Twenty Second Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/22)

Papeete, Tahiti, 12-14 March 2008

Agenda Item 5: Identify Future Programs

Asia and South Pacific Initiative to Reduce Emissions (ASPIRE)

Partnership for Increasing Efficiency and Reducing Greenhouse Gas Emissions in Aviation

(Presented by the Federal Aviation Administration)

SUMMARY

The working paper discusses how the FAA, in conjunction with several global air navigation service providers, has placed renewed emphasis on developing service improvements designed to increase efficiency and reduce greenhouse gas emissions through several initiatives in the Atlantic and most recently in the South Pacific oceanic region.

1. Introduction

1.1 As aviation services continue to grow, we can anticipate an increase in the industry's carbon emissions. This is happening against a background of (1) emission reductions from some sources other than aviation, and (2) the rising values we place on environmental quality. If not successfully addressed, environmental issues may significantly constrain air transportation growth in the 21st. century.

1.2 Today, air navigation service providers (ANSPs) and sponsoring governments are assessing the environmental impacts of air transportation on the global climate. As a result of these assessments, ANSPs have placed renewed emphasis on developing service improvements designed to reduce greenhouse gas emissions.

1.3 In June 2007, the FAA and the European Commission for Aviation announced a partnership to demonstrate a series of technologies in the U.S. and Europe focusing on reduction of carbon and nitrogen emissions for trans-Atlantic flights. This partnership is known as the Atlantic Interoperability Initiative to Reduce Emissions (AIRE).

1.4 In August 2007, the FAA presented a series of near and mid-term Pacific initiatives to the Asia Pacific Economic Cooperation (APEC) Forum on Aviation Emissions. In presenting these oceanic initiatives, the FAA proposed that Pacific ANSPs and governments should consider bilateral and regional partnerships to demonstrate end-

to-end technologies leading to reduction in greenhouse gasses.

1.5 On February 18, 2008 the FAA, Airservices Australia, and Airways New Zealand signed a cooperative statement at the Singapore Air Show's Aviation Leadership Summit, creating the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE). ASPIRE takes advantage of many of the on-going operational initiatives in the South Pacific being coordinated by Informal South Pacific ATS Coordinating Group (ISPACG) and provides a new environmental focus that ISPACG participants can support through existing and new regional efforts to reduce greenhouse gas emissions.

2. Aviation Emissions and the AIRE Partnership

2.1 The United Nations Intergovernmental Panel on Climate Change (IPCC) attributes approximately 3% of global greenhouse gas emissions to aviation, an impact which the industry is committed to diminishing as aviation grows. Improving aviation's environmental footprint, however, presents a significant challenge. Transport activity is expected to increase robustly over the next several decades. Demand for air transportation will continue to grow rapidly to support our economic productivity and quality of life.

2.2 The air transportation industry provides 32 million direct, indirect, and induced jobs worldwide. Aircraft carry approximately 40% of all world trade. In 2007, more passengers than ever before, nearly 2.2 billion people flew on the world's scheduled air carriers, with predictions of 9 billion passengers by 2025.

2.3 The air transportation industry has a long record of environmental achievement. Reduced energy consumption and engine emissions are core aviation business principles. Technological advancement has reduced aircraft fuel consumption and emissions significantly over the last 30 years, and this is expected to continue in the future.

2.4 At the June 2007 Paris Air Show, then FAA Administrator Marion Blakey and Vice President Jean Barrot announced the creation of the AIRE Partnership with an aggressive time table to complete operational demonstrations along principal North Atlantic routes to validate environmental benefits within a 12 month time frame. AIRE will adopt a "phased approach" to planned flight demonstration initiatives. Flight demonstrations will feature new technologies and procedural improvements which include:

2.4.1 ***Trajectory Based Operations (TBO) on the ground*** – AIRE will leverage promising new technologies to demonstrate the value of collaborative surface operations in maximizing airport throughput while reducing fuel burn and engine emissions. Turbojet aircraft require a significant thrust increase to begin moving from a stop, far in excess of that required to maintain stabilized taxi. Stops and starts, therefore, increase fuel usage and emissions while an aircraft moves on the ground. TBO can reduce aircraft stops and starts, with lower overall ground emissions, as well as increase airport surface safety benefits by reducing taxiway conflicts.

2.4.2 ***Collaborative Oceanic Trajectory Optimization*** – Trajectory collaboration and optimization during trans-Atlantic flight has the potential for major fuel efficiencies and significant aircraft emission reductions. The concept of trajectory optimization is a key enhancement of the U.S. Next Generation Air Transportation System (NextGen) and part of an extensive technology development program for oceanic airspace over the next decade. During the AIRE initiative, U.S. and European ANSPs and industry partners will demonstrate collaborative trajectory optimization in the oceanic environment, initially using a manual optimization process. Automated profile optimization tools will be included as these become available.

