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As More EVs Hit the Road, Charging Stations Must Become the Priority

 **WHITE PAPER**

Sam Veng and Jason Coey

As the conversation continues on proposed bans on new internal combustion engine (ICE) vehicle sales, the proliferation of electric vehicles (EVs) could become reality—not only in the United States, but also in Europe and other regions considering similar regulations.

The U.S. Environmental Protection Agency (EPA), for example, has announced proposed standards that would virtually put an end to gas-powered and hybrid vehicle sales.

Whether these bans go through at the federal level or not, some U.S. states, such as California and New York, are planning to ban sales of gas-powered vehicles after a certain date.

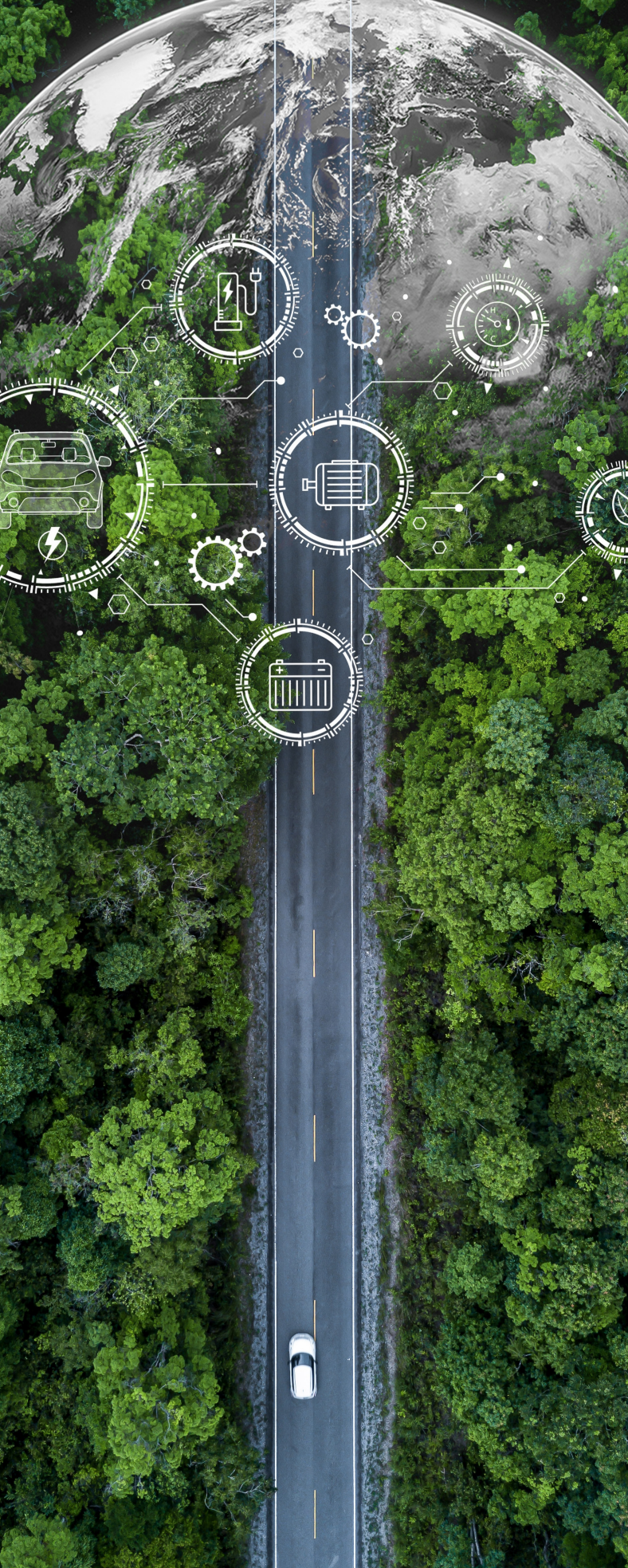
Around the world, Britain, Israel and Singapore are examples of other countries that plan to ban new ICE sales by 2030. China aims for battery electric, hybrid and fuel cell vehicles to account for the majority of new vehicle sales by 2035.

