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National Air Transportation Association

Statement

of the

National Air Transportation Association

before the

Subcommittee on Aviation,

Committee on Transportation and Infrastructure,

U.S. House of Representatives:

Hearing on

Aviation and the Environment: Emissions

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Chairman Costello, Ranking Member Petri, and Members of the Subcommittee:

Thank you for this opportunity to appear before you to discuss our members' efforts to minimize the impact our industry has on the environment.

My name is James K. Coyne, and I am president of the National Air Transportation Association (NATA). NATA, the voice of aviation business, is the public policy group representing the interests of aviation businesses before the Congress, federal agencies and state governments. NATA's over 2,000 member companies own, operate and service aircraft and provide for the needs of the traveling public by offering services and products to aircraft operators and others such as fuel sales, aircraft maintenance, parts sales, storage, rental, airline servicing, flight training, Part 135 on-demand air charter, fractional aircraft program management and scheduled commuter operations in smaller aircraft. NATA members are a vital link in the aviation industry providing services to the general public, airlines, general aviation and the military.

Background

Climate change is an important topic and one that includes all of U.S. industry. The aviation industry is one of the fastest growing sectors of the economy, and attention has been focused on carbon dioxide emissions from aircraft. The industry has adopted an environmental agenda that also supports aviation's continued growth. This agenda includes testing alternative fuels to be used in aircraft, participation in carbon offset programs, and encouraging "green airports." It is important to highlight the facts on emissions concerning aviation:

- **Aviation accounts for only 3% of greenhouse gas emissions worldwide,** according to data from the Intergovernmental Panel on Climate Change (IPCC).

- **Aviation gasoline and jet fuel account for 12% of all petroleum products**. According to data from the U.S. Department of Energy, aviation gasoline and jet fuel supply account for 1,624,000 barrels per day compared to 20,588,000 barrels of all petroleum products used per day.

- **Alternative fuels programs exist within aviation.** Virgin fuels, Boeing, and GE Aviation have joined forces to develop an alternative fuel that includes a biofuel blend composed of babassu oil and a mixture of jet fuel and coconut oil. Additionally, the University of North Dakota received a $5 million grant to develop a cold weather sustainable biofuel to be used by the military.

- **New aviation technology is producing cleaner and more efficient aircraft.** Advances in aerodynamics offer more efficient wings and designs with less drag. The Cirrus and Columbia aircraft are examples of more efficient general aviation aircraft. New composite materials are making aircraft lighter in weight, which results in increased fuel efficiency.

NATA Climate Initiative

NATA's members have been very active in addressing ongoing concerns with the general aviation industry's impact on the environment. Late last year, NATA established its

Environmental Committee to develop programs designed to assist member companies in minimizing their impact on the environment including the development of a new Climate Initiative that would provide NATA members with the opportunity to purchase carbon offsets for their aircraft operations. Below is a brief description of the new *NATA Climate Initiative*:

- ***Carbon Offsets:***
  Carbon offsetting involves reducing emissions by investment in projects that save energy, such as investment in technology that allows industry to be more efficient and increasing the generation of renewable energy. NATA is establishing a program to make carbon offsets available to member companies. This includes a 3- to 4-cent per gallon carbon offset based on the Chicago Climate Exchange, the only voluntary, legally binding integrated trading system to reduce emissions of all six major greenhouse gases (GHGs), with offset projects worldwide.

- ***Green Aviation Facilities***:
  NATA encourages its member companies to meet proper environmental compliance standards including a Spill Prevention Control and Countermeasure (SPCC) plan, if fuel is stored above ground in tankers. The association is currently undertaking the development of best management practices that will allow aviation businesses to capitalize on becoming more energy efficient and minimizing their company's impact on the environment. To date, NATA has crafted best management practices for the following topics *(note: each topic has a white paper that is attached at the back of this testimony)*:

  - **Spill Prevention Control and Countermeasures (SPCC)**
  - **Hazardous Waste**
  - **Storm Water**
  - **Used Batteries**
  - **Used Oil**
  - **Used Fluorescent Lamps**

Public Relations Campaign

NATA is currently developing a public relations campaign to provide the facts about aviation's impact on the environment and what the association's members are doing to ensure the protection of the world's environment.

