



FOURTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 26 August to 6 September 2024

Agenda Item 3: Air navigation system performance improvement

3.1: Proposals to improve the efficiency of air navigation services contributing to LTAG

GREEN ATM OPERATIONS

(Presented by Japan and Singapore)

EXECUTIVE SUMMARY

This paper presents the outcome of the collaboration between the Civil Aviation Authority of Singapore (CAAS) and the Japan Civil Aviation Bureau (JCAB) on Green air traffic management (ATM) operations, including the ATM measures undertaken and how they contribute to increased flight efficiency and reduction in carbon emissions. Japan and Singapore successfully conducted a one-year trial in June 2024 on ATM continuous climb and descent operations, and optimal cruising flight level assignment operational measures aimed at achieving sustainable and efficient aviation, or Green ATM operations. These measures save fuel, reduce carbon emissions and flight times. The trial was initially conducted for one daily passenger service between Singapore and Tokyo, and subsequently extended to all passenger flights between Singapore and Tokyo.

Action: The Conference is invited to:

- a) note the information contained in this paper;
- b) encourage States/administrations to implement ATM measures that will improve the efficiency of air navigation services contributing to long-term aspirational goal (LTAG); and
- c) encourage States/administrations to assist ICAO to develop a common methodology to determine if a flight has performed continuous climb operations (CCO) and continuous descent operations (CDO).

1. INTRODUCTION

1.1 ICAO forecasted that air passenger demand in 2024 will be around 3 per cent above 2019 levels, and could reach 4 per cent if the pace of recovery strengthens in routes that have not yet reached pre-pandemic levels. This optimistic air traffic forecasts requires acceleration of sustainability efforts by global community to mitigate the environmental impact, including through air traffic management (ATM) measures.

1.2 In December 2022, the Civil Aviation Authority of Singapore (CAAS) and the Japan Civil Aviation Bureau (JCAB) signed a high-level framework arrangement to collaborate on civil aviation matters as these two major air hubs of the Asia-Pacific region emerge from the COVID-19 pandemic. The collaboration covered six key areas of air transport, aviation sustainability, aviation safety, ATM, airport innovation and technology, and unmanned aircraft systems and advanced air mobility. As part of the collaboration on ATM, CAAS and JCAB agreed to pursue Green ATM operations between Singapore and

Japan by conducting operational trials on ATM measures over a one-year period, aimed at achieving sustainable and efficient aviation.

1.3 First phase of the trial commenced on 23 May 2023 with one daily passenger service between Tokyo (Narita) and Singapore, for a one-month period. The scope of the first phase of the trial included the facilitation of continuous climb and descent operations, and optimal cruising flight level, as well as post-operations research and analysis to assess the benefits brought about by the Green ATM measures. Following the success of initial trial, Japan and Singapore extended the Green ATM operations to all flights between Singapore and Tokyo until June 2024.

2. DISCUSSION

Scope and Methodology

2.1 Japan and Singapore conducted the following Green ATM initiatives daily as part of the trial:

2.1.1 Green ATM measure #1: Facilitation of continuous climb/descent operations

- Continuous climb/descent operations provide fuel savings benefits to flights as they can climb/descent at optimum air speed with optimal engine thrust settings, thus reducing total fuel burn and emissions.

2.1.2 Green ATM measure #2: Facilitation of optimal cruising flight levels

- Assignment of optimum flight level before an aircraft leaves the respective areas of responsibility provides higher chance of the flight continuing at that altitude in the en-route phase.

2.2 Air traffic control (ATC) would conduct continuous climb/descent operations and assign optimal cruising flight levels to the identified departure flight, subject to air traffic situation to ensure safe operations within their respective areas of responsibility.

2.3 For flights that successfully conducted each Green initiative, Japan and Singapore would indicate accordingly in their respective monitoring and tracking sheet.

2.4 In order to facilitate the post-operations research and analysis, Singapore and Japan exchanged data using the following performance matrix to align collation of results. The implementation rate of these measures was collated.

← Singapore-issued/facilitated → ← Japan-issued/facilitated →

Callsign	Date	ORG	DES	CDO	CCO	Optimal Cruise Level	CDO	CCO	Optimal Cruise Level
SQ11	1/6/23	RJAA	WSSS	√	-	-	-	√	√
SQ12	1/6/23	WSSS	RJAA	-	√	X	X	-	-

Table 1. Tracking mechanism for all flights

Analysis and Assessment

2.5 The results of the one-year trial demonstrated that more than half of all flights between Singapore and Tokyo have successfully conducted CDO, CCO and/or assigned optimal altitude. This has helped the airlines reduce fuel consumption and thereby contributing to LTAG.

2.6 These Green ATM initiatives were also performed in a safe manner by taking into considerations the tactical operating environment. It was noted that there may be reduced opportunities to facilitate such initiatives following the post-COVID air traffic recovery and future air traffic growth. However, the conscious effort to facilitate these Green ATM measure at opportune moment would be critical to contribute towards LTAG.

