The benefits of flying Green

by Matt Thurber

ALTHOUGH BUSINESS AIRCRAFT ACCOUNT for just 2 percent of aviation carbon emissions and .04 percent of manmade emissions, pressure on private jet operators to mitigate the effects of their impact on the environment remains high. The Jan. 1, 2012 deadline for U.S. jet operators flying to Europe to comply with the European Union's Emissions Trading Scheme (ETS) is tangible evidence of that pressure and will require owners and operators to participate in an enormously complex emissions monitoring program and pay fees when certain thresholds are exceeded.

The ETS is just the first concrete attempt by governments to force aircraft owners and operators to mitigate their emissions. It's not clear whether the EU's ETS program is intended–through its sheer complexity–to discourage business jet travel or to raise money through what is in essence a carbon tax. But the EU is a signatory to the Kyoto Protocols and thus has committed to meet emissions-reduction goals.

However, the ETS could have been much simpler. A jet engine, after all, generates a certain amount of CO_2 emissions for every gallon of fuel it consumes, and it would be easy to set a rate to tax those emissions. The formula, according to a Gulfstream Aerospace presentation, is pounds of carbon dioxide equals pounds of fuel times 3.149.

The Air Transport Association and its airline members have sued the EU to prevent implementation of the ETS and legislation has been introduced in the House of Representatives to ban U.S. air carriers from participating in the ETS. Although the EU has offered a method of avoiding compliance with the ETS, so far the U.S. hasn't come up with a plan. Any country to which the ETS applies is welcome to develop its own carbon-reduction system and if it meets certain requirements, that country's aircraft would be exempt from the ETS.

WHILE THE ETS POSES CHALLENGES, FLYING green clearly offers benefits. These include not only the satisfaction of lowering carbon emissions but also fuel savings, reduced maintenance costs and improved longevity of the aircraft, engines and systems.

A key driver of lowered aviation emissions will be efforts to modernize air-traffic-control systems, which are

underway worldwide. The U.S. NextGen program promises to improve efficiency using performance-based navigation technology, and by replacing radar with a system that allows aircraft to fly more direct trajectory-based routes. In its latest NextGen update, the FAA estimated that reductions in delays by 2018 will save airlines and aircraft operators $23 billion, lowering consumption of aviation fuel by 1.4 billion gallons and preventing the emission of 14 million tons of carbon dioxide. Incidentally, aircraft owners will need to come up with tens or possibly hundreds of thousands of dollars to upgrade for NextGen by the FAA's 2020 deadline. At a minimum, U.S. airlines will have to pay $650 to $767 million to equip for NextGen and business jet and general aviation operators $2.4 to 2.7 billion, according to RTCA's NextGen Advisory Committee.

There are other ways to lower carbon output, but these would require a concerted effort to persuade governments of the benefits. Biofuels offer one possible solution *(see sidebar on next page)*. New standards for them have been approved and demonstration flights have been done with business jets.

Another effort might focus on regulations that cause excess fuel consumption, according to Learjet pilot Roger Humiston, who has written to the FAA about this problem. For your jet to fly above 29,000 feet, not only must it meet FAA Reduced Vertical Separation Minimums (RVSM) standards (all new jets already do) but your pilots must be approved for RVSM operations. The problem is that the FAA is so overburdened, inspectors take months to issue these approvals. While waiting, you can fly only below 29,000 feet, which burns much more fuel than flying at optimum altitudes. You could always register your jet in the Cayman Islands, which assigns RVSM certification just to the airplane and automatically issues approval to the pilots with no waiting, or the FAA could change its policy to eliminate the lengthy approval process for pilots. This would save a lot of fuel.

There are other operational changes that could easily reduce CO_2 production, with some regulatory forethought. The FAA, for example, could modify East Coast U.S. operations, where jets are often brought in on low-altitude fuel-wasting routes over Kentucky on the way to the New York area, according to aviation consultant Rolland Vincent. "If we could [calculate] the key drivers of emissions, loitering times and indirect routings would jump close to the front of things to eliminate or cut back on fuel burn and emissions," he said.

