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September 20, 2023

California Energy Commission
Re: Docket No. 19-AB-2127
715 P Street
Sacramento, CA 95814

Re: Comments on Staff Report for AB 2127 Electric Vehicle Charging Infrastructure Assessment

Powerflex, Siemens, and Zemetric, together the "Joint Parties", appreciate the opportunity to file these comments on the AB 2127 Electric Vehicle Charging Infrastructure Assessment Staff Report ("Report").

PowerFlex is a leading installer, owner, and operator of distributed energy resources (DERs) including non-residential solar PV, energy storage, and electric vehicle supply equipment (EVSE), both Level 2 (L2) and Direct Current Fast Chargers (DCFC). PowerFlex uses Automated Load Management (ALM) at each of its EVSE sites to dynamically control the EVSE according to driver and site needs, often avoiding the need to upgrade customer- and utility-side infrastructure. With more than 10,000 L2 EVSE using ALM in California, we offer the following comments.

Siemens is a leading provider of EV charging infrastructure technology, including chargers, make-ready equipment, software, and services. We are committed to supporting California's transition to electrified transportation, including electrifying our own fleet. We have adopted a corporate goal of net zero carbon emissions by 2030. A primary reason for our support of electrification is the economic benefits accruing to all citizens, including those in disadvantaged communities.

Founded by industry veterans and headquartered in California, Zemetric simplifies transport electrification with pioneering infrastructure that is clean-sheeted with reliability and interoperability at the core. Zemetric innovates to delight the customer with a charging platform that disrupts the technological and commercial barriers in the transition to electron-fuel.

General Comments

The Joint Parties appreciate the analysis that went into the 2023 Report. We believe it is not only a valuable, but also an essential tool for California to utilize in achieving its transportation electrification targets for 2035.

The Joint Parties continue to support the **first Report's** recommended actions to further EV charging infrastructure deployment in the state. These range from public support for charger deployment to aligning charging to support the grid to prioritizing charger connector and communications interoperability.[1]

A key theme in our comments is that the CEC should *not* emphasize the "gas station model" for multiple reasons, including the fact that DCFC stations are very well funded already. According to the Environmental Defense Fund (EDF), **"For direct current fast chargers (DCFCs), existing and announced chargers account for more than 100% of the needed DCFC chargers past 2032."[2]** While we support the buildout of DCFC in programs that already exist and acknowledge the critical role that DCFC will play in electrifying transportation, we do not support transitioning away from funding L2 chargers to fund a DCFC "gas station model."

We would also like to highlight that the AB 2127 report is missing three major points of coverage, including cost of charging, total cost of EV charging infrastructure, and an ideal load curve. We discuss each point in further detail below.

First, there is no analysis of the cost/price of charging, including any comparison of cost/price among home, multi-family, workplace, and public DCFC beyond the general statement that home charging is cheaper. While the Joint Parties do not have comprehensive data, our observations in the market are that in general, multi-family and workplace charging are significantly cheaper than public DCFC – another reason the "gas station model", while a critical element of the overall EV charging picture – should not be seen as the preferred solution. Consumers are very sensitive to fuel prices as demonstrated by their sensitivity to gasoline prices and even small differences between gas stations, where price differences are a few percent. In contrast, EV charging prices per kWh often vary by more than 100 percent between, for example, workplace charging and public DCFC. Achieving an accurate forecast of charging behavior requires taking pricing into account.

