CALIFORNIA STATE TRANSPORTATION AGENCY GAVIN NEWSOM, GOVERNOR

California Department of Transportation

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January 28, 2022

Stephanie Pollack
Deputy Administrator
Federal Highway Administration
1200 New Jersey Avenue SE
Washington, DC 20590

Request for Information on the Development of Guidance for Electric Vehicle Charging Infrastructure Deployment (Docket Number: FHWA-2021-0022)

Dear Deputy Administrator Pollack,

The California Department of Transportation (Caltrans) and California Energy Commission (CEC) in coordination with California Air Resources Board (CARB), the California Governor's Office of Business and Economics (Go-Biz), and California Public Utilities Commission (CPUC), appreciates the opportunity to provide input to the US Department of Transportation (USDOT) and Federal Highway Administration (FHWA) in response to the request for information on the Development of Guidance for Electric Vehicle (EV) Charging Infrastructure Deployment as published on November 29, 2021.

Caltrans strongly supports the ambitious goal of building a new national network of EV Chargers by 2030, as funded in part through the Infrastructure Investment and Jobs Act (IIJA). With that said, there are many technical and logistical challenges that lay ahead, which must be overcome to ensure the goal is reached. The challenges include, but are not limited to:

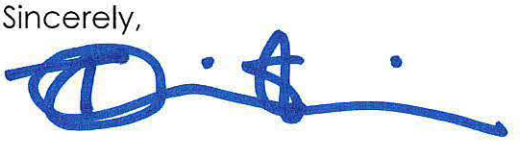
- Determining the distance between available EV charging infrastructure in a way that accounts for rural and remote areas, as well as underserved communities disproportionately impacted by air pollution;
- Developing clear guidelines that define the types of electrical upgrades that can be covered by formula funding;
- Establishing rates that incentivize charging behaviors that are beneficial to the electrical grid;
- Determining connector protocols that enable easy-to-use, grid integrated EV charging at scale;
- Identifying communication protocol;
- Clarifying the use of formula funding for installation of EV chargers at existing off-highway travel centers, fuel retailers, small businesses, overnight truck parking

sites, and other facilities that can feasible accommodate EV charging infrastructure;
- Accommodating residents living in multi-family housing, low-income areas, and rural or remote communities;
- Developing clear guidance regarding the ability for state departments of transportation (DOTs), or private entities, to charge fees to drivers utilizing DOT facilities;
- Determining if only a portion of an interstate is designated alternative fuel pending or ready, if funds can be used for the "missing links" or, if the "missing links" of the corridors need to be designated first; and,
- Establishing charging solutions for trucks that are not centrally fueled at depots

Caltrans stands ready to partner with US DOT, FHWA, and other key stakeholders in the successful implementation of EV infrastructure across California. We greatly appreciate the opportunity to provide feedback and encourage FHWA to carefully consider the input provided in our attached comments.

If you have any questions, please contact Tony Dang, Deputy Director of Sustainability at (916) 926-1494 or tony.dang@dot.ca.gov.

Sincerely,



TOKS OMISHAKIN
Director

Enclosures
California State Agencies, comments for the Request for Information on the Development of Guidance for EV Charging Infrastructure

cc: Hannon Rasool, Deputy Direct for Fuels and Transportation, CEC
Pete Skala, Director for Procurement, Efficiency, and Electrification, CPUC
Tyson Eckerle, Deputy Director for Zero Emission Vehicles, Go-Biz
Elizabeth Scheehle, Research Division Chief, CARB
Lori Pepper, Deputy Secretary, Innovative Mobility Solutions, CalSTA

Docket Number: FHWA-2021-0022

Development of Guidance for EVCI Grants RFI – California State Agencies' Answers

Introduction

Please find information in response to statutory considerations 1 through 12 below. These comments were developed by the California Energy Commission and Caltrans in coordination with other state agencies including the California State Transportation Agency, the California Public Utilities Commission, the California Air Resources Board, and the California Governor's Office of Business and Economic Development.

Questions

The statutory considerations for the EV Charging Program are:

1. The distance between publicly available EV charging infrastructure;

In theory, the distance requirement of electric vehicle (EV) charging infrastructure every 50 miles appears sufficient. However, this distance requirement does little to solve the issue of providing charging infrastructure in rural and remote areas. For example, if within a 50-mile distance there are two population centers located 25 miles apart, the gap is considered filled even if only one population center is equipped with charging infrastructure. Since drivers who live in the population center without charging infrastructure will likely not drive 25 miles to charge their vehicles, a gap still exists. Optimally for driver convenience, EV stations deployed along corridors should be within 20 to 30 miles of one another. Some corridors, especially rural ones, may not be able to attain this. Feasibility depends on factors including the availability of services near offramps and the distances between exits. Additionally, to ensure equitable access to charging, in instances where underserved and disproportionately air pollution-burdened communities are close to otherwise well-served communities, exceptions to minimum distances should be allowed. Another consideration is that the distances between infrastructure sites serving medium- and heavy-duty vehicles may need to be considerably shorter to ensure sufficient public infrastructure to serve the variety and volume of trucks that will need it.