2.4.3 ***Oceanic Tailored Arrivals (OTA)*** – The OTA is a comprehensive trajectory based arrival clearance to a coastal destination airport. The OTA is a low power, continuous descent approach designed to reduce fuel burn, noise and emissions. Ground based systems calculate the aircraft's four-dimensional (4D) arrival profile including flight path, vertical profile and speed/time optimized for arrival conditions. The arrival profile is data-linked to the aircraft, where it is auto-loaded into the aircraft Flight Management System. The profile is confirmed via voice clearance in the radar environment and executed by the onboard guidance system with little additional cockpit modification required. Early field trials indicate that tailored arrivals could save between 400 and 800 pounds of fuel per flight.

2.5 AIRE will conduct a phased flight demonstration program to explore the potential environmental benefits of new aviation technologies and improved operational procedures. Near and longer term outcomes are anticipated which will lead to implementation of proven technologies and procedures and, subsequently, shorter average flight times, significant industry fuel savings, and commensurate engine emission reductions.

3. Asia and South Pacific Initiative to Reduce Emissions (ASPIRE)

3.1 In light of the successful AIRE partnership, the FAA placed a high priority on establishing a similar undertaking in the Pacific region. Such a Pacific partnership would offer a prime opportunity to demonstrate a variety of service enhancements and technologies leading to carbon emissions reductions. Many of these enhancements are currently being developed and implemented by the FAA and neighboring service providers, and could be readily leveraged in a Pacific emissions reduction program similar to AIRE.

3.2 Recognizing the potential impact that such a partnership could have on emissions reduction efforts worldwide, the FAA Air Traffic Organization, Airservices Australia, and Airways New Zealand banded together on February 18, 2008 to sign a joint statement creating ASPIRE. This partnership will take advantage of the current leadership of the signatories in the region, primarily through ISPACG, and expand to include all necessary stakeholders, including governments, ANSPs, airlines and user groups to address emissions reduction across the entire Asia Pacific region. The current outlook is to start with existing South Pacific ATC operational efficiency

initiatives, and expand through a phased approach to the North Pacific and other key Asian countries in the years to follow.

3.3 Commercial air transport in the Pacific Region (as a whole) is characterized primarily by sophisticated jumbo passenger and freight aircraft flying distances typically in excess of 4000 nautical miles and for durations of eight hours or more. Consequently, one of the principal goals of South Pacific ANSPs and users under ASPIRE will be to further optimize flight profiles, reduce fuel burn through greater flexibility and predictability, and develop common metrics and data sets for the measurement of emissions reductions. Candidate ASPIRE initiatives include:

3.3.1 ***Pacific ATS Route Realignment*** – The FAA has been working with adjacent ANSPs to modify the current fixed route system to more appropriately reflect today's operating environment and efficiencies created by advanced decision support systems such as the FAA's Ocean21 system. This work has been completed in the Oakland flight information region (FIR); however, benefits can still be gained by expanding this concept throughout neighboring FIRs in the South and North Pacific regions.

3.3.2 ***User Preferred Route (UPR) Expansion*** – Due to recent advancements in ground automation, the FAA can now offer UPRs to all flights in the South Pacific region. ISPACG has sponsored a program to expand the use of UPRs into additional airspace and on new routes. Discussions are underway with Japan to extend UPR trajectories into Japanese airspace. The FAA is also currently working with Singapore Airlines (SIA) on UPR expansion. We recently arranged for SIA to fly UPRs for flights from the US west coast to Singapore. SIA expects flight time savings between 20 and 40 minutes per flight.

3.3.3 ***Dynamic Airborne Reroute Programs (DARP)*** – The FAA is promoting the availability of airborne re-routes for more efficient trajectories for all flights not on oceanic fixed or flex track systems. The FAA, Airservices Australia and Airways New Zealand are working with other ANSPs including Fiji and Tahiti to expand DARP use across FIR boundaries.

3.3.4 ***Automatic Dependent Surveillance-Contract (ADS-C) In-Trail Procedures*** – The FAA is developing a reduced separation standard based on distance measuring equipment (DME) in-trail procedures, but using ADS-C surveillance to verify distance between aircraft pairs. This procedure would allow more aircraft to reach fuel efficient altitudes.

3.3.5 ***Tailored Arrivals*** – The FAA and Airservices Australia have conducted Tailored Arrivals trials at the coastal airports of Sydney and San Francisco.

3.3.6 ***Pre-Departure Oceanic Trajectory Management 4-D (OTM4D)*** – The FAA is developing a concept to improve the probability that an aircraft's oceanic entry altitude and en route preferred profile will be available by suggesting minor adjustments to track, altitude and time requests for oceanic entry. The

Japan Civil Aviation Bureau (JCAB) has expressed interest developing a complementary program.

3.4 In order to realize the potential benefits from the availability of enhanced services in the South and North Pacific, major regional carriers such as Air New Zealand, Qantas, United, and Japan Airlines have invested heavily in data link technology and advanced navigation performance technology creating a large pool of viable air-carrier partners for demonstration activities.

4. Action by the meeting

a) The meeting is asked to note the progress of regional partnerships on the environment such as AIRE in the Atlantic and the recently created ASPIRE partnership in the South Pacific.
b) The meeting is also asked to consider existing and new projects and action items to add to the ISPACG work program that support a reduction of greenhouse gas emissions.