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FreeWire Comments - IEPR VGI & Charging Funding Workshop - TERPA

Additional submitted attachment is included below.

FREEWIRE®

July 15, 2020

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket No 20-IEPR-02– FreeWire Technologies Comments on the IEPR Workshop on Vehicle-Grid Integration and Charging Infrastructure Funding

On behalf of FreeWire Technologies, thank you for the opportunity to provide comments regarding the California Energy Commission's ("CEC") Integrated Energy Policy Report workshop entitled "Vehicle-Grid Integration and Charging Infrastructure Funding." FreeWire appreciates CEC's continued support of transportation electrification across the state and offers these comments to convey our strong support of the Transportation Electrification Regulatory Policies Act ("TERPA") concept that was presented during the above-referenced workshop.

As the leading manufacturer of battery-integrated electric vehicle supply equipment ("EVSE"), FreeWire's comments are intended to provide unique insights and perspective regarding the proposed TERPA approach to public funding of charging infrastructure. If implemented successfully, we believe the concept outlined during the workshop would provide a more effective framework for public investment in charging infrastructure that supports a broad suite of EVSE technologies, including new innovations that can drive down total cost and accelerate deployment.

At FreeWire, we believe that the current fragmented approach for funding charging infrastructure results in separate cost-benefit analyses for each component of given project: utility "make ready" programs focus the analysis on grid infrastructure whereas equipment incentives either focus on the capital costs associated with purchasing and installing the equipment or provide an "of right" incentive on a first-come, first-serve basis without any cost-benefit assessment. Operational costs, resiliency benefits and the value stacking potential of, for example, integrating energy storage or on-site renewable energy generation do not appear to receive any consideration whatsoever. The net result of this lack of a holistic consideration of cost-benefit is more stranded charging assets, a higher overall, societal cost to deploy charging infrastructure and an unlevel playing field for new and innovative solutions even though the advancement of EV charging technologies is hardly settled or resolved.

FreeWire's Experience in California

FreeWire was founded in 2014 with a mission to provide electrification at the grid edge and beyond. We believe that the incorporation of energy storage with electric vehicle supply equipment (EVSE) is fundamental to ensuring a cost-effective, streamlined and geographically diverse buildout of EV charging infrastructure. Our Mobi and Boost Charger product lines demonstrate the potential for this integration to increase asset utilization as well as reduce overall deployment and ongoing operational costs.

A. Mobi

FreeWire's Mobi charging system is a mobile, dual Level 2 EV charger that uses lithium-ion batteries as on-board energy storage. By integrating energy storage onto a mobile drivetrain, the Mobi increases charger utilization rates and reduces the need for expensive grid upgrades, enabling customers to scale up EV charging quickly and cost-effectively. The technology allows customers to store the energy required for EV charging during off-peak hours, creating a smoother energy consumption curve and supporting energy arbitrage (purchasing and storing electricity during off-peak times, and then utilizing that stored electricity during periods when prices are the highest), while minimizing peak-hour draw (and associated peak costs) from the grid.

FreeWire has deployed over 150 Mobi systems across California since commercializing the product in 2015, with no public investment support save for initial pilot/demonstration funding and eligibility under the California Air Resources Board Clean Off-Road Equipment Voucher Incentive Project (CORE) for freight applications, which launched this year. The Mobi has not qualified for level 2 charging incentives because it is "different" from conventional stationary level 2 systems on the market. Program administrators have disqualified the Mobi from most level 2 EV charging incentives largely because of its mobility, citing the lack of assurance that the charging asset will remain at given location or within the state of California writ large despite the fact that GPS data is readily available for reporting purposes.[1]

Mobi is much more expensive than a conventional level 2 charger, priced at $65,000 versus $1,000-$1,500. However, because the Mobi is recharged from a standard 120v power source, it avoids $10,000 - $20,000 in costs associated with grid upgrades and can be deployed instantly upon delivery. In addition, as mentioned above, the Mobi can reduce operational costs on an ongoing basis by minimizing peak-hour draw from the grid. Furthermore, the Mobi avoids idle plug time as it is actively brought from vehicle to vehicle. In practice, this means the Mobi charges an average of six vehicles per day, delivering 10 kWh to each vehicle. In comparison, a conventional level 2 charger charges one or two vehicles per day, meaning that Mobi utilization is 3X to 6X higher on average.

