using a biofuel-powered commercial aircraft. It flew its Boeing 747-400 aircraft using 20 percent biofuel (a mixture of coconut and babassu oil) and 80 percent conventional jet fuel.

Clearly dedicated to finding cleaner and more sustainable fuels, Virgin Chairman Richard Branson has committed to use all profits from travel firms such as Virgin Atlantic and Virgin Trains over a 10-year period to fund research and development of alternative, renewable fuels, amounting to a US\$3 billion pledge to combat global warming.

Virgin has taken a series of initiatives to make its businesses as sustainable as possible, including washing planes and engines to improve performance, efforts to reduce noise levels, engaging in recycling programs, reducing electricity consumption, reducing paper use, offering offsetting programs, and serving fair trade tea and coffee onboard. The move to fair trade products is in line with Virgin Atlantic's business sustainability strategy including providing more ethical, environmental and sustainable products.

### What Remains

There's a lot more airlines can do to reduce fuel consumption and greenhouse gases. Many airlines are still operating at less-than-optimal efficiency in terms of resources they deploy and how they operate, and many have not taken steps from top down to make the environment a priority. There are old and new ways to gain benefits in lower fuel costs, such as replacing inefficient planes, simplifying business processes and taking steps to recycle.

Airlines need to follow fuel-smart procedures and make this a daily priority. Basic steps include weight reduction and reducing the number of items onboard, reducing exterior paint, washing engines to improve performance, flying more efficiently such as using continuous descent, limiting use of APUs and reverse thrusters, turning off an engine while taxiing, actively recycling and minimizing waste, and reducing reliance on conventional fuels, among others. **F**

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