Business aviation efficiency has been improving at an average of 1 percent per year for 30 years, Vincent pointed out, and this trend shows no sign of abating. New technologies such as Pratt & Whitney's geared turbofan and modification programs by Hawker Beechcraft, Nextant Aerospace, Clifford Development and Sierra Industries–where modern, efficient engines replace

10 Ways to Cut CO_2 Now

Here, courtesy of Gulfstream Aerospace, are 10 actions your pilots and crews can implement right away to produce quantifiable results:

1. Plan optimum altitude based on winds, and optimize climb and descent profiles.

2. Avoid carrying extra fuel. Doing so may save money but never saves fuel and always hampers performance. On a 2,200-nautical-mile trip in a G550, carrying unneeded fuel can produce an extra 5,200 pounds of CO_2.

3. Travel lightly and load carefully. Carrying 500 pounds of unnecessary items on a 6,000-nautical-mile mission will produce 834 excess pounds of CO_2. A simple way to save fuel and CO_2 is to load the airplane toward the rear. The closer the center of gravity is to the aft limit, the more efficient the flight.

4. On the ground, run the auxiliary power unit as little as possible. Also, avoid excessive idling, taxi on one engine and use the closest runway.

5. Don't use full power for every takeoff. While it doesn't save fuel directly, this practice causes less engine wear and thus lowers overall fuel consumption.

6. If permitted by air traffic controllers, turn on course as quickly as possible and clean up the airplane for an efficient climb. But controllers aren't always able to facilitate rapid climbs; this is something that the U.S. NextGen program may fix *(see main story)*.

7. Calculate efficient routes (you can help by being flexible) and select altitudes that provide maximum ground miles for minimum fuel. On a 5,000-nautical-mile trip, flying 4,000 feet below the optimum altitude produces an extra 3,820 pounds of CO_2.

8. Slow down. While it's tempting to fly as fast as possible, doing so yields small time savings compared with the increased fuel burn. On a 4,500-nautical-mile mission in a G550, flying at Mach 0.85 versus Mach 0.80 saves 32 minutes but adds 11,886 pounds of CO_2 to the trip. Bump up to Mach 0.87 and the excess CO_2 triples, to 34,001 pounds.

9. Employ continuous-descent approaches. These approaches, which basically involve idling down from altitude, are popular with cargo airlines like UPS, which works closely with the FAA to make this practice possible at its busy Louisville, Ky. hub. The FAA should make this easier for business jet pilots, but this may be another change that will have to wait for NextGen. Savings are also available after landing by not using maximum reverse thrust, taxiing on one engine and minimizing auxiliary power unit use.

10. Incorporate fuel-conservation practices into routine flight operations. Potential savings for a 3,000-nautical-mile trip in a G550 could easily reach 35,000 pounds of CO_2. *–M.T.*

CARRYING EXTRA FUEL MAY SAVE MONEY BUT NEVER SAVES FUEL AND ALWAYS HAMPERS PERFORMANCE.

OPINION

Biojet Cocktail May Produce a Big Hangover

At this year's Paris Air Show, some big players bellied up to the biojet bar: Boeing flew one of its new 747-8s from the U.S. to the show fueled by a mix of 85 percent jet-A and 15 percent camelina plant oil derivative; Honeywell–the jet-engine and avionics manufacturer–made the trip using a 50-50 mix in a Gulfstream G450.

The good news: No engines were fried and nobody died. Historically, jet engines run well on a jet-A/bio-fuel mix with modest 1 to 2 percent improvements in fuel consumption and significant emissions reductions. The technology isn't complicated and you can make the stuff from almost anything: algae, plant oils, even lawn clippings.

The bad news: Widespread adaptation of aviation biofuels will dramatically increase the cost of flying, either directly at the pump or indirectly via coercive government taxation coupled with heavy public-sector subsidies to the biofuel makers. All this in the name of cutting aviation's carbon emissions, which account for less than 2 percent of all manmade emissions worldwide.

Want to see where this is headed? Look no further than the money-losing ethanol debacle for auto fuels. Forget about the way it has distorted corn prices and imposed double-digit food inflation. The U.S. government subsidizes this effort to the tune of $1.78 a gallon, according to former Treasury official Steven Rattner. It takes more energy to make the ethanol than it saves, and its refining markedly adds to the overall carbon footprint. Jet biofuel is likely headed down this same trail of tears.

