Agenda Item 4: Report on GESEA activities and deliverables and Subgroups

VIRACOPOS PROJECT: POST-IMPLEMENTATION RESULTS IN OPERATIONAL EFFICIENCY AND ENVIRONMENTAL PERFORMANCE

(Prepared by Brazil)

SUMMARY

This working paper presents the post-implementation results of the Viracopos Project, implemented by DECEA in the São Paulo Terminal Control Area. Based exclusively on actual operational results reported after implementation, the paper highlights the analysis of 48,987 flights over six months, estimated savings of 1,871,937 kg of fuel and avoidance of approximately 5,915,321 kg of Carbon dioxide (CO_2) emissions, as well as improvements in taxi and arrival efficiency and the subsequent refinement of nine aeronautical charts.

References:

- Projeto Viracopos – post-implementation results provided by Brazil.
- CIRCEA 100-121 – Analysis of airspace concepts by aircraft operators.

1. Background

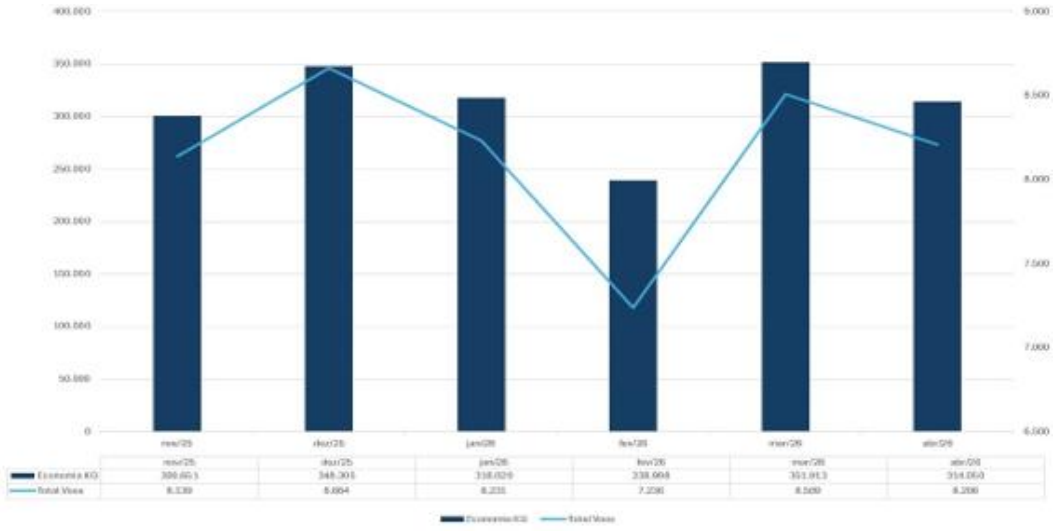
1.1 The Viracopos Project was implemented by the Department of Airspace Control of Brazil (DECEA) on 7 August 2025 to revise air traffic circulation within the São Paulo Terminal Control Area (TMA São Paulo), with particular focus on Viracopos International Airport (SBKP). The initiative was designed to make flight trajectories more efficient, reduce operational complexity, optimize Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO), and reduce fuel consumption and carbon dioxide (CO_2) emissions.

1.2 Less than one year after the new procedures entered into force, the post-implementation phase confirmed that the benefits anticipated during planning had been effectively achieved. The assessment combined operational indicators, monitoring of actual operations and collaborative work involving DECEA specialists, operational units and airlines.

2. Analysis

2.1 Using the methodology established in CIRCEA 100-121, Azul Linhas Aéreas analysed 48,987 flights operated over a six-month period. The assessment identified estimated fuel savings of 1,871,937 kg, corresponding to an approximate reduction of 5,915,321 kg of Carbon dioxide (CO_2) emissions.

2.2 The results correspond to an average of 8,165 flights per month, average monthly fuel savings of 311,989 kg and an average monthly CO_2 reduction of 985,885 kg. On a per-flight basis, the observed averages were approximately 38 kg of fuel saved and 120 kg of Carbon dioxide (CO_2) emissions avoided.



2.3 Operational indicators also showed measurable efficiency improvements. The average additional departure taxi time decreased from **2.36 minutes before implementation to 2.11 minutes after implementation.** Likewise, the average additional terminal arrival time decreased from **approximately 2.9–3.0 minutes to between 2.3 and 1.9 minutes**, depending on the month evaluated, confirming the operational benefits of the redesigned trajectories.

2,36 Taxi-out Adicional	**13,28** Taxi-out Médio	**10,92** Taxi-out Desimpedido	**2,11** Taxi-out Adicional	**13,24** Taxi-out Médio	**11,13** Taxi-out Desimpedido
19.725 Mov. DEP	**12,50** Taxi-out Mediano	**9,83** Taxi-out Percentil 20	**19.786** Mov. DEP	**12,52** Taxi-out Mediano	**9,73** Taxi-out Percentil 20

2.4 The additional time in the Terminal suffered a significant drop from 2.9 / 3.0 to 2.3 / 1.9. which reflects well the result of the new circulation from TMA to SBKP.

2.5 The post-implementation results exceeded the estimates presented prior to the project's entry into force. The project had forecast an annual reduction of more than 302,000 nautical miles flown and a mitigation of approximately 5.4 million kg of carbon dioxide (CO_2) emissions per year. Actual

operational data collected **during the first six months** showed approximately 5.9 million kg of carbon dioxide (CO_2) emissions avoided.

2.6 The quantified benefits in terms of fuel savings and reductions in carbon dioxide (CO_2) emissions represent only a portion of the broader operational benefits resulting from airspace optimization.

2.7 In addition to the benefits that were effectively measured, more efficient flight trajectories may contribute to reduced flight and taxi times, decreased crew exposure associated with individual operations, shorter aircraft ground time, and increased fleet availability. Likewise, reduced aircraft exposure to operational cycles may contribute to lower maintenance costs over time.

2.8 These additional benefits were not quantified in the present assessment and should therefore be regarded as potential operational effects arising from improved trajectory efficiency, rather than as measured results.

2.9 Consequently, airspace optimization has the potential to generate system-wide benefits throughout the entire air transport chain, promoting operations that are more efficient, environmentally sustainable, and economically competitive.

2.10 The post-implementation assessment was conducted using the methodology established in CIRCEA 100-121. The analysis was based on 48,987 Azul Linhas Aéreas flights operated during the first six months following implementation (August 2025 to January 2026). Fuel consumption and carbon dioxide (CO_2) emissions were calculated using actual operational data, enabling comparison between the estimates developed during the design phase and the results effectively observed after implementation.

2.11 The results demonstrate the value of a continuous airspace planning process based on technical studies, operational monitoring, performance indicators, and collaborative development with airlines and other airspace users. The Viracopos Project demonstrates that airspace planning can simultaneously contribute to operational safety, increased capacity, lower operating costs for airspace users, and reduced environmental impact.

3. Suggested actions

3.1 The Meeting is invited to

a) take note of the post-implementation results of the Viracopos Project, in particular the measurable reductions in fuel consumption and Carbon dioxide (CO_2) emissions and the improvements observed in operational efficiency; and

b) consider the use of post-implementation monitoring, performance indicators and collaborative review with airspace users as relevant practices for airspace optimization initiatives in the SAM Region.

END