The Alternative Fuels Data Center provides locations for existing charging infrastructure, allowing for geospatial analysis of distances between these stations. The California Energy Commission's (CEC) Electric Vehicle Infrastructure for Road Trips (EVI-RoadTrip) model, developed in collaboration with the National Renewable Energy Laboratory, projects the needed DC fast charging (DCFC) infrastructure along corridors

to support future long-distance[1] electrified travel. The outputs of this model provide latitude/longitude coordinates of projected stations, including the number of chargers at each station and their power levels. These results enhance the CEC's ability to assess future DCFC infrastructure needs and evaluate distances between future stations and existing stations to identify priority locations.

EV charging infrastructure is needed across several segments. The CEC's recent AB 2127 analysis found that over 50% of stations would be sited in retail/shopping centers, followed by parks and gas stations. Other land use types made up minor portions of the station locations. 2030 model projections showed stations of varying distances ranging from a few miles up to 60 miles. This is largely due to the model's methodology, which assumes drivers will seek a charger when their remaining range is very low, rather than incorporating an assumption that drivers will proactively charge before it is necessary. This tradeoff results in more stations closer to each other, rather than larger "hub" sites.

If the purpose or intent of the program is to facilitate travel, then the 50-mile requirement is adequate; however, if the program intends to facilitate the replacement of gasoline powered vehicles for EVs for everyday life, different criteria may need to be developed to ensure remote and rural areas have access to charging infrastructure and to ensure the overall charging network is comprehensive and thereby usable.

2. Connections to the electric grid, including electric distribution upgrades; vehicle-to-grid integration, including smart charge management or other protocols that can minimize impacts to the grid; alignment with electric distribution interconnection processes, and plans for the use of renewable energy sources to power charging and energy storage;

This is a wide-ranging question which asks important questions. The response below provides several suggestions of varying complexity and maturity. In considering and incorporating these responses the federal guidance should seek to strike a balance between (1) well-informed and robust guidance and (2) the need to give clear, actionable, expedited action to the states. The states have varying degrees of expertise in EV infrastructure deployment but the one thing they all have in common is the need to deploy equitable, accessible, and convenient charging infrastructure to support EV adoption and decrease air pollution.

There is a need for the program to require electric vehicle chargers to have interoperability. EV charging service providers (EVSPs) should reflect rates (fuel prices) to some degree in their customer offerings. Moreover, there is a need for utility rates that incentivize charging behaviors that are beneficial to the grid, including time of use (TOU) rates, dynamic or real-time rates, and compensation for services enabled by

[1] Long distance is defined at 100+ miles for the purposes of this analysis.

bidirectional charging. Additionally, a technology and automotive market assessment of connector and communication protocols needed to enable easy-to-use, grid integrated EV charging at scale, and identification of communication protocols is needed.

Overall, the guidelines must clearly define the types of electrical upgrades that can be covered by formula funding. Many facilities likely do not have the electrical infrastructure (e.g. distribution grid capacity or panel capacity) capable of charging vehicles at fast rates. The formula funding guides should specifically list the improvements, upgrades, or structures that can be included in the formula fund projects. It's important to note that in many cases, the cost of the electrical upgrades needed may far exceed the cost of the EV chargers themselves.

Rates: Utility rate design is an important incentive tool. TOU rates and other basic structures can influence driver behavior. Ideally, EV charging service providers (EVSPs) will reflect rates to some degree in their customer offerings. Rate design also impacts advanced solutions such as automatic load management. The California Public Utilities Commission (CPUC) has established a general goal of leveraging vehicle grid integration (VGI) to avoid or mitigate distribution-side upgrades where feasible. The CPUC also issued requirements for EV charging infrastructure programs administered by California investor-owned utilities (IOUs) to deploy automatic load management technology where it will reduce the need for electrical system upgrades while meeting the needs of the host sites. Planning tools, which require continuing development, can reflect managed charging capabilities and inform infrastructure investment decisions.

Load forecasting: Multiple EV adoption forecasts and load modeling tools evaluate potential electric system impacts of increasing transportation electrification in California. Hourly load forecasts from light-duty as well as medium- and heavy-duty vehicles for multiple scenarios are available for individual California IOU service territories and CAISO-wide for 2020-2030. These forecasts are based on an economic adoption model, reflect a high degree of TOU electricity rate participation, and are used for utility planning. Additionally, policy attainment scenarios with higher levels of EV deployment across vehicle classes were modeled to illustrate different charging loads according to varied driver charging preferences and the utilization of TOU and smart charging techniques.

