



**ASSEMBLY — 42ND SESSION**

**EXECUTIVE COMMITTEE**

**Agenda Item 16: Environmental Protection- International Aviation and Climate Change**

**A PROACTIVE APPROACH TO SUSTAINABLE AND DIGITAL AIRPORTS**

(Presented by Italy)

**EXECUTIVE SUMMARY**

The sustainable development of airport infrastructure requires integrated frameworks that align environmental, social, economic, governance, and digital priorities. To address the gap between strategic goals and practical implementation, the Italian Civil Aviation Authority (ENAC) has developed the Guidelines for Sustainable and Digital Planning. These guidelines introduce a standardized, data-driven methodology for assessing sustainability within airport master plans.

At the core of this framework are two indicators: The Overall Airport Sustainability Indicator (ISCA), which measures airport-wide sustainability and digital performance, and the Planned Intervention Impact Indicator (ImIP), which quantifies the contribution of individual projects to long-term objectives. Both are calibrated using real data from Italian airports, ensuring methodological consistency, comparability, and operational relevance.

Each airport incorporates a Sustainability Plan into its Master Plan, including diagnostics, future scenarios, and quantified impact assessments. Developed in collaboration with key stakeholders and aligned with the International Civil Aviation Organization’s (ICAO) environmental goals and Airports Council International (ACI) Europe’s strategy, this model enhances governance, supports investment prioritization, and enables transparent, evidence-based planning. It offers a replicable, scalable approach applicable across European airport networks and other transport infrastructures.

<i>Strategic Goals:</i>	This working paper relates to the Strategic Goal – <i>Aviation is Environmentally Sustainable</i>
<i>Financial implications:</i>	The initiative introduces structured tools for strategic planning, investment prioritization, and cost-benefit assessment. ISCA and ImIP enable transparent, data-driven resource management, facilitating access to future funding and offering a replicable model across transport sectors.
<i>References:</i>	Annex14 Long-Term Aspirational Goal (LTAG) <i>EU Green Deal and Fit for 55 Package</i> <i>ACI Europe – Sustainability Strategy for Airports</i> <i>ENAC – National Airport Plan and Planning Guidelines (2024)</i> Data & Statistics – IEA

## 1. INTRODUCTION

1.1 Sustainable development means a System evolution that meets the present needs without compromising the ability of future generations to meet their own needs (Brundtland Report, 1987). Ensuring the sustainable development of infrastructure requires a holistic vision that integrates environmental, social, governance, digital, and economic pillars.

1.2 The airport sector is operating in a particularly challenging context due to the lingering impacts of the COVID-19 crisis, which have slowed progress in sustainability and digital transformation. In this context, the Italian Civil Aviation Authority (Ente Nazionale per l'Aviazione Civile (ENAC)) faces the challenge of leading the sector's sustainable development in line with the growing demands for ecological innovation and social responsibility.

1.3 The aviation sector is often criticized for its environmental impact and potential pollution; therefore, it is crucial to develop emission reduction strategies that are not only effective but also sustainable in the long term, ensuring that selected solutions align with broader sustainability goals.

1.4 The broader European commitment to achieve net-zero emissions by 2050 involves all economic sectors, including aviation, which currently accounts for approximately 3.5% of global CO<sub>2</sub> emissions and nearly 10% of transport sector emissions. This necessitates accelerated decarbonization efforts to meet climate goals.



<sup>1</sup> data source «Global CO<sub>2</sub> emissions from transport by sub-sector in the Net Zero Scenario, 2000-2030 – Charts – Data & Statistics – IEA»

1.5 The Long-Term Aspirational Goal (LTAG) group of the International Civil Aviation Organization's (ICAO) Committee on Aviation Environmental Protection (CAEP) has outlined scenarios for reducing airport sector emissions by 2050, with targets ranging from 39% up to 87% reduction compared to current levels. Achieving these ambitious objectives depends on three main levers: advancing aircraft technologies, optimizing flight operations, and especially adopting Sustainable Aviation Fuels (SAF), which could enable reductions up to 55%.