But getting more EVs on the road isn't as easy as simply selling more of them to consumers. Something big has to happen first: The right EV charging infrastructure needs to be in place to accommodate this massive change in the way people travel.

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The State of EVs and EV Charging Today

Currently, there aren't nearly enough public charging stations across the United States to support this accelerated movement toward EV-only sales. Without easy access to readily available, reliable and high-performance charging stations, EVs will never become reality.

Today, there are approximately [3 million electric cars](#) on U.S. roadways, which make up only 1% of total traffic. To support supplement residential charging, there are about 58,000 public charging stations (parking garages, parking lots, etc.) located in key areas of the country. Together, they contain a total of [157,000 electric vehicle supply equipment \(EVSE\) ports](#). Each port can charge one vehicle at a time. In other words, only 5% of the country's 3 million electric vehicles can be charged across the United States at any one time.

This number needs to grow substantially. In fact, a recent [EEI/Institute for Electric Innovation report](#) projects that nearly 1 million public charging ports will be needed in the United States by 2030. That's an increase of nearly 537%!

These new EV charging stations will be needed in retail centers, airports, downtown districts, college campuses, workplaces, restaurants and even along highways. How well is the country doing on this progress? Last year, in 2022, the United States only installed [6,300 fast chargers](#).

Many EV drivers already have fears about range and charging. Currently, the biggest concern of EV owners involves [charging anxiety](#) caused by broken chargers, faulty credit card readers and long wait times.

These concerns are bound to intensify as more electric vehicles hit the road despite this lack of charging infrastructure. Ultimately, this may also limit the adoption of EVs, especially in rural areas.

The bottom line: The United States (and the rest of the world) needs significantly more EV charging infrastructure if it expects to pull off this transition to electric vehicles.

The Challenges Standing in the Way of EV Charging Station Deployment

Electric vehicles, as well as the infrastructure and technology they require, are new territory for everyone involved.

As the industry learns lessons and establishes best practices, several big challenges must be overcome before public charging stations can be rolled out at a pace that aligns with predicted EV usage.

1. Collaboration Is Lacking Among Charging-Infrastructure Stakeholders

Several parties must come together to make EV charging stations a reality: EV manufacturers, charger manufacturers, charging station owners, government entities, point-of-sale platform creators, grid operators (typically utility companies), internet service providers and landowners or charging site hosts.

Today, these parties rarely agree on how to approach wide-scale implementation of an affordable, reliable and secure EV charging network. Even though each group has different preferences and priorities, they must be able to collaborate and come to an agreement on resource utilization, logistics, protocols and technology.

Truly collaborative efforts can lead to:

- More efficient planning, deployment and management of EV charging stations
- Access to fast, efficient charging in the right locations for EV drivers to minimize wait times and charging anxiety
- Compatibility and interoperability among charging networks and connectors
- The creation of more jobs

2. Building and Maintaining Charging Sites Is Expensive

Designing and developing EV charging stations isn't a small investment. They can be very costly, and many factors play into the final number: the equipment and software chosen, subsidies, infrastructure and additional costs that range from branding and signage to protective bollards.

But installation expenses aren't the only costs to consider. Commissioning and regular maintenance also require ongoing funds.

While the federal government is backing its commitment to EVs through programs like the Bipartisan Infrastructure Law and Inflation Reduction Act, which can help cover expenses associated with charging station deployment, there are still other significant costs to consider.

3. EV Chargers Aren't Always Reliable or Easy to Use

Downtime isn't an option for charging stations—they're the only way EV drivers can get to where they're going. If an EV dies in the wild, then the driver is stranded (and there's no way to send someone

down the road to a convenience store where they can fill a gas can with fuel for you).