California IOUs report measured load data for EVs subscribed to TOU rates. This data indicates that participating drivers significantly reduce load during times with high prices, although this may not be representative of all drivers or vehicle types.

There is a need for utility rates that incentivize charging behaviors that are beneficial to the grid, including TOU rates, dynamic or real-time rates, and compensation for services enabled by bidirectional charging. Given the load curves and data suggesting strong response to TOU rates for early EV drivers, the CEC and CPUC are evaluating proposals for more dynamic retail rates to convey price signals. Several utilities have or plan to

pilot dynamic retail rates for EV charging, including for commercial fleet customers. The CPUC recently approved a dynamic commercial EV rate pilot (docket A.20-10-011) by the utility PG&E. A decision on the potential to create a rate for EVs that export is due Q3 or Q4 2022. And in December 2021, the utility SDG&E proposed a Commercial Electric Vehicle Dynamic Rate for exporting energy to the grid (docket A.21-12-008).

Grid impact analysis: California IOUs provide information on the available capacity of their primary voltage distribution grids, calculated by allocating statewide charging electricity consumption among local areas within their territories. This information is displayed in integration capacity analysis (ICA) maps, which illustrate the magnitude of potential capacity deficits on the distribution systems. The CPUC ruled in favor of refining the ICA modeling methodologies, including for the purpose of expediting EV charger deployment, by coordinating with the CEC's EV charging infrastructure and load profiling models. It should be noted that these IOU maps are still a work in progress and need further refinement. Nonetheless, they provide a good example of what other utilities through the nation should be doing.

The CEC is assessing regional grid constraints and the load impacts of chargers i.e. electric vehicle supply equipment (EVSE) via its EVSE Deployment and Grid Evaluation (EDGE) tool. This analysis takes utility-provided geospatial grid capacity data and compares it to outputs from EV infrastructure projection models to help identify locations where hosting EV charging infrastructure would be most feasible. Areas on the electric grid with low grid capacity but high demand (in terms of light-duty EV travel or medium- and heavy-duty EV parking) could be identified as candidates for "non-wires" solutions including on-site renewable generation and energy storage, or for larger grid infrastructure upgrades to support transportation electrification in these regions.

Building Codes: The California Green Building Standards Code (CALGreen) includes EV charging-related requirements for construction of residential and non-residential buildings. Revisions to CALGreen adopted in December 2021 include automatic load management and other measures related to EV charging to increase EV readiness. In addition, the CEC is considering the development of regulations to ensure that household appliances, including EV chargers, include load shifting capabilities to improve grid flexibility and decarbonization.

Unidirectional and Bidirectional Charging: EV charging and grid integration strategies can take many forms and include flexible unidirectional charging (also called smart charging, managed charging, and "V1G") and bidirectional charging (also called "V2X," which can include using an EV battery to help supply buildings or homes with electricity, or in the case of vehicle-to-grid (V2G), discharging to the grid to provide energy services). The umbrella term vehicle-grid integration (VGI) incorporates flexible charging and bidirectional charging.

These capabilities, via several available technology pathways, can make electricity use more flexible. This will reduce the grid impact of charging and improve system reliability. And since renewable generation can have intermittency and variability, VGI will strengthen the grid's ability to host higher levels of renewable energy more economically and rapidly.

Specifically for corridor charging, as a practical matter, some versions of V1G and V2X may not be customer friendly for these use cases. Conceivably, some if not a majority of drivers charging along corridors may need to charge quickly as part of a road trip. High-power DCFC will make that experience more convenient for the driver. Therefore, reducing the flow of power or expecting the driver to engage in bidirectional charging in that setting may not be realistic. There are still opportunities for VGI via load flexibility provided by hardware/software and/or co-sited energy storage. This load flexibility can avoid or minimize the need for distribution upgrades, reduce utility demand charges, and unlock other benefits depending on the use case. Strategies should be appropriate for the use case.

In July 2021, several California state agencies submitted a joint response to DOE's Request for Information on Integrating Electric Vehicles onto the Electric Grid (DE-FOA-0002528). Several items from that response are relevant and are condensed and adapted below along with more recent content.

The CEC encourages Federal agencies to take a broad review of opportunities for VGI. Many demonstrations and pilot projects have demonstrated the effective use of EVs for peak load reduction, time-shifting of charger energy consumption, ancillary services such as frequency regulation, and other uses.

