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Agenda Item 8: Environment Matters
8.3 Aviation and Global Climate

UPDATE ON ACTIVITIES OF THE ASIA AND SOUTH PACIFIC INITIATIVE TO REDUCE EMISSIONS (ASPIRE) AND THE ATLANTIC INTEROPERABILITY INITIATIVE TO REDUCE EMISSIONS (AIRE)

(Presented by the United States)

SUMMARY
This paper presents information on the ASPIRE Partnership and the AIRE Partnership Phase II Oceanic Demonstration.

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

1.1 ASPIRE is a partnership of air navigation service providers focused on environmental stewardship in the region. The ASPIRE partnership was initiated by the signing of the ASPIRE Joint Statement of Purpose, by Airservices Australia, Airways New Zealand, and the Federal Aviation Administration at the Singapore Air Show on February 18th, 2008. Unlike regional collaborations focused primarily on technology demonstration, the ASPIRE partnership is a comprehensive approach to environmental stewardship for the Pacific Rim. Under ASPIRE, current and future partners pledge to adopt and promote best practices that have demonstrated and proven success in the reduction of greenhouse gasses, as well as to the development of work programs to promote future gains for the environment.

1.2 On 4-5 June 2008, the ASPIRE Partners met in Auckland, NZ to develop a shared approach to ASPIRE, based on the principles established in the Joint Statement of Purpose. The ASPIRE Coordinators established a core set of goals for the partnership:

a) Accelerate the development and implementation of operational procedures to reduce the environmental footprint for all phases of flight on an operation by operation basis, from gate to gate;
b) Facilitate world-wide interoperability of environmentally friendly procedures and standards;
c) Capitalize on existing technology and best practices;
d) Develop shared performance metrics to measure improvements in the environmental performance of the air transport system;
e) Provide a systematic approach to ensure appropriate mitigation actions with short, medium and long-term results; and
f) Communicate and publicize ASPIRE environmental initiatives, goals, progress and performance to the global aviation community, the press and the general public.

1.3 The South Pacific ASPIRE Work Program, known as Work Program "A" consists of near-term and mid-term initiatives such as:

a) Performance model for efficiency gains identifying and past performance gains in the South Pacific
b) Development of the Ideal-flight benchmark
c) Development of a South Pacific Performance Baseline
d) ASPIRE-Flight demonstrations
e) Expansion of Dynamic Airborne Reroute Procedures (DARP)
   (a) DARP allows airborne aircraft to take advantage of updated atmospheric conditions
   - Oakland ARTCC began operational use of DARP in March 2006 for flights that cross the common boundary with Auckland Oceanic Center (OAC). Oakland ARTCC has been working to expand the use of DARP for flights crossing the other South Pacific FIR boundaries. DARPS have saved flights up to 907 kg of fuel burn and 7 minutes flying time.

f) Expansion of User Preferred Route (UPR) availability
   (a) Users choose optimum routes based on individual airframes to maximize the efficiency of the route at the time of flight planning. Pacific Oceanic flights utilizing UPRs routinely result in savings of 900 to 1,800 kg of fuel per flight, with the following projected annual emissions reductions:
   - New Caledonia/New Zealand to Asia since June 2008
     - Projected annual savings up to 2.09M kg of fuel and 6.6M kg of CO_2
   - Asia to Hawaii since August 2008
     - Projected annual savings up to 2.88M kg of fuel and 5M kg of CO_2
   - Narita, Japan to Sydney/Brisbane/Cairnes, Australia
     - Projected annual savings of 1.89M kg of fuel and 5.97M kg of CO_2

g) ADS In-Trail Procedures development
h) Analysis of separation reductions below 30/30
i) Collaboration on Optimized Profile Descents such as Tailored Arrivals (TAs)
   - December 2007 Tailored Arrival trials began for Pacific Oceanic flights transitioning for San Francisco (SFO) arrivals
     - Dec 2007 thru Dec 2008 aircraft participating in SFO trials collectively used 907,200 kg less fuel and reduced carbon dioxide emissions by 2.7M kg according to Boeing data
       - On average Boeing 777s flying full TAs used 591 kg less fuel
       - On average Boeing 747s flying full TAs used 1,039 kg less fuel
       - United Airlines benefits for 9 flights January 2008 to March 2009
         - 340,200 kg less fuel
         - 1.13M kg less CO_2
   - September 2008, TA trials began for Atlantic Oceanic flights transitioning for Miami arrivals begun
   - TA trials for Pacific Oceanic flights transitioning for Los Angeles arrivals targeted for FY2010

1.4 Between September 2008 and November 2008, the ASPIRE Partners collaborated with airlines and industry on a series of three green flights, or ASPIRE Flights designed to demonstrate the potential fuel and emissions savings from a) the harmonization of existing green procedures and technologies such as just-in-time fuelling, User Preferred Routes and RNP reduced pair-wise separation and b) the best-case management of controllable constraints such as taxi delays and low altitude vectoring. The ASPIRE Flights conducted are:

a) **ASPIRE-Air New Zealand**: successfully demonstrated on September 12th with a B777 from Auckland, NZ to San Francisco, CA.
b) **ASPIRE-Qantas**: successfully demonstrated on October 20th with an A380 from Los Angeles, CA to Melbourne, Australia.
c) **ASPIRE-United**: successfully demonstrated on November 14th with a B744 from Sydney, Australia to San Francisco, California

