

# Global airports accelerate sustainability initiatives to prepare for unprecedented growth



Since 2019, Kempegowda International Airport in Bengaluru has been water positive - replenishing more than it uses

As the global aviation industry soars toward a future with over 41,000 aircraft by 2035, airports worldwide are racing to transform their operations through ambitious sustainability initiatives while managing unprecedented growth demands. This expansion, representing a 2.8% annual increase from the current fleet of 31,200 aircraft, is intensifying environmental pressures on airport operations and driving innovative solutions across the sector.

## Multiple initiatives

Dubai International Airport (DXB) has joined an elite group of global gateways, achieving Level 4 “Transformation” status in ACI’s Airport Carbon Accreditation program. The certification, held by only the top 5% of participating airports worldwide, recognizes DXB’s comprehensive emissions reduction strategy and systemic changes.

“This recognition not only highlights our progress in reducing our own carbon footprint but also reflects the strength of our partnerships in driving broader, systemic change across the aviation ecosystem,” said Dubai Airports CEO Paul Griffiths in a recent interview. “For us, sustainability is not a checkbox - it’s a long-term strategy that involves collaboration, innovation and constant improvement.”



Several airports globally have invested heavily in solar farming, including Dublin and Birmingham International

DXB's initiatives span multiple operational areas, from transitioning ground service equipment to innovative fuel solutions. A recent collaboration with dnata and Emirates National Oil Company has seen the airport's non-electric airside fleet switch to biodiesel, eliminating over 3,500 tonnes of carbon emissions annually. The airport has also partnered with Etihad Energy Services to enhance energy efficiency through comprehensive building retrofits and solar integration.

### **Alternative energy**

In Europe, airports are pioneering renewable energy solutions. Dublin Airport has unveiled a two-pronged approach to sustainable power generation. The Irish gateway has commissioned a substantial 9MW solar farm comprising 15,000 high-efficiency panels, which will generate approximately 8.7 million kilowatt-hours annually - equivalent to powering 1,600 homes and reducing CO2 emissions by 2,583 tonnes yearly.

But Dublin's ambitions extend beyond solar power. The airport is breaking new ground by exploring geothermal energy for heating and cooling facilities, joining progressive airports like Copenhagen, Paris-Orly, Amsterdam Schiphol, Geneva and Vancouver in harnessing underground thermal resources. High-level feasibility studies conducted in 2022 confirmed the Dublin Airport campus as an effective geothermal resource suitable for ground source heat pump systems.

"We are excited to explore the potential of geothermal energy - known as the 'heat beneath our feet' - as a sustainable solution for heating and cooling at Dublin Airport," said Andrea Carroll, daa's Group Head of Sustainability. "This initiative, along with our new solar farm which became operational in October, underscores our commitment to reducing our carbon footprint and

advancing towards our goal of net zero carbon emissions by 2050.”

The UK is seeing similarly ambitious targets, with Birmingham Airport unveiling a new 6.8-megawatt solar farm featuring 12,000 panels. The £9.7 million (US\$12 million) investment will provide at least 20% of the airport’s electrical power requirements, supporting its aggressive goal to achieve net zero by 2033 – significantly ahead of government deadlines.

“Our solar panels will ensure that at certain times of the year, during sunnier and warmer days, we will have no reliance on incoming power sources, key to our net zero target,” explains Birmingham Airport CEO Nick Barton. The facility is part of a broader £300 million (US\$372 million) investment in terminal and airfield infrastructure aimed at delivering sustainable growth over the next decade.

### **Repurposed organic material**

Innovation in sustainable construction is emerging as another crucial frontier in airport sustainability. Frankfurt Airport is breaking new ground by testing a 200-meter road section built with asphalt containing organic cashew-based bitumen – a world first for airports. This biogenic material, derived from cashew nut shell liquid, offers superior durability while providing significant environmental benefits.



In an astonishing advancement, Fraport is using cashew-based bitumen, a by-product of the cashew industry, to create its asphalt

“We regard this innovative bioasphalt based on organic bitumen as a fascinating possibility for reducing Frankfurt Airport’s carbon footprint,” said Andreas Eibensteiner of Fraport AG’s Environmental Management Department. “To effectively combat climate change, you have to think out of the box and try out ingenious approaches like this one.”

Ground operations are proving to be another crucial battlefield in the sustainability fight. Munich 3

Airport's introduction of electric ground power units (eGPUs) exemplifies the significant impact of electrifying essential airport services. The facility is deploying 20 eGPUs by year-end as part of its Net Zero 2035 sustainability program, bringing the proportion of electrically powered ground power units to two-thirds of its total fleet and eliminating approximately 8,000 tons of CO2 emissions annually.

## **Emissions reduction**

Smart resource management is gaining traction across the industry. Frankfurt Airport has implemented 'smart, needs-driven' technology powered by AI algorithms to regulate air conditioning systems, achieving annual CO2 emission reductions of up to 1,900 tonnes. Meanwhile, Bengaluru International Airport has achieved water-positive status through innovative conservation methods including rainwater recharge pits and integrated waste management systems.

"Airports are uniquely positioned to lead sustainability efforts," said Mabel Kwan, Managing Director, Alton Aviation Consultancy. "Situated at the intersection of airlines, governments and communities, airports can drive collaborative initiatives to address these challenges." This collaborative approach is increasingly vital as airports work toward the industry-wide goal of net-zero carbon emissions by 2050, set by both ACI and IATA.

The path forward involves multiple parallel strategies. Sustainable master planning has emerged as a crucial tool, enabling airports to balance growth with environmental stewardship while meeting stakeholder expectations. This includes preparing for emerging technologies like sustainable aviation fuels and future hydrogen-powered aircraft - Amsterdam Schiphol is already investigating hydrogen fueling systems for this transition.

Digital innovation is playing an increasingly important role. Brussels Airport has employed digital twin technology to demonstrate potential pathways to net zero and determine optimal implementation strategies. This technology allows designers to simulate operational performance and optimize energy efficiency before construction begins.

## **Creative funding**

Funding these initiatives requires creative approaches. Airports are increasingly turning to green bonds to finance capital-intensive projects, exemplified by JFK Millennium Partners' recent US\$1.85 billion green bond issuance for Terminal 6 expansion. Government grants provide another avenue, with the US Federal Aviation Authority allocating approximately US\$92 million to sustainability projects in 2023.

The aviation industry's commitment to sustainability reflects both environmental necessity and economic prudence. As airports balance expansion plans with environmental responsibilities, their innovations in renewable energy, sustainable construction and smart resource management are setting new standards for infrastructure development worldwide. Looking ahead, experts emphasize that success will require coordinated deployment of multiple solutions, from operational efficiencies and sustainable aviation fuels to ground electrification and future hydrogen-powered aircraft.