



# OTTAWA CITIZEN



## Flying eco-friendly skies: Nav Canada upgrade leads to fewer emissions from jets

BY IAN MACLEOD, THE OTTAWA CITIZEN OCTOBER 30, 2009

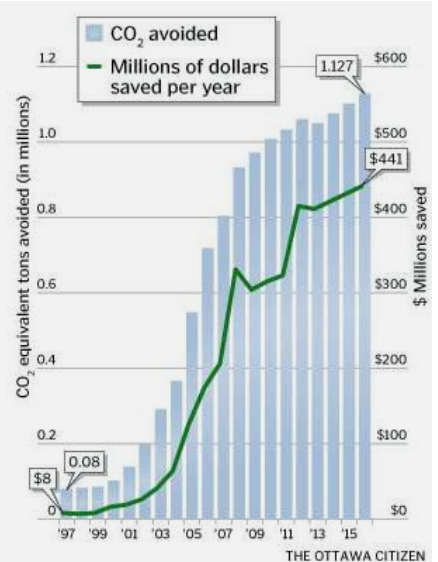
### Polar routes: Less time, less fuel ...

Polar routes are more efficient for aircraft flying between many North American and Asian cities. These routes significantly reduce flight times and the need for connecting flights or refuelling stops.



### ... fewer emissions, more savings

By improving its air control Nav Canada has reduced greenhouse gases released by aircraft into the atmosphere. One litre of jet fuel produces 2.629 kg of CO<sub>2</sub> equivalent emissions.



A \$1.3-billion technological upgrade to Canada's air traffic control system is taking off in another way — cleaner skies.

The investment by Nav Canada, the private company that controls Canada's civilian airspace, includes a new GPS satellite surveillance system that will soon allow up to 16 oceanic flights to safely and more efficiently occupy the same Atlantic airspace once restricted to a single airliner.

Savings from that one new system alone over the next eight years are forecast at \$50 million in fuel costs and a reduction of almost 131,000 metric tonnes of aviation-related greenhouse gases.

Like oceanic airspace, much of Canada's North lacks radar coverage, so aircraft must be separated by up to 80 nautical miles to ensure safety. The key to allowing aircraft to follow the most efficient routes and altitudes is increased airspace capacity, and maximum capacity requires surveillance and communications.

So Nav Canada is replacing or combining ground-based navigational aids in the North with new GPS satellite surveillance and navigation to precisely track high-level flights. That will reduce the separation standard to five nautical miles, allow more Arctic and trans-polar flights to fly more direct routes, burn less jet fuel and cut pollution.

Projected savings by 2016: \$195 million in fuel and 547,000 metric tonnes of emissions.

Overall, Nav Canada says its new equipment, technologies and procedures offer more direct routings, fewer delays and more airspace capacity, resulting in \$3 billion in fuel savings for its airline customers and an 8.4-million--tonne drop in emissions through 2016. That's in addition to the estimated \$1 billion in fuel saved and 4.3-million-tonne reduction in emissions since the non-profit company's inception in 1996.

The \$4 billion in cumulative fuel savings would be enough fuel to fly a Boeing 777-300 ER around the globe more than 10,000 times.

### Upgrade: Lowering fuel costs top goal

Though aviation-related greenhouse emissions account for less than three per cent of total global emissions, high-altitude contrails and long queues of big, idling jets awaiting take-off have saddled the industry with a less than stellar environmental image.

"There is a perception out there that aviation is a much bigger contributor to the problem than it is," Jeff MacDonald, Nav Canada's manager of air navigation service plans and programs, said during the release of the progress report on the company's environmental performance.

Lowering airlines' fuel costs is the primary goal. "By doing so, we generate environmental benefit, operational benefits and a more effective air navigation service for everyone, including the public," he said.

Air traffic control relies on two types of navigation: positive and procedural. Positive control tracks a plane on a radar scope. When radar is not available, procedural control is used, with pilots reporting their positions to air traffic controllers every several minutes.