First, let's review the magnitude of carbon emissions for aviation as compared to other modes of transportation. The U.S. Department of Energy (DOE) has issued a publication titled *Transportation Energy Data Book: Edition 26* (June 1, 2007). In this publication, the DOE provides an annual statistical compendium designed to characterize transportation activity and explore data on other factors that influence transportation energy use. Much of this publication is just the numbers, but an analysis of this data can provide some very interesting insights. In order to obtain a relative comparison of the magnitude of carbon emissions for different modes of transportation, an analysis of fuel consumption is used. Because different types of fuel (gasoline, diesel fuel, jet fuel to name a few) provide different energy values, the data is normalized by looking at the energy use in British Thermal Units (BTUs). This provides a better comparison than actual gallons of fuel consumed. The table below shows the energy use for aviation and several other modes of transportation.

Mode of Transportation	BTUs Used (Trillions) in 2005	Percent of Total
Aviation	**2,477**	**9.0%**
Cars	9,140	33.4%
Light Trucks	8,108	29.6%
Medium/Heavy Trucks	4,577	16.7%
Water	1,366	5.0%
Pipeline	842	3.1%
Rail	657	2.4%

The table shows that aviation accounts for only 9% of the total transportation energy use. Cars and light trucks each use more than three times the energy as the aviation industry, and medium/heavy trucks account for about twice that of aviation. Highway transportation (cars, light trucks, and medium/heavy trucks) combine for almost 80% of the transportation energy and thus contribute a similar level of greenhouse gases. Aviation, on the other hand is a much smaller contributor to energy use and greenhouse gas emissions.

Further analysis within the aviation group shows the relative contribution of commercial aviation versus general aviation. The table below shows this comparison.

Mode of Transportation	BTUs Used (Trillions) in 2005	Percent of Total Transportation
Aviation	**2,477**	**9.0%**
Domestic Carriers	1,861	6.8%
International Carriers	373	1.4%
General Aviation	242	0.9%

General aviation accounts for less than one percent of the total transportation energy use in the United States and its fuel use is about one seventh that of the domestic air carriers.

The analysis of the relative efficiency of fuel use for different modes of transportation includes several additional factors. This analysis includes normalizing the data using the BTU content as did the previous analysis, but also includes the average passengers per vehicle, and provides a conversion into an equivalent miles per gallon (MPGe) based on the BTU content of gasoline (115,000 BTU per gallon). For example, automobiles have an average passenger use of 1.57 passengers per car. Using the DOE data, we find that cars use on average 3,496 BTUs per passenger mile and this corresponds to approximately 33 MPGe. The table below shows several modes of transportation and their corresponding MPGe.

Mode of Transportation	Average Passengers per Vehicle	BTUs per Passenger Mile 2005	MPG Equivalent
Aviation	**90.4**	**3,959**	**29 MPGe**
Cars	1.57	3,496	33 MPGe
Light Trucks	1.72	4,329	27 MPGe
Rail (Commuter)	32.9	2,569	45 MPGe
Rail (Intercity- Amtrak)	17.9	2,760	42 MPGe
Bus (Transit)	8.7	4,318	27 MPGe

This table shows that aviation provides the greatest average passengers per vehicle and the resulting MPGe of 29 is roughly the same as cars and light trucks. With the vast advantage of moving large numbers of people quickly over many miles, the aviation industry is a very efficient mode of transportation.

In summary, this analysis of transportation modes shows that aviation provides a very efficient mode of transportation and compares similarly to typical highway transportation (cars and light trucks) in per passenger equivalent miles per gallon. Additionally, the aviation industry contributes a much smaller percentage (about 9%) of the total energy use and thus contributes a much smaller percentage of greenhouse gas emissions as compared to highway transportation (about 80% for cars, light trucks and medium/heavy trucks).

Industry Actions

Two prime examples of NATA members being proactive on the environmental front are NetJets Inc. and DayJet Corporation.

NetJets Inc.