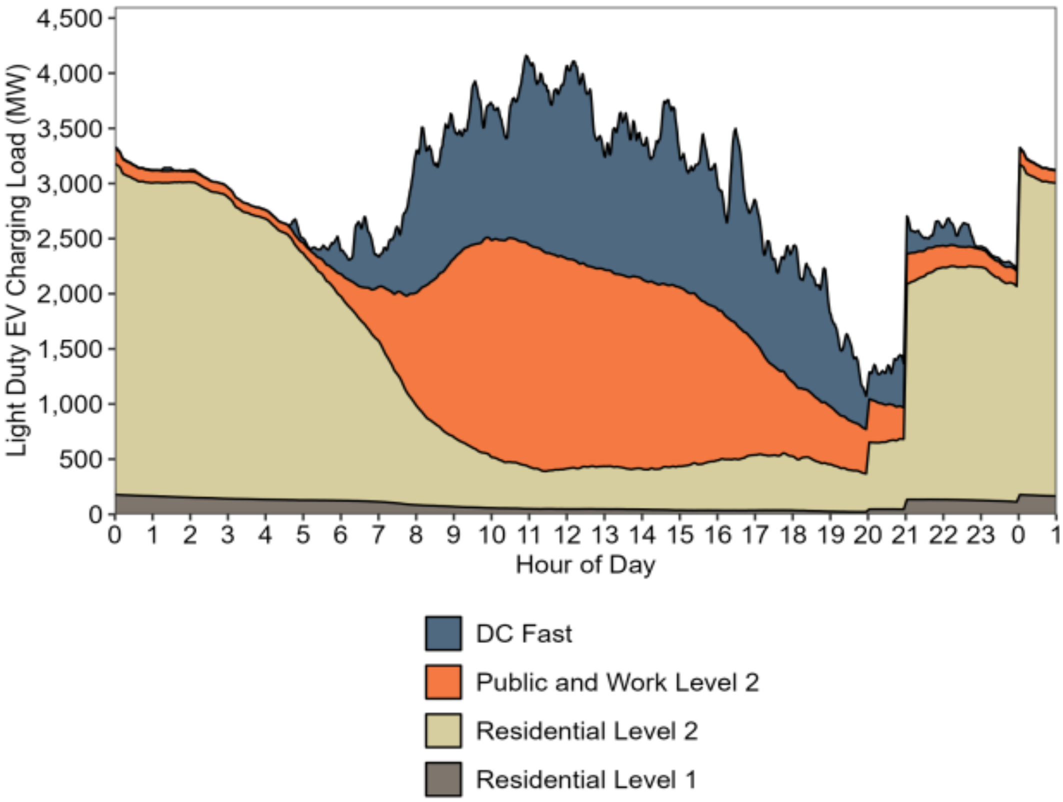
Second, while we appreciate the different scenarios presented in the report (Figure 21), a key element of comparing the scenarios is missing: the total cost of the EV charging infrastructure for each scenario. The six scenarios result in different numbers of chargers but also different *mixes* of chargers among multi-family L2, public and work L2, and DCFC. **Given the large cost differences in the three charger categories, it is critical that the report show a cost estimate of each scenario in order that policymakers have a complete understanding of the financial implications of each of the six scenarios.**

Third, while the report presents a number of load curves such as the one below (Report, page 5), the reader does not know if an EV charging load curve is good or bad. This is because **the report does not show what the ideal load curve would be, given California's resource mix.** Showing load curves in the absence of what would be a better or best load curve provides no context in

[1] - Report at pp. 91-92.
[2] Environmental Defense Fund, "U.S. Public Electric Vehicle (EV) Charging Infrastructure Deployment," July 2023. Available at: http://www.edf.org/sites/default/files/2023-07/WSP%20US%20Public%20EV%20Charging%20Infrastrcuture%20Deployment%20July%202023.pdf

which a policymaker can evaluate the load curves shown in the report. Therefore, the report should include a likely or potential "ideal" load curve for EV charging.

Figure 2: Projected Statewide Power for Light-Duty Vehicle Charging for 7.1 Million Zero-Emission Vehicles on a Typical 2030 Weekday



The CEC should select a modeling and investment strategy that sets California up for success. Modeling and investments should build the future we want, including consideration of the grid, ease of deployment, speed of deployment, deployment cost, and customer cost and experience. We already see challenges meeting ACF deployments, and a gas station model would compound those challenges.

The Joint Parties submit the following comments on the overarching topics as identified in the Report and as listed in the Chapters.[3]

Chapter 2

The Joint Parties submit the following corrections to the findings in this section:

[3] Report August 2023, Page 13

- It is presumptive to state that the light-duty (LD) ZEV market *has matured*. While the trend from a product perspective is moving in the right direction, the ZEV market is still nascent compared to the product and customer choice availability in the internal-combustion engine (ICE) category. While the current LD market has many models to choose from, over 70% of the BEV models are luxury models as seen in the figure below. With total penetration in California as of the end of 2022 of less than four percent[4], ZEVs are clearly still within the early adopter phase.