<u>V2X-Specific:</u> Grid connection processes are an important factor in EVSE deployment. This is true for unidirectional chargers and more so for bidirectional chargers. Grid connection delays by electric utilities can cause increased soft costs and are material bottlenecks to deployment.

To help address barriers to interconnection of bidirectional EVs and chargers, the CPUC issued a decision[2] in September 2020 that: 1) Established an interconnection pathway for bidirectional capable direct current chargers using a stationary inverter offboard the EV certified to Underwriter Laboratories (UL) 1741-Supplement A (1741-SA), thus aligning with existing smart inverter interconnection requirements; 2) Established a connection pathway for bidirectional capable direct current chargers to connect in "unidirectional (charge only) mode" when implementing a UL-certified Power Control System to avoid unintentional discharge; and 3) Created a workgroup to develop pilots for IOUs to determine safe interconnection pathways for bidirectional EVs and chargers using AC charging, in which case the inverter onboard the EV is used. Interconnection

[2] Link to CPUC decision: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M347/K953/347953769.PDF

codes and charging communication protocols are undergoing continued harmonization and standardization.

Bidirectional charging can be a powerful tool for many use cases and settings. It may not be as appropriate for corridor charging due to driver needs in those settings. However, bidirectional functionality is anticipated to constitute an increasing part of the portfolio. It could even be a material part of corridor charging when co-sited energy storage is present. Considerations include interconnection, permitting costs and delays, research by state energy agencies and utility regulators, and demonstration projects.

The California Independent System Operator (CAISO) developed a tariff to allow aggregations of EV charging to participate in the wholesale market as a demand resource. And in December 2021, the California Public Utilities Commission (CPUC) released a Decision on Phase 2 Summer Reliability, which includes an expanded Emergency Load Reduction Program allowing bidirectional and managed EV charging to participate via aggregation, as well as a pilot of dynamic rates in the Southern California Edison utility territory.

Bidirectional EV charging technologies have shown improvements in capabilities to reduce peak load, integrate renewable generation, and provide other grid benefits. However, demonstrations of bidirectional products faced challenges related to the lack of agreed-upon open standards for communicating charging information and grid controls between vehicles, chargers, and electric system operators as well as interconnection of bidirectional chargers and EVs, but with general improvement over time.

Analyses have considered EV charging installation in underserved communities. It is important to evaluate deployment in underserved communities. This includes ensuring that utility distribution upgrades in underserved communities are on equal footing relative to higher income communities.

Barriers related to long permitting times for construction of EV chargers showed a need for streamlined permitting at the city and county level. The California Governor's Office of Business and Economic Development developed a repository of tools to help communities and stakeholders streamline the charging infrastructure permitting process.

Technology Standardization: Multiple commercial providers of managed charging services have demonstrated the capability of using smart (network-connected) charging equipment to manage load across multiple vehicle segments, as well as using vehicle telematics to manage load. Network connectivity via the charger or the vehicle is necessary to communicate the grid signals needed to beneficially coordinate vehicle charging with grid conditions on a consistent and automated basis.

The CEC conducted a technology and automotive market assessment of connector and communication protocols needed to enable easy-to-use, grid-integrated EV charging at scale, and identified two key communication protocols: Open Charge Point Protocol (OCPP) for communication between charging equipment and charging networks, and International Organization for Standardization (ISO) 15118 for communication between charging equipment and vehicles. These complementary protocols have a strong potential to provide a standardized pathway for communicating grid signals, driver preferences, charging session payment information, and other user convenience features. They can be further integrated with make-specific apps, infotainment interfaces, or telematics networks to enable widespread and user-friendly VGI. Chapter 5 of the CEC's AB 2127 Electric Vehicle Charging Infrastructure Assessment describes lack of standardized communication may result in decreased customer choice, vendor lock-in, and forgone VGI benefits.

A report from a CEC-funded technology demonstration describes how to resolve gaps in the implementation of charging control interfaces between the charger and utility distributed energy resource aggregators (i.e., via OpenADR, OCPP 2.0, and SEP 2.0b) and between the charger and vehicle (i.e., the need to align charge and discharge parameters with the second edition of ISO 15118).[3] The CEC highlights the potential of interoperability to improve driver convenience and strengthen customer choice, and is considering implementation of common connector standards and communication protocols in state infrastructure investment programs. It is also investing in vehicle, charger, and network interoperability testing and in EVSE product certification to encourage harmonization in the market leading to greater system interoperability,[4] and is co-funding the evaluation and testing of the Charging Interface Initiative (CharIN) Megawatt Charging System.