FreeWire's success in selling and deploying the Mobi across California is due to this higher utilization, lower operational cost and elimination of grid upgrade and installation costs. For FreeWire's customers, and in particular for our workplace and fleet customers, the ability to instantly provide charging resources and mitigate installation/operating costs has justified the investment in the product. Many other potential customers have not moved forward to purchase the Mobi due to its higher upfront cost and lack of subsidy, combined with the prospect of equipment incentives and a 100% subsidy for grid upgrades through utility make ready programs for conventional systems. We believe that if funding opportunities were administered through a more holistic approach, where equipment incentives are not divorced

[1] The lack of NRTL certification is another reason the Mobi has been deemed ineligible for public funding programs, despite the fact that no UL standard exists today for the evaluation of mobile EV chargers and that the core components of the Mobi, the battery system and the EV charging apparatus, are NRTL-certified.

from the grid infrastructure calculus of the make-ready programs and operating costs and expected utilization are also factored into the evaluation, the Mobi would be recognized as a more cost-effective solution in many more situations and deployed much more widely than it is today. The proposed TERPA framework, through its establishment of an avoided cost of charging framework for funding decisions, would harmonize the current bifurcated approach and result in a more level playing field for innovative technologies like the Mobi to compete with the status quo.

B. Boost Charger

FreeWire is in the final stages of launching a new DCFC product, the Boost Charger. The Boost Charger offers a step-change improvement in reducing DCFC installation costs and demand charges, while still providing drivers fast, high power charging. The Boost Charger is an "infrastructure-light" stationary DCFC that utilizes an onboard 160 kWh battery system to deliver up to 120 kW to one or 60 kW to two EVs simultaneously, while only drawing up to 27 kW from the grid, using low voltage and widely available 240v or 208v input power. With this configuration, the battery serves as a buffer, enabling fast charging assets to be deployed upon the existing electric service available at most commercial locations. The energy storage system inherently reduces costs on an ongoing operational basis by limiting peak energy consumption and associated demand charges. As such, the Boost Charger is able to satisfy current and projected utilization scenarios for EV charging at most sites across California, fast charging 18 vehicles a day based on a 25 kWh average charging session.

The breadth of energy storage applications has expanded significantly with the observed and projected advancement of lithium ion battery technology. From enabling market competitiveness of electric vehicles to matching renewable energy generation assets with electricity demand, the CEC has rightfully acknowledged the transformative potential of energy storage systems in these contexts. FreeWire expects battery cost to continue to decline and their power density and performance to increase similar to solar technology, enabling more charges at faster rates within the same physical footprint.[2]

Battery-backed EVSE systems like the Boost Charger can greatly expand the universe of sites where DCFC stations can practicably be located, and for EVSE siting purposes, geographic distribution and deployment in strategic locations should be paramount if the goal is to provide charging resources where they are needed to combat charge anxiety and spur EV adoption. FreeWire does not suggest that battery-integrated EVSE are the only solution – there are sites where the grid upgrades necessary for a conventional DCFC are both feasible and appropriate – but instead we urge the implementation of this TERPA concept as a common framework for ensuring a level playing field for current and emerging DCFC technologies like the Boost Charger.

[2] Physical space is a critical issue, especially in dense urban areas, and integrated battery systems can reduce the footprint of the charging installation making it a more attractive option for site hosts.

When FreeWire offers its Boost Charger to a site host, its equipment is typically more expensive than the traditional DCFC dispenser. However, because of the Boost Charger design it substantially eliminates make-ready costs. When make-ready costs for traditional DCFC equipment are rate-based, the site hosts are insensitive to them, rendering alternative technologies which avoid those make-ready costs at a substantial disadvantage in the marketplace. Evaluating funding decisions on the proposed "avoided cost of charging" basis would duly recognize the value of alternative solutions like the Boost Charger. We believe the net result would significantly advance deployment and foster the technological innovation necessary to meet the State's transportation electrification goals and support basic program equity. The following table illustrates how the current make-ready approach can actually function to disfavor a solution like the Boost Charger that is ultimately more cost-effective if a more holistic analysis as proposed under TERPA were to be employed.

