International Civil Aviation Organization

A37-WP/185
EX/34
10/09/10

WORKING PAPER

ASSEMBLY — 37TH SESSION

EXECUTIVE COMMITTEE

Agenda Item 17: Environmental protection

SUSTAINABLE ALTERNATIVE AVIATION FUELS

(Presented by the United States of America)

EXECUTIVE SUMMARY

Development and deployment of sustainable alternative aviation fuels offer environmental sustainability, energy security and economic stability for international aviation. Breakthroughs in sustainable alternative fuels are key to meeting U.S. and global goals to reduce aviation climate change impacts. Member States, industry and ICAO have recognized the importance of such fuels in reducing aviation's global environmental impacts, and many efforts led by industry, States and international organizations are currently underway to develop, evaluate, demonstrate, qualify for use and commercialize alternative aviation fuels, and to assess the sustainability of these fuels. In this paper, the United States provides an update on progress made and future plans for testing, qualifying for use and deploying sustainable alternative aviation fuels. It will also reiterate the important information-sharing role that ICAO should play in support of these activities.

Action: The Assembly is invited to:

a) encourage States to collaborate on the development, testing and demonstration of advanced alternative aviation fuels from novel feedstocks and processes that may have additional environmental and economic benefits over existing fuels;
b) reaffirm the role of ICAO to facilitate the international exchange of information among States regarding sustainable alternative aviation fuels research and development, qualification and financing and commercialization efforts; and
c) encourage ICAO to stay apprised of efforts of experts from States and relevant international organizations engaged in activities to assess the lifecycle GHG emissions and sustainability of alternative aviation fuels.

Strategic Objectives:	This working paper relates to Strategic Objective C, *Environmental Protection – minimize the adverse effect of global civil aviation on the environment.*
Financial implications:	No additional resources required.
References:	A37-WP/23, *Aviation and Alternative Fuels*

1. INTRODUCTION

1.1 Sustainable alternative aviation fuels are a key component to reducing aviation's greenhouse gas (GHG) emissions and air quality impacts, and their use in commercial aviation is on the near horizon. Their development and deployment offer prospects for enabling environmental sustainability, energy security and economic stability for international aviation. Breakthroughs in sustainable alternative fuels are critical to meeting U.S. and global goals to reduce aviation climate change impacts. In this paper, the United States provides an update on progress made and future plans for testing, qualifying for use and deploying sustainable alternative aviation fuels. It will also reiterate the important information sharing role that ICAO should play in support of these activities.

2. BACKGROUND

2.1 The United States has taken a comprehensive approach to addressing barriers and enabling the adoption and end use of sustainable alternative aviation fuels in commercial jet aircraft. Working in partnership with government, university, and industry researchers and also with stakeholders through the Commercial Aviation Alternative Fuels Initiative (CAAFI), a government-industry partnership, the United States has made rapid progress towards achieving the technical, environmental, fuel-qualification and -specification, and deployment opportunities needed to support sustainable alternative fuels use in commercial jet aircraft.

2.2 United States government agencies, including the Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), Department of Defense, Department of Energy, Department of Agriculture and Environmental Protection Agency (EPA), are coordinating their efforts with industry to support testing and demonstration; to facilitate fuel approval via ASTM International; to conduct environmental measurements and analysis; to understand fuel feedstock and production potential and readiness level; to facilitate information exchange among stakeholders; and to provide support to deployment of sustainable alternative aviation fuels.

2.3 Internationally, States and industry are leading a number of efforts to develop, evaluate, demonstrate, qualify for use and commercialize alternative aviation fuels, including environmental and sustainability assessments. Understanding the sustainability of alternative fuels is a key activity to enable environmental compliance that will allow for deployment and end use of sustainable alternative aviation fuels. Experts from States, international organizations, and industry are working to develop sustainability metrics to assess alternative aviation fuel. These alternative fuel activities require significant technical expertise and include and extend beyond alternative fuels for aviation. Appropriately addressing alternative aviation fuels sustainability impacts must be done in the context of broader sustainable fuel development and deployment for all sectors.

2.4 There is tremendous potential in the development of sustainable alternative aviation fuels. ICAO recognized the importance of such fuels to reducing aviation's global environmental impacts and the substantial efforts made by individual States and industry by holding a Conference on Aviation Alternative Fuels (CAAF/09) in November 2009.

3. UPDATE ON ACTIVITIES

3.1 In September 2009, the first alternative aviation jet fuel specification was approved by ASTM International. The new specification (ASTM D7566) enables the use of a 50% blend of synthesized

hydrocarbon jet fuel made via the Fischer-Tropsch (FT) process from biomass, gas, or coal mixed with petroleum jet fuel. The specification is structured so that additional fuel processes and sources can be approved as testing is completed and data become available. This was the first new jet fuel standard approved in the last 20 years. We anticipate the approval of a second alternative fuel blend of 50% hydroprocessed renewable jet (HRJ) and petroleum jet fuel by early 2011. CAAFI's role in developing the new specification helped it to win *Air Transport World's* 2010 Joseph S. Murphy Award for service to the industry.

