

**Business Aviation
Commitment on
Climate Change:
An Update**



Aviation's Environmental Responsibility

Aviation creates social and economic benefits, bringing development and jobs; it connects communities, improves business productivity, brings people together, and links markets in an increasingly globalized world. However, these benefits come with an environmental cost, and aviation must balance them with a responsibility to mitigate climate change.



Making Shorter Flights Possible

Automatic Dependent Surveillance-Broadcast (ADS-B) is a technology that allows for direct routes, reduces delays, and ultimately increases overall airspace capacity. Reducing flight time cuts down on fuel burn and emissions. What's more, ADS-B devices like Appareo's affordable Stratus ESG are already available today, years ahead of the mandated implementation date. In addition, ADS-B receivers make electronic chart applications more useful and attractive for pilots, eliminating the need to produce heavy and wasteful paper charts.

In 2009 business aviation manufacturers and service providers, represented by the General Aviation Manufacturers Association (GAMA), and business jet operators, represented by the International Business Aviation Council (IBAC), jointly announced the Business Aviation Commitment on Climate Change, an aggressive program to address the industry's carbon emissions by meeting the three following targets:



- #1: Improving fuel efficiency 2% per year from 2010 until 2020
- #2: Achieving carbon-neutral growth from 2020
- #3: Reducing CO2 emissions 50% by 2050 relative to 2005

Our industry will achieve these objectives through improvements in the following areas:

Technology/ Alternative Fuels



Infrastructure



Operations



Market-Based Measures



Today, on the eve of the 39th Session of the Assembly of the International Civil Aviation Organization (ICAO), the business aviation industry proudly points to a strong record of improvement and progress toward meeting our climate change goals.

Complete Life-Cycle Approach Driving Environmental Sustainability

As a responsible manufacturer of both commercial airliners and business jet aircraft, Bombardier has established a dedicated Ecodesign Program to integrate environmental concerns during

all lifecycle stages of each new aircraft program—from design, supply chain, manufacturing and testing through to flight operations, maintenance, recycling, dismantling, and end-of-life.

Scheduled to enter service in the second half of 2018, the state-of-the-art Global 7000 business jet features



Technology and Alternative Fuels: Progress is Significant

Aircraft and engine manufacturers have, as promised, brought to market new products incorporating lighter materials and fuel-saving designs (see sidebars). New avionics that allow aircraft to fly more precise, direct routes are now available and are being deployed globally, thus improving the efficiency of the industry.

New CO₂ Standard Ensures Continued Progress: The year 2016 saw the successful development at ICAO of the first-ever CO₂ emission standard for aircraft. The standard will be formally adopted by the ICAO Council in the spring of 2017 and then implemented by national authorities for application to new type design aircraft in 2020 (2023 for business aircraft). This landmark standard also includes a production cut-off for aircraft that do not meet the standard by 2028.



Sustainable Alternative Jet Fuel offers the greatest opportunity to significantly and quickly lower net lifecycle carbon emissions from aviation. The industry has proven that such fuels can be produced from a broad range of feedstocks. Challenges remain that are impeding commercial development. The aviation industry urges governments to work with this nascent industry to enable commercialization and to establish stable policy frameworks that will assist in accelerating the production of sustainable alternative fuels for aviation.

More Efficient Operations

Business aviation operators are reducing their carbon footprint, which also benefits cost, as they implement measures such as single-engine taxiing, using electric power on the ground rather than auxiliary power units (APUs), reducing payload, making improvements to flight planning for more direct routing, and, where possible, using performance-based navigation (PBN) and techniques such as continuous descent approaches to reduce fuel, which in turn impacts CO₂ output.

advanced design techniques and technologies that will meet and exceed ICAO CAEP/8 for emissions and ICAO Chapter 4 for noise.

Sporting an industry-leading 23:1 compressor pressure ratio, the all-new GE Passport engine incorporates advanced technologies and materials to improve durability, deliver a lower

noise output, and provide 8% lower specific fuel consumption than competing engines in its class.

Additionally, a new high-speed transonic wing will offer superior short-field and high-speed performance to cut down drag, reduce fuel burn and lower emissions.

Renewable Fuels Help Reduce Emissions

Gulfstream Aerospace Corp. is using a renewable fuel blend on its Savannah, Georgia-based demonstration aircraft, Airborne Product Support aircraft, and the G500 flight-test fleet.

The fuel, produced by AltAir and distributed by World Fuel Services, is a blend of low-carbon, drop-in renewable fuel derived from agricultural waste and Jet-A. It provides the same performance as conventional, petroleum-based jet fuel and requires no changes to factory-standard engines or aircraft. Each gallon of renewable fuel burned is expected to reduce greenhouse gas emissions by more than 50 percent on a lifecycle basis.



Designing Sustainability in Business Jets

Gulfstream's newest family of aircraft, the G500 and G600, are powered by versions of the new Pratt & Whitney Canada PW800 series engine, which, along with the Gulfstream-designed wing, delivers fuel efficiency improvements of more than 10 percent over previous generation engines, fewer emissions, and less engine noise.



Reducing Environmental Impact Through Composite Materials

In 2005, Embraer launched two new aircraft into the entry-level and light jet categories: the Phenom 100 and Phenom 300. The Phenom jets were Embraer's first aircraft to utilize composite materials on primary structures such as vertical and horizontal empennages, nearly double the proportion of composites in the original Legacy aircraft.

The Phenom aircraft also deliver operational efficiencies with tangible environmental benefits. The Phenom 100 engine's fuel burn is comparable to that of a leading turboprop, with significant savings in fuel as well as emissions. The Phenom 300's swept wing design includes winglets to increase fuel efficiency.

The introduction of two more clean-sheet design aircraft, the Legacy 500 midsize and Legacy 450 mid-light jets, brought innovation previously only seen in much larger aircraft. The Fly-By-Wire technology delivers greater flight precision, rendering higher fuel efficiency, and a much smoother flight experience for the passengers.

Infrastructure: Governments Must Invest in Air Traffic Modernization

Achieving the above targets over the long run will require realistic solutions that balance economic growth, progress, and technology improvements. All stakeholders agree that additional system-wide efficiency can only be realized once the current ground-based air traffic control infrastructure is modernized. This will require governments to fulfill their stated commitment to make the public investment necessary to bring these changes to fruition. This will improve both efficiency and safety.

A Global Market-Based Measure: Countdown to the 39TH ICAO Assembly

The aviation industry, including business aviation, is fully committed to achieving carbon-neutral growth starting in 2020. Global market-based measures will act as a gap-filler in order to achieve the long-term goal: reducing CO₂ emissions to 50% by 2050 relative to 2005. This is why it is vital that the 39th General Assembly of ICAO reaches an agreement on a framework for a single global market-based measure (GMBM). For the last three years, there has been much work at both technical and political levels at ICAO to develop a global carbon-offsetting scheme for international aviation. Reaching agreement among 191 countries—particularly given this is the first time any industrial sector has attempted a global scheme of this scope—represents a challenge.



It is important that any global market-based measure is environmentally meaningful, and the administrative and implementation costs do not exceed the environmental benefits from compliance, particularly for small operators.

On behalf of manufacturers, service providers, and operators worldwide, GAMA and IBAC are strongly committed to achieving our targets in improving efficiency and to mitigating our industry's impact on the environment.



General Aviation
Manufacturers Association
www.gama.aero



International Business
Aviation Council
www.ibac.org



GAMA and IBAC are members of Air Transport Action Group (ATAG).