

Sustainable airports: the burning need

A Primer

As passenger traffic continues to soar, airports worldwide will face the challenge of flying an additional 43%(3.7 billion) passengers by 2035. Modernization and rehabilitation of their infrastructure and services are in order and could leave an impact on the environment. Airports are taking proactive measures, much more needs to be done.

WHAT'S INSIDE!

1 Establishing the need for
sustainability

2 Several areas of impact-
not just carbon emissions

3 Top areas to focus

4 New initiatives to optimize
footprint



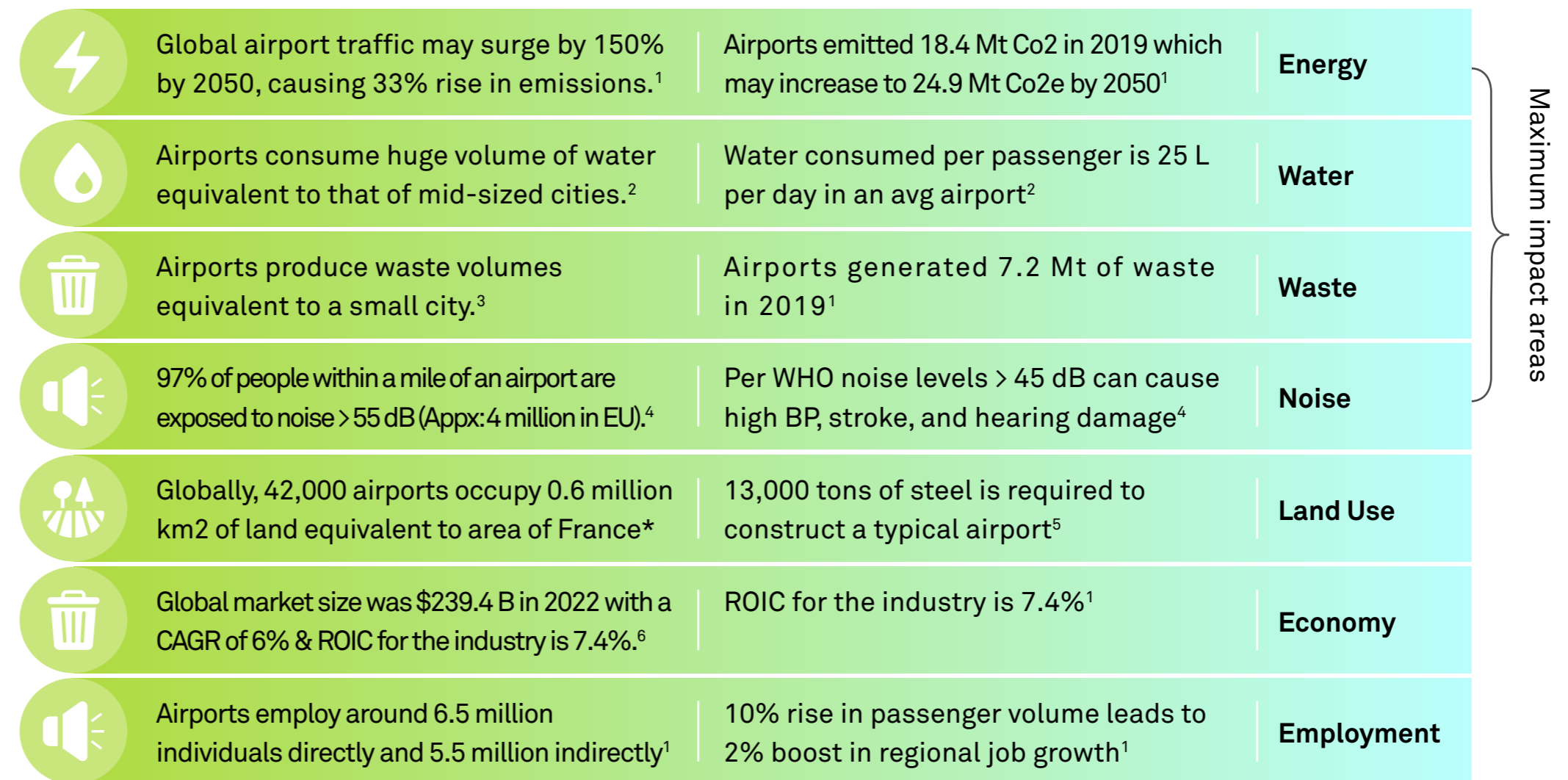
The need for sustainable airports

As concerns about climate change grow, it is crucial for everyone to work together globally to reduce the harmful effects of the expected impact on the atmosphere, water and other natural resources. **The aviation industry contributes about 2-3%¹ of the carbon emissions caused by humans, and airports account for around 2%² of that contribution.**

Aviation's contribution to overall emissions will rise as air traffic continues to expand, especially as other sectors work towards decarbonization. Hence, it is imperative for this industry to prioritize decarbonization efforts to promote sustainability. Some organizations have enforced mandatory accreditations and certifications pertaining to carbon emissions and sustainable practices that airports must adhere to.

