



Plug In America
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November 5, 2018

Judith Whitney, Clerk
Vermont Public Utility Commission
112 State Street
Montpelier, VT 05602

Re: Case No. 18-2660-INV Investigation into promoting the ownership and use of electric vehicles in the State of Vermont

Dear Ms. Whitney,

Plug In America appreciates the opportunity to contribute to Vermont's investigation of the issues surrounding the ownership and use of electric vehicles (EVs). Please accept for filing the Comments of Plug In America in response to the Commission's *Order Commencing Next Step of Investigation* dated October 24, 2018.

Best regards,

A handwritten signature in cursive script that reads "Pete O'Connor".

Pete O'Connor
Policy Specialist
Plug In America



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STATE OF VERMONT

PUBLIC UTILITY COMMISSION

Case No. 18-2660-INV

Investigation into promoting the ownership and use of electric vehicles in the State of Vermont	Filed: November 5, 2018
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On behalf of the nearly one million plug-in electric vehicle (PEV) drivers we represent, Plug In America would like to thank you for this opportunity to provide feedback on the questions from the VT PUC, case No. 18-2660-INV. Plug In America is the nation's leading independent consumer voice for accelerating the use of PEVs in the United States to consumers, policymakers, auto manufacturers and others. Formed as a non-profit in 2008, Plug In America provides practical, objective information collected from our coalition of plug-in vehicle drivers through public outreach and education, policy work and a range of technical advisory services. Our expertise represents the world's deepