



**WORKING PAPER**

**ASSEMBLY — 39TH SESSION**

**EXECUTIVE COMMITTEE**

**Agenda Item 22: Environmental Protection – International Aviation and Climate Change – Policy, Standardization and Implementation Support**

**VIEWS OF THE UNITED STATES ON ICAO’S BASKET OF MEASURES TO ADDRESS CLIMATE CHANGE FROM INTERNATIONAL CIVIL AVIATION**

(Presented by the United States)

**EXECUTIVE SUMMARY**

The United States supports ICAO’s comprehensive approach to achieving carbon neutral growth from 2020 through a “basket of measures” comprising technical, operational, and infrastructure enhancements; sustainable alternative fuels; a CO<sub>2</sub> standard for aircraft; and the development of a global market-based measure as a gap-filler. This paper sets out the U.S. views on ICAO’s comprehensive basket of measures and provides information on various resources expended by the U.S. in relation to the elements of the basket of measures.

**Action:** The Assembly is invited to:

- a) note the views of the United States on the basket of measures;
- b) note the significant financial and other resource investments of the United States in each element of the basket of measures;
- c) note the opportunities for international partnerships with States and industry to enhance implementation and use of various elements in the basket of measures; and
- d) take note that different national circumstances, or “differentiation,” is being addressed in different ways across the basket of measures, with some Member States undertaking the majority of effort in the key areas of technology development, operational and infrastructure improvements, and alternative fuels.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective E – <i>Environmental Protection</i>
<i>Financial implications:</i>	
<i>References:</i>	

## 1. INTRODUCTION

1.1 The United States notes that none of the individual parts of the basket of measures will, on its own, comprehensively address aviation's contribution to climate change. Rather, it is the sum of the parts—the entire basket—that must be ICAO's focus. Similarly, when we consider efforts made by ICAO Member States to reduce international aviation Greenhouse Gas (GHG) emissions, we should consider what they are doing with regard to the entire basket of measures.

1.2 ICAO and its Member States have made substantial progress in all elements of the “basket of measures” to address the impacts of aviation on climate; nevertheless, further work will be necessary for aviation to sustainably grow and achieve ICAO's goals. ICAO should continue to pursue its comprehensive approach to reducing greenhouse gas (GHG) emissions from aviation through the “basket of measures.” The United States is committed to working with ICAO, its Member States, and Observers to further develop and implement these measures.

1.3 This paper provides in the following sections 1.) U.S. views on ICAO's comprehensive basket of measures, and 2.) U.S. efforts with regard to the individual elements in the basket of measures. The United States has provided our views on GMBM in WP/XX.

## 2. OVERARCHING U.S. VIEWS ON THE BASKET OF MEASURES

2.1 The United States notes that none of the individual parts of the basket of measures will, on its own, comprehensively address aviation's contribution to climate change. Rather, it is the sum of the parts—the entire basket—that must be ICAO's focus.

2.2 When examining the entire basket of measures, we see that there are some elements on which all or most Member States and operators are expected to take action. There are many more elements, however, on which some States undertake the majority of effort, in ways that benefit other States whose national circumstances prevent them from taking significant action. For example, the work of the United States on the basket of measures includes the development of technologies, infrastructure and operational improvements, and significant investment in alternative fuels. Our efforts in these areas do not only benefit our own operators; they can and will continue to benefit other States and their industry's efforts to enhance efficiency and reduce CO<sub>2</sub> emissions. So, while it is not possible or appropriate to differentiate among States on every aspect of every element of the basket of measures, it is possible to respect the foundational principle of non-discrimination while also accommodating the specific national circumstances of States as long as we consider the entire landscape of climate action in this sector.

## 3. INDIVIDUAL ELEMENTS OF THE BASKET OF MEASURES

3.1 As indicated above, the United States is working on all the items in the basket of measures to comprehensively address climate impacts from aviation. Below is a discussion of activities undertaken within—or supported by—the United States to address the issue of climate change.

3.2 Technology: The evolution of modern, more fuel-efficient airframes and engines has produced the most significant aviation emissions reductions historically and will drive more reductions in

the future. The United States is leading a number of efforts and collaborating with the aviation industry to not only develop, but also improve technology that results in better fuel efficiency and reduced emissions. U.S. actions to improve aircraft and engine technology are coordinated through the National Aeronautics Research and Development Plan.<sup>1</sup> The Continuous Lower Energy, Emissions, and Noise (CLEEN) Program, launched by the Federal Aviation Administration (FAA) in 2010, is a collaborative partnership with five aviation manufacturers (Boeing, General Electric (GE), Honeywell, Pratt & Whitney, and Rolls-Royce) to develop technologies that will, among others, reduce emissions and fuel burn, and expedite integration of these technologies into current and future aircraft. Over the last five years, the total federal investment in the CLEEN Program has been \$125 million. With participating aviation manufacturers exceeding the one-to-one cost share requirement, the overall investment in the program has exceeded \$250 million. Technologies matured under the CLEEN Program are anticipated to begin entering the commercial aircraft fleet this year. The FAA has now advanced to the second phase of the CLEEN program, CLEEN II, which is planned to run from 2015 through 2020, developing new aircraft technologies to further reduce fuel burn, emissions, and noise. The awarded companies are: Aurora Flight Sciences; Boeing; GE Aviation; Delta TechOps/MDS Coating Technologies/America's Phenix; Honeywell Aerospace; Pratt & Whitney; Rolls-Royce; and Rohr, Inc./UTC Aerospace Systems. The FAA anticipates investing \$100 million over the 5 year program, with cost-share from industry partners that will match or exceed the FAA contribution. The FAA anticipates that developed CLEEN II aircraft technologies will be on a path for introduction into commercial aircraft by 2026.

