Climate Change : Climate Solutions

Efficient Aviation: The Sky's the Limit

The soaring growth of aviation means soaring greenhouse gas emissions. But with skyrocketing fuel prices, airlines are looking for smarter ways to fly to stay in business – and reduce their impact on the environment.

SAS Norway has reduced top speed during some of its flights reducing fuel burn and CO2 emissions by 7 to 8 percent /Photo: SAS Norway)

Every driver knows that a heavy foot on the pedal guzzles more gas than cruising at a sensible speed. If you want to save money, take your foot off the gas.

The Norwegian division of Scandinavian airline SAS has done exactly that. They have slowed down their fleet of Boeing 737s, reducing fuel use and consequently carbon dioxide (CO2) emissions on a typical flight by seven to eight percent.

"The Oslo to Bergen flight [about 360km] normally produces a little over five and a half tons of CO2," explains Helge Hafftad, environment manager at SAS Norway. "We saved just under half a ton of CO2 by reducing the standard cruise speed from 860 to 780km/h. The entire journey lasts only three minutes longer."

According a 1999 report by the UN Intergovernmental Panel of Climate Change, aviation is responsible for 2 percent of global CO2 emissions, and about 13 percent of CO2 emissions from transport.

Those figures are continuously rising. A 2007 report by U.S., European, and British aviation agencies predicts that by 2025, annual global CO2 emissions from airplanes will grow by 50 to 70 percent to between 1.2 and 1.5 billion tons. To put that in perspective, the total annual CO2 emissions of the European Union in 2004 was 3.1 billion tons.

The art of the possible

At the same time, the rocketing price of oil has elevated fuel costs above labor and maintenance as airlines' largest expense, forcing airlines to look harder for ways to burn less fuel. SAS Norway's Hafftad calls it a situation where economic and environmental concerns "fall

nicely hand in hand." Airlines cannot simply wait for the next generation of lighter, more aerodynamic planes, or super-efficient engines running on biofuels.

"It's all about the art of the possible," argues Ian Poll, professor of aerospace engineering at Britain's Cranfield University. "It will take 20 years to see the benefits of new technologies. Operations should be the first place to start."

SAS Norway flights emit a little over one million tons of CO2 every year. Helge Hafftad is hopeful of beating his target of six to seven percent reductions in emissions by flying slower, taxiing on one engine, and other measures.

Nevertheless, he acknowledges it is increasingly difficult to find new operational improvements – improvements that Ian Poll fears will be "eaten up" by the runaway growth in aviation. Although aviation is undoubtedly becoming more fuel-efficient, its overall contribution to climate change will almost certainly continue rising.

For Poll, there is one potential path to radical change. "Get rid of the gas turbine engine," he says. "Nuclear is the obvious candidate. The U.S. Air Force researched this until the 1960s. We've been there before."

It is theoretically possible, but tens of thousands of mini-nuclear reactors hurling across the skies and landing at an airport near you? The public might need some persuading.

Lean Kerosine - Eight Ways to Green Aviation

SAS Norway has attached blended winglets to its 737s, reducing drag and saving 1-5% of fuel burn and CO2 emissions (Photo: SAS Norway)

'Operations' covers everything the airplane does from switching on its engines at the departure gate to shutting them down at the arrival gate. The International Air Transport Association (IATA) maintains a list of best practices:

1. Reducing tankering: Different countries have different prices and taxes for kerosene. To save money, aircraft fill up in cheaper countries with much more fuel than they need. This 'tankering' weighs the plane down so it burns two to four percent more fuel.

2. Fitting winglets: Small winglets reduce drag in the air. These cut fuel consumption on SAS Norway's flight from Oslo to the Canary Islands by as much as five percent.

3. Lightening up: Refitting aircraft with lighter seats saved one airline 900kg in weight (2.1 percent of the aircraft's total) which prevented an estimated 3,700 tons of CO2 emissions.

4. Using ground power: Air conditioning, lighting and other cabin functions are often powered by engine fuel while on the ground. Using power from the airport instead, one airline saved 10,000 tons of CO2 emissions in a year.

5. Hitching a ride to the runway: Rather than using the engines to taxi to the runway, planes can be towed like a ship leaving harbor. Virgin Atlantic has been trialing a tow system, estimating that it could save ten percent of the fuel that a long haul flight burns on the way from the gate to takeoff.

6. Taxiing on one engine: If hitching a ride is not possible, using only one engine to get to the runway helps, too. Other engines can be started up just before takeoff. After landing, all engines except the one for taxiing can be shut down.

7. Flying direct: This is tricky, because of the tangle of national air traffic control systems, safety considerations, congestion, and the existence of reserved military airspace, but it is extremely important. In Europe, the average extra distance flown is 9 to 11 percent. IATA estimates that the proposed Single European Sky initiative could save 25,000 tons of CO2 emissions a year.

In Australia, the Flex Tracks system allows pilots to adjust their routes based on optimum winds. In the first 50 days of operations between Singapore and the Australian east coast, the estimated CO2 emissions reduction was 1,580 tons.

8. Descending continuously: Traditional approaches involve airplanes descending, then leveling off, and descending again, repeated several times. This may be more comfortable for passengers and air traffic controllers, but it wastes fuel. Continuous descent approaches (CDA) tested by SAS Sweden at Stockholm airport saved 100 kilograms of fuel per landing.

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