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CEC EVSE reliability comments April 1, 2022

Additional submitted attachment is included below.



California Energy Commission
Comments on Electric Vehicle Charging Reliability
Docket No. 21-TRAN-03

Submitted by Cool the Earth
April 1, 2022

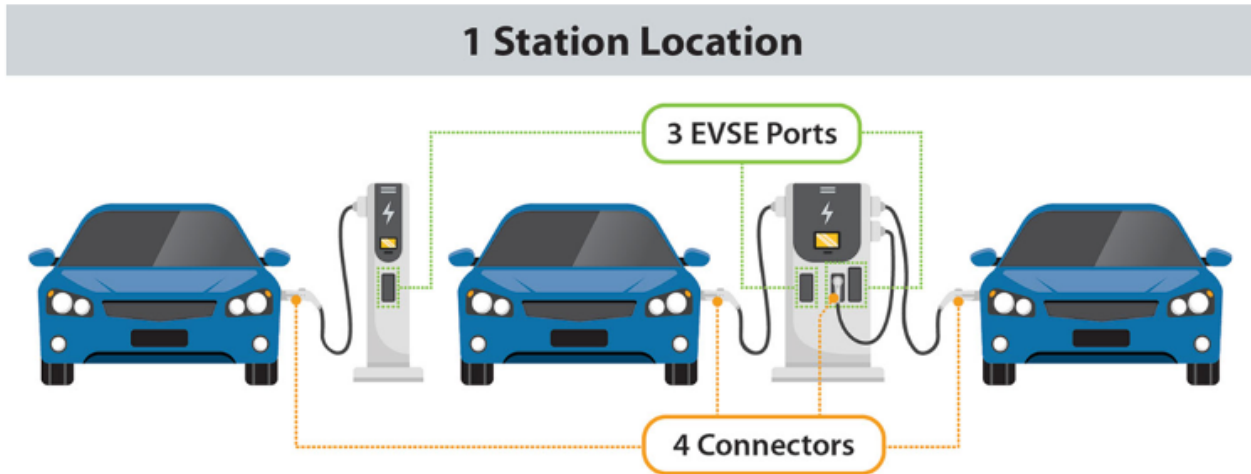
Cool the Earth commends Governor Newsom and the California Energy Commission (CEC) for their commitment to ensuring EV charging infrastructure provides the high reliability and ease of use experience needed for consumers to have confidence in a rapid transition to clean electric driving.

Cool the Earth appreciates the opportunity to comment on the California Energy Commission's Electric Vehicle Charging Reliability Workshop. Cool the Earth, a nonprofit organization, has worked for over 8 years to educate consumers about clean electric driving and currently leads a national non-profit collaborative effort, Ride and Drive Clean. Cool the Earth has extensive user-focused experience with public charging including DC Fast (DCFC), working with thousands of members of the public as well as with cities, agencies, NGOs, utilities and CCAs. Unfortunately, our constituents frequently have encountered inoperable kiosks, charging cords that cannot reach vehicle charging inlets, payment systems that do not work and other issues that prevent successful charging. Reliable and accessible DCFC is essential for drivers to make the transition into electric vehicles. This is especially the case for those who live in multi-family dwellings and in disadvantaged communities who may not be able to charge at home.

With these comments, we recommend specific requirements for design, performance, and service to ensure reliable EV charging. These requirements must be enforceable conditions of funding agreements with consequences for non-compliance. We recommend that a final grant payment should be withheld until all conditions have been met. Success must be measured by reliable operation of EV charging infrastructure, not by qualitative metrics.

A. Definitions

Cool the Earth recommends adopting consistent language, as listed below. These definitions follow the terminology used by the National Renewable Energy Laboratory Alternative Fueling Station Locator.



Station: A site with one or more EVSE ports at the same address. Examples include a parking garage or a mall parking lot.

Port: An EVSE port provides power to charge only one vehicle at a time even though it may have multiple connectors.

Kiosk (post): The unit that houses EVSE ports; a kiosk can have one or more EVSE ports.

Connector: a connector is the item at the end of the cable that plugs into a vehicle to charge it. Multiple connectors and connector types (such as CHAdeMO and CCS) can be available on one EVSE port, but only one vehicle will charge at a time.

EVSE: an EVSE refers to the equipment used to charge a single electric vehicle, including the electrical conductors, related equipment, screen, payment system, cable, connector, software, and communications protocols that deliver energy to the vehicle. If a kiosk can charge only one EV at a time, it comprises one EVSE. If a kiosk can charge 2 EVs at the same time, it comprises two EVSEs. This includes hardware and software, but does not include infrastructure upstream from the charger (e.g. the electricity grid, cellular and WiFi).

B. EV Charging Station Design

Charging stations must be designed to provide comfortable and safe user experiences.