On September 13, 2007, NetJets Inc. Chairman & CEO Richard Santulli announced the company's new multifaceted program to address the impact of its flight operations on the environment.

The initiative, which will be expanded in the coming months, includes a focus on offsetting carbon emissions from NetJets' flights, while at the same time it begins to reduce the carbon footprint of NetJets' operations worldwide. It also includes a substantial investment in leading-edge technology research with the goal of creating an ultra-low emission jet fuel.

The following core elements of the initiative are the results of a detailed environmental review process undertaken by NetJets beginning in early 2006:

1. Improving Energy Efficiency and Reducing Greenhouse Gas Emissions – NetJets U.S. has established a goal of improving its energy efficiency, cutting waste, and reducing carbon emissions from its internal operations by 10% over the next two years. It has established Director of Environmental Management positions, reporting to the Office of the Chairman, in both the United States and Europe. These senior executives will manage, monitor, and report regularly on NetJets' progress and any

ongoing challenges, as well as helping to identify new opportunities to do more in the coming months and years.

2. *Driving Technological Transformation* – NetJets is investing in cutting-edge research to identify more environmentally friendly aviation technologies through sponsoring The Next Generation Jet Fuel Project at Princeton University with the University of California, Davis to develop an ultra-low emission jet fuel.

3. *Offsetting Unavoidable Impacts* – NetJets is investing in a set of carefully reviewed and closely monitored carbon offset projects that will provide verified greenhouse gas reductions. These projects will allow the company to offset fully the carbon footprint of its internal operations. The offset portfolio will also be available to NetJets Owners so they can offset their flights. Additionally, Marquis Jet Partners will make the NetJets carbon offset portfolio available to Marquis Jet Card Owners.

4. *Leveraging World Class Expertise* – To ensure that NetJets remains a leader on climate issues, the company has established both U.S. and European advisory boards – each consisting of environmental experts who can help NetJets apply best-in-class practices and provide guidance to the company at every step along the way. The U.S. Advisory Board consists of Fred Dryer, Professor of Mechanical and Aerospace Engineering at Princeton University; Ashok Gupta, Director of the Air and Energy Program at the Natural Resources Defense Council; Terry Tamminen, former Secretary of the California Environmental Protection Agency; Bonnie Reiss, Operating Advisor to Pegasus Capital and founder of the Earth Communications Office; and George Favaloro, Managing Partner at Esty Environmental Partners.

NetJets realizes that its responsibilities also extend to the communities in which it operates. With this in mind, it will build on these four areas of immediate commitment by launching a community-based Solar Schools Project. Beginning in California and drawing on Governor Arnold Schwarzenegger's environmental leadership, this innovative public-private partnership will fund the placement of photovoltaic cells on school roofs – while in the process educating school children about environmental issues.

DayJet Corporation

Dayjet Corporation has produced a Very Light Jet Footprint Analysis Concept Paper to ensure that it maximizes its operations by using state-of-the art technology while minimizing its impact on the environment. A description of this concept paper can be reviewed below:

Introduction

DayJet Corporation is a technology-driven company, pioneering the creation of the on-demand, per-seat air, regional transportation market. In spearheading the use of the new generation of very light jets (VLJs) in air carrier service, DayJet is committed to building on the inherent efficiencies and favorable footprint of the Eclipse 500 aircraft, toward the long range goal of sustainable air transportation. DayJet's strategies are informed and motivated by the emerging understandings of the epochal challenges of managing carbon dioxide and other greenhouse gas effects on climate dynamics. DayJet strives to translate the understanding from the climate science community to applications on how the company manages the effects of its aviation activities. DayJet works to apply these understandings to its company strategies for technology, for operations, and for business practices.

DayJet's strategic framework for moving toward a sustainable business in on-demand air transportation includes three major phases of technology implementation over the near term (two to four years), mid-term (four to six years), and longer term (more than six years).