	"Conventional" 120 kW DCFC	Boost Charger
Equipment	$85,000	$155,000
Installation	$15,000	$15,000
Electric Infrastructure	$150,000	$5,000
Total Cost	**$250,000**	**$175,000**
"Make-Ready" Subsidy	$150,000	$5,000
Total Cost for Station Owner	**$100,000**	**$170,000**

Table 1. Cost Comparison of the Boost Charger versus a Conventional 120 kW DCFC.

Due to its novel integration of 160 kWh of energy storage capacity, the Boost Charger costs $155,000 – about thirty percent more than comparable DCFC equipment that costs $70,000 - $100,000 on average. On a total cost of deployment basis, a Boost Charger will cost ~$175,000 on average to deploy, consisting of the $155,000 equipment cost, $15,000 for installation (mounting on concrete pad) and $5,000[3] to bring electrical input from the existing panel. Conventional DCFC deployments average approximately $240,000, consisting of $85,000 for equipment, $15,000 for installation and $150,000 for electric infrastructure.[4] However, CPUC-driven utility "make-ready" programs cover electric infrastructure costs for DCFC entirely, reducing the charging station owner's total investment to $100,000 for a conventional DCFC versus $170,000 for the Boost Charger. It is important to further note that this example does not even delve into the ongoing savings from an operational perspective, which is completely absent from consideration under utility make-ready and other EVSE equipment/installation incentive programs in place today.

In short, we hope this discussion of the Boost Charger and the unlevel playing field for DCFC funding currently in place helps illustrate the need for a technology-agnostic, holistic

[3] We are uncertain whether the Boost can even receive the modest $5,000 make-ready upgrades under current utility make-ready programs, like PG&E's Fast Charge and SCE's Charge Ready Transport, since the program criteria only envision a one-size-fits-all approach of providing 480v, 3-phase electric connections.

[4] These costs are from known projects that have gone forward and don't reflect projects that have failed to proceed because of the high cost of bringing in 3-phase 480V power.

consideration of public funding expenditures as embodied by the TERPA proposal. Without it, innovative solutions to overcome the barriers to achieving the state's ambitious EV charging targets will be at a competitive disadvantage relative to the status quo.

Resiliency

A regionalized TERPA approach should incorporate the need for resilient, hardened charging infrastructure. As critical fueling infrastructure, it is necessary to ensure an adequate spread of EVSE that are resilient in the face of outages across the state associated with utility shutoffs, wildfires, earthquakes and other events. For example, Public Safety Power Shutoffs will create a drag on vehicle electrification as fleets, particularly in critical service industries, will need chargers that can operate independently of the grid. These fleets may not electrify or may elect to retain both internal combustion as well as electric vehicles to ensure transportation capabilities during these events. Similarly, when fires occur and the grid is preemptively shut down, evacuation in EVs will present serious, if not insurmountable, challenges. Therefore, ensuring the deployment of resilient charging infrastructure is critical for fully meeting the state's electrification goals and resiliency should be explicitly recognized in calculating the avoided cost of charging under TERPA or as an attendant consideration for receiving additional public funding separate from the avoided cost analysis.

Conclusion: Integrate TERPA with a One-Stop-Shop Approach to Public Funding of Transportation Electrification

In my presentation during the June 24 IEPR workshop panel entitled "EV Charging Scale-Up: Potential New Business Models for Private Investment," I recommended the establishment of a one-stop-shop as a means of streamlining access to various public funding opportunities. Navigating separate programmatic requirements and application processes creates a substantial administrative burden as entities seeking access to these siloed funding programs must navigate separate requirements, agencies and application processes, placing a significant administrative burden that impacts small businesses and startups in particular. In addition, I pointed out that the siloed administration of the programs results in a failure to consider costs from a holistic perspective, as further contextualized through the discussion provided above.

Evaluating funding decisions under the proposed TERPA avoided cost of charging framework would provide for such a holistic evaluation. As such, FreeWire recommends the implementation of TERPA under a regionalized "one-stop-shop" approach.

Sincerely,

Rajiv Shah
Counsel & Director of Regulatory Affairs
FreeWire Technologies