Future car charging stations

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It"s been 20 years since Tesla Motors began development on the Roadster, and that car rode the cutting edge of electric vehicle technology at the time. But EV tech hasn"t stood still in the past two decades... far from it. Today"s EVs have greater range, lower price tags, and a whole host of advancements that make the Roadster seem positively ancient.

Of course, improved tech has reached more than the cars. Charging technology is changing so fast that understanding the future of EV charging has become as important as understanding the vehicles themselves. So here"s where the charging industry is heading.

Power management technology helps keep your electrical infrastructure efficiently distributed and balanced. Many elements in your network likely have power metering capabilities. A power management system takes this a step further by accounting for the max amperage of your service and dynamically balancing loads.

Most residential and commercial buildings don"t have the electrical capacity to power multiple charging stations at once, and upgrading infrastructure to accommodate that increased demand is very expensive. With power management in place, operators can safely balance demand and supply without needing to build more capacity. That raises your existing site"s total energy capacity, which can create savings you can put towards adding more electric vehicle charging stations in the future. Because you"re going to need them.

Power management can help mitigate grid-wide failures by flagging instability or unavailability. When those warning signs crop up, it can automatically activate local batteries or generators to maintain charging availability even in the middle of a blackout.

Power management can identify trends in your power use to raise overall efficiency. For example, if your infrastructure sees very low demand during certain hours, your power management system can curtail your power use down to demand levels, saving you money.

By the same token, power management can set your chargers to use less power when utility companies are charging the most for energy. Then, as those costs shift downward over the course of the day, you can open the throttle. Customers still get to charge whenever they want, but you get to save some money in the process.

Typically, EVs draw power from the grid, but the future of EV charging means they might also give it back with vehicle-to-grid technology (or V2G). Today, when an EV charges, it turns the grid"s alternating current (AC) into direct current (DC) and stores it. An emerging technology called bidirectional conversion technology lets the charger convert back from DC to AC.

In practical terms, this could turn every EV on the road into a battery for the grid. When a bidirectional

conversion-enabled EV connects to a V2G-enabled charger, it will charge its own battery to full. If the car is still plugged in when demand on grid jumps, its battery can be tapped for energy. Alternatively, if an EV is set to charge overnight but only requires a few hours to charge, its charger can slow the charging process down to avoid using power during peak demand. That helps keep the whole grid stable.

One of the main reasons EVs are good for the environment is that they let us shift more of our consumption to renewable energy sources. The energy those sources generate is highly cyclical--you"re only getting solar during the day, for instance, so it either has to be used immediately or stored in batteries. There are only so many of those batteries, and the materials they require (such as lithium) are the same as those used in EV batteries.

Rather than force manufacturers to choose between making stationary batteries and EV batteries, V2G effectively makes EV batteries into energy cells for the grid. That means we can store more renewable power for moments when supply and demand are out of alignment. The result: more efficient renewable energy, lower energy costs, and more emergency backup batteries in the event of a power outage.

As adoption grows, ever-increasing convenience will likely define the future of EV charging. Plug-and-charge, also known as ISO 15118, is a critical step in that process. It aims to jettison all the external factors that currently go into charging an EV--the fobs, logins, and other cumbersome authentication methods--and replace them with vehicle-based authentication.

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