3.2 The United States continues to advance our technical capacities to assess lifecycle greenhouse gas (GHG) reductions as well as other sustainability factors through partnerships, research/development and regulatory pathways. This year, the FAA completed a screening-level GHG life cycle analysis (LCA) for 16 different alternative aviation fuels.[1] Additionally, the U.S. Air Force, in coordination with FAA, EPA, DOE Laboratories, the U.S. Army and the U.S. Navy published a framework and guidance document for conducting LCA for alternative aviation fuels.[2] The Air Force-led group has follow-on activities underway, including the development of detailed case study LCAs for three specific alternative aviation fuels over the next year.

3.3 EPA finalized this year the U.S. Renewable Fuels Standard (RFS), which mandates volume increases of biofuels in the U.S. fuel supply that expand to 36 billion gallons by 2022. Under the RFS, EPA finalized the GHG lifecycle analysis methodology used to determine eligibility of biofuels to meet the RFS volume mandates. Alternative aviation biofuels can be used to meet the volume standard if they meet RFS requirements. To meet the volume standard, biofuels are required to reduce lifecycle GHG emissions by specific reduction thresholds as compared to a 2005 petroleum baseline. RFS encourages development and deployment of advanced alternative fuels by mandating increasing volumes of biofuels that show greater lifecycle GHG emission reductions. The program thereby provides additional opportunity for alternative aviation fuel technologies that would provide the aviation sector increasing GHG reductions.[3]

3.4 Progress in commercial deployment in the U.S. is also being made. In late 2009, fifteen airlines signed pre-purchase agreements with two alternative fuel suppliers to develop long-term purchasing arrangements for both FT and HRJ fuels. In March 2010, U.S. airline and military jet fuel purchasers signed a strategic alliance to align their process and create a "single market" for alternative jet fuel purchasing. This represented another important step in providing "demand pull" for accelerating the development and deployment of sustainable alternative fuels in the United States as together they represent nearly all the jet fuel purchasers in the U.S. market.

3.5 Technology development continues. In June 2010, the FAA announced the Continuous Lower Energy, Emissions and Noise (CLEEN) program that will develop and demonstrate new technologies, including sustainable alternative aviation fuels. Current investments in sustainable alternative aviation fuels under CLEEN are valued at $18 million including the cost share contribution of the industry. These efforts include fuel system compatibility, laboratory, rig, engine and flight testing of multiple alternative aviation fuels. Data developed will support advancement of fuel qualification and certification of the fuels tested.

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[1] Russel W Stratton, Hsin Min Wong and James I. Hileman, "Life Cycle Greenhouse Gas Emissions from Alternative Jet Fuel" PARTNER Project 28 Report, 2010. available at http://web.mit.edu/aeroastro/partner/reports/proj28/partner-proj28-2010-001.pdf

[2] David T. Allen, et al, "Framework and Guidance for Estimating Greenhouse Gas Footprints of Aviation Fuels" Air Force Research Laboratory Propulsion Directorate, United States Air Force 2010. available at http://www.caafi.org/information/pdf/AFRL-RZ-WP-TR-2009-2206.pdf

[3] for more information on RFS see http://www.epa.gov/otaq/fuels/renewablefuels/index.htm.

3.6 Exciting technologies are on the horizon. A large number of promising alternative aviation fuels using novel non-food feedstock sources and conversion processes are emerging but are still at early stages of evaluation, qualification and certification. Some of these fuels promise significant improvements over conventional and first-generation sustainable alternative aviation fuels in their potential to increase feedstock availability, reduce cost, improve overall scale of production, reduce cost of conversion, reduce life cycle GHG emissions, and enhance sustainability. The United States will support testing and demonstration of new novel sustainable alternative aviation fuels to expand availability of the maximum number of feasible fuels that meet safety, performance, and environmental requirements. The data generated along with engine and flight tests will support an expected window of fuel qualification activities in 2013 for fuels containing components from advanced fermentation, catalytic, pyrolytic and other processes.

4. ICAO'S ROLE

4.1 The ICAO CAAF/09 was an opportunity to collectively share our efforts and strategies to promote sustainable alternative aviation fuels. The United States welcomes ICAO's interest in and attention to sustainable alternative aviation fuels and endorses the role of ICAO as a facilitator of information exchange among States in support of sustainable alternative aviation fuel development.

4.2 The United States encourages the ICAO Secretariat to stay apprised of ongoing efforts by experts from States, international organizations, and other organizations to assess the lifecycle GHG emissions and sustainability of alternative aviation fuels. We encourage the ICAO Secretariat to share this information with States to foster the development and deployment of alternative aviation fuels in a sustainable manner, and encourage States to develop and deploy these fuels within the global framework of renewable energy.

5. CONCLUSIONS

5.1 Breakthroughs in sustainable alternative aviation fuels are key to meeting U.S. and global goals to reduce aviation climate change impacts. There are many promising developments in the field of sustainable alternative aviation fuels and real prospects for these fuels to become available in the near term. While questions around lifecycle GHG emissions and sustainability need to be addressed, there are many ongoing processes to do so. The successful development, qualification, and deployment of sustainable alternative aviation fuels is crucial to ensuring the environmental sustainability and economic strength of international aviation over the long term. For this reason the United States, in partnership with industry and interested States will continue to strive for development and deployment of sustainable alternative aviation fuels.

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