International Civil Aviation Organization

WORKING PAPER

A42-WP/279[1]
EX/120
31/7/25

ASSEMBLY — 42ND SESSION

EXECUTIVE COMMITTEE

Agenda Item 16: Environmental Protection – International Aviation and Climate Change

MEETING GROWING AIRPORTS' ENERGY DEMAND TO ENABLE DECARBONIZATION

(Presented by Airports Council International (ACI), Brazil, the Airport Services Association (ASA World), the International Business Aviation Council (IBAC) and the International Coordinating Council of Aerospace Industries Associations (ICCAIA))

EXECUTIVE SUMMARY

This paper presents the importance of energy access for the industry. Aviation needs to accelerate access to sufficient, reliable, renewable and low-carbon energy to meet growing demand, achieve ICAO and aviation decarbonization goals, and enable future sustainable air transport solutions. Some airports face barriers in accessing this energy, including regulatory constraints, limitations on self-generation capacity, and grid dependency on non-renewable sources. The problem is likely to intensify in the future as traffic increases, and more demand is placed on energy and electricity across multiple sectors.

Action: The Assembly is invited to:

a) urge Member States and relevant local government bodies to coordinate with their national ministries responsible for energy and utility providers to establish enabling policies and remove regulatory and technical barriers to the generation, procurement, use, and storage of renewable and low-carbon energy for and at airports;
b) encourage ICAO to advocate that airports, especially those in developing countries or capacity-constrained regions, have access to sufficient, reliable, renewable and low-carbon energy, as well as to climate finance, voluntary technology transfer, and technical assistance to support renewable energy deployment, including for essential operations such as Ground Support Equipment (GSE);
c) encourage industry efforts to collaborate with international financial institutions to create financing solutions that help attract investment in aviation and airport renewable and low-carbon energy projects, especially in regions with limited financial capacity or underdeveloped markets;
d) adopt the amendments to Resolution A41-21: *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*, proposed in the Appendix; and
e) recognize that enabling access to renewable and low-carbon energy for airports is a foundational step in achieving the Long-Term Aspirational Goal (LTAG).

Strategic Goals:	This working paper relates to the Strategic Goal – *Aviation is Environmentally Sustainable.*
Financial implications:	No

[1] English, Arabic, Chinese, French, Russian and Spanish versions provided by ACI.

References:	A41-21*: Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change*

1. INTRODUCTION

1.1 The global energy transition must be accelerated across all sectors to meet the objectives of limiting global temperature rise to well below 2°C, and preferably to 1.5°C. Aviation, as a hard-to-abate sector, must play its part in this transition, and has committed to achieving net-zero carbon dioxide (CO_2) emissions by 2050, a goal formalized through several complementary initiatives. In 2021, Airports Council International (ACI) was the first in the industry to adopt a net zero carbon goal at a global level. The Airport Carbon Accreditation (ACA) programme, led by ACI, continues to provide a structured framework for airports to measure, reduce, and ultimately neutralize their carbon footprint. At the global level, ICAO's Long-Term Aspirational Goal (LTAG), adopted at the 41st Assembly in 2022, represents the sector's collective ambition.

1.2 ICAO Resolution A41-21 consolidates the Organization's ongoing climate change policies and practices, emphasizing the need for enhanced cooperation among States and stakeholders. The outcome of the Third ICAO Conference on Aviation and Alternative Fuels (CAAF/3) in 2023, including the adoption of an ICAO Global Framework and related ICAO SAF Vision, highlights the importance of clean energy infrastructure. Additionally, Working Paper A41-WP/210 presented by ACI, outlined the role of airports in decarbonization and calls for collaborative action among governments, regulators, and the energy sector. The role of aerodromes and the need for new energy infrastructure were also highlighted in the 14th Air Navigation Conference's Recommendation 2.1/1 - *Evolving aircraft technologies contributing to the long-term aspirational goal*.

