

The Microgrid Solution: Transforming EV Charging Station Infrastructure for the Future

Stress on the Grid with the Rise of EVs

International electric vehicle (EV) ownership is expected to reach approximately 125 million units by 2030. It is therefore critical that energy providers and cities in general prepare for a considerable increase in demand for EV charging infrastructure. With many countries having already laid out plans to phase out internal combustion engines by 2050, governments are now offering incentives such as price subsidies and tax reductions to stimulate the EV market. [1]

These trends will have a major impact on public infrastructure and current business models related to private mobility, mobility services, car sharing, public transport, and urban logistics.

As the number of EVs increases, several key problems will inevitably arise. Unmanaged peak load from EV charging will place stress on current electricity grid infrastructure, which will be detrimental to both charging point operators (CPOs) and consumers, because it will lower the quality of charging services across the entire grid. Demand penalties intended to work around this problem will also increase operating costs for CPOs, and this will undoubtedly be passed onto the consumer.

There are two solutions to these problems.

First is the implementation of dynamic loading to the grid. While this will ease pressure on energy infrastructure, it may require considerable modification to charging stations and the grid. It will also invariably reshape electricity consumption patterns. Second is the installation of on-site energy storage systems. With the load shifted from the grid, this will postpone the need to upgrade key infrastructure. Coupled with green energy, this also presents a means for CPOs to significantly reduce their operating costs.

An Immediate Solution for EV Charging Stations: On-Site Energy Storage Systems

From an operational standpoint, the primary problems faced by CPOs include determining a suitable approach to installing charging facilities at existing sites and finding a balance between operational efficiency and service quality. Overcoming these problems largely involves managing power distribution in the face of power capacity constraints while reducing

the impact of power supply spikes on the grid. On-site energy storage systems offer an immediate solution.

For CPOs, this presents an opportunity to optimize on-site energy efficiency while easing the stress placed on current energy infrastructure as the market adapts over time. Batteries can be charged during off-peak times to save on electricity costs, and then used to power EV chargers during peak periods to ensure the grid remains stable. In addition to reducing operating costs, on-site energy storage systems will ultimately allow CPOs to provide EV owners with improved charging facilities and build a level of consumer confidence that is needed to further drive the EV market.

The Emergence of Microgrids

To further assisting in coping with the increase in power demand during peak times, the utilization of green energy sources—particularly solar power—can further enhance the implementation of dynamic energy management and installation of on-site energy storage systems.

Suitable energy management systems will allow green energy, such as from solar power, to be stored in on-site batteries and then leveraged so that EVs can still be charged when electricity prices are high during peak times. This means that CPOs need draw power from the grid only when it is more economical to do so. This will be critical not only in reducing the impact of EV charging on the grid, but also in striking a balance between operating costs and service quality.

While construction of this infrastructure will be crucial in urban areas, it also opens up new possibilities for building EV charging stations in more remote locations, such as on intercity roads or in smaller towns where the upgrade of key infrastructure is not as economically feasible.

The benefits of this approach are clear. Utilizing green energy and dynamic energy management at EV charging stations will reduce energy costs for CPOs while having a positive impact on the environment. It will also ensure that grid stability will be maintained under increased power demand during peak periods, effectively transforming EV charging stations into microgrids.

Visit us to learn how Delta's EV chargers, PV inverters, energy storage systems, and energy management systems form the backbone of solutions paving the way for future EV charging station infrastructure: <https://www.deltaevcharging.com/solution>.

Note:

[¹]<https://www.cnn.com/2018/05/30/electric-vehicles-will-grow-from-3-million-to-125-million-by-2030-iaa.html>