ACCOMMODATING THE DEMAND

Responding to the rise in electric vehicle adoption

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What was once a hard-to-imagine shift in the composition of vehicles on the road is rapidly becoming a reality. The rise in electric vehicle (EV) adoption carries many benefits and challenges as the race to implement charging infrastructure gains traction. Such a dramatic change in transportation is not only possible but also could be compared to the early 1900s when roads occupied with horse-drawn carriages transitioned to an influx of gas-powered automobiles.

Nearly 10% of global car sales in 2021 were electric, a market share four times higher than in 2019, according to the International Energy Agency (IEA). The same study cites 6.6 million EVs sold in 2021, doubling the sales from the prior year. The number of electric models available continues to increase; five times the number of EV models were available in 2021 than in 2015, according to IEA. This rapid increase means stakeholders will need to keep ahead of the EV trend to provide enough charging infrastructure and support to keep EVs as a viable mode of transportation.

What's Driving the EV Industry

Recent funding is easing the burden on both individuals and businesses to install EV chargers, as part of an effort to increase the EV infrastructure options available in the coming years. The Bipartisan Infrastructure Law allocated $5 billion in grants to increase the number of publicly accessible EV chargers. The law also introduced a tax credit for EV owners that covers 30% of the cost to install a charger at home (up to $1,000 per unit). Commercial businesses are also incentivized to install chargers by utilizing a credit worth 6% of the cost of installation (up to $10,000 per unit).

This transition to support EVs is exciting for many reasons. An increase in EV usage means lower vehicle emissions by reducing or eliminating the fumes from gas-powered vehicles. This will not only provide significant environmental benefits but will help cities and states meet decarbonization goals. For example, California has pledged to cut air pollution by 71% and slash greenhouse gas emissions by 85% by 2045. Furthermore, EVs provide an improvement in quality of life for residents living near busy roadways by reducing noise pollution.

Looking at the Big Picture

A rise in EV usage will also require a modernized and more automated grid to accommodate the increase in electric load that comes from charging those vehicles. Modernizing the electric grid will lead to greater resiliency, with the possibility of implementing a decentralized energy system to place energy production facilities closer to densely populated areas and thus corresponding high rates of energy consumption. These small- to medium-scale facilities will be able to serve customer loads in areas of high demand and better allocate resources.

Installing additional facilities closer to high-volume areas will help deliver power in a reliable and sustainable way. For example, restoring power following a widespread outage could lead to peak usage on the grid, as many drivers plug in their EVs once the power is back on. Installing enough energy production facilities to handle the sudden electric load would prevent the grid from becoming overwhelmed.

While the benefits are great, the EV demand still poses many challenges.

EV chargers must be safeguarded against cybersecurity concerns. Risks are prevalent because of how chargers are connected to the electric grid and the high voltage available through each unit. A number of cybersecurity measures can be implemented to mitigate attacks. Additional security for the cloud component of chargers, as well as physically reinforcing the units against tampering, can reduce the likelihood of compromise.

Grid operators, vehicle manufacturers, charging network operators and many other energy professionals will need to adhere to cybersecurity standards developed in response to EV adoption in the coming years. Additionally, peak hours will need to be examined to determine when the demand is at its greatest and adjust the load accordingly through customer incentive programs.

Examining the Road Ahead

Utilities can begin proactively planning to protect chargers against cyberthreats by examining services exposed to the internet and identifying any technology gaps that may need to be addressed. A technical risk assessment would provide the opportunity for increased protection, not only for customers and their vehicles but for power systems and the electric grid as well. Charging speed should also be considered when implementing EV charging infrastructure. Modern society is fast-paced, and drivers will need the ability to charge EVs on the go, without the fear of being stuck at a charger for a great deal of time. High-powered EV chargers have the capability of providing an 80% charge in less than 10 minutes; wider implementation and infrastructure improvements will be necessary to accommodate driver expectations.

The location and ease of access to public EV chargers will also need to be considered by city planners and those implementing infrastructure. While many drivers prefer charging at home or at work, publicly accessible EV chargers will be necessary for lengthy road trips. Installing EV chargers wherever current gas stations are built is a solution already being widely implemented. The sheer number of these locations might be able to handle the number of drivers needing to access a charger. Analytics of where a high rate of EV usage is present will also need to be considered; EV chargers will be most utilized in areas with high traffic.

Over the next decade, the increase in the number of EVs on the road is going to alter the planning of the modern roadway significantly. The future of successful electric mobility is tied to the readiness of EV infrastructure to handle this demand. EVs are turning the transportation industry on its head and will continue to significantly impact vehicle manufacturers and drivers, as well as energy, transportation and cybersecurity professionals. ✪

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