Regarding cybersecurity, the CPUC and the California legislature direct Energy Systems for the 21st Century (CES-21), a cybersecurity research and development program. It is a collaborative effort between the investor-owned utilities Southern California Edison, Pacific Gas & Electric, San Diego Gas & Electric, as well as Lawrence Livermore National Laboratory. The goal of CES-21 is to explore the next generation of industrial control systems cybersecurity to protect the electric grid infrastructure from emerging threats.

The guidelines must clearly and concisely define which technologies can and cannot be procured with formula funding. Caltrans supports the inclusion of technologies that support smart charge management, minimize impacts to the grid, utilize renewable

[3] As illustrated in Figure 22 of the CEC's AB 2127 Electric Vehicle Charging Infrastructure Assessment https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127

[4] Termed the Vehicle-Grid Innovation Lab, or ViGIL https://www.energy.ca.gov/solicitations/2021-05/gfo-20-610-vehicle-grid-innovation-lab-vigil

energy such as solar, and provide for energy storage in the form of backup batteries. Battery backup and solar technologies are valuable tools in reducing the cost of electricity to consumers, managing the electric grid, and emergency preparedness. While chargers operated by solar energy may initially be more expensive to purchase, in the long run this technology can provide substantial savings.

3. The proximity of existing off-highway travel centers, fuel retailers, and small businesses to EV charging infrastructure acquired or funded under the Program;

The program should allow and encourage the use of formula funds for the installation of EV chargers at existing off-highway travel centers, fuel retailers, small businesses, etc. so that they are ubiquitous and convenient. Charging infrastructure should be available as close to highway exits as possible. The areas surrounding the exits are generally dedicated to businesses that serve travelers, such as gas stations and restaurants. This not only ensures that the charging infrastructure is comprehensive, it also effectively shows non-EV drivers that EV charging infrastructure is readily available and therefore EV ownership is desirable. These facilities have amenities that can be utilized by drivers while their vehicles are charging, creating an experience similar to fueling a gasoline vehicle. Moreover, providing opportunities to charge at existing fueling facilities opens opportunities to truly create a comprehensive charging network and follows established and familiar means of fueling a vehicle.

Another priority location for infrastructure serving priority corridors is overnight truck parking sites where drayage, local haul and other day-cab trucks congregate off-shift. It will be important to provide infrastructure solutions that capture these freight fleets to allow for public charging of trucks that are often owner-operated and don't have access to a centralized depot for refueling.

4. The need for publicly available EV charging infrastructure in rural corridors and underserved or disadvantaged communities;

The guidance must accommodate charging for people living in disadvantaged communities as well as rural communities. Public charging is particularly needed in disadvantaged communities where there is a high instance of multi-family dwellings and street parking. In California, about 26% of all residents live in multi-family housing. About 47% of California's low-income population rents and lives in multi-family housing. For multi-family housing, it is critical that charging solutions be designed with the residents in mind, rather than trying to fit a generic charging solution into a unique environment. California state agencies are supporting this work through investments specifically targeted to multi-family housing charging infrastructure and in the state building code. Additionally, the CEC's analysis for Senate Bill 1000 (Lara, Statutes of

2018, Chapter 368)[5] finds that in general, over 80 percent of all rural and about 16 percent of specified low-income communities have drive times that average 10 minutes or more to the nearest public DCFC station. Drive times vary greatly between communities, with some having average drive times of over an hour. About 13 percent of disadvantaged communities have average drive times of at least 10 minutes, but none have drive times over an hour. The analysis found that low-income communities have the fewest total per-capita public Level 2 and DCFCs compared to middle- and high-income communities.

Public charging is also needed in many rural or remote areas, where there may not be sufficient power available to enable residents to charge at typical power levels (Level 2) at their homes without expensive upgrades. At these locations charging at home is generally difficult, and therefore there is a great need to be able to charge vehicles at locations people frequent such as workplaces, shopping areas, schools, and recreational facilities. Moreover, with the exception of workplaces and schools, most dwell times are generally of a short duration, which means it is important to have DC fast chargers available at locations with shorter visit times in order to allow drivers to charge their vehicles. Finally, alongside increasing access to publicly available EV charging infrastructure, increasing home charging access in a targeted way is also critical to making EVs accessible to rural, underserved, and/or disadvantaged communities. Solutions to increase home charging access should be especially targeted to multi-family housing and to single-family homes low-income and/or disadvantaged communities.