1.6 Despite these ambitions, the airport sector faces significant challenges, including the need to accommodate growing air traffic through infrastructure development and upgrades, while investing in electrification, energy efficiency, renewable energy production, and storage systems. Airports thus are central to a critical energy and technological transition that balances growth, innovation, and sustainability.

1.7 Extensive international and national regulations and guidelines set clear macro-objectives and strategic priorities for the aviation sector. For example, ICAO's net-zero emissions target by 2050 and ASA's priority on sustainable airport waste management by 2030 provide a broad sustainability framework. Similarly, ICAO Appendix D of Doc 9184 *Airport Planning Manual* offers general guidance on sustainability, while European initiatives promote certified projects such as LEED Gold terminals and sustainability goals certified at the Airport Carbon Accreditation (ACA) level. These frameworks establish solid strategic and regulatory foundations to support sector development.

1.8 However, despite the availability of such guidelines, a critical gap persists between these strategic goals and their operational implementation. Current challenges include the absence of adequate planning tools that link high-level objectives to concrete projects, misalignment between regulations, strategies, and operational activities, and the lack of objective, standardized KPIs to assess and compare sustainability performance. While projects undergo strict regulation during implementation—with defined activities, timelines, and resources—there is still a need for holistic planning and management frameworks that enable data-driven governance and continuous improvement.

1.9 To bridge this gap, ENAC has developed a detailed and actionable methodology through its initiative to create Guidelines for Sustainable and Digital Planning. This approach introduces measurable, standardized KPIs and innovative tools designed to monitor, measure, and compare sustainability and digitalization levels across Italian airports, effectively translating strategic vision into practical, operational implementation. These tools support transparent decision-making and continuous performance assessment, fostering a stronger connection between sector-wide objectives and on-the-ground interventions.

## 2. DISCUSSION

2.1 The Guidelines for Sustainable and Digital Planning, developed by the Italian Civil Aviation Authority (ENAC), establish a structured framework to operationalize sustainability and digitalization goals within the airport sector. These guidelines define a minimum set of deliverables required for each Sustainability Master Plan, comprising two fundamental documents:

- a technical-descriptive report, which offers a detailed analysis of the airport's current and forecasted performance across sustainability and digital domains;
- a summary sheet, which synthesizes the primary directives for sustainable development tailored to the specific airport context.

2.2 Central to this framework are two innovative, data-driven indicators created through rigorous research and development, designed to bridge the gap between high-level strategic goals and concrete operational planning:

- **Overall Airport Sustainability Indicator (ISCA):** comprehensive metric that enables standardized, comparable assessment of airport-wide sustainability and digitalization performance. ISCA facilitates evidence-based strategic decision-making by providing a holistic view across multiple dimensions.

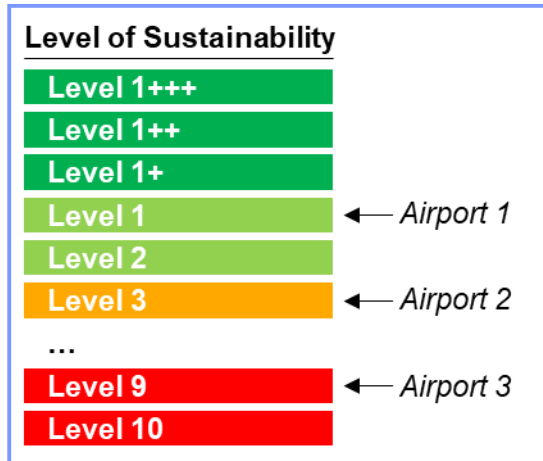


Figure 1.

- **Planned Interventions Impact Indicator (ImIP):** a KPI for evaluating the anticipated impacts of individual projects on sustainability and digitalization. ImIP supports prioritization processes by quantifying expected benefits and enabling transparent comparison of interventions.

