

Green Airports: At the Frontier of Aviation's Cleaner Energy Transition

By ICAO Secretariat

Airports have long been central to connecting people, markets, and ideas across continents. Yet in an era marked by environmental urgency and the need for rapid decarbonization, their role is evolving. Today, airports stand at the frontier of a broader sustainability transition, one that redefines not only how they operate but how they contribute to the resilience and vitality of the communities they serve.

The concept of a “green airport” extends far beyond energy-efficient lighting or recycling initiatives. It speaks to a holistic transformation: an airport designed and operated with a commitment to minimize its environmental footprint, foster innovation, and engage meaningfully with its surroundings. This vision encompasses renewable energy integration, sustainable infrastructure development, biodiversity conservation, climate adaptation planning, and deep collaboration with a broad array of stakeholders.

ICAO has long recognized that achieving a net-zero aviation sector demands the full engagement of airports. As vital nodes in the air transport ecosystem, airports influence emissions directly and indirectly across a wide range of activities, and they are uniquely positioned to catalyze action, both within their boundaries and across the broader transport and energy systems they connect to. Following the adoption

of the Long-Term Global Aspirational Goal (LTAG) at the 41st Session of the ICAO Assembly in 2022, and the

endorsement of the ICAO Global Framework for SAF, LCAF, and other Aviation Cleaner Energies at CAAF/3 in 2023, ICAO continued to advance work on the aviation cleaner energy transition. The Green Airports Seminar, hosted in Athens in April 2024, served as an important platform to support and promote the implementation of these global initiatives.

The 2024 ICAO Green Airports Seminar discussed ambitious net-zero goals and roadmaps for airports, emerging environmental subjects such as innovations in airport management, circular economy, biodiversity, climate adaptation, as well as the transition to sustainable aviation fuels, lower carbon aviation fuels and cleaner energy sources. All Sessions within the programme of the event considered the opportunity and challenge of financing green projects and innovations, recognizing the importance of connecting and facilitating project developers' access to financial institutions' public and private funding. In addition, addressing the challenges of plastic usage in aviation is of key importance to the international community, and the 2024 ICAO Green Airports Seminar dedicated a specific Session to discuss this topic. The Seminar discussions showcased the strong support to the ongoing work of UNEP and the ongoing negotiations to develop an international legally-binding instrument on plastic pollution.

The following sections summarize the key themes and insights that emerged from the Seminar. All the presentations from panelists and the full recorded Sessions are respectively available at the event's dedicated website¹ and at ICAO.TV.²



1 <https://www.icao.int/Meetings/greenairports2024/Pages/Programme.aspx>

2 <https://www.icao.tv/icao-seminar-on-green-airports>



FIGURE 1: ICAO Seminar on Green Airports held at Greece, Athens, in April 2024.

- **Session 1: Setting the Scene – ICAO Work on Climate Change**

The opening session framed the critical importance of aligning airport strategies with ICAO’s Long-Term Aspirational Goal (LTAG) of net-zero carbon emissions by 2050.

ICAO’s recent achievements, including the outcomes of the third ICAO Conference on Aviation and Alternative Fuels (CAAF/3), have built a global policy foundation for ambitious action. Airports are expected to play a dual role: reducing their direct emissions and enabling lower-carbon air travel through supportive infrastructure and services.

The Session reaffirmed that greening airports is not peripheral to aviation’s decarbonization journey — it is central to it.

- **Session 2: Key Drivers for Innovation – Sustainability**

Sustainability and innovation have become inseparable.

In this session, Athens International Airport, the Airport Regions Council, and Istanbul Airport shared examples of how the drive for greener operations is pushing technical boundaries.

From advanced energy management systems to low-impact construction techniques, airports are leveraging innovation not simply to comply with environmental standards, but to reimagine their business models and enhance resilience.

Notably, sustainability was no longer discussed as a constraint, but increasingly as a catalyst for strategic and competitive advantage.

- **Session 3: Emerging Environmental Topics**

Environmental issues confronting airports continue to diversify.

The first part of Session 3 focused on the challenge of reducing single-use plastics in aviation. Representatives from UNEP, IATA, ACI World, and IAWMA presented their strategies — including material substitutions, new design standards, and circular economy principles — aimed at curbing plastic waste without compromising safety or passenger experience.

The second part expanded the conversation to other emerging priorities: promoting circular economy models, strengthening biodiversity protections, engaging local communities more effectively, and preparing for the operational impacts of Urban Air Mobility (UAM).

Case studies from ANAC (the Brazilian Civil Aviation Authority), EUROCONTROL, Dakar Blaise Diagne Airport, and Chile's Civil Aeronautics Board brought real-world nuance to these topics, highlighting that progress often requires tailoring solutions to specific regional and cultural contexts.

- **Session 4: Taking Flight Towards Climate Resilience – Building Adaptation Strategies for Airports**

As climate risks intensify, adaptation planning is no longer optional.