- Parking shall be designed per local code requirements and shall accommodate a full size EV without the vehicle intruding into the drive lane, with adequate space on both sides for easy access.
- The cable shall be long enough to reach the EV inlet ports of all EVs
- The kiosk and parking spot shall be covered to protect EV drivers and the kiosks from the elements.
- The station shall be monitored 24 hours per day
- Adequate lighting shall be provided per IES guidelines
- At least one kiosk at each station shall be accessible according to relevant ADA requirements
- The charging cable shall have a retraction line to support the weight of the cable
- The screen legibility and touch input shall follow similar product usability guidelines (e.g., bank ATM Design Guidelines).
- For stations along designated Alternative Fuel Corridors, at least one kiosk must be drive-through to allow charging of long vehicles or EVs towing trailers.

C. EVSE Reliability

We strongly encourage the Commission to require reliability standards via uptime guarantees for publicly funded charging stations (including stations funded by utilities and community choice aggregators).

In order to achieve a rapid transition to electric vehicle driving, a highly reliable and easy to use charging infrastructure is critical to building confidence as consumers shift from using familiar gas vehicles to unfamiliar electric vehicles. Unfortunately, consumers currently experience frequent issues. For instance, a recent survey of EV drivers in California reported mixed experience with existing EV chargers (CARB 2022). The EV drivers reported experiencing broken plugs, unexpected shut off during charging, charging station not functioning, payment problems, and the need to contact customer service via cell phone. This experience appears to contradict a simultaneous survey of the EV service providers (EVSPs) who reported 95 to 98 percent uptime of their public chargers.

A more recent study by UC Berkeley also found similar poor performance of DCFC.¹ Of the 657 open public DCFC CCS EVSEs evaluated the greater Bay Area in this study, 72.5% were functional at the time of testing while 27.5% were either not functional or the cable was too short to reach the EV inlet. The most common cause of a nonfunctional EVSE was an electrical systems failure which included an unresponsive or unavailable screen, a payment system failure, a charge initiation failure, a connection failure, or a broken connector.

To ensure the reliability of DCFC charging infrastructure, Cool the Earth recommends that the CEC require publicly-funded EVSE meet a minimum of a 97 percent uptime guarantee at the

¹ <https://arxiv.org/abs/2203.16372>

individual EVSE level for a minimum of five years. This would be consistent with CEC's EV charging grant solicitations for multi-family housing and rural communities.² .

A 97 percent uptime guarantee or higher has already been established in other public or ratepayer funded programs across North America. These examples include:

- The Federal Highway Administration's National Electric Vehicle Formula program requires a greater than 97 percent uptime guarantee at the individual station level .³
- The New York State Energy and Research Development Authority requires 97 percent uptime for its DCFC grant program .

At the CEC's March 11, 2022 Workshop of EV Charging reliability, Cory Bullis of FLO referenced additional requirements for 97 percent uptime:

- ConEdison's Make Ready EV Program requires 99 percent uptime for DCFC EVSE.
- Louisville Gas & Electric requires 99 percent uptime for DCFC EVSE.
- Florida Power & Light requires 98 percent uptime for both Level 2 and DCFC EVSE in an RFP.
- Governmental entities have also recommended uptime guarantees, including:
- The Regional Electric Vehicle Plan for the West recommends a 97 percent uptime requirement for charging stations.⁴
- The Northeast States for Coordinated Air Use Management recommends a 99 percent uptime requirement for DCFC EVSE.⁵

Uptime guarantees ensure EVSEs are online and operational for drivers when they need them, minimizing consumer frustration and maximizing the public benefit provided to drivers from EVSE funded by public dollars. When an EVSE is not operational, this public benefit is not delivered. For these reasons, it is critical the CEC require publicly funded EVSE to adhere to clearly defined uptime guarantees and enforce these requirements.

D. Calculating and Reporting Reliability Data

Uptime guarantees must be measured and enforced through a standardized uptime data reporting framework. Collecting reliability data is the only way to understand the performance of publicly funded charging stations, whether reliability is a problem, and to what extent it is a problem.

²<https://www.energy.ca.gov/solicitations/2021-11/gfo-21-603-reliable-equitable-and-accessible-charging-multi-family-housing>

³ FHWA 2022. The National Electric Vehicle Infrastructure Formula Program Guidance, US DOT Federal Highway Administration, February 10, 2022, p.22

https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

⁴ https://www.naseo.org/Data/Sites/1/revwest_volminimumstandards.pdf

⁵ NESCAUM. Building reliable EV charging networks: Model state grant and procurement contract provisions for public EV charging. Northeast States for Coordinated Air Use Management. Boston, MA. May 2019.

<https://www.nescaum.org/documents/model-contractprovisions-for-public-evse-5-24-19.pdf/>

In developing reliability reporting requirements, excluded time should be minimized. Excluded time hides operational issues that are very real for EV drivers. These issues need to be acknowledged and solutions found, not ignored.