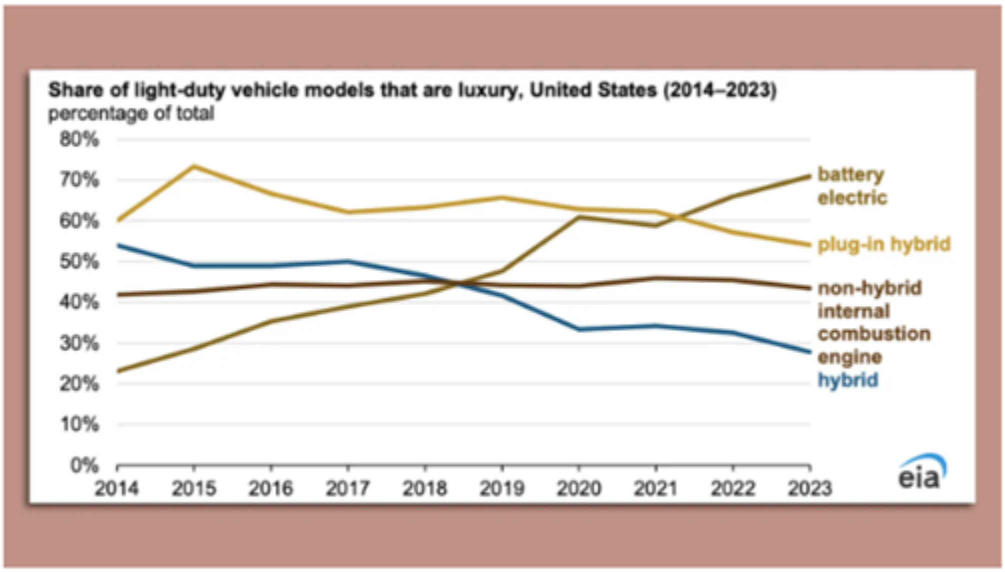
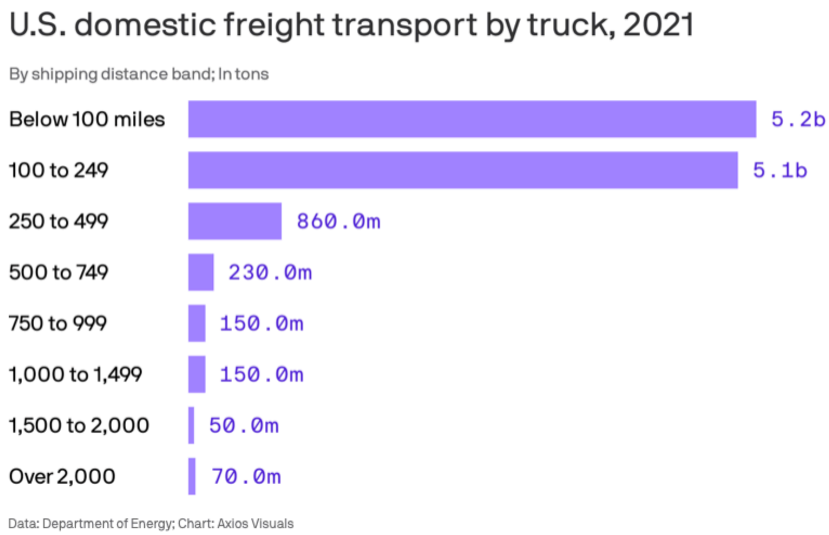


Image courtesy of the Energy Information Administration

- Range remains a decisive factor in EV adoption given the myriad impacts that determines a vehicle battery range while in use (versus what is specified by the EPA as the vehicle's official range).

- The report should be expanded where it states that "trucks are expected to use DC fast charging more than cars."[5] The majority of truck shipments within the US are below 250 miles._Of roughly 12 billion tons of cargo that trucks moved domestically in 2021, 44% was moved in trips below 100 miles, and another 43% in trips between 100 and 249 miles.[6] **(See below graph).** For most trucks for most daily usage of under 200 miles, a 19.2 kW AC charger is a viable option, so it is premature to conclude that DC charging will be the default option for these vehicles.

[4] https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle
[5] Report August 2023, Page 20
[6] https://www.axios.com/newsletters/axios-generate-cc82c21a-ce96-4ead-947b-818610194c64.html?chunk=3&utm_term=emshare#story3



Chapter 3

On Level 2 (L2) chargers

The Joint Parties concur that most chargers that have been installed in the state are L2. However, the report should clarify that most of these L2 chargers have been installed at the lower power level of L2 chargers, i.e., 7 kW. While there continue to be use cases for lower power L2s which should be supported by the CEC, given the increasing battery pack sizes in LD vehicles, the need to support MD and some HD vehicles, and the improved consumer experience of faster charging, L2 funding should also include higher-powered L2 chargers (19.2 kW), especially at medium dwell and MDHD charging sites. As per the data shared in page 2 of these comments, a significant portion of truck charging needs can be supported via higher power L2 chargers (versus using DC chargers). The Report therefore needs to be amended on this point.