1. Near Term: This phase of the strategy focuses on reducing carbon emissions through airspace efficiencies. With the Federal Aviation Administration, DayJet plans the early implementation of certain of the operating capabilities envisioned in the U.S. Joint Planning and Development Office (JPDO) vision for the Next Generation air transportation system (NextGen). This vision underpins transformation of the national airspace toward a performance-based air traffic management system. This system incorporates performance-based navigation, surveillance and communications technologies. The technologies associated with this transformation include Required Navigation Performance (RNP), Area Navigation (RNAV), and Automatic Dependent Surveillance-Broadcast (ADS-B). These technologies let DayJet optimize its flight routes for savings in energy, carbon and noise. When implemented, these optimized routes will reduce fuel consumption for the company's networked fleet operation by an estimated 15 percent and more. These fuel savings translate directly into emissions reductions. DayJet's business model operates effectively using the second- and third-tier airports serving the nation's smaller suburban, rural and remote communities. These airports are largely underutilized national assets, with virtually none of the congestion and delays issues that would add unacceptable costs to DayJet's operations. At these smaller airports, as a consequence, DayJet is able to operate with greatly reduced ground times from engine start to takeoff and from landing to engine shutdown. The effect is to reduce emissions that would affect local air quality around airports.

2. Mid Term: This phase of the strategy focuses on alternative fuels that reduce carbon and other emissions. DayJet supports fuel strategies that enable movement toward carbon neutral practices across the company's industrial sector. Because DayJet's business model calls for approximately a five-year life cycle for its aircraft, the company will be in a position to provide aircraft and engines coming out of its fleet for testing of new fuels.

3. Longer Term: This phase of the strategy focuses on being early adopters of advancing aircraft and propulsion systems that do not add carbon and other greenhouse gases to the environment.

Based on this framework, DayJet is undertaking action in five arenas:

Engines- DayJet works with the aircraft and engine manufacturers toward continual improvement in the efficiencies and emissions from flight operations, for the current and future generations of equipment.

Fuel- DayJet collaborates with the university research community on modeling, analysis, and strategies for continual improvement of the footprint for on-demand air transport operations using VLJs and other technologically advanced aircraft. DayJet is engaged in planning dialogue with Embry Riddle Aeronautical University

(ERAU), Florida Institute of Technology (FIT), Florida Atlantic University, and the University of Central Florida (UCF) to establish relationship strategies leading to creation and adoption of new technologies.

NextGen Airspace Efficiencies- DayJet partners with other on-demand air transportation service providers to accelerate the early adoption of the operating capabilities envisioned in the U.S. Joint Planning and Development Office (JPDO) Next Generation Air Transportation System (NextGen). NextGen technologies reduce the footprint of DayJet's fleet operations.

Neutralizing Carbons- The DayJet service model is conceived to offer regional business travelers an alternative to highway travel. This means that the aggregation of travelers on a DayJet trip can be carbon-competitive with highway transport alternatives in certain specific cases. In the nearest term, DayJet will implement strategies for airspace efficiencies with the goal of advancing toward carbon-competitive effects of on-demand air travel, relative to highway alternatives.

Sustainable Business Practices- DayJet manages unavoidable carbon emissions through careful assessment of total company operations with the aim of achieving verified greenhouse gas reductions. The goal is to reduce where possible and to otherwise offset the carbon footprint of the company's internal operations.

Tropospheric Flight

The questions regarding potential fuel efficiencies (and therefore carbon sourcing) of on-demand, networked fleet operations of VLJs include the effects of flight in the troposphere versus the stratosphere. The initial assessments by the International Panel on Climate Change (IPCC) regarding the effects of aviation on the environment focused on flight in the stratosphere. These past studies published first in 1999[i] and then reviewed in 2006[ii] summarize the three most important ways that aviation affects the climate:

1. Direct emissions of greenhouse gases specifically CO_2 and water vapor
2. Nitrogen oxide emissions interacting with ozone and methane
3. Contrail-induced cirrus cloud formation

A new generation of aircraft referred to as very light jets (VLJs), and a new generation of on-demand air transportation service business models are now emerging in regions of the United States, as well as in Europe and other continents. These new business models influence the characteristics of fleet operations using these new VLJs. These operations will share common characteristics in flying relatively shorter segments and in making effective use of mid-altitudes that are not extensively used by larger air carrier transports. In particular, because the average flight segment length in these regional transportation services is approximately 300 miles, and because of airspace utilization and traffic flow considerations, the typical flight levels for these fleet operations are below 26,000 feet, well below the stratosphere, and within the troposphere.