3.3 Technology measures would be incomplete without acknowledging the recent aircraft CO<sub>2</sub> emissions standard. The United States was heavily involved in the Committee on Aviation Environmental Protection (CAEP) work leading up to the CAEP/10 decision on the aircraft CO<sub>2</sub> emissions standard. We applaud the ICAO Council on the adoption of this new and important technology-based standard.

3.4 Infrastructure and Operations: Under the auspices of the Next Generation Air Transportation System (NextGen), the United States is updating its National Airspace System (NAS) infrastructure and procedures to provide for more efficient aircraft operations and reduced GHG emissions. Our NextGen program incorporates many blocks and modules included in the ICAO Aviation System Block Upgrade Framework. For example, recent investments in Automatic Dependent Surveillance-Broadcast have enabled more efficient operations across the Gulf of Mexico. Our En Route Automation Modernization program will increase air traffic flow and improve automated navigational, conflict, and detection services. Similar enhancements are being made to terminal airspace through our Terminal Automation Modernization, and Replacement program. These technologies, when paired with other ongoing upgrades, will allow our NAS to operate with greater efficiency, increased predictability, and reduced environmental impact. Implementation of these technologies has already resulted in reductions of millions of gallons of fuel usage and CO<sub>2</sub> emissions. FAA and the aviation industry anticipate spending approximately \$36 billion on NextGen between 2010 and 2030. Once all planned programs are in place, we expect NextGen to deliver roughly \$166 billion in direct airline, industry, and passenger benefits (passenger value of time and CO<sub>2</sub> emissions) through 2030. FAA is committed to working with other States to modernize and upgrade the efficiency of aircraft operations internationally. For example, we are working with States in the Caribbean on plans to implement Air Traffic Flow Management and Collaborative Decision-Making programs, which will result in increased efficiency in how air traffic is handled throughout the Caribbean region.

3.5 Sustainable Alternative Fuels: The United States is actively supporting and facilitating the development and deployment of sustainable Alternative Jet Fuels (AJF) with lower life-cycle GHG

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<sup>1</sup> National Aeronautics Research and Development Plan available at <http://www.whitehouse.gov/sites/default/files/microsites/ostp/aero-rdplan-2010.pdf>

emissions than conventional petroleum fuel. Interagency coordination and industry collaboration is central to our work in this area; two primary examples include the Farm to Fly 2.0 cooperation agreement and the Commercial Aviation Alternative Fuels Initiative (CAAFI). The former focuses on supply chain and production infrastructure creation; the latter, on Research and Development, environmental assessment, fuel testing, demonstration, and commercialization. Development of alternative jet fuels is a global effort requiring international collaboration. The U.S. has signed formal alternative jet fuel cooperation agreements with five countries [Australia, Brazil, Germany, Spain, and Indonesia], carries out regular informal information sharing with others, and has contributed to the ICAO CAEP Alternative Fuels Task Force and workshops hosted by ICAO. Thus far, the global standard setting organization, ASTM International, has approved five alternative jet fuels for use in aviation. Research is ongoing to pursue additional approvals as well as examine the viability of regional supply chains and chart a path for overcoming barriers to production. FAA alone has spent approximately \$20 million since 2012 on the development and deployment of sustainable alternative fuels; other agencies, including the U.S. Departments of Agriculture, Energy, and Defense have spent many millions more. This interagency coordination and industry collaboration is paving the way to large-scale production and broad commercial use of AJF, both domestically and internationally, thereby providing greater opportunity for the U.S. and ICAO to meet climate-related goals.

3.6 Global Market-Based Measure: The United States actively engages, participates, supports, and provides significant financial and personnel resources toward the successful development and implementation of a GMBM for international aviation. For further discussion, please refer to WP/##.

#### 4. ACTION

4.1 The Assembly is invited to:

- a) note the views of the United States on the basket of measures;
- b) note the significant financial and other resource investments of the United States in each element of the basket of measures;
- c) note the opportunities for international partnerships with States and industry to enhance implementation and use of various elements in the basket of measures; and
- d) take note that different national circumstances, or “differentiation,” is being addressed in different ways across the basket of measures, with some Member States undertaking the majority of effort in the key areas of technology development, operational and infrastructure improvements, and alternative fuels.

— END —