However, carbon emissions represent just one of the environmental effects of airports. There exist numerous other impacts stemming from their operations, outlined in the graphic (figure 1). **The major ones being Energy, Water, Waste and Noise.**

300+ airports around the world have committed to reducing their carbon emissions to zero by 2050. 90+ Airports in Europe alone are on track to achieve Netzero by 2030.



1 Schneider Electric | 2 Electroind | 3 ScienceDirect | 4 Airport Council International | 5 FAA | 6 WHO | 7 Statista | *Calculations by Lab45

Figure 1: Environmental Impacts of Airports: A Statistical Overview

Energy usage (Electricity & Emissions)



Airports have a high energy demand mostly met by on-site and off-site electricity generation, with purchased off-site electricity being the largest contributor to carbon emissions. **Cooling and lighting needs account for 46% of energy usage, with terminal buildings and other airport functions being major contributors³.**

Water consumption



Overuse of water for airport operations can harm ecological habitats, and runoff water can pollute nearby water bodies with de-icing chemicals and fuel residues. **Toxic drinking water near Heathrow and Gatwick airports contained high levels of trichloroethylene, possibly from de-icing fluids, a 2023 survey found⁴.**

Waste generation



Airports generate various types of waste streams including food waste, hazardous substances, and plastic waste. **Of these waste categories, plastic waste is the most abundant, leading to a yearly disposal of 1326 tons⁵.** Improper waste management can result in pollution and mismanagement of hazardous materials.

Noise pollution



Airport noise disrupts nearby communities' sleep patterns and can cause health issues, arising from aircraft, construction, passenger traffic, and supporting equipment noise. **In 2021, Belgium government had to pay \$27 million fines due to air traffic noise generated by Brussels airport⁶.**

Land use and habitat disruption



Airports require a lot of land for infrastructure like runways, terminals, retail spaces and parking. Expansion can lead to deforestation, habitat destruction, and biodiversity loss in surrounding areas. **A survey found that building an international airport in the forest of Nijgadh, Nepal, will require chopping down 2.4 million trees⁷.**

Economic growth



Airports function as gateways that connect regions and countries, promoting economic exchanges and attracting investments. **Toronto airport has announced an investment of \$700,000 towards local organizations breaking down employment barriers⁸.**

Employment



Airports stimulate economic growth through trade, tourism, job opportunities, support for local businesses, and regional development. **London Gatwick airport has opened a new STEM centre to teach school children about STEM and aviation⁹.**

Materials use

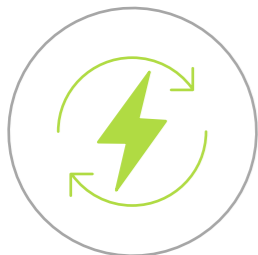


The construction of airport infrastructure requires substantial amounts of construction materials, such as concrete, steel, asphalt, and other resources. **The extraction and production of these materials can lead to habitat destruction, increased energy consumption, and emissions of pollutants.**

Areas to focus for maximum impact

In the pursuit of a more sustainable future, airports around the world are increasingly recognizing the critical importance of addressing key environmental challenges. Sustainability is surfacing as a top priority for major airports worldwide.

Among the myriad sustainability concerns, four key areas have emerged as focal points for airports aiming to maximize their impact.



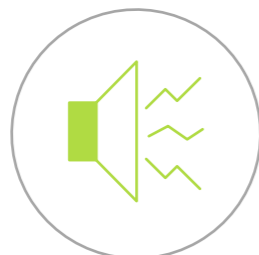
Energy



Water



Waste



Noise

These areas not only hold the potential to significantly reduce the ecological footprint of aviation hubs but also enhance the well-being of nearby communities and ecosystems. Airports can take a host of initiatives to reduce their footprint in each of these areas.

In addition to the operational activities of airports, it's crucial to recognize that retail services and spaces within airports also have a notable environmental impact. Therefore, retailers can also explore the following initiatives to enhance the airport's overall sustainability and promote adopting environmentally friendly practices such as minimizing single-use plastics, sourcing sustainable products and sustainable packaging. This collaborative effort not only strengthens the airport's commitment to sustainability but also promotes a broader culture of environmental stewardship throughout the aviation ecosystem.

Some sustainable initiatives taken by leading airports worldwide:

- 1 In 2023, Hyderabad Airport in India launched a

Sustainable practices such as renewable energy sources, efficient buildings, water reuse and waste management have resulted in a 16% increase in employee productivity.

biodiesel fueling station that emits 80% less CO₂ and almost 100% less SO₂ emissions.

- 2 The Galápagos Ecological Airport used recycled materials for 80% of its construction, including repurposed steel pipes from the Amazon.
- 3 Since 2018, the Hong Kong International Airport has mandated that food and beverage vendors must use reusable tableware for customers who dine in at their establishments.