5. The long-term operation and maintenance of publicly available EV charging infrastructure to avoid stranded assets and protect the investment of public funds in that infrastructure;

The emphasis of the National Electric Vehicle Formula Funding plan should be to support the concept of developing a sustainable workforce and industry to manufacture electric vehicles chargers and to install, own, operate, service, and maintain the charging infrastructure. Over the last decade, companies who specialize in EV charging infrastructure have utilized their expertise and experience to design, build, manage, and maintain the infrastructure. This expertise should be leveraged to fill the gaps in the Alternative Fuel Corridors, while contributing to the establishment of a strong, sustainable electric vehicle charging industry. If the income of proprietors or stockholders is tied directly to the operation of the EV chargers, the chargers are likely to be maintained and serviced in a manner that provides reliable charging equipment for drivers. Charging station providers would work with parties including landowners,

[5] Senate Bill 1000 Electric Vehicle Infrastructure Deployment Assessment webpage with reports available at https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/electric-vehicle-infrastructure

business owners, private entities, public agencies, and tribes to secure sites for EV charging infrastructure along the corridors.

Additionally, the Formula Funding Plan and the FHWA need to provide specific guidance which supports long-term operation and maintenance, regardless of who owns and operates the charging infrastructure beyond the initial 5 years as specified in the Act. There are still many questions surrounding where drivers can be charged a fee for utilizing electric vehicle chargers within the interstate Right of Way. While the FHWA has made an effort to clarify the regulations regarding charging a fee, state DOTs are still uncertain of how to move forward. This uncertainty needs to be resolved to ensure the chargers are operational and to provide funding to meet future demand as well as the recurrent maintenance and operations costs.

Operational and maintenance costs should include the costs typically considered under an administration/networking and maintenance contract, along with power costs, cellular service, and repairs to both the electrical infrastructure and chargers due to ordinary use, misuse, vandalism, accidents, etc. The administration/networking contracts are needed for the data collection required by the Act and to perform needs analysis for future chargers. While maintenance contracts cover routine upkeep, software updates, and many warranty issues, they do not generally cover vandalism, "Acts of God", or other accidental damages. Funding to cover these types of costs is imperative to maintain the chargers and ensure that repairs are made quickly.

Additionally, maintenance costs for pavement and striping may also need to be considered under operational and maintenance costs. If the charging infrastructure is located at a stand-alone facility not in conjunction with an existing business or facility, there may be additional landscaping and lighting costs.

Charger reliability and driver experience is critically important. There is anecdotal evidence that there are inoperable EVSE currently installed throughout California, warranting further investigation. The CEC intends to conduct a workshop and investigate the issue holistically. Although the problem has yet to be analyzed on a quantitative level, the root cause(s) appear complex and the CEC is in the process of investigating. This may take the form of working directly with stakeholders, public workshops, and RFIs to survey EVSPs to confirm operational status of their chargers. To address station reliability in the future, the CEC has begun allowing operations and maintenance plans (i.e. warranties) to be included as allowable costs in project applications for grants. This may evolve into a requirement or take other forms.

In addition to EVSE reliability, a convenient user interface is critical to driver experience. This includes using common payment methods and prioritizing common interfaces across charging providers, as addressed in regulations from the California Air Resources Board (CARB).

Finally, it is worth mentioning that redundancy equals resilience when it comes to EV chargers. Similarly to strategies used by EVSPs including Tesla, any funding program should consider funding multiple chargers in a single location.

6. Existing private, national, State, local, Tribal, and territorial government EV charging infrastructure programs and incentives;

The CEC's Clean Transportation Program funds projects through competitive grant funding solicitations to support electric vehicle charging infrastructure. The CEC uses a combination of "in-house" solicitations and block grants to fund infrastructure deployment.

In-house solicitations are designed through a public stakeholder process, released, and scored. They focus on a range of areas such as corridor charging, multi-family homes, and rural communities. Several of these are described below. The in-house solicitations allow the CEC to do a deeper dive, gain knowledge, and refine best practices.

Block grant solicitations use a competitive process to select an implementer. The implementer designs the project in collaboration with the CEC and implements incentive projects such as the California Electric Vehicle Infrastructure Project (CALeVIP). CALeVIP is a first-come, first-served rebate program for the purchase and installation of chargers at publicly accessible sites in California. This program has allocated $200 million in rebates to address regional needs for EV charging infrastructure throughout California while supporting state goals to improve air quality, combat climate change, and reduce petroleum use.

Another block grant in place is the Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles (EnergIIZE) project. This first-in-the-nation project uses a concierge-like model working directly with eligible applicants to help plan and fund the purchase of charging and hydrogen fueling infrastructure. This $50 million multi-year project aims at helping communities most impacted by transportation-related pollution by providing funding to meet essential infrastructure needs of companies and public agencies committed to replacing old, polluting trucks and buses with clean battery-electric and hydrogen options.

In addition to block grants, the Clean Transportation Program has funded competitive in-house solicitations including the following:

- BESTFIT: Offered $7,500,000 in grant funds for projects that demonstrated transformative technology solutions and worked to accelerate the successful commercial deployment of EV charging infrastructure for light-duty, medium-duty, and heavy-duty applications. This solicitation was aimed at demonstrating novel technologies and/or business models that highlight innovative charging

solutions that are the "best fit" for the local built environment, use case, and vehicle type.