Session 4 highlighted the growing need for airports to assess vulnerabilities and integrate climate resilience into every facet of their planning and operations.

ICAO's adaptation work was complemented by experiences shared by Abu Dhabi Airports, Netherlands Airport Consultants (NACO), Fraport Greece, and the World Bank.

The case studies shared by the panellists illustrated both the complexity and the urgency of taking action on adaptation measures: whether dealing with sea-level rise, extreme temperatures, or intensified storm events, airports must build resilience now to safeguard their long-term viability.

An important lesson emerged — adaptation is not a one-off project; it is a mindset that must permeate strategic thinking.

- **Session 5: Transition to Cleaner Energy Sources and Sustainable Infrastructure**

The energy transition is already reshaping airports worldwide.

Presentations from airport and regulator representatives from Indonesia, Reunion Island, Crete, and Oman showcased solar arrays, wind installations, and preliminary hydrogen initiatives now underway across airport campuses.

Energy systems are being reconfigured to prioritize renewable generation, energy efficiency, and intelligent distribution.

In doing so, airports are not only reducing their own operational emissions but increasingly positioning themselves as contributors to broader national and regional energy transitions.

- **Session 6: Era of Sustainable Aviation Fuels (SAF), Lower Carbon Aviation Fuels (LCAF) and Other Aviation Cleaner Energies**

Aviation's path to net-zero emissions hinges significantly on the scale-up of Sustainable Aviation Fuels (SAF) and Lower Carbon Aviation Fuels (LCAF). Session 6 explored how airports can actively facilitate this transition.

Through the ACT-SAF Programme, ICAO is providing technical assistance and capacity-building to States. However, it became apparent that airports themselves must invest in the necessary infrastructure — from fuel storage and blending facilities to SAF-compatible hydrant systems — to make cleaner fuels accessible.

Speakers from Neste, Repsol, Rotterdam The Hague Airport, and others emphasized that while technology pathways are advancing, robust policy support and coordinated planning remain essential.

- **Session 7: Financing Future Energy Hubs**

The financial dimension of greening airports cannot be overlooked.

Session 7 focused on mechanisms to unlock the significant investment required to deliver sustainable airport transformations.

Experts from the International Solar Alliance, World Economic Forum, European Commission, SMARTENERGY, and GEK Terna shared experiences with innovative financing models, including blended finance, risk-sharing structures, and public-private partnerships.

It became clear that designing projects with strong business cases — aligned with environmental and economic objectives — is critical to attract both public and private sector investment at the scale needed.

- **Session 8: Building Partnerships for a Sustainable Future**

No airport can navigate the sustainability transition alone.

Session 8 highlighted the importance of forging strong partnerships between airports, governments, airlines, energy providers, financiers, and local communities.

Examples from Singapore, Torino, Santiago International Airport, and Airbus illustrated how strategic collaborations can enhance project feasibility, accelerate innovation, and deliver co-benefits across sectors.

Building trust, aligning interests early, and maintaining transparent communication were all cited as essential ingredients for successful partnerships.

Towards Energy Hubs and Beyond: The Airport of Tomorrow

Throughout the Seminar, a broader vision took shape: the airport of the future will not only be a gateway for air travel but also a decentralized clean energy hub — generating, storing, and sharing renewable energy with the surrounding region. Realizing this vision will require airports to fully integrate into wider energy, transport, and digital networks.

It will demand new forms of cross-sector governance and bold leadership willing to embrace a more expansive societal role.

But the opportunities are immense. Green airports can become engines of local development, resilience, and climate action.

Next steps

Building on the momentum of recent initiatives, ICAO will continue to advance the green airport agenda, especially through the upcoming ICAO's Committee on Aviation Environmental Protection (CAEP) 14th cycle (CAEP/14), with targeted work streams led by Working Group 2 (WG2). A series of tasks will directly support airports in enhancing sustainability, resilience, and environmental performance, reflecting the broader goals established under ICAO's LTAG and the Global Framework for Cleaner Energies.

Key areas of focus will include the development of new guidance on community engagement, the promotion of climate adaptation strategies tailored for airports, and the advancement of practical tools such as the Eco-Airport Toolkit e-collection, covering biodiversity, ground operations electrification, sustainable aviation fuels, and more.

Additional efforts will address emerging environmental challenges through work on sustainable plastics management and PFAS (Perfluoroalkyl and Polyfluoroalkyl Substances) contamination at airports. Financing, operational improvements, and supporting policy coherence will also remain central, as ICAO and its partners continue to ensure that airports can play a leading role in aviation's sustainable transformation.

Through these concerted efforts, ICAO reaffirms its commitment to providing the practical guidance, tools, and frameworks that will enable airports worldwide to transition toward greener operations, delivering tangible progress on the collective path to 2050 and beyond.