But procedural control means controllers must put a bigger “safety bubble” — lateral and vertical separation distance — around the plane, since its exact, real-time position can’t be tracked until it reaches radar-controlled airspace.

This year, Nav Canada introduced the first phase of a system called Automatic Dependent Surveillance-Broadcast (ADS-B). In planes equipped and certified to broadcast their GPS positions to Nav Canada, it extends positive control to airspace where there is no radar coverage and allows air traffic controllers to safely separate aircraft by five nautical miles, instead of 80, opening up more fuel-efficient routing.

Nav Canada began installing the equipment around Hudson Bay two years ago and it became operational in January. Additional ADS-B stations in the eastern Arctic and southern Greenland are to be operational next year, extending positive control over the North Atlantic south and east of Greenland. That will permit the 80- to 5-nautical mile reduction in separations, earlier climbs to higher, more fuel-efficient altitudes and more direct routings in the busiest airspace in the world.

Airliner exhaust gases primarily contain carbon dioxide mixed with smaller quantities of nitrous oxide and methane. The standard measurement is in “carbon dioxide equivalents” or CO<sub>2</sub>e. One litre of jet fuel, for example, produces 2.629 kilograms of CO<sub>2</sub>e emissions. One metric tonne of fuel produces 3.286 metric tons.

**By lowering airlines’ fuel costs, we generate  
environmental benefit, operational benefits and a  
more effective air navigation service for everyone**

Meanwhile, Nav Canada’s list of fuel-saving and green investments goes on:

**-The North Warning System:** Starting next year, Nav Canada will use Department of National Defence radars to provide an additional 40 minutes of surveillance for westbound trans-Atlantic aircraft not equipped or certified for ADS-B flying. Savings are projected at \$30 million in reduced fuel and 87,000 metric tonnes of emissions.

Because of the earth’s curvature, radar coverage doesn’t extend beyond about 300 kilometres, leaving vast surveillance gaps where oceanic flights are invisible to controllers and flying under procedural control with VHF and text communications.

That was the case in June when an Air France Airbus A330, flying from Rio de Janeiro to Paris, went down in the Atlantic Ocean, 1,500 kilometres off Brazil’s mainland and out of radar coverage. All 228 aboard perished.

**-Northern Radar:** Seven new-generation radar systems installed across the North earlier this decade have reduced aircraft separation standards, improved traffic flow, route and altitude assignments, according to Nav Canada. The company says emissions have been cut by 450,000 metric tonnes to date, with an additional savings of 650,000 tonnes projected by 2016. Fuel savings through 2016 is forecast at \$392 million.

**- Reduced Vertical Separation Minimum (RVSM):** Earlier in this decade, Nav Canada, with its counterparts in the U.S. and Mexico, adopted RVSM, which increases the capacity of the available airspace by reducing the vertical separation requirement from 2,000 feet to 1,000 feet for aircraft flying above 29,000 feet. Emissions and fuel savings are estimated at four million tonnes and more than \$1.2 billion by 2016.

**-Trans-Polar routes** have dramatically shortened the distances to Asia and Europe, requiring planes to carry less fuel and freeing up payload capacity for more passengers and cargo. Shortened flights have also reduced flight crew and maintenance costs.

Airlines have responded with a ten-fold increase in flights — more than 8,000 last year — since Nav Canada introduced the over-the-top routing in 2001.

**-Required Navigation Performance:** Now used on a limited basis at 20 Canadian airports, it involves “short turn” approaches that feature a constant descent technique that eliminates inefficient step-down approaches.

**-Direct Controller Pilot Communications:** Airplane separation standards also are based on a plane’s communication’s capability. Because of the remoteness of much of Canada’s North, pilots often communicate by relaying messages to controllers through high-frequency radio operators. New Nav Canada equipment will allow for direct text and voice communication, making the system more responsive to route and altitude changes while in flight.

**-Converging Runway Display Aid:** Air traffic controllers can use these monitors to more safely space aircraft on converging runway approaches. That can reduce traffic-based holds and delays and reduce emissions.