- Charging Access for Reliable On-Demand Transportation Services (CARTS): Offered $6 million in grant funds for projects to support EV charging infrastructure for high-mileage, on-demand transportation services including ride-hailing, taxis, and meal and grocery delivery.
- Rural Electric Vehicle Solicitation (REV) solicitation: Offered $4,800,000 in grant funds to demonstrate replicable and scalable business and technology models that can deploy EV charging stations to serve and support travel by rural EV drivers, especially those from low-income or disadvantaged communities, provide EV charging access in rural areas not served or inadequately served by charging stations, provide support and maintenance services to ensure reliable and readily accessible chargers, and to engage local rural communities and businesses to increase charger awareness and promote EV adoption.
- Reliable, Equitable, and Accessible Charging for Multi-Family Housing (REACH) solicitation: Offered $8,500,000 in grant funds for projects that assure increased charging access and enabled greater EV adoption by residents at multi-family homes. The purpose of this solicitation was to establish replicable and scalable business and technology models for large-scale deployment of EV charging infrastructure capable of maximizing access and EV travel for these residents.

The CEC developed and allocated funding to the CARTS, REV, and REACH solicitations while taking into consideration stakeholder feedback from its December 2020 light-duty electric vehicle allocation workshop. The CEC continues to address stakeholder feedback to develop investment plans and future funding opportunities to support and expand electric vehicle charging infrastructure.

Finally, per the response to Question 2 above, the CEC is also investing in vehicle, charger, and network interoperability testing and in EVSE product certification to encourage harmonization in the market leading to greater interoperability, and is co-funding the evaluation and testing of the Charging Interface Initiative (CharIN) Megawatt Charging System.

7. Fostering enhanced, coordinated, public-private or private investment in EV charging infrastructure;

To establish a sustainable business model for electric vehicle charging infrastructure at DOT facilities, the FHWA needs to provide clear guidance as to the ability for DOTs or private entities to charge fees to drivers utilizing DOT facilities. This guidance should specifically clarify the legal parameters for charging members of the public for use of EV charging stations at fringe and corridor parking facilities (park-and-ride facilities) and other state rights of way under federal law. While guidance was recently issued in an effort to clarify current law, this guidance has created additional questions. Unless there

is a revenue or funding stream available, DOTs will not be able to indefinitely operate, maintain, and replace EV charging equipment when needed.

Currently, encouraging private investment or public-private partnership development at DOT facilities is difficult without clear regulations regarding where fees can and cannot be collected. Sample agreements or wording from the FHWA would assist DOTs in forming public-private partnerships or sustainable air space leases.

The CEC houses cost data on its website, and the administrator for its CALeVIP block grant program houses cost data for CALeVIP. The CEC also maintains a ZEV dashboard to track zero-emission vehicle and infrastructure statistics, and recognizes the importance of sharing place-based information together with vehicle and infrastructure deployment. To promote equity, the CEC provides higher grants for disadvantaged and low-income communities. The CEC recommends a transparent recording of public dollars vis a vis private dollars invested, with a long-term goal of phasing down public dollars over time as the market matures in many locations. Using public funds to ensure equitable access is an important consideration in how to target and/or phase out funding in different segments and use cases.

To provide a resource outlining how agencies and stakeholders can move together with the scale and speed required to reach the state's ZEV targets, the California Governor's Office of Business and Economic Development (GO-Biz) and partner agencies developed and maintain the ZEV Market Development Strategy as a living document that will adapt based on feedback and lessons learned.

8. Meeting current and anticipated market demands for EV charging infrastructure, including with regard to power levels and charging speed, and minimizing the time to charge current and anticipated vehicles; and

The CEC's Electric Vehicle Infrastructure for Road Trips (EVI-RoadTrip) tool models DCFC infrastructure for long-distance (100+ mile) electrified travel along corridors. Vehicle technology improvements, including longer ranges and higher charging power acceptances for EVs, will moderate DCFC infrastructure need over time. Technology improvements will also make replacing low-power chargers with high-power chargers at existing sites more attractive. The modeled 2020 network is dominated by 50 and 150 kW chargers, while the 2030 network consists almost entirely of 250 and 350 kW chargers to meet market demand and minimize charging times. Corridor charging is a unique use case where the foremost objectives are fast charging speed and driver convenience. These qualities should be prioritized for future corridor infrastructure deployment. The combination of technology-moderated DCFC and future demands for higher-powered chargers highlights the need for future-proofing equipment and infrastructure today, and building out a DCFC network capable of meeting anticipated market demand. Where possible, power levels of 250 or 350 kW should be prioritized.