Sustainability efforts will require a pragmatic approach assessing the current realities, customizing the transformation, and adopting an iterative and continuous approach.

Some of these initiatives will have greater impact while others may not impact significantly but will be easier or less expensive to implement.

Each airport will need to assess their current state and take steps, that will most suit their situation.

Implementation timeframe	Energy	Water	Waste	Noise
	Long term	<ul style="list-style-type: none"> Hydrogen fuel cells Biofuels and Synthetic fuels Virtual power plants Solar roadways 	<ul style="list-style-type: none"> AI for water usage pattern prediction Sensor based drip irrigation Desalination and water treatment innovation 	<ul style="list-style-type: none"> Hydrothermal liquefaction AL/ML to identify recyclables Closed loop system
Medium term	<ul style="list-style-type: none"> AI based Lighting system Smart energy grid concentrated solar power plants sustainable aviation fuel Energy efficient terminal design 	<ul style="list-style-type: none"> Aircraft deicing fluid recycling Sustainable landscaping Permeable pavements 	<ul style="list-style-type: none"> Use of sustainable materials Smart bins E-waste collection system 	<ul style="list-style-type: none"> Incorporating biophilic design elements Advanced air quality monitoring Noise mapping technology
Short term	<ul style="list-style-type: none"> Electric/hybrid ground equipment Smart lightning Natural light/ventilation 	<ul style="list-style-type: none"> Low water fixtures Recycling greywater Collection of rainwater Water audit and leak detection 	<ul style="list-style-type: none"> Waste segregation stations Reuse and upcycling waste streams Composting programs 	<ul style="list-style-type: none"> Implementing noise-reducing structures such as “sound walls” Nighttime curfew Flight path adjustment

References

- [1] “Sustainability Strategy for Airports Worldwide with Selected Case Studies”, Airport Council International, 2021

- [2] “Long-Term Carbon Goal Study for Airports”, Airport Council International, 2021”

- [3] “Airports”, Bizenergyadvisor, 2020

- [4] “Residents near Heathrow and Gatwick reportedly supplied with increased levels of PFAS in drinking water”, Ends Report, 2023

- [5] “Los Angeles Airport” Report, 2021

- [6] “Noise Pollution by Air Traffic at Brussels Airport Has Cost Belgium €25 Million”, Schegen Visa, 2023

- [7] “Building an airport in Nijgadh forest will wreak havoc on its biodiversity”, The Farsight, 2022

- [8] “Greater Toronto Airports Authority announces \$700,000 in funding to break down barriers to employment”, International Airport Review, 2023

- [9] “London Gatwick opens new STEM centre to inspire local children to pursue airport-related careers”, International Airport Review, 2023

- [10] “2023 Passenger It Insights”, SITA, 2023

- [11] “Greater advancements for sustainability in aviation”, Inform Software, 2024

- [12] “Sustaining your world: Vision and strategy towards the most sustainable airports”, Schipol Group, 2022

- [13] “Advancing Sustainability in Global Crisis”, Changi Airport, 2021.

- [14] “Climate Action Plan”, San Francisco Airport, 2021.

Lead Authors@lab45

Deepika Maurya 

Contributing Authors@lab45

Sujay Shivram 

Maha Alkhalawi 

Chantal Contijoch 



Lab45 is a visionary space developing ground-breaking solutions to foster and accelerate ideation throughout Wipro.

At Lab45, engineers, research analysts, and scientists come together to infuse creative ways of incubating solutions for customers that will transform the future. It is a space filled with ambition at the vanguard of far-reaching research across cutting-edge technologies.

Established with the Silicon Valley culture of free-flowing creativity, Lab45's goal is to make bold ideas a reality and to invent the future of enterprise. So come, collaborate, and see what happens when ideas are left unbound.

[Feedback](#)

[Click to Know More](#)

Disclaimer: This report was created using various sources such as expert interviews, internet reports, website research and media releases. This information is collated in good faith and used on an as is and as available basis by us. Our reports should only be construed as guidance. We assert that any business or investment decisions should not be based purely on the information presented in our reports. We do not guarantee or take responsibility for the accuracy, completeness, reliability and usefulness of any information. The opinion expressed in the reports is our current opinion based on the prevailing market trends and is subject to change.



Ambitions Realized.

Wipro Limited

Doddakannelli, Sarjapur Road
Bengaluru – 560 035, India
Tel: +91 (80) 2844 0011
Fax: +91 (80) 2844 0256
wipro.com

Wipro Limited (NYSE: WIT, BSE: 507685, NSE: WIPRO) is a leading technology services and consulting company focused on building innovative solutions that address clients' most complex digital transformation needs. Leveraging our holistic portfolio of capabilities in consulting, design, engineering, and operations, we help clients realize their boldest ambitions and build future-ready, sustainable businesses. With over 250,000 employees and business partners across 66 countries, we deliver, on the promise of helping our customers, colleagues, and communities thrive in an ever-changing world.

For more information, please write to us at info@wipro.com