

**DOCKETED**

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**ABB E-mobility EV Charging Reliability**

*Additional submitted attachment is included below.*

April 1, 2022

California Energy Commission  
715 P Street  
Sacramento, CA 95814

RE: 21-TRAN-03: Zero Emission Vehicle Infrastructure Barriers and Opportunities.

Dear California Energy Commission:

ABB E-mobility is pleased to provide the following submission to the California Energy Commission in response to Docket No. 21-TRAN-03: Zero Emission Vehicle Infrastructure Barriers and Opportunities as it relates to EV Charging Infrastructure Reliability.

ABB E-mobility has been manufacturing EV chargers for the US market for over a decade and is the leading manufacturer of electric vehicle chargers globally, having sold 680,000 electric vehicle chargers, including 30,000 direct current fast chargers (DCFC). ABB E-Mobility is a division of ABB, which has nearly 20,000 employees in the US across 40 manufacturing facilities in dozens of states. ABB has proudly been providing electrification and automation technology and equipment in the US for over 100 years.

**ABB’s Experience Manufacturing and Servicing EV Charging Infrastructure**

ABB provides charging technology to owners and operators of charging equipment across the transportation sector including public charging networks, transit bus operators, electric utilities, auto dealerships, auto manufacturers, shipping and logistics fleets, commercial fleets, and more.



Figure 1. Examples of ABB EV Chargers in the field

ABB chargers are currently in use and have been installed by multiple leading public charging operators and network partners. Vehicle and truck manufacturers rely on our chargers for research and development, interoperability testing, and for their dealerships. ABB’s bus- and truck- focused heavy vehicle chargers are utilized by over 40 state and local transit agencies, including some of the largest agencies in the US and California, totaling over 60MW of charging capacity.

While ABB’s focus is on developing, manufacturing, and delivering innovative and reliable charging technologies to the market, ABB does not own or operate chargers available to the public. ABB primarily provides charging owners and operators with the technology needed to deliver seamless and high-quality charging experiences. As part of that commitment, ABB has a robust service and maintenance operation providing 24/7/365 monitoring, troubleshooting, and repair services for ABB chargers in the field.



Figure 2. ABB EV Charging Products

### EV Charging Infrastructure is More Than Just Electrical Hardware

An EV charger is not conventional electrical equipment, rather it integrates hardware, software, and cloud services. From a hardware perspective, an EV charger integrates advanced power electronics and communications technologies with power distribution technology and electrical equipment. Underlying these technologies are a significant reliance on semiconductors, printed circuit boards, and display and communications modules. However, to operationalize an EV charger, it must be connected to a charging operator’s network, often via OCPP protocols. Additionally, ABB chargers connect to an ABB dedicated cloud that can monitor the chargers, perform remote diagnostics, and provide firmware and software updates to the chargers as needed.

Different EV charger manufacturers use varying hardware and software architectures and the software to integrate different chargers onto different operators’ networks are unique. Further, different charger variations require different software and hardware implementations. For example, different cable types, payment types, or network connectivity methods may require unique changes to both hardware and software that can be different for different charging owners and operators. Taken together hardware, firmware, and software of a charger must work in unison.

The complexity of EV charging infrastructure makes well-developed service and maintenance programs of paramount importance for maintaining reliability and high uptime.

### **Recommendations for Ensuring Reliability and EV Charging Uptime**

For a public charging network to be effective at removing barriers to electrification, the chargers themselves must be reliable; and EV chargers are not “set it and forget it” infrastructure. Rather, ensuring reliability and quality includes both quality manufacturing and interoperability testing, as well as ongoing service and maintenance of those chargers, at scale, across various networks, operators, and geographic regions.

#### *All Chargers Should be Capable of Remote Connectivity*

As a baseline, all chargers should be networked connected to the cloud. Without cloud connectivity and remote monitoring, maintaining a high level of uptime is extremely challenging. Connectivity enables monitoring, diagnosis, and repair. For ABB, we can diagnose nearly 90% of all charging issues remotely and we fix nearly 75% of all issues remotely.

#### *Service and Maintenance Plans Should be Required*

In order to have high uptime, a charging operator will have to implement a service and maintenance plan or program. A well-developed operations and maintenance model could include a number of features, including, but not limited to those listed below. These components of a service and maintenance plan could be performed in-house by the owner or operator or via agreements or contracts with third-party providers.