On DCFC "gas station"

Unlike ICE vehicles, EVs have a more convenient "gas-station" in L2 chargers at medium-long dwell sites such as residences, workplaces, garages, depots, airports, etc. These chargers provide the lowest-cost kWh for customers, and because drivers are already there, greater convenience. For these reasons, the vast majority of charging occurs at these sites and, the Joint Parties believe that the majority will continue to be at such sites for the same reasons. These factors will not change over time.

Additionally, beyond convenience, grid impacts, and driver costs, L2 charging, especially at workplaces, generally coincides with daytime solar generation, making it the lowest marginal greenhouse gas (GHG) option and helping absorb excess solar generation.

It is true that not all EV owners have access to such charging sites and therefore will need some other form of "public/shared" access, *i.e.,* DCFC. This need is being addressed via state public programs such as CALeVIP, as well as ratepayer funded utility programs. In addition, the federal NEVI program has been designed to address this very need by the provision of DC fast charging every 50 miles along designated corridors (AFCs). Moreover, several automakers such as Mercedes, as well as a consortium of automakers have made commitments to build fast charging stations (as they have done in Europe), which would be in support of the ZEV models that they have announced for launch.

Public dollars should address gaps in the market. **As reported by EDF, existing and announced DCFCs already account for account for more than 100% of the needed DCFC chargers past 2032.**[7] The CEC should prudently focus its limited funds on the gaps that the market is not addressing and should not duplicate efforts in a charging segment that is not only expensive to build, but also serves a small percentage of the market's overall needs. The most important gaps are multi-family and other medium- to long-dwell sites in DACs, including workplaces.

On Counting Chargers

Given that the CEC is dependent on voluntary surveys to account for private chargers, it is very likely that the CEC, and consequently this report is undercounting the statewide L2 chargers in deployment. The CEC should utilize probabilistic modeling to fill gaps in data - such analysis can help the CEC better estimate actual charger counts, as well as the market segments that these chargers are deployed in.

Regarding the MDHD category, the CEC should better understand the duty-cycles of such commercial vehicles as the foundational step for analyzing charging requirements.

<u>Chapter 4</u>

On L1 Chargers

The Report correctly highlights the inadequacies of L1 chargers vs. L2 given vehicles with bigger range and ability to charge at higher speeds. Moreover, charger manufacturers are developing improved L2 chargers and making them easier to install as noted on page 82, thus making it significantly more likely that EV owners will select L2 as the dominant option. Therefore, the Joint Parties **question the model's estimates of L1 chargers in single and multifamily housing into 2035** and recommend that the CEC discontinue spending any public dollars on L1 charger deployment beyond what has been committed in the current programs.

On the Ubiquitous DCFC/ "Gas Station Model"

The Report includes an alternative future scenario that assumes people without access to charging at home use DCFC as their primary means of charging. It reaches the conclusion that 402,000 fewer public and shared private L2 chargers would be needed. The Joint Parties do not believe this

[7] *Op. cit.*

scenario is realistic for several reasons. Today, DCFC usage is primarily for long distance travel and, for local charging, where L2 charging is inconvenient or unavailable. The reasons are that L2 costs/prices are lower, and, where convenient, provide a better consumer experience. Convenient and available L2 charging includes multi-family, workplace, retail, parking garages, and other destination charging. L2 charging will continue to remain less costly and, as today, usually more convenient. L2 charging also puts less stress on EV batteries and extends EV battery life. As the percentage of drivers without single family home access increases, so too will L2 charging opportunities. It is too early to predict how the proportion of inconvenient/unavailable L2 charging will change over time, but the inherently lower installation and operation costs, lower power costs, and improved battery life related to L2 chargers, will continue to drive L2 installations in preference to DCFC.

The other aspects of this scenario – which would require 63,000 additional DCFC – are twofold. The cost of trading off the added DCFC with fewer L2s is not shown in the report but should be. In addition, the effects of the added DCFC on the grid are not shown but are known to be negative.

Chapter 5

The Joint Parties commend the CEC on its near-term deployment achievements. However, the **Joint Parties concur that the "gas station" model is not a feasible scenario for fueling ZEVs owing to a) capital expense, b) expensive for the driver compared to the alternatives (an important equity issue), and c) inability to support the grid when needed.** Dynamic pricing does not allow any charging shift as the essence of a "gas station" model is to be on-demand. It is also a fact that the average drive per day in the US was 37 miles[8] – which is easily and most conveniently supported by home/near-home and workplace charging.

Additionally, provision of high power L2 charging (in future deployments or upgrades) provides the top-up needed outside of medium-long dwell sites for most EV drivers – it is especially suited for work charging when renewables are aplenty, and therefore prices can act as an incentive.