Based on these operational realities, we plan to support research focused on the following four topics:

- Comparative greenhouse effect of water vapor emitted by VLJs between 18,000 and 26,000 feet, versus in the stratosphere
- Comparative effect of nitrogen oxide emitted by VLJs between 18,000 and 26,000 feet on atmospheric ozone versus emissions in the stratosphere
- Implications of the effect of NOx-induced depletion of methane for NOx emissions in the troposphere
- Reduced effect of cloud formation due to absence of contrails by VLJs flown in the troposphere
- Effect of lowered propulsive efficiency in the troposphere versus higher propulsive efficiency in the stratosphere on overall carbon dioxide emissions, for VLJs. The results of this analysis will lead to engine design requirements for operating turbofans such as the Geared Turbofan[iii] in the mid altitudes.

The state of the art in climate modeling is limited in terms of providing reliable estimates for the specific aviation-induced radiative forcing effects. Even so, perhaps the relative effects of stratospheric and tropospheric flight can be considered. A rule of thumb in climate science estimates that each unit of fuel burned by stratospheric air transport flights has the greenhouse effect of three times that of ground transport[iv]. Further, it is estimated that the radiative forcing from persistent contrails and contrail-induced cirrus clouds (PCC) exceeds the contributions from all other aviation-induced RF combined[v]. However, quantitative analysis is absent regarding the effect of flying in the troposphere specifically by VLJs. We plan to support analysis to provide quantitative information regarding this distinction.

Legislative Actions

Clearly Congress will have a vital role in outlining the next steps necessary to mitigate aviation's footprint on the environment. The U.S. House of Representatives' FAA Reauthorization bill, H.R. 2881, provides an outstanding blueprint for the aviation industry to utilize new technologies through the legislation's support of the Next Generation Air Transportation System.

Since last year, NATA members have been strongly encouraged to support H.R. 2881, a bill approved by the U.S. House of Representatives that would provide historic funding levels, nearly $13 billion, for the FAA's Facilities and Equipment (F&E) account that will accelerate implementation of the Next Generation Air Transportation System (NextGen). NextGen is the FAA's national plan to transform the air traffic control system from a ground-based navigation system using radar to a satellite-based system. This legislation will enable the FAA to make needed repairs and upgrades to existing facilities and equipment, and provide for high-priority safety-related systems.

By utilizing new technologies, airspace routes can be better defined, allowing more aircraft and more routes to be determined within the airspace. And most importantly, utilizing new technologies to improve airspace usage, aircraft will be able to fly routes more directly, thereby minimizing noise and the impact on the environment.

The demand for air travel is increasing steadily. The FAA projects that by 2025 the number of domestic enplanements will have doubled to 1,482 million per year. The environmental impact of air travel is increasingly important to consumers, which is why the aviation industry is collaborating to address this important issue.

Thank you for the opportunity to testify, and I will be happy to answer your questions.

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[i] International Panel on Climate Change Special Report: Aviation and the Global Atmosphere – Summary for Policy Makers, 1999.
[ii] Workshop on the Impacts of Aviation on Climate Change: A Report of Findings and Recommendations. June 7-9, 2006 Cambridge, MA, August 2006.
[iii] Pratt & Whitney reference TBD
[iv] Noppel, F.; and Singh, R.: Overview of Contrail and Cirrus Cloud Avoidance Technology. Journal of Aircraft, Vol. 44, No. 5, Sept-Oct 2007, pp. 1721-1726.
[v] Sausen, R., Isaksen, I., Grewe, V., Hauglustaine, D., Lee, D., Gunnar, M., Kohler, M. O., Pitari, G., Schumann, U., Stordal, F., and Zerefos, C.: “Aviation Radiative Forcing in 2000: An Update on IPCC (1999),” Meteorologische Zeitschrift; Acta Scientiarium Naturalium Universtatis Normalis Hunanensis, Vol. 14, No. 4, Aug. 2005, pp. 555-561.