2. ENERGY DEMAND FOR AND AT AIRPORTS

2.1 Airports are strategic nodes in the transport system, serving as hubs of economic activity, technological innovation, and energy consumption. As infrastructure operators managing already energy-intensive systems, they will require access to reliable, clean power to meet growing demand, support emerging electricity-dependent technologies, and achieve emissions reductions.

2.2 ACI forecasts global passenger traffic will more than double by 2053, reaching 22.3 billion. By 2050, aviation may require 600 to 1,700 terawatt-hours (TWh) of clean electricity annually to support hydrogen and electric aircraft. Meeting this demand could require USD 700 billion to 1.7 trillion in investment across the aviation value chain[2]. Large hub airports could experience a five- to tenfold increase in electricity needs by mid-century for electrification of airport systems and GSE, with some U.S. airports requiring up to five times their current peak power capacity[3].

2.3 Producing or liquefying hydrogen at airports demands a significant amount of energy, often far more than the airport currently uses for all other operations. Peak energy demand will need to be carefully managed, and coordination with energy providers will be essential to ensure grid resiliency and to prevent major power outages or disruptions from affecting airport operations.

2.4 Climate change impacts will contribute to higher energy use, due to increased needs for heating and cooling, and airport energy consumption will be driven upward by the growing deployment of electric GSE, airside and landside e-mobility, the adoption of green building standards, and the integration of digital

[2] https://www.weforum.org/publications/target-true-zero-delivering-the-infrastructure-for-battery-and-hydrogen-powered-flight/.
[3] https://www.enterprisemobility.com/en/news-stories/news-stories-archive/2024/01/electrifying-airport-ecosystems-could-require-significantly-more-power.html.

and automated systems across airport facilities. Collectively, these trends underscore the urgent need to plan for renewable and low-carbon energy systems for airports.

3. ACCESS TO RENEWABLE AND LOW-CARBON ENERGY

3.1 Reliable access to renewable and low-carbon energy is fundamental for airports seeking to decarbonize their operations and meet the long-term goals of the aviation sector. Airports can pursue renewable energy through on-site generation, such as solar farms and microgrids, or through off-site procurement mechanisms, notably Power Purchase Agreements (PPAs).

3.2 Airports in some regions may face regulatory barriers that limit on-site renewable energy generation and use, let alone the sale of excess capacity. Challenges include restrictive grid access, complex permitting, and generation caps. These are often linked to concerns from national utilities about revenue impacts when large customers reduce their grid dependence. In some cases, airports may even be classified as regulated providers, adding further complexity. Balanced policy and regulatory frameworks are essential to support airport decarbonization while safeguarding energy sector stability.

3.3 PPAs are long-term contracts that allow airports to secure a stable, renewable, and low-carbon energy supply, especially when on-site generation is limited by space, grid access, or policy. PPAs also help airports credibly account for energy use, ensure emissions reductions are additional and traceable, supporting ICAO's LTAG and national climate targets. The effectiveness of PPAs depends on enabling market conditions, such as the ability to contract with producers, and favorable regulatory environments. In many States, such frameworks remain unclear, particularly in centralized utility markets. National reforms and regional cooperation can improve PPA feasibility. At the same time, aging or constrained grid infrastructure remains a challenge, underscoring the need for joint investment by governments, utilities, and the aviation sector to ensure reliable access to renewable energy.

3.4 Energy storage systems are essential to enable stable and scalable deployment of renewable and low-carbon energy for and at airports. They help manage the intermittency of sources like solar and wind, improve grid reliability, and allow for peak-shaving during periods of high electricity demand. By storing excess generation and discharging it when needed, storage enhances energy self-sufficiency and operational resilience.

3.5 While progress is being made globally, disparities remain between regions in terms of grid infrastructure, renewable and low-carbon energy access, financing capacity, and technical expertise. Some States and airport operators face acute challenges in accessing stable energy supplies or attracting investments for their energy transition.

