Plugging in to Power

Ground Power, Preconditioned Air Units Have Advantages in Many Scenarios

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Since the 1980s, efforts have increased to provide 400-hertz and 28-volt DC ground power systems and preconditioned (PC) air systems at most commercial aviation terminals in the United States.

These units eliminate the need to run the aircraft's on-board auxiliary power unit (APU) while the aircraft is parked at the gate. The APU provides power to run instrumentation, cabin equipment and on-board cabin air conditioning systems while the aircraft is on the ground. It may also be used in limited situations during taxi and flight operations or to start aircraft engines. Regional jets and piston-powered aircraft often do not have APUs and instead have historically used mobile air-start and ground power units.

Because the APU runs on jet fuel, it generates emissions, while newer gate-based systems run on electricity from the grid, increasing efficiency and improving the local airport environment. Older systems primarily used diesel fuel, limiting benefits in fuel burn, noise and emissions.

Because ground power and PC air systems reduce emissions, qualifying airports in designated air quality nonattainment and maintenance areas may be able to implement these and other facility updates through Federal Aviation Administration (FAA) grants. Recently, Voluntary Airport Low Emission Program funding, known as VALE, has enabled U.S. airports to install these systems through the FAA's Airport Improvement Program.

Aside from the emissions benefits, ground power and PC air systems yield other gains for airlines and airports. First, and perhaps foremost, aircraft APUs consume significant amounts of fuel — 40 gallons to 60 gallons per hour for a typical narrow-body APU. The fuel savings from ground systems can be especially significant during extended ground times for aircraft, such as longer turn times or overnight maintenance at the gate. Ground power and PC air systems also operate without the high-pitched noise that some APUs produce.

Passenger comfort can be a factor in the decision to install PC air systems, which cool and heat aircraft parked at the gate and precool or preheat boarding bridges for passenger comfort. The technology in today's PC air systems include central plant PC air systems and point-of-use direct expansion PC air units. A life cycle cost analysis study can determine the most economical option for each airport based on number of gates, gate schedules, local utility rates, initial capital cost and terminal space availability.

For ground power, either central plant motor generator systems or central plant solid state systems can be compared with point-of-use solid state gate units. Again, a life cycle cost analysis study is the best tool to determine the most economical system for each airport.

Ground power and PC air units are not a universal solution. Some airports lack the electrical infrastructure to install them at a reasonable cost, and they may be impractical in situations where turn-around times are quick or when high winds or other ground conditions make use of PC air hoses difficult. However, where they make sense operationally, airlines can use ground power and PC air units to save money, reduce wear and tear on APUs and achieve environmental improvements. The use of these units can also directly translate to passenger comfort during boarding and on the tarmac.

Ground power systems and preconditioned air units can help airlines reduce the need to fire aircraft auxiliary power units.