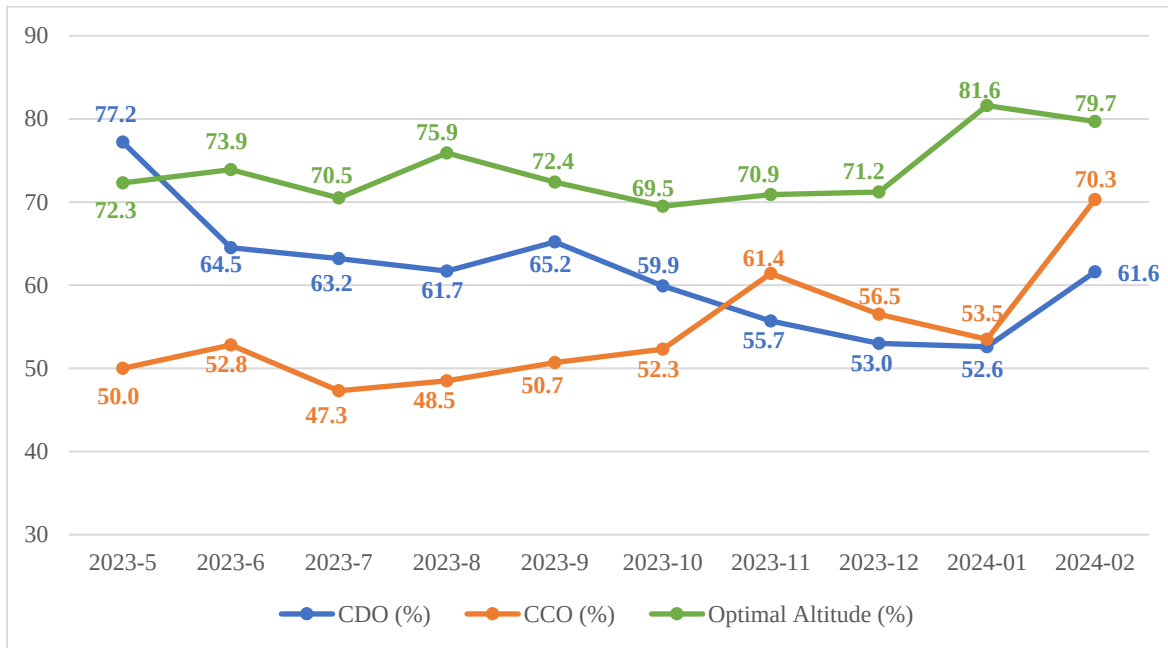


Chart 1. Singapore-issued/facilitated performance

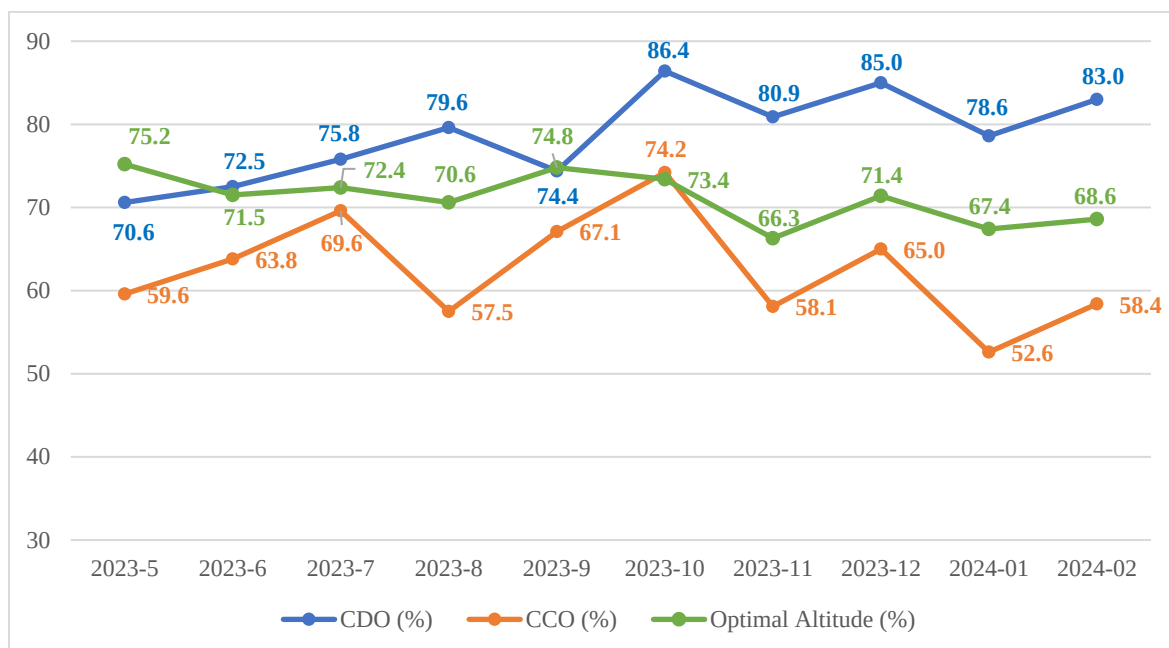


Chart 2. Japan-issued/facilitated performance

3. CONCLUSION

3.1 Taking a conscious approach to facilitate Green ATM measures and monitoring the uptake of these measures is a critical step towards sustainable ATM. While ATM has often been regarded as a minor contribution to the aviation net zero initiatives, it is nevertheless a contributor and initiating Green ATM measures does not require hefty investment in technologies nor manpower overhaul and should be seen as a low-lying fruit to working towards LTAG. Member States/administrations are encouraged to initiate and share their Green ATM initiatives.

3.2 The Conference is invited to:

- a) note the information contained in this paper;
- b) encourage States/administrations to implement ATM measures that will improve the efficiency of air navigation services contributing to LTAG; and
- c) encourage States/administrations to assist ICAO to develop a common methodology to determine if a flight has performed CCO and CDO.

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