- 24/7/365 connectivity and monitoring of the operations of chargers
- 24/7/365 service call center to receive service or repair requests
- Service ticketing and process to ensure service and operational issues are addressed in a reasonable timeframe
- Scheduled preventative maintenance
- Detailed documentation and procedures to troubleshoot and repair chargers
- Sufficient technicians trained to work on the make and model of charger they operate in the regions in which they operate
- Experience and capability to execute detailed service campaigns hand in hand between owner, operator, and manufacturer
- Sufficient local inventory of spare parts and logistics infrastructure

Without the items listed here, it would be difficult to maintain a level of reliability. For example, if an operator does not have a process and staff to remotely monitor chargers and manage reports of charging failures, they cannot know there is a problem. Without sufficient trained technicians located in the geographic region where the chargers are, it is difficult to quickly dispatch a repair crew to a charger. If an operator does not have sufficient inventory of spare parts for common failures, it could take a few days or weeks to order and receive that part from a supplier; particularly during a time of global supply chain constraints.

For these reasons, ABB recommends that CEC require that all charging owners and operators submit well-developed operations and maintenance plans for the expected useful life of the chargers that they operate, which can be up to 10 years.

### Need for Service Level Agreements (SLA) with Charging Original Equipment Manufacturer (OEM)

In addition to in-house comprehensive service and maintenance plans, service level agreements with charging manufacturers (OEMs) are essential for maintaining a high-level of uptime. Successful public charging owners and operators work hand in hand with charging manufacturers because EV charging technology is evolving so rapidly and because chargers often have custom integrations with different owners and operators.

There are a few reasons why SLAs with charging manufacturers are needed in order to maintain reliability. First, diagnosing and repairing many issues or charger failures require charging manufacturers to take an action. Whether that is accessing or “looking” at the charger remotely to properly diagnose an issue or providing a spare part for a broken component. As noted above, ABB can diagnose nearly 90% of all charging issues remotely and fix nearly 75% of all issues remotely.

Second, while OEMs provide standard warranties for parts and labor for a period of time, an SLA between the OEM and the charging operator fills a few important gaps:

- (1) Warranties cover manufacturing defects, not replacements of consumable parts, like cables and connectors which are subject to significant wear and tear;
- (2) SLAs set a process and expedited timeline for fixing warranty parts and non-warranty parts, like cables and connectors;
- (3) SLAs allow OEMs and operators to plan for the resources needed to perform repairs;
- (4) SLAs set a framework for repairing issues beyond the warranty period and up to the full useful life of a charger which can be 10 years or more.

Third, an SLA helps ensure that repairs to chargers are in compliance with manufacturer requirements and performed by trained technicians. Because chargers are complex infrastructure, repairs performed by technicians who are not trained or certified by the charger OEM can lead to significant new problems down the road.

### Technicians Must be Qualified

The need for qualified EV charging technicians who have been trained and certified to service particular charger makes and models is extremely important particularly because the current pool of such technicians is very limited. The challenge is exacerbated by a couple key factors. First, the EV charging industry is in the very early stages and training and hiring technicians is not keeping up with the growth in deployments; second, it is a challenging hiring market, further impacting the ability to find qualified technicians. As California works to encourage and support the training and certification of new EV charging technicians it should keep three important principles in mind.

- (1) Qualified Technicians. As noted above, EV chargers are not just electrical equipment. Electricians are needed as part of an installation team. However, commissioning, service, and maintenance are often performed by certified technicians with a other skillsets including electronic parts repair, maintenance, and replacement; software troubleshooting and upgrades; and applications engineering.
- (2) Chargers Vary by Manufacturer. While there are common principles among different EV chargers, the architecture of chargers varies by manufacturer. Manufacturer- and model- specific training and certification is needed to properly service a charger.



(3) Geographic Diversity. EV chargers are located across the state and country, some of which are in remote locations. All regions of the US and California should have access to quality training.

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Thank you for the opportunity to provides comments on this important issue. ABB shares California’s commitment to electrifying the transportation sector and creating US jobs and economic growth in the process.

If you have any questions or want to discuss any of these topics further, please do not hesitate to reach out to Asaf Nagler, Vice President for External Affairs, at [asaf.nagler@us.abb.com](mailto:asaf.nagler@us.abb.com).

Respectfully Submitted,

Asaf Nagler, Esq.  
Vice President, External Affairs  
ABB E-Mobility