



Future of Airports and Growth Opportunities - Sustainability & Digitization

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Exclusively produced for Airport Show 2023

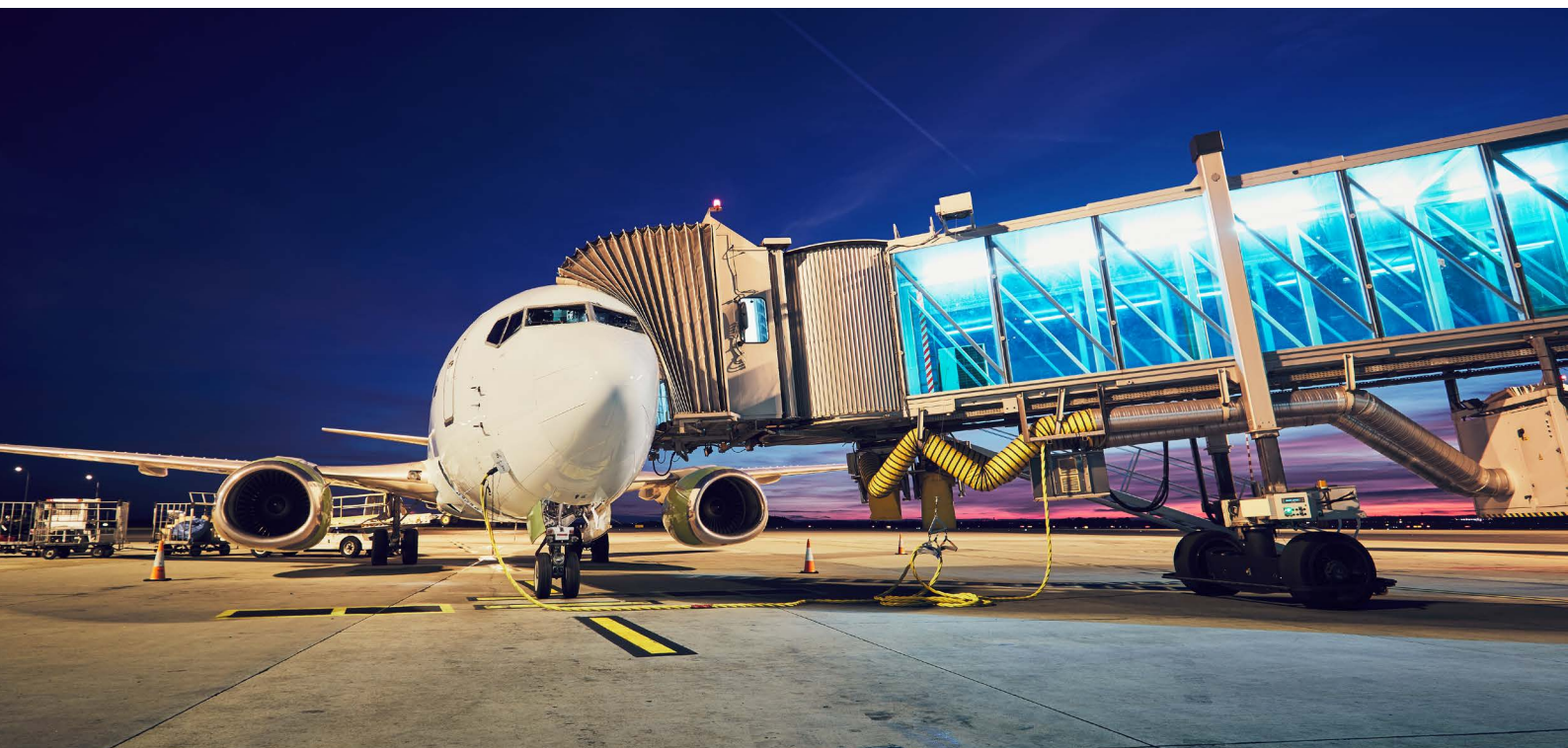
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Introduction

The pandemic dealt a critical blow to the growth aspirations of airports across the globe with more than 60% drop in passengers leading to more than US\$ 120 billion in losses in 2020. Airports world over were in the process of determining solutions and designing strategies to match the forecasted double-digit growth of passenger demand when the pandemic hit. Airport operators overnight had to shift all their focus from expansion to cost reductions and expedite changes to become more resilient and agile.

As of Q1 2023, recovery is in full swing, airports are experiencing a surge in passenger traffic because of pent-up demand. The full recovery of passenger numbers is expected to be achieved by Q4 2023 to Q2 2024 with each region recovering at a different rate. With some lingering effects of the pandemic still impacting airport operations such as shortage of workforce coupled with other socio-economic aspects, airports operators are keen on quickly adapting to manage the increasing demand while dealing with existing challenges.

Airports are going through a transformation, be it the way they operate or the use of solutions/technology and this has led to operators searching for alternative and innovative solutions/technologies to address their specific goals. This has made both small and large airports rethink their strategies providing a strong growth opportunity across the airport ecosystem for suppliers of airport technologies.



Post-pandemic Changes at Airports

The two years of a drastic drop in passenger traffic coupled with the now changed and evolved passenger journey has impacted stakeholders across the value chain. All stakeholders, including the airports have had to re-look and change their long-term plans and strategies to adapt to the changes in the ecosystem. The cost has become a major aspect and now, with faster than expected recovery of passenger traffic mainly contributed by huge pent-up demand for leisure travel is making many airports speed up their plans while also being agile in terms of operations.

The key focus areas for airports post-pandemic are:



Airports all over are making changes in their operation plans and strategies to adapt and inculcate the learnings of the last two years to better manage the growing passenger demand while also reducing costs and increasing revenues to cover up the losses incurred. From a future growth perspective, airports are also taking steps to guard themselves against potential risks while at the same time increasing confidence in passengers to bring the much-needed growth in passenger numbers.

Increase in the Rate of Deploying Automation

The COVID-19 pandemic drove airports to increasingly focus on automation and inculcate novel solutions within the existing ecosystem at various locations across the airport value chain at the landside, airside in the terminal, and for both passenger-related services as well as operational aspects.

This is true for Tier 1 and Tier 2 airports and smaller regional airports that are equally inclined to adopt automation, given that point-to-point travel has seen a strong surge in demand.

Autonomous Cleaning Bots

Artificial intelligence (AI)-powered self-driving bots are becoming a common sight at large airports such as Changi, Narita, and others. These bots are efficient and can be deployed at large floor areas to clean, sanitize, and disinfect the floor area. These are deployed to aid airport operators achieve the required standards of cleanliness while using limited workforce.

Increased focus on Enhancing Passenger Experience

The passenger journey has been impacted and, in many cases, has become complex and confusing. Airports are looking at enhancing passengers' travel experience while they adapt to the multiple changes. Furthermore, it is also crucial for airports to attract more passengers by increasing their confidence quotient at the airport. Airports are deploying various initiatives, be it in retail, F&B, or check-ins, to improve the experience.

Augmented Reality (AR)/Virtual Reality (VR)

VR is being used to provide passengers virtual tours, simulations, and an immersive experience at airports to enhance the overall passenger experience.

IGA Istanbul Airport has implemented AR technology to enable passengers to view retail objects virtually and in 3D, to offer an interactive and intuitive shopping environment. Dubai airport is using AR/VR to support passengers with indoor navigation of the terminal.

Wider Use of Biometrics for Passenger Processing from Curb to Gate

The need for biometrics at various airport touchpoints rose sharply with the COVID-19 pandemic as airports moved towards curbing the spread of the virus. Biometrics, especially touchless biometrics, not only supported reducing the touchpoints but also allowed for less human intervention, expediting passenger flow and making it even more seamless. Technologies such as cloud platforms further enabled airports to deploy biometrics at multiple levels and even at lower costs than before. Biometrics is not only being increasingly deployed at large airports but also at smaller regional airports.

Contactless Recognition

While fingerprint scanning is widely used at various airports, using Iris scanning technology and facial recognition is a step ahead in enhancing passenger processing. Abu Dhabi Airport, Singapore Changi Airport, and Dubai Airport amongst others have begun deploying iris and facial recognition for immigration and border control and other passenger processes.

Real-time Passenger Flow Management

Passenger's movements right from even before arriving at the airport to boarding the aircraft and vice versa, are being monitored, tracked, and analyzed by airport operators to understand and study patterns to support:

- Increasing passengers throughout with existing infrastructure
- Reducing wait time
- Identifying bottlenecks and reducing inefficiencies

AI-based Video Analytics

Airports are deploying AI-based video surveillance that actively tracks passengers in real time and provides operators critical input that can be adapted for airport operations, real-time decision making, and also making predictions such as opening more security counters if wait times increase by a certain amount or if a specific check-in counter is crowded.

Reduce Cost of Operations by Resource Optimization

Manpower at airports has become even more scarce post the pandemic, and while the recovery is in full swing, airports are finding it difficult to hire the right staff with the required capabilities leading to delays and errors at airports. Also, as airports become bigger and the number of flights increase, deploying the required GSE (Ground Support Equipment) as and when required in the given time becomes even more challenging. Hence, airports are looking at solutions that aid in optimizing resource allocation where the tasks can be achieved with the limited resources available without impacting the turnaround time. Airports are leveraging data captured by various sensors such as RFID (radio frequency identification) and geolocation to manage and deploy resources in real-time.

Individual processes at airports, be it at the gate, at the apron, or at check-in, are increasingly being mapped with historical and real-time data to determine patterns that help in increasing overall resource management by predicting where and when resources will be required, including what type of resources and how many resources will be required.

Use of AR for Baggage Handling

A ground handling company in Singapore Changi Airport is utilizing AR for few activities of ground operations. The AR glasses can be used to look up information related to loading, handling, and processing on the ramp. This saves time and reduces the number of staff needed to carry out tasks and freeing up staff to be allocated elsewhere.

Dubai Airport is using AI coupled with Big Data to support optimum allocation of resources in the airport.

Digitalization at Airports



Digitization has been the cornerstone for airport strategies across the globe for the last couple of years, but the need and focus on digitization has become even more prominent in recent years. The only way airports could operate efficiently and effectively during such challenging times was to adopt digitization. According to Frost & Sullivan's recent analysis, the airport digitalization sector will be worth US\$ 8.5 billion by 2030.

Need for Digitization at Airports

Increases Airport Capacity

Digitalization supports increased throughput by improving operational efficiency, resource management, passenger processing while not having to spend on large infrastructure expansions.

Stakeholders Collaboration

It enables collaboration between various stakeholders at an airport to streamline process flows and share data that helps in reducing the workload on individual stakeholders. This results in better decision-making in reduced time.

Increase in Efficiency

Digitization aids in reducing human intervention and, as a result brings down errors and prevents the costly delays linked to them. This is relevant for both airside operations as well as for landside operations.

Resource Optimization

Workforce shortage is becoming a key concern for most airports, and digitization is one cost-effective way that enables airports to continue operations with reduced staff while allocating them optimally. Limited resources can be deployed appropriately and in real-time at gates, turnarounds, baggage belts, check-in, and boarding.

Airport Digitalization Trends

Use of Digitization to Bolster
Collaboration of Airport
Stakeholders

Leveraging AI and Big Data
for Airport Operations

Use of IoT to Track
Passenger Movement

Reducing Turnaround Times

Enhancing Passenger
Experience

Innovative Digital Solutions to
Increase Non-aero Revenue



Use of Digitization to Bolster Collaboration of Airport Stakeholders

Rise in demand amongst the airport stakeholders to increase situational awareness at airports by leveraging the information sharing between the stakeholders across the airport ecosystem. Stakeholders have earlier been apprehensive about sharing data and collaborating due to lack of transparency, but with digitization, it enables a high level of visibility into the operations of all key stakeholders as well as measures the performance of each stakeholder in real-time and its impact. Stakeholders are willing to connect to a single platform as the benefit is mutual.



Leveraging AI and Big Data for Airport Operations

Large amounts of data are being constantly generated, collected, and analyzed by airports to support real-time decision-making and predict operation failures and bottlenecks. By leveraging AI and Big Data, all the millions of data points are being individually analyzed and mapped, giving airport operators situational awareness and alerting them on potential events that may cause a negative impact with possible resolutions for the same. Furthermore, the use of AI and Big Data is applicable not only for airside and landside operations but even before passengers arrive at and after departing the airport.





Use of IoT to Track Passenger Movement

Thousands of sensors are being installed at the airside, landside, and terminal of airports to track and monitor passenger movements be it at the car parking, the boarding gate, or at the Duty-Free outlets. These sensors capture and send data in real-time to a central location to enable informed decision-making for processes across the airport from a single nodal point.

Reducing Turnaround Times by Increasing Automation

Airports and airlines alike are constantly looking at reducing turnaround times and even more so from an airport's point of view as they aim to attract more airlines especially LCCs (Low-Cost Carriers) where turnaround time is a key factor. Airports have been deploying various digital solutions that aid in bringing down process times, including passenger check-in, boarding, security, and ground services.



Enhancing Passenger Experience

The passenger dynamics have changed in the past few years with a shift from business travel to more leisure travel, and now with passengers preferring point-to-point direct routes making not only larger airports but smaller airports also having to enhance their passenger experience especially with passengers in many cases having options to choose between city airports and larger airports. Use of chatbots, holograms, and airport apps are being deployed to support seamless passenger processing.



Innovative Digital Solutions to Increase Non-aero Revenue

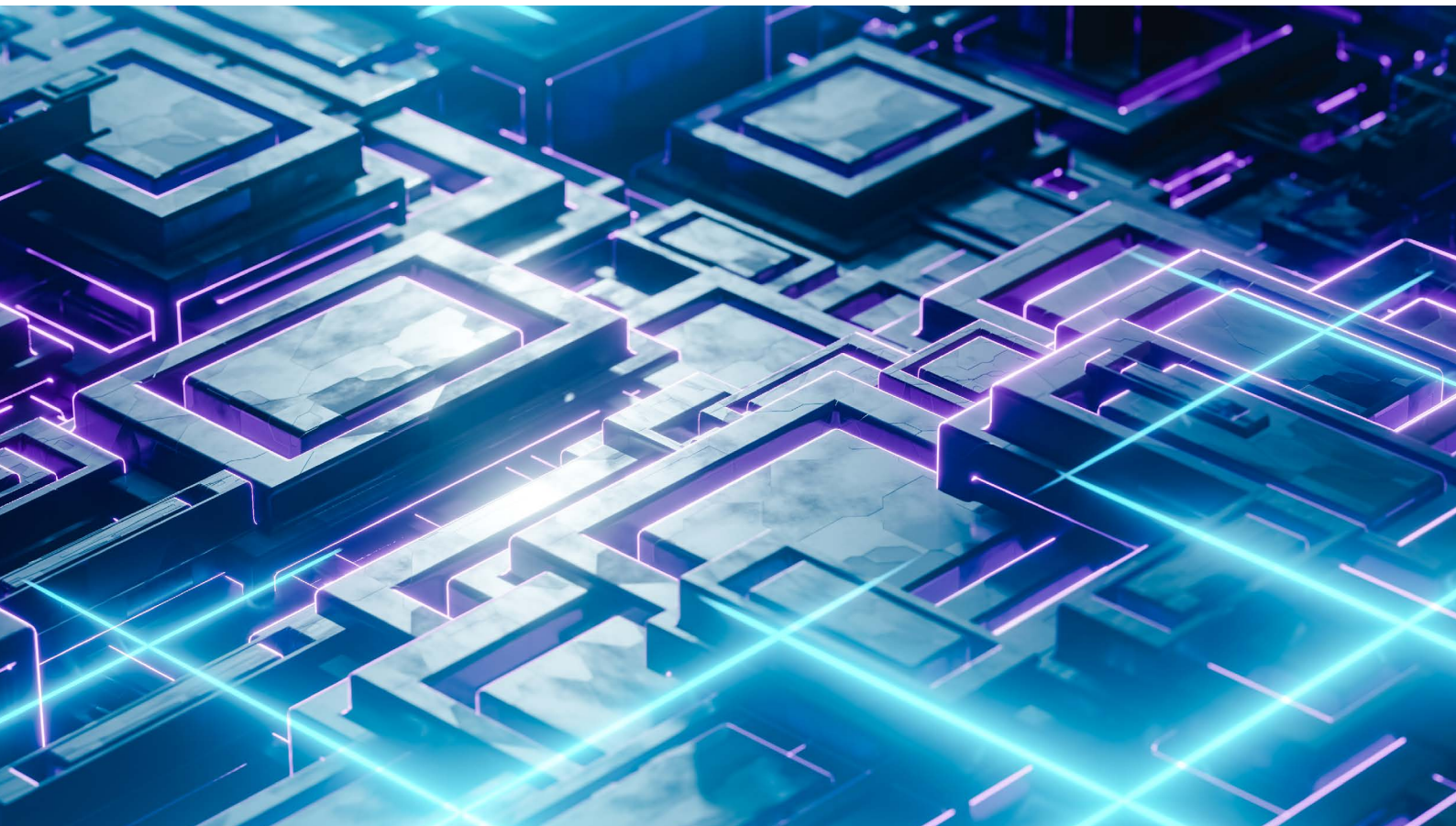
Non-aeronautical revenue for airports is becoming even more crucial as aero revenues become stagnant or decline in some cases. To support this, airports are looking at leveraging innovative solutions to increase revenue and find new revenue streams to make up for losses during the pandemic years. Using digitization solutions such as e-commerce at airports, food ordering service at gates, and immersive VR experience is enabling airports to increase avenues to earn non-aero revenues.

Future of Digitization at Airports

Airports are managing ever-increasing traffic post-COVID-19, and the demand will likely maintain an upward curve. The growing number of passengers has led operators to focus on process improvements, with digitization as an enabler for fast, secure, and safe airport operations that help increase efficiency and revenues.

Digitization will continue to be a cornerstone for airports' strategy going forward though there remain few challenges that may deter the deployment and adoption of digitization such as stakeholders not agreeing to the implementation and stakeholders not willing to share data with one another. Cost remains the major concern followed by the life span of the technologies deployed. However, the benefits of digitization far outweigh the challenges making it hard for any airport to delay the implementation.

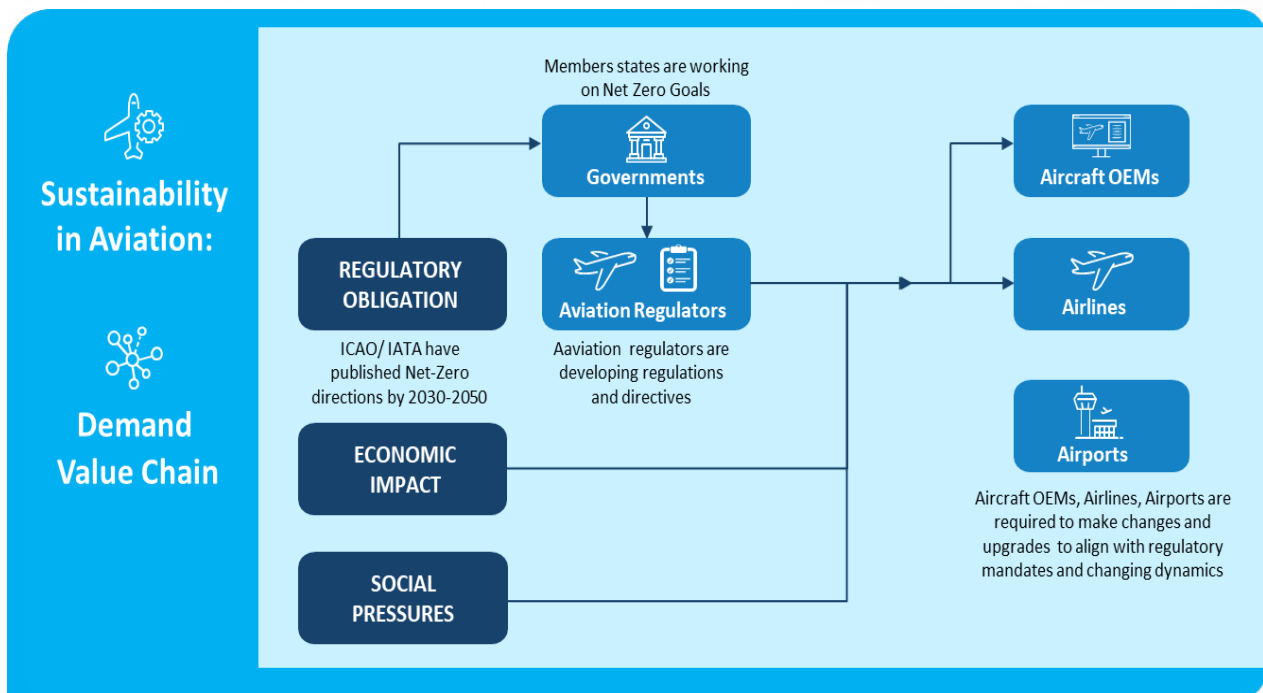
Airports will be keen to invest in technology/solutions that match their specific requirements and visions. The needs change by region, making it crucial for technology providers to offer solutions that can be customized as per the requirements of the regions while aligning with the future plans and strategies of the individual airports.



Sustainability at Airports

Sustainability is a vital focus area for airport planning and service delivery across the aviation value chain. Airports are deploying various initiatives for reducing carbon emissions and achieving net-zero targets. They play a crucial role in enabling airlines achieve their net-zero targets by offering SAF (Sustainable Aviation Fuel), autonomous taxi bots, or through reduced taxi times.

The imperatives for airports to adopt sustainability in a speedier fashion are multifaceted—regulatory, economic (rising energy costs), and social (passengers demanding greener travel).



Source: Frost & Sullivan Analysis

Regulatory and environmental councils are releasing guidelines/regulations to reduce the carbon emissions of airports. ICAO (International Civil Aviation Authority) has been advising on several initiatives and policies aimed at airport sustainability, such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), Implementing EMS (Environmental Management System), and noise management. The aim of these policies is to achieve sustainability at airports by 2050 effectively.

Airside

The airside of an airport which comprises runway, taxiways, aprons, and hangars have a significant impact on the carbon footprint of an airport. To achieve net-zero emissions, airports are replacing the legacy convention fuel-powered vehicles with hybrid/electric ground support equipment, people movers, and other vehicles. Airport operators and airlines are collaboratively working towards reducing emissions while taxing before and during departure by using electrically powered autonomous solutions to taxi the aircraft instead of the aircraft's engines.

Airports are looking at leveraging unmanned vehicles with electric power for airside operations for ground handling and people movement to reduce airside emissions.

Landside

The landside of the airport is being reimagined with renewable sources of power generation, effective waste management, and impactful landscaping to contribute to increasing sustainability of the airport. Renewable energy sources are increasingly being prioritized over conventional sources to support airport's complete energy requirements to have net-zero operations.

Airports such as Amsterdam Schiphol, London Heathrow, and San Francisco International are establishing sustainability aviation fuel production plants at the airports, which would support airlines by easing the process of transporting and storing SAF. This will increase the use of SAF in the industry.

In the future, airports would also have to find ways to support next-gen aircraft requirements, be it hydrogen or electric power, in terms of storage and distribution.

Cochin Airport in Kerala (India) is harnessing solar power with a 12 MW power generation capacity to support the airport's electric power requirements.

Terminal

Smart terminal buildings are paving the way for airport sustainability by leveraging modern technology, keeping in mind the impact on the environment and surroundings. Airport operators are looking at developing greener building designs that incorporate waste management, renewable energy sources, and effective heating, ventilation, and lighting solutions focused on reducing carbon footprints and increasing healthy passenger flow.

San Francisco as a LEED-accredited airport has implemented a range of sustainable design, construction and operations measures that support energy efficiency, water conservation, sustainable material, indoor environmental quality, and waste management.

Future of Sustainability at Airports

Airport operators are undertaking developments and modernization efforts in airports to achieve net-zero targets. Though airlines hold a larger share of carbon emissions in the aviation value chain, airports can play the deciding role in standardizing and promoting sustainability initiatives and implementation.

The shift towards sustainability will accelerate in the coming years with the development of innovative and scalable solutions/technologies such as digital platforms, intelligent building management, generation and use of alternate energy sources coupled with various integrated solutions that integrate stakeholders and support in accelerating achieving net-zero targets.

In the future, there will be continuous increase in demand for solutions/technologies that enable airports to achieve net-zero goals, especially those that can offer benefits over a longer period and are resilient while requiring minimum changes to existing infrastructure and airport processes.

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