Sample Fuel Savings from an ASPIRE Flight (ASPIRE-Air New Zealand)

	Fuel burn saved			
	USG	litres	kilos	kilos CO2
Fuel saved by reduced APU use	60	227	182	574
Fuel saved through 'just in time' refueling	68	257	206	650
Fuel saved by use of Maximum climb power	40	151	121	382
Fuel saved by use of UPR (average)	420	1,590	1,272	4,015
Fuel saved by DARP (average)	70	265	212	669
Fuel saved by slower Cost Index	90	341	273	860
Fuel saved by Optimum Altitude	135	511	409	1,291
Fuel saved by use of Tailored Arrival	200	757	606	1,912
Fuel saved by 'delayed flap'	80	303	242	765
Fuel saved by reduced APU use	10	38	30	96
Totals	1,173	4,440	3,552	11,214

2. The Atlantic Interoperability Initiative to Reduce Emissions (AIRE)

2.1 Introduced in 2007, the AIRE Partnership is an international government, airline, and industry partner's initiative to minimize global aviation's environmental impact. The AIRE program is working to accelerate the development and implementation of oceanic procedures that result in environmentally friendly operations such as reduced emissions and noise. AIRE is working on efforts to integrate new technologies and procedures under NextGen and SESAR to achieve the following objectives:

a) Hasten development of operational procedures to reduce aviation's environmental footprint for all phases of flight, from gate to gate;
b) Accelerate incorporation and world wide interoperability of environmentally friendly procedures and standards;
c) Capitalize on existing technology and best practices;
d) Provide a systematic approach with short, medium and long-term initiatives; and,
e) Validate improvements with flight trials and demonstrations.

2.2 The AIRE Partnership focus includes all flight segments, beginning with the departure gate and terminating when an aircraft arrives at its destination; hence, "Gate to Gate." AIRE focuses on the entire flight, with a "phased approach" to flight demonstration initiatives.

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

2.4 Trans-Atlantic flight demonstrations, occurring from 19 – 28 May 2008, were made possible with the international partnership, collaboration, and commitment of the FAA, Nav Portugal, European Commission, and Air Europa Airlines. The Phase I AIRE Oceanic demonstrations were conducted using a selected number of Air Europa revenue flights. These flights took off from Madrid (Spain) and flew through Santa Maria, New York, and Miami oceanic airspace to various destinations in the Caribbean. During the flights, Air Europa's Airline Operation Center (AOC), New York's Air Route Traffic Control Center (ARTCC), and Santa Maria Center (Portugal) utilized existing oceanic technologies to periodically improve flight trajectories.

2.5 Starting in 2009, AIRE demonstrations will validate the environmental advantages of new procedures for all phases of flight, from engine start at the departure gate through taxi, take off and climb to cruise altitude, en-route to the destination, approach, landing and taxi to the arrival gate. The collected data from these flight tests will be used to determine the environmental benefits. The results of these demonstrations are envisioned to accelerate the development of oceanic operational procedures and standards on both sides of the Atlantic Ocean.

2.6 Phase II AIRE Oceanic demonstrations will provide metrics to quantify en route performance, identify changes in cruise efficiency, compare those changes to the reference oceanic baseline and to the cost of the user preferred trajectories.

2.7 The objectives of the Phase II AIRE Oceanic Demonstration are:

a) Illustrate the emissions reductions that can be achieved when a limited set of flights are allowed to fly closer to their 4D User Preferred Trajectories (UPT)
b) Show the feasibility of linking an oceanic trajectory to a Tailored Arrival procedure

2.8 The FAA, NATS UK and Nav Portugal will collaborate on the Phase II AIRE Oceanic Demonstration. The demonstrations will be limited to candidate flights whose planned flight trajectories are mainly within the oceanic airspace controlled by New York (ZNY) and Santa Maria (LPPO) oceanic centers. The airline partners for this phase are American Airlines, Air France, Air Europa, Air Portugal and Lufthansa.

2.9 The following criteria are used to select candidate flights for the Phase II AIRE Oceanic Demonstration:

a) The candidate flights for the Phase II AIRE Oceanic Demonstration must have the majority of their Oceanic flight plan operate within ZNY and LPPO oceanic airspace;

b) The candidate flights for the Phase II AIRE Oceanic Demonstration will be limited to those by aircraft that are Automatic Dependent Surveillance-Contract (ADS-C) and Controller-Pilot Data Link communications (CPDLC) equipped, flown by crews trained and certified to use that equipage and logged on to the appropriate ATS Facility; and,
c) The candidate flights for the Phase II AIRE Oceanic Demonstration will be limited to westbound flights that enter North Atlantic Oceanic airspace from within the LPPO CTA, and proceed directly into the ZNY CTA. (Eastbound flights may be considered for later phases of AIRE Oceanic Demonstrations.)

2.10 The Phase II AIRE Oceanic Demonstration will be conducted over the period from June 2009 through September 2009. During the demonstration period, the AIRE participant flights may also be able to request and receive TA clearances into Miami International (MIA).

2.11 The data collection on the candidate flights will end at the conclusion of the AIRE Oceanic Demonstration period, expected to be the end of September 2009; however, airlines may continue to use the procedures for flight optimization.

3. Conclusion

3.1 The meeting is invited to note:

a) The progress of ASPIRE and AIRE; and,
b) That the FAA is interested in developing activities or partnerships that will bring similar efficiency and environmental gains to the Central Caribbean region

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