While there may be grid constraints which make this challenging or costly, generally a preference should be given for higher-power chargers.

Since interoperability across charging corridors must be ensured, staff recommends requiring that funded charger sites be equipped with a minimum of at least one Combined Charging System (CCS) connector, as the CCS connector is the dominant plug type for most vehicle models. The hardware should also be capable of ISO 15118 communications, so long as there are sufficient ISO 15118-capable options available in the market. This requirement should not create a barrier to deployment due to an insufficient number of available brands/models. The CEC has engaged with stakeholders and believes that the market is generally implementing certain ISO 15118 use cases. While there is not universal consensus on communication standards, there are a significant number of ISO 15118 proponents.

9. Any other factors, as determined by the Secretary.
In connection with question 9, please describe any other factors that you suggest that we consider in developing the EV Charging Program guidance.

Further questions and notes for consideration:

- If only a portion of an interstate is designated alternative fuel pending or ready, can funds be used for the "missing links"? Or must the "missing links" of the corridors be designated first?
- If an interstate is designated alternative fuel corridor only for natural gas, can EV chargers be added, or does the corridor first need to be designated as an alternative fuel corridor for electric charging?
- What is the definition of operating costs? Both the definition and the method of determination need to be very clear.
- Would it be an allowable operating expense to offer subsidies to charging providers who provide discounts to low income and/or senior drivers who charge their vehicles?
- Delays remain for sourcing equipment and components due to supply issues. Some manufacturers, even without constraints such as Buy American requirements, are unable to deliver chargers in a timely manner. Policies should not do anything to limit supply or restrict products at this time since bottlenecks already exist due to supply chain issues.
- Special emphasis should be given to heavy-duty truck infrastructure, specifically for the drayage and long-haul sectors, because of their significant impact on carbon emissions and air quality in communities that are often disadvantaged and/or low-income. California has led the way in this area with CARB's Advanced Clean Trucks regulation, requiring manufacturers to produce and sell zero-emission trucks in California, coupled with the Advanced Clean Fleets regulation which is under development and would require fleets to transition to zero-

emission trucks. This is being supported by significant state investment into high-power charging infrastructure to support these vehicles, including the EnergIIZE project mentioned above.
- Of particular importance is to establish charging solutions for trucks that are not centrally fueled at depots. For example, chargers along common truck routes would support long-haul trucks, and distributed publicly accessible chargers would support owner-operated trucks that park overnight in various locations.

FHWA also requests comments to inform the implementation of the Charging and Fueling Infrastructure Program to provide discretionary grants for corridor and community charging. Specifically:

10. Please provide examples of best practices relating to project development of EV charging infrastructure and hydrogen, propane, and natural gas fueling infrastructure at the State, Tribal, and local levels.

- California Energy Commission (CEC) Clean Transportation Program, Clean Transportation Program Investment Plan, and related solicitations.
- California Air Resources Board (CARB) Zero-Emission Vehicle Program
- California Zero-Emission Vehicle Market Development Strategy (California Executive Order N-79-20)
- California Zero-Emission Vehicle Market Development Strategy: Equity Engagement & Implementation Plan
- California Zero-Emission Vehicle Action Plan
- California Governor's Office of Business and Economic Development (Go-Biz) Electric Vehicle Charging Station Permitting Guidebook (2019)
- Go-Biz Hydrogen Station Permitting Guidebook (2020)
- AB 1236 Local Ordinances- Electric Vehicle Charging Stations (Requires cities and counties to adopt an ordinance that creates an expedited, streamlined permitting process for EV charging infrastructure). And AB-970 Planning and Zoning- Electric Vehicle Charging Stations: Permit application and approval. Best practice examples include the City of Redlands Municipal Code Title 15, Section 15.58: Electric Vehicle Charging Systems.

11. What topics do you suggest that we address in guidance on project development of EV charging infrastructure and hydrogen, propane, and natural gas fueling infrastructure at the State, Tribal, and local levels to allow for the predictable deployment of that infrastructure?

Provide clarification of funding applicability for strategies to facilitate hydrogen supply movement from production locations to fueling locations.

12. Please provide any suggestions to inform the administration of competitive grants under the Charging and Fueling Infrastructure Program for corridor and community charging.

The competitive funds should be targeted to the most underserved and burdened communities who are impacted most by poor air quality. Site selections should be coordinated between the formula funding program and the competitive funding program to ensure that efforts are not duplicative. Prioritize ZEV infrastructure and products that are the "greenest" and have the lowest environmental impact and carbon intensity by prioritizing zero-emission fuels, infrastructure, and technologies.