The ability to report uptime necessarily requires that needed data is available and collected continuously for each EVSE by the EVSP. As such, the commission should require 24/7/365 connectivity and monitoring of the operations of each charger, with a penalty for non-compliance.

We recommend the following definitions and implementation of calculating and reporting reliability data.

Uptime: the percent of time, net of allowable excluded time, that the EVSE is operational and charging can be sustained until either the battery is charged to the vehicle limit or the customer ends the charge.

Uptime shall be calculated and reported for each EVSE, not on a station or network basis. Calculations on a station or network basis would not provide the needed detailed understanding of reliability and potentially hide user experience with troublesome EVSEs.

A standardized reporting formula to calculate uptime is necessary to provide accurate and consistent information. We offer the following formula for the CEC's consideration.

$$\text{Uptime \%} = 100 * ((\text{Hrs in the period} - \text{Excluded time}) - (\text{Downtime} - \text{Excluded time})) / (\text{Hrs in the period} - \text{Excluded time})$$

Uptime data should be reported quarterly for a minimum period of 5 years. All reliability analysis should be published for public stakeholder review and assessment.

Downtime: the total time an EVSE is not operational, e.g., unable to initiate and sustain a charge at the expected level for the expected duration.

Recording of downtime shall be initiated by any of the following

- The detection of a system fault through the EVSP network where the fault results in the inability to charge.
- A customer call to the service number to report a non-functional EVSE.
- Periodic on-site maintenance and servicing reports a non-functioning EVSE.
- Third party testing at the charging station reports a non-functioning EVSE or that the EVSE is not delivering power at the intended rate.
- In the case of vandalism or theft, recording of downtime shall start 24 hrs after the EVSP identifies or is notified of the issue.
- Any of the failures listed under Excluded Time.

Excluded Time: the total time an EVSE is not operational that is outside the control of the EVSP, including the following:

- Upstream power loss
- Upstream internet failure
- Upstream cellular failure (does not include spotty cell reception)
- Force majeure, i.e. catastrophic unforeseen weather events
- Site access restrictions outside the control of the EVSP and permitted under the terms of the incentive agreement (e.g. closing a parking garage 12-6 am, planned maintenance, etc.)

Cool the Earth recommends that vandalism and theft not be included in Excluded Time. These two issues are real and potentially significant limitations on EVSE functionality, especially for disadvantaged communities. If they are allowed as Excluded Time they will be collectively ignored. Instead CTE recommends that the Commission recognize these potential issues and address them creatively in grant solicitations with the goal of developing joint solutions. For instance, the CEC could request proposals for enhanced security stations and kiosks in areas identified with high vandalism and theft risk, with the potential for additional funding for these.

EVSPs should be required to separately report details of both Downtime and Excluded Time. These reports should provide information including but not limited to type, frequency, number of and length of incidents and occurrences. Separate reports of Downtime and Excluded Time would provide the CEC with a robust understanding of these issues, and the opportunity to develop solutions.

E. Enforcement

The above requirements are meaningless unless there is an enforceable consequence for non-compliance. We recommend dividing the grant payment into several portions. The final payment should be withheld until all performance, maintenance, and reporting requirements have been met consistently for a period of 12 months after the date of initial operation. If consistent 97% uptime is not met during the initial 12 months of an EVSE's operation, the funding entity should institute a financial penalty.

Reported uptime shall be periodically confirmed with a 3rd party evaluation, measurement and verification (EM&V) audit. In addition, compliance measures may require third-party assessments of EVSEs, using a standard test methodology, at the time of initial operation and at regular intervals thereafter and an assessment of reliability data collected by the EVSPs.

F. EV Charging Station Service and Maintenance

Charging companies should also be required to submit detailed service and maintenance plans for review and evaluation. Cool the Earth recommends the Commission require the following minimum service and maintenance items:

- The site owner or EVSP will maintain an ongoing service contract with a requirement for service within 24 hours of notification.
- Periodic maintenance and cleaning of all kiosks and the related parking space.
- 24/7/365 customer call center to receive service calls
- 24/7/365 connectivity and monitoring of the operations of each charger

G. Publically Available Real Time Reporting of Reliability

Real-time data would allow EV owners to better understand the actual reliability of the EV infrastructure and adjust their expectations accordingly. Real-time data could be reported by EVSPs to the NREL Alternative Fuels Data Center (AFDC) and published on the National AFDC map and database. The data could also be made available for commercial applications that provide locations of EV charging stations and information on EVSE status to EV drivers.

Cool the Earth remains committed to working with the CEC to develop and implement a reliable EV charging network.

Thank you for your consideration,

Carleen Cullen, Founder and Executive Director
Cool the Earth

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