Despite how critical charging is, research from J.D. Power shows that 20.8% of EV drivers using public charging stations through the end of the first quarter of 2023 experienced [charging failures or equipment malfunctions](#). These failures left them unable to charge their vehicles. At one point in 2022, the report reveals that almost 2 in 5 charging visits (39%) were unsuccessful.

Common problems can involve things like broken screens, cords or plugs. These items are exposed to the elements and can fall victim to vandalism as well, which can render them useless. Sometimes, network connections or payment systems fail. In these cases, the charger may be working, but the driver can't use it.

In addition to reliability concerns, ease of use is also a frustration with public EV charging. Complexity and cumbersome use if a driver has to:

- Juggle multiple apps, memberships or accounts to complete the charging process
- Deal with charging cords that are too short or difficult to access
- Work around EV charging spots that are used as parking spots for gas-powered vehicles

4. Fast Charging Requires Peak Power

There are different types of EV chargers: Level 1, Level 2 and Level 3. The higher the charging level, the faster it charges a car—and the more power output it provides.

Levels 1 and 2 deliver alternating current (AC power) at maximum power outputs of 2.3 kW and 22 kW. Level 3 charging feeds direct current (DC) to the car's battery at a maximum power output of up to 400 kW.

Drivers who travel long distances use rapid or fast chargers (Level 3) to minimize the amount of time it takes to power up. They need a reliably fast charging speed, which can only be supported by peak power.

One report estimates that, by 2030, highway charging sites will require, on average, 20+ fast chargers to meet these needs. It's predicted that these sites will ultimately require 5 MW in charging capacity: the [same level of power demand](#) as a professional outdoor sports stadium. By 2045, some charging sites may reach up to 40 MW in peak charging demand, which equals the demand of a major industrial site.



But fast charging comes with risks. For example, the charger can overheat if it's used at fast charging speed for too long. This can not only lead to malfunction, further contributing to the reliability issues we mentioned above, but also create a potential fire and safety risk for EV drivers.

5. Existing Proprietary Networks Make Upgrades Difficult

To function properly, networked charging stations must be able to communicate with their supporting networks to share data that can help improve service. EV charging stations and central management systems provided by different vendors also need to be able to communicate with each other.

But much of today's EV infrastructure has been fragmented and developed privately, without coordination and a shared vision.

Proprietary challenges often force charging station owners to commit to a single, closed-network provider for the lifetime of the charging equipment. If they want to switch network service providers, then they must first purchase and install new charging stations.

The Silver Lining: Overcoming These Challenges Is Possible

While the EV charging industry has lots of ground to cover quickly, there are experts who can help you get started.

Belden has an entire in-house automotive team who understands EVs and the intricacies and challenges of the EV charging market. To overcome deployment obstacles, we create tailored solutions that are designed to:

- Lower costs
- Improve charging station uptime and ease of use
- Support the safe use of peak power
- Support interoperability among systems and providers

Long before your EV charging stations are designed, we can help you establish a backbone OT network for your charging infrastructure, plan for complete network visibility and data security, and ensure data flow back and forth so you can:

- Troubleshoot network issues
- Improve reliability and performance in real-time
- Optimize power output for the fastest and safest possible charge
- Manage traffic from revenue payment systems
- Ensure secure data transmission

By facilitating access to this real-time diagnostic information about charger performance, payment processing issues and even excessive heat generation during charging, you'll know right away when all signs point to a charging station or charger going down.

We can also preconfigure communication models to use a plug-and-play approach, with support for remote network access so improvements can be made on the fly to correct or enhance performance and ensure regulatory compliance.

Belden's automotive team can help you deploy EV charging station infrastructure securely and at scale so you can confidently support remote monitoring and management to maximize efficiency and provide excellent support. Our [Customer Innovation Center](#) can reduce your risk by simulating your EV charging station environment so we can tailor your solution from the ground up and test its performance so you know exactly how it will function after deployment.

To offset upfront costs, our monthly subscription packages can help you accelerate deployment of EV chargers and experience faster ROI.

Reach out to our [automotive experts](#) to learn more.



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