Historically, the aviation industry has embraced any market-based solution that improves efficiency and saves money. Today's jetliners are 70 percent more efficient than the 707s and DC-8s my grandparents flew on. Aviation Partners estimates its winglets have saved the airlines more than 2.5 billion gallons of fuel by improving aircraft performance. Composite structures cut aircraft weight. New jet engines coming online are 16 to 20 percent more efficient, quieter and much cleaner than the ones of only a decade ago. New air-traffic-control technology promises to produce more direct routing, cutting travel times and fuel burns by double-digit percentages. All these things make good economic sense.

Making a gallon of jet biofuel can cost up to 12 times as much as making a gallon of jet-A. So how does one rationalize biofuels? Simple: Artificially distort the market. What the biofuel lobby is proposing on the front-end is a global carbon-emission standard for aircraft. The International Civil Aviation Organization hopes to have a standard in place by 2013. It's analogous to the U.S. Environmental Protection Agency's CAFÉ (corporate average fuel economy) standards developed in the 1970s. It would provide a yardstick to aggressively tax those who do not meet the standard.

This cake already is in the oven. Look at the European Union's Emissions Trading Scheme and at Australia, which is getting ready to impose a carbon tax on jet fuel that will hit domestic airlines there with an extra $930 million in costs over the next four years.

It's easy to see why Boeing and Honeywell are on board this train wreck: Older airplanes with older engines produce more emissions. Tax the emissions and you make new aircraft and new aircraft engines more attractive. But current aircraft technology alone will not be enough to achieve the holy grail of "carbon neutral growth," so that is where the biofuels come in: You can double the number of airplanes out there yet maintain today's carbon footprint. It's a feel-good cocktail that comes with a big tab. Richard Wynne, Boeing's director of environment and aviation policy, admitted to me earlier this year, "We're going to have to have some kind of government support, which is why we are working the policy." Translation: Get ready for the hangover. –*Mark Huber*

older ones–offer significant environmental benefits, he said.

Vincent, who used to work for fractional provider Flexjet, noted that participation by shareowners in the company's carbon-offset program never exceeded 10 percent. The number is similar at other major fractional-share companies, although NetJets declined to reveal its participation percentage.

While the NetJets carbon-offset program is voluntary in the U.S., NetJets Europe launched a mandatory plan in 2007. According to the company, "NetJets purchases and provides these offsets to our owners at the same price we pay for them. By the end of 2012, NetJets Europe will be 100 percent carbon neutral." NetJets is also working with the FAA on NextGen development and recently replaced navigation charts and documents in the cockpit with iPads. Although charts are not a significant amount of weight for a business jet, every drop in excess weight ultimately lowers fuel burn.

CitationAir by Cessna offers its owners carbon offsets from TerraPass, and Flexjet works with JP Morgan ClimateCare. Participation rates for both companies remain fairly low, but like any operator of large fleets of aircraft, they also endeavor to streamline operations, which helps minimize CO_2 production. "Flexjet has always worked hard to optimize schedules for flights, aircraft, crew and maintenance to ensure we keep deadhead trips to the lowest possible level," said a company spokesperson.

The NBAA's Action Plan

The National Business Aviation Association's Environmental Issues Strategic Action Plan has made progress in several areas:

Implementing a sustainable management system. The association has recommended practices to members to help reduce fuel burn and emissions.

Creating industry alliances. Besides working with the General Aviation Manufacturers Association and International Business Aviation Council, the NBAA is examining ways to cooperate with the Air Transport Association on its challenge to the European Union's Emissions Trading Scheme.

Surveying members. The NBAA conducted a survey in 2009 to gauge the way members are utilizing best practices and plans to do additional surveys periodically.

Developing information sessions. Since 2008, the NBAA has held information sessions at its annual convention and at the European Business Aviation Convention and Exhibition (EBACE). Sessions are also held at the NBAA's Regional Forums.

Creating an aircraft efficiency index. The NBAA is working on this with the International Civil Aviation Organization. The ICAO working group will review a draft in November. *–M.T.*