Energy Infrastructure & Industrial Solutions

Smart Charging for Electric Fleets: DeltaGrid® EVM

Empowering Efficient Charging Management at Electric Bus Depot

"Electrification of Transportation" is one of Taiwan's key strategies for achieving net-zero emissions. The government aims to fully electrify urban buses by 2030, expecting to deploy 11,700 electric buses to meet transportation needs with green vehicles. However, as electric buses are deployed, related charging issues emerge, such as potential power overloads from mass charging and the impact of charging times on fleet scheduling. Balancing charging efficiency and operational dispatch will directly affect the costs and profits of commercial fleets.

Delta's EV charging solution utilizes the self-developed DeltaGrid® EVM, an electric vehicle charging management system for smart charging, power allocation, and charging equipment management. This system was successfully implemented at the Taipei City electric bus fleet depot in the second quarter of 2024. To avoid exceeding the site's power limit during simultaneous charging, which could result in fines or power outages, the depot adopted a smart charging management system to effectively address power overuse and charging allocation issues. Under limited power conditions, the system efficiently allocates charging power for the electric buses and provides flexibility for future fleet expansion.

Charging and Power Allocation Issues for Electric Buses

The charging scenario for electric buses differs from that of private EVs. Due to site or power constraints, it is challenging for fleet depots to equip each vehicle with a dedicated charger. With different schedules and routes, buses return to the depot at various times, posing higher demands on charging scheduling and efficiency. Additionally, electric buses have larger battery capacities and require high-power DC fast chargers to shorten charging times. After operations end, buses return to the depot for charging, which may exceed the depot's power limit if charging is performed simultaneously. These scenarios place high requirements on the depot's charging efficiency and power management capabilities, making power allocation a pressing issue.

Digital Solutions for Smart Fleet Charging

Delta's EV charging solution successfully implemented seven 200kW DC fast chargers at the Taipei City electric bus fleet depot, providing simultaneous charging for up to 14 buses. Given the depot's power limit of 1000kW, simultaneous charging of all vehicles would exceed this limit. Therefore, the depot adopted DeltaGrid® EVM to help manage their charging scheduling.

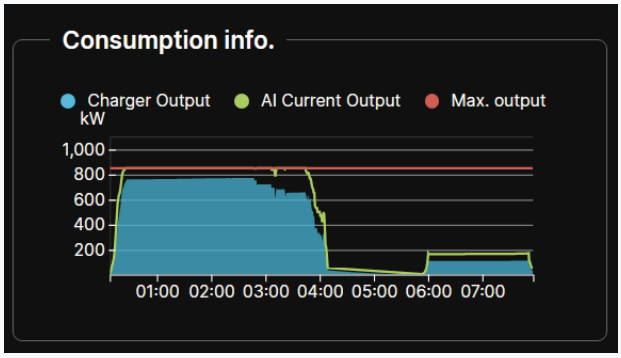
DeltaGrid® EVM serves as the central system for energy dispatch, monitoring, and management of charging equipment in Delta's EV charging solutions. It has been widely applied in both community and commercial office charging scenarios. To address the challenges of charging commercial fleets, the system has dedicated features that were developed for electric buses and commercial fleet charging needs:

1 Vehicle Identification Function

The bus identification information is written into the management system. When plugged into the charging gun, the system immediately recognizes the vehicle and starts charging without the need for card swiping or button operations, simplifying the charging process for electric buses.

2 Site Current Limitation

To address power issues caused by simultaneous bus charging, past practices often set current limits on chargers to avoid power overuse. However, this approach wastes the chargers capacity and reduces charging efficiency. With DeltaGrid® EVM, a current limit can be set for overall site charging usage. Each charger is set with a minimum charging power value. On a per-minute basis, the system dynamically allocates the output power of each charging gun based on the site's remaining power, the remaining charge in the vehicles' batteries, and charging priority, thus achieving optimal charging efficiency under restricted conditions.



3 Real-Time Alerts

The biggest concern for electric bus fleets is abnormal charging equipment, leading to insufficient power during operation. DeltaGrid® EVM can constantly monitor the charging equipment status, sending immediate alerts and notifying service providers to dispatch technicians for repairs if an anomaly is detected. Real-time monitoring of the charging status prevents equipment failures from impacting fleet operations.

Using DeltaGrid® EVM as an intelligent core solution, the Taipei City electric bus depot can precisely balance on-site power allocation and charging efficiency management for electric buses. Through dynamic allocation, it effectively enhances charging efficiency, optimizes operational benefits for electric fleets, and successfully demonstrates the transformation to the electrification of transportation.