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# Electrification Factors for Future-Proofing Airports and Related Terminal and Parking Facilities



Airports worldwide are increasingly adopting electrification to reduce their reliance on fossil fuels. This transition is driven by a growing commitment to sustainability, which has evolved from a buzzword to a critical mandate. By integrating more electric solutions, airports can significantly lower their fossil fuel consumption, leading to more environmentally friendly operations.

## **The Mandate for Sustainability**

In the prevailing era, sustainability is not optional for airports; it's a necessity. The aviation industry has a desire to electrify as a part of modernizing infrastructure, which includes building for a sustainable future — around the next 40 years.

This desire has led to the widespread adoption of sustainability measures, including the electrification of various airport operations. Electrification helps meet these sustainability goals and often leads to long-term cost savings and improved operational efficiency.

## **Electrification of Rental Car Fleets**

A notable trend in airport sustainability efforts is the electrification of rental car fleets. Many airports are now requiring rental car companies to offer electric vehicles (EVs) to travelers. This shift necessitates the construction of new infrastructure to support these vehicles, including parking structures and consolidated rental car centers located off-site to reduce congestion and enhance passenger experience at terminals.

With the rise in electric rental cars, airports must ensure that adequate EV charging stations are available within

these facilities. This need extends to passenger vehicles, which may be parked at the airport for several days. Providing sufficient charging infrastructure is essential to accommodate this growing demand and to support the overall transition to a rental fleet that includes EVs.

#### **EV Integration in Airport Operations**

Beyond rental cars, airports are integrating EVs into various aspects of their operations. Ground service equipment, such as baggage carts, tugs, and trams, is increasingly being replaced with electric alternatives. Additionally, bus fleets that transport passengers to and from rental car facilities, as well as people movers within the airport, are being electrified.

This transition to electric ground service equipment reduces emissions and improves air quality within the airport vicinity, benefiting workers and passengers. Moreover, EVs of all types often require less maintenance than their fossil fuel counterparts, resulting in lower operational costs over time.

#### **Doubling Capacity with Electrification**

Many airports are working to double their existing capacity to accommodate growing passenger numbers and increased flight operations. This expansion is not just about building more runways or terminals; it's about integrating modern electrical infrastructure that can support a variety of electric vehicles and equipment. By doubling capacity through electrification, airports aim to create more efficient, sustainable, and future-proof operations.

But while the push towards electrification is strong, airports face significant challenges in this transition. Most airports are not inherently experts in electrical infrastructure, which involves complex systems for power distribution, EV charging stations, and integration with existing airport operations. Bringing in all this electrical infrastructure requires specialized knowledge and expertise, which many airport authorities may lack. To address this, airports often collaborate with external experts in electrical engineering and infrastructure development. These partnerships are crucial for ensuring the new systems are effective, scalable, and adaptable to future technological advancements.

#### **Upgrading Substations**

Modernizing airport infrastructure also involves significant upgrades to electrical systems, starting with substations. Substations are critical for managing the distribution of electricity across the airport, providing a reliable power supply to all operations. Upgrading these facilities is essential to handle the increased electrical load from new technologies and the growing use of electric vehicles and equipment.

These upgrades often include the installation of intelligent circuit breaker technology with predictive maintenance, digital switchgear that can reduce the footprint of a typical lineup, and power protection equipment that keeps the campus running 24/7.

**By improving the capacity and reliability of substations, airports can support a wide range of new electrical demands and prevent outages that could disrupt operations.**

#### **Enhancing Power Protection Equipment**

Alongside substation upgrades, enhancing power protection equipment is crucial for maintaining a stable and safe electrical supply. Airports need robust systems to protect against power surges, electrical faults, and other potential disruptions. This includes the installation of surge protectors, circuit breakers, and advanced fault detection systems.

Upgraded power protection equipment helps safeguard sensitive airport operations, from lighting and security systems to the extensive array of electronic devices used in day-to-day activities, such as radar and other communication equipment from the control tower to the flight operations centers. Guaranteeing the safety and reliability of the electrical supply is essential for both operational efficiency and passenger safety.

#### **Providing All Ranges of Power**

To support the diverse electrical needs of modern airport infrastructure, it is necessary to provide all ranges of power: low voltage, medium voltage, and high voltage.

Different applications within the airport require different levels of power. For instance, lighting and small electronic devices typically use low voltage, while medium voltage is necessary for larger equipment and systems. High voltage is required for heavy-duty applications, such as powering large HVAC systems or supporting electric buses and ground service equipment.

By upgrading electrical infrastructure to support various power requirements, airports can ensure that all systems operate efficiently and effectively. This flexibility is crucial for integrating new technologies and adapting to future changes in airport operations and energy use.

Effective communication and integration between different pieces of equipment are critical for the smooth operation of airport infrastructure. This interoperability facilitates efficient power management and enhances the electrical system's overall performance, enabling all components to work harmoniously together.

Digital switchgear leverages open communication protocols, allowing for greater flexibility and compatibility with various systems. This enhances the monitoring and control of electrical systems, providing real-time insights and data that can improve operational efficiency and safety. The use of open communication protocols also secures the integration with existing and future technologies, supporting long-term adaptability.

#### **Enhancing Airport Infrastructure with Advanced Electrical Solutions**

As airports undergo significant modernization to meet future demands, integrating advanced electrical solutions is crucial for both landside and airside applications. ABB, a leader in electrification, offers a range of technologies designed to support terminal upgrades, cargo and hanger

expansion, consolidated rental car centers, and parking structures equipped with EV chargers. These solutions ensure that airports are efficient, reliable, sustainable, and ready for future advancements.

One of the primary approaches ABB takes in supporting airport modernization is integrating innovative technologies to create a future-proof electrical design. This includes advanced circuit breakers and relays that enhance the safety and reliability of power distribution systems. By employing methods for predictive maintenance and virtualized protection and control, airport electrical systems can be robust and adaptable to future needs.

#### **Serviceability and Modular Designs**

ABB's solutions are designed with serviceability in mind, featuring plug-and-play and modular designs. This approach simplifies installation, maintenance, and upgrades, minimizing downtime and operational disruption. Advanced circuit breaker and relay technology further enhances airport electrical systems' ease of maintenance and reliability. These features are particularly beneficial in dynamic environments like airports, where quick and efficient serviceability is essential.

#### **Summary**

The electrification of the aviation industry is a complex yet essential undertaking. As airports strive to double their capacity and integrate sophisticated electrical infrastructure, they must navigate the challenges of limited expertise and stringent federal procurement requirements. Through strategic partnerships with companies like ABB and a focus on sustainability, the industry is making significant strides towards a more electrified and environmentally friendly future. This transformation supports current operational needs and paves the way for continued innovation and growth in the years to come.