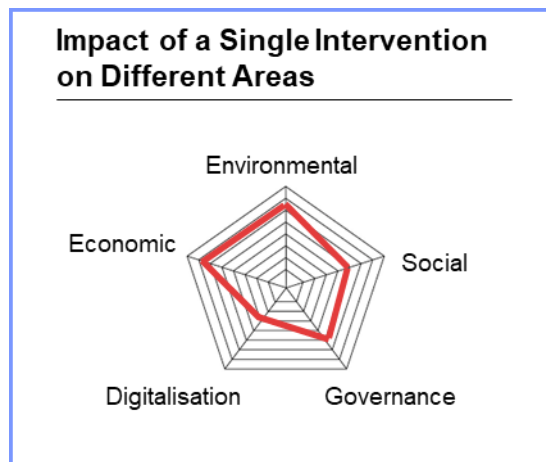


Figure 2.

2.3 These indicators are organized into five main thematic areas — Environmental, Social, Governance, Economic, and Digitalization — subdivided into 18 detailed sub-areas, creating a modular, adaptable analytical framework that evolves with sector needs. Their design aligns fully with the strategic priorities outlined in the National Airport Plan (PNA) and adheres to guidelines from ENAC’s strategic leadership.

2.4 With these indicators in place, the technical-descriptive report should represent the following aspects, which are indicative and not exhaustive:

- Technical-descriptive report:

- i. Premises (values and objectives of the Plan);
- ii. Description of the current ISCA situation of the Airport as per Annex 1;
- iii. Focus on the individual Areas:
  - a. Environmental
  - b. Social
  - c. Governance
  - d. Economic
  - e. Digitalization
- iv. Forecast of new ISCA levels based on the implementation of new IIP interventions as per Annex 2
- v. Indication of the sources used to obtain the data of the variables necessary for the calculation of the ISCA and IIP indicators
- vi. Summary sheet for the Sustainable Development of the Airport
- vii. Report the impact of each IIP on the ISCA, broken down by phases, in line with the Master Plan structure.

2.5 The scope and depth of deliverables will be calibrated according to airport type and operational complexity.

2.6 This integrated approach leads to several strategic advantages:

- It establishes a clear, replicable measurement system that facilitates benchmarking and comparability across airports;
- It reinforces Authority's leadership role in promoting sustainability and digital innovation through multi-level monitoring at the intervention, airport, and sector levels;
- It offers a scalable reference model potentially transferable to other transport sectors, enhancing public perception and policy coherence;
- It positions Italy at the forefront of European countries adopting structured, transparent governance models aligned with international sustainability commitments.

2.7 Moreover, this framework directly addresses previously identified gaps between high-level strategic and regulatory goals—such as those defined by ICAO, the European Aviation Safety Agency (EASA), and European initiatives—and their transformation into operational actions. By introducing standardized KPIs and actionable methodologies, ENAC enables a holistic, data-driven governance model that supports continuous improvement, stakeholder collaboration, and accountability. This closes the loop between strategy, regulation, and project execution, ensuring interventions are not only compliant but also optimized for long-term sustainability outcomes.

2.8 Importantly, this methodology also facilitates better financial planning and resource management by providing structured tools for investment prioritization and cost-benefit evaluation. Transparent quantification of sustainability impacts enhances access to funding opportunities and supports more efficient allocation of resources within airports and the wider sector.

### 3. CONCLUSION

3.1 ENAC's Guidelines for Sustainable and Digital Planning represent a major step forward in translating strategic environmental and digitalization objectives into measurable, operational actions. By introducing standardized, data-driven indicators and integrating them into airport master planning, this initiative addresses longstanding gaps between policy ambition and implementation.

3.2 The methodology strengthens institutional governance, enhances transparency, and supports informed decision-making. It enables continuous performance monitoring, facilitates investment prioritization, and provides clear pathways to access sustainable funding opportunities.

3.3 The approach is not only applicable across the Italian airport network but also scalable and adaptable to other national contexts and transport sectors. It positions Italy as a frontrunner country in aligning infrastructure development with sustainability goals.

3.4 By operationalizing the principles of accountability, comparability, and innovation, the initiative contributes meaningfully to the achievement of national and international decarbonization targets, while supporting a resilient, forward-looking, and sustainable aviation system.

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