4. AIRPORTS AS ENERGY HUBS

4.1 Through on-site renewable energy generation and energy storage systems, airports can meet their own operational needs and, in some cases, supply surplus energy to surrounding communities or national grids. Airports can also serve as critical infrastructure platforms for clean mobility and alternative fuels, including electric vehicle (EV) charging, and hydrogen distribution. These roles integrate airports into broader clean energy ecosystems and open opportunities for collaboration with governments, utilities, and the private sector to pilot next-generation technologies like microgrids, vehicle-to-grid systems, and AI-driven energy management.

4.2 Airports that have chosen to become energy hubs can thus increase their positive contribution to local communities, by helping these communities at varying scales to accelerate their own energy

transition and achieve their decarbonization commitments. However, not all airports can become energy hubs, due to constraints such as limited land availability, outdated grid infrastructure, constrained capital, or centralized utility control.

4.3 Additionally, airports in remote or off-grid locations may require decentralized renewable and low-carbon energy systems, such as standalone solar microgrids, to achieve energy resilience and net zero emissions. Airports that manage their own electricity grids must also plan for sustained investment to keep pace with these evolving energy demands.

4.4 States can play a key role in facilitating the establishment of energy hubs by creating enabling policy frameworks and providing dedicated support mechanisms to airports.

5. CONCLUSION

5.1 Continued commitment to the ICAO Long-Term Aspirational Goal (LTAG) is vital for maintaining credibility and advancing decarbonization. Energy access for airports is a key enabler of this objective, and airports' inclusion in national energy and climate strategies is fundamental. Facilitating the energy transition of airports not only contributes to climate goals but also drives innovation, strengthens energy resilience, and supports inclusive economic growth. Locally, renewable energy projects can generate skilled jobs, enhance investor confidence, enable infrastructure upgrades, and deliver long-term energy cost savings through greater price stability. Expanding renewable and low-carbon energy for airports also supports broader sustainable development goals, such as energy access, poverty reduction, and voluntary technology transfer in under-resourced regions.

5.2 In addition, renewable energy systems improve energy self-sufficiency and operational continuity, which are critical for climate resilience and for maintaining airport functionality during extreme weather events or grid disruptions. As climate change increasingly disrupts energy infrastructure, especially electricity networks, resilient on-site energy systems and storage become essential. Investing in renewable energies can also contribute to energy security, reducing vulnerability to price volatility and external supply disruptions. By leading in the energy transition, airports strengthen their reputation as innovative and sustainable transport hubs, reinforcing their global competitiveness and long-term viability.

5.3 ICAO, governments, and industry stakeholders must collaborate to overcome technical, financial, and policy obstacles that limit renewable and low-carbon energy deployment at airports, especially in developing countries. Such cooperation should also extend across regions to ensure that infrastructure for hydrogen and electric aircraft is interoperable and widely available, enabling the global aviation network to decarbonize in a coordinated manner.

5.4 There is a need to ensure that access to climate finance provides targeted support mechanisms for States and regions that lack the fiscal space or institutional capacity to independently drive the renewable and low-carbon energy transition of airports.

— — — — — — — —

APPENDIX

Suggested Amendments to Resolution A41-21: *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change*

1. Addition to the Preamble

"Recognizing that airports are critical enablers of international aviation decarbonization, including through infrastructure that supports the deployment of clean energy, alternative fuels, and low-emission technologies necessary to meet the ICAO Long-Term Aspirational Goal (LTAG), and the role of the ICAO/ACI Seminar on Green Airports in addressing emerging topics associated with airports;"

2. Addition to the Operative Clauses

Under the "Requests States to" section, add:

"Develop and implement frameworks that facilitate the deployment of renewable and low-carbon energy projects at airports, including provisions for self-generation and storage, and infrastructure for electric ground support equipment;"

3. Addition to the Operative Clauses

Under the "Requests the Council to" section, add:

"Provide capacity-building programs and technical assistance focusing on the planning, implementation, and management of renewable and low-carbon energy projects at airports;"

— END —