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ASSEMBLY — 38TH SESSION

EXECUTIVE COMMITTEE
TECHNICAL COMMISSION

Agenda Item 17: Environmental Protection
Agenda Item 38: Other issues to be considered by the Technical Commission

GREEN INITIATIVES - INDIA

(Presented by India)

EXECUTIVE SUMMARY

Aviation and associated activities impact communities in the vicinity of airports and under flight paths. On ground, Volatile Organic Compound (VOC), Carbon Monoxide (CO), Sulphur Dioxide (SO_2) and particulate matter (PM) are released through aircraft emissions. In flight, aircraft emit exhaust gas pollutants such as Carbon Monoxide (CO), Carbon Dioxide (CO_2), Nitrogen Oxides (NO_x) directly in the upper troposphere and lower stratosphere. These emissions are responsible for depletion of ozone and other constituents which are known to cause health hazard. Noise generated by aircraft is another area of concern.

However, given the long distances involved in travelling, currently transport industry has no practical alternative to flight. Therefore it is imperative that aviation activities must be optimised to mitigate the adverse impact of aircraft operation on environment.

Airports Authority of India (AAI) as has embarked upon many major initiatives with focus on improving ANS infrastructure, Procedures and Training for enhancing safety, efficiency, cost-effectiveness of aircraft operations with undivided focus on environmental benefits.

Strategic Objectives:	This paper relates to the Environmental Protection and Sustainable Development of Air Transport Strategic Objective
Financial implications:	No financial implications
References:	None

1. INTRODUCTION

1.1 Some of the major Green initiatives taken by Airports Authority of India that have contributed to substantial fuel savings by the Airlines by facilitating the User Preferred profile are listed below. The initiatives have contributed to reduced delays, improved on-time performance of aircraft and more importantly, substantial reduction in emission.

- Route Optimisation
- Up gradation of Surveillance Infrastructure
- Upper Airspace Harmonisation
- Continuous Descent Operations
- Collaborative Environmental Initiatives
- Ground Efficiency Improvement programmes

2. DISCUSSION - MAJOR ENVIRONMENTAL INITIATIVES

2.1 Route Optimisation

2.1.1 Route structure in Indian FIRs has been optimized with 93 international routes and 173 domestic routes in addition to 32 Connector routes. The connector routes have been implemented to provide better connectivity, flexibility with reduction in contract miles. Considering the inherent safety and operational efficiency in PBN procedures, AAI has developed a robust PBN implementation strategy in line with ICAO regional PBN Implementation Plan. Further, PBN RNAV-1 based SIDS and STARS have been implemented for 9 airports and 13 RNAV 5 routes connecting metros have been established.

2.2 Up gradation of Surveillance Infrastructure

2.2.1 In addition of extensive network of 35 Radar Sensors across the country, 8 more ASR/MSSR are under implementation. 14 ADS-B stations have also been implemented to ensure 100% overlapping Radar Surveillance throughout the continental airspace with sufficient redundancy. The Radar/ADS-B Surveillance Sensors have been networked and integrated with the Automation system to permit uniform separation standards, procedures and dynamic sectorization. The initiative has facilitated more direct routings, optimum level availability resulting in substantial fuel savings and reduced carbon emission. For example, with enhanced surveillance coverage through integration of 4 Radars from Bhopal, Hyderabad, Jharsuguda and Nagpur in the critical Nagpur Automation System, a reduced spacing of 40 NM between aircraft has been introduced on route W20 which a very busy domestic route from Delhi to Bangalore and Chennai. In addition to reduced separation between aircraft in the enroute space, separation has been reduced from 5 NM to 3 NM in approach phase at major airports.

2.3 Upper Airspace Harmonisation

2.3.1 Upper Airspace Harmonisation project has been implemented at Chennai FIR which has harmonized the ATM procedures, optimized the resources, in addition to facilitating optimum flight profile for the aircraft. Upper air space in Chennai FIR has been restructured with 5 upper ACC sectors and 6 lower ACCs. The main highlights of the project include operating multiple sectors of Air Traffic Control from a

single centre at Chennai covering the enroute phase of the flights, Integration of 10 Radars, state-of-the-art-ATS Automation system with various advanced controller decision support tools and Remote operations of VHF from Chennai. The Integration of Radars facilitates direct routing of flights thereby reducing flight distance/time and consequently saving fuel for the airlines. The minimum distance between the aircraft is reduced through application of Radar Separation Minima even in the Enroute phase, which helps increase capacity of airspace. The Upper Airspace Harmonization of the Kolkata, Delhi & Mumbai FIRs is planned for execution in near term.

2.4 Continuous Descent Operations

2.4.1 Procedural design for Continuous Descent Operations (CDO) permitting aircraft to descend continuously from the cruising level with minimum engine thrust has been implemented at Ahmadabad and Mumbai. By permitting the aircraft to descend continuously from cruising level till touchdown, operational efficiency of the aircraft is considerably increased in addition to reduction in Fuel consumption for the aircraft.

2.5 Collaborative Environmental Initiative: (INSPIRE)

2.5.1 Airports Authority of India leads an environmental initiative called INSPIRE (The Indian Ocean Strategic Partnership to Reduce Emission) which is a collaborative network of partners and peer organizations across the Indian Ocean and Arabian Sea Region dedicated to improving the efficiency and sustainability of aviation. The INSPIRE has identified User Preferred Routes (UPR) as one of the initiatives for reducing emissions in the Enroute phase of flight. Depending upon the prevailing weather conditions at the time, UPR allows an airline to fly along what it judges to be the most efficient route for each type of aircraft used. The system helps to improve operational efficiency by providing each aircraft with an optimal flight path and shortening flight times and reducing Carbon emission.

2.6 Improvement in Ground Efficiency

2.6.1 Implementation of ASMGCS at all major airports and measures like encouraging intersection departure, Reduction in final approach spacing, Tactical Flow Control, Reduced taxi time through planned runway use and judicious use of Mixed Mode operations (Delhi) have drastically reduced departure congestion and long queues of aircraft awaiting their turn for take-off. Better management of departure has significantly contributed to on-time departures, efficient climb profile and availability of preferred flight levels thereby resulting in reduced fuel burn and reduction in emission.

2.7 **Tangible Estimated Benefits from the major initiatives:**

ANS improvements	**Fuel Saving per Year** (in Tonnes)	**Carbon emission reduction** per Year in Tonnes	**Cost Savings** per Year(In Million $)	Remarks
50NM RHS	**1,04,573**	**3,30,449**	**114.98**	15 routes
RNAV 5	**14,637**	**46,251**	**16.06**	Q1 to Q13
NEW DOMESTIC ROUTES	**9,889**	**31,248**	**10.95**	8 routes
RNP 10	**11,662**	**36,851**	**12.78**	L875,756,516,899,518
THREE RWY OPS	**13,140**	**41,480**	**1.30**	Delhi
UPPER AIRSPACE HARMONIZATION	**18,060**	**57,060**	**19.90**	Chennai FIR
INSPIRE	**218**	**6,88**	**0.20**	Based on 1031 UPR flights
PBN	**22836**	**72162**	**25.11**	Based on 6 Airports
ENHANCED SURVEILLANCE	**14,500**	**45,800**	**16.00**	RHS on W20 and R460
CDO	**11,64**	**36,78**	**1.30**	Based at Ahmadabad ops
CONNECTOR Routes	**4,095**	**12,941**	**3.65**	V1 to V32
TOTAL	**2,13,610**	**6,74,242**	**222**	

2.8 **Current Major Environmental Initiative**

2.8.1 In a major Technological leap, Airports Authority of India has taken up Central Air Traffic Flow Management for implementation. CATFM will facilitate optimizing the capacity vs. demand in air traffic both strategically and dynamically by integrating various operational constraints and weather parameters in the ATM system. The system will substantially reduce delay/holding in the air/ground.

3. **CONCLUSION**

3.1 The Assembly is invited to note the information contained in this paper and encourage other states to take up similar ATM improvement programs in line with ASBU requirements to achieve the strategic objectives of ICAO in general and environmental protection in particular.

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