

**60<sup>th</sup> CONFERENCE OF  
DIRECTORS GENERAL OF CIVIL AVIATION  
ASIA AND PACIFIC REGIONS**

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**AGENDA ITEM 7: AVIATION AND ENVIRONMENT**

**GREENER SKIES THROUGH SUSTAINABLE AIR  
NAVIGATION INITIATIVES**

(Presented by Indonesia)

**SUMMARY**

This Paper outlines Indonesia's continued efforts to support the achievement of a sustainable and environmentally responsible aviation sector by implementing greener air navigation services. It highlights the implementation of Performance-Based Navigation (PBN), User Preferred Routes (UPR), and other strategic programs that contribute to reducing aviation emissions, aligned with national and regional climate goals. The Conference is invited to support broader adoption of environmentally focused operational measures, enhance cross-border coordination through UPR and Flexible Use of Airspace, facilitate capacity-building for emission monitoring and environmental awareness, encourage system integration and digital innovation, and explore a regional platform to monitor the environmental impact of air navigation services.

## GREENER SKIES THROUGH SUSTAINABLE AIR NAVIGATION INITIATIVES

### 1. INTRODUCTION

1.1 Aviation remains a cornerstone of connectivity and economic growth across the Asia-Pacific region. However, its environmental impact—particularly in terms of carbon emissions—continues to pose a critical challenge to sustainable development.

1.2 In response, Indonesia has committed to climate action under the Paris Agreement and has integrated emission reduction objectives into the transport sector through Ministerial Decree No. KM 8 of 2023, with a goal of achieving Net Zero Emissions (NZE) by 2060.

1.3 In the aviation domain, Air Navigation Services (ANS) are recognized as key enablers of environmental improvement, with the potential to significantly reduce emissions through optimization of flight trajectories, improved route design, and modern air traffic management technologies.

### 2. DISCUSSION

2.1 Indonesia's approach to greener skies is focused on delivering operational improvements that lead to measurable environmental benefits. Air Navigation Services are being modernized to increase efficiency across all phases of flight, from pre-departure to arrival.

2.2 One of the cornerstone initiatives is the widespread implementation of Performance-Based Navigation (PBN). PBN has enabled more direct, predictable, and fuel-efficient routing across domestic and international airspace. All international airports in Indonesia now implement RNP approaches, and most of them also support PBN SID/STAR procedures. The deployment of RNAV 2 routes has shortened distances and improved airspace throughput, with some major routes showing fuel savings of 160 kg per flight.

2.3 In parallel, Indonesia has implemented User Preferred Routes (UPR). This approach allows operators to select trajectories based on actual wind, aircraft performance, and weather conditions rather than predefined routes. The UPR concept was initially trialed in 2020 and fully implemented in 2023 for international flights within upper airspace. In 2023 alone, UPR contributed to a reduction of more than 4,000 tons of CO<sub>2</sub>, and further benefits are expected as the program expands.

2.4 To complement these core improvements, Indonesia is integrating advanced tools such as Air Traffic Flow Management (ATFM) and Airport Collaborative Decision Making (A-CDM). These systems enable better coordination among stakeholders, optimize runway and airspace usage, and reduce unnecessary fuel burn due to holding or ground delays.

2.5 Further, Indonesia is optimizing its surveillance and navigation systems in remote areas, particularly in eastern regions such as Papua, where the introduction of RNP 2 routes and new monitoring systems have improved access and route reliability.

2.6 The impact of these improvements is significant. In 2023, total estimated CO<sub>2</sub> reduction from PBN, UPR, and supporting measures exceeded 366,000 tons. The target for 2025 is a 420,000-ton reduction, and this is reviewed periodically to ensure responsiveness to real-time traffic conditions and system performance.

2.7 From 2025 to 2029, Indonesia is focusing on strategic programs that include:

- Expanding advanced ATFM and A-CDM systems.
- Building green infrastructure (eco-towers and renewable energy at navigation sites).
- Enhancing system integration for data and emissions monitoring.

- Increasing training for air navigation inspectors and personnel in sustainability-focused operations.

2.8 Despite the progress in advancing operational efficiency and emissions reduction in Indonesian airspace, Indonesia faces several persistent and structural challenges in delivering greener air navigation services such as Geographic Complexity, Infrastructure Gaps, Fragmented Airspace Usage, Financial Constraints and Weather and Climate Variability.

2.9 Indonesia reaffirms its commitment to sustainable aviation and to making air navigation modernization a core pillar of climate strategy. The progress demonstrated through PBN, UPR, and ATFM implementation reflects Indonesia's alignment with global goals. Indonesia stands ready to work together to create a future of cleaner, more efficient, and more resilient skies.

### **3. ACTION BY THE CONFERENCE**

3.1 The Conference is invited to:

- a) Note the information contained in this Paper;
- b) Encourage other States to adopt operational measures that directly reduce emissions and enhance efficiency, including PBN, ATFM, A-CDM, and UPR;
- c) Support regional collaboration to enhance route optimization through cross-border UPR corridors, data sharing, and harmonized Flexible Use of Airspace arrangements;
- d) Facilitate capacity-building programs that promote environmental awareness among Air Navigation Inspector/ANSP personnel and enhance technical capabilities in emission monitoring;
- e) Promote digital innovation and systems integration in meteorology, ATM, and surveillance to enable real-time adaptation to environmental and operational constraints;
- f) Explore a regional reporting platform to track the environmental impact of air navigation services, aligned with ICAO State Action Plans and APAC Seamless ATM goals.

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