Chapter 6

The Joint Parties concur on the five areas that the CEC has identified to grow vehicle-to-grid integration's (VGI's) potential and are supportive of the CEC's activities in this area as described in the report.

The one item we would recommend is to separate out the three major categories of VGI, because the technologies, use cases, economics, and rules and regulations are very different for each category. (There are additional categories beyond the three below, such as V2L or V2V, but these are far less significant from a policy and regulatory perspective.)

[8] https://www.kbb.com/car-advice/average-miles-driven-per-year/

1. V1G – this category is the use of managed charging to minimize costs. The chargers are unidirectional and turned on and off in response to financial incentives in the form of TOU prices or demand response incentives. Standard smart meters are sufficient, though having submeters for EV-only TOU tariffs provides additional benefits. Policies are needed to promote chargers that communicate with remote charge management apps or other software, standards for those communications, and the financial incentives in the form of TOU tariffs and demand response program incentive payments. This can also include automated load management (ALM) which can be used to defer or completely avoid the need for utility-side infrastructure to support EV charging and reduce the needed infrastructure on the customer site.

2. V2B/V2H – this category is focused on using EVs as backup power but also enables greater economic benefits, because EVs can take power from the grid when power is cheap and deliver it to the home or building when grid power is expensive. The chargers are bidirectional, and technology must be installed to disconnect the building from the grid. Policies are needed here to promote standards and interoperability but also to define the rules and regulations for disconnection/interconnection.

3. V2G – this category extends bidirectional charging to delivering power back onto the grid. This capability creates additional economic benefits from selling power or ancillary services back to the utility or the wholesale market. On the technology side, the chargers must be interconnected via equipment that allows power to be sent to the grid, as well as having the metrology needed to support selling power or ancillary services. In addition to this more complex technology, more extensive rules, regulations, and standards, as well as tariffs, are needed to implement V2G programs and capture their benefits. One example is in the Report on page 81, noting the limitations of the current ISO 15118 standard.

We see these three categories deploying over time, given that the technology and regulatory requirements start fairly simple then become more complex at each of the next stages. Importantly, EV drivers can capture significant value at each step independently of the other steps, *i.e.,* VGI is not an "all-in-one" proposition.

Chapter 8

The Joint Parties concur on the following conclusions, with additional recommendations:

1. Expansion of home, multi-family, workplace, and other destination charging reduces the need for public charging, especially DCFC, which is capital intensive as well as expensive for the driver and the grid. The Joint Parties recommend that the CEC provide incentives

for L2 charging to maximize driver experience and minimize the buildout of expensive DCFC "gas stations".

2. L2 charging deployment should focus on long dwell time sites – and we recommend that medium-dwell sites be included as well (such as all workplaces), and not just offices or campuses.

3. We strongly support the reliability and technology interoperability requirements for all public and ratepayer funded programs. We encourage that the CEC treats the NEVI technical requirements as the floor, and not the ceiling.

4. Leveraging VGI promotes EV adoption and grid efficiency in all three main categories. V1G reduces costs to both drivers and grid operators while reducing grid stress. V2B/H provides further reduces costs and grid stress, while V2G converts EVs into active DERs that can provide power and ancillary services to the grid.

5. We strongly support ALM in a technology neutral manner. Behind-the-meter Distributed Energy Resources (DER) such as energy storage would not only speed up installation, but it would positively impact ratepayers by delaying or eliminating distribution grid upgrades.

6. While the state should proactively plan for the electrification of MDHD vehicle category, the CEC should be undertaking careful analysis of business models and duty-cycle needs to be prudent in the investment of public funds. Data shows that a major portion of even MDHD charging needs can be met by L2 charging in depots.

7. We recommend that the CEC look at ALM technologies as a viable and proven pathway to minimize costly distribution grid upgrades that are negatively impacting ratepayers. Sites that have deployed ALM have realized significant cost savings,[9] and programs, policies, or regulations in place to support or require ALM could significantly reduce the cost of electrifying transportation on customers and ratepayers through avoided infrastructure buildout.

We commend the CEC on the thoughtful report – with our recommended corrections and additions – it will provide a roadmap for infrastructure deployment essential to meet the state's EV adoption goals.

Powerflex, Siemens and Zemetric appreciate the opportunity to comment.

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[9] *Pacific Gas and Electric Company Electric Vehicle Charge 2 Prepared Testimony*, pages 2-9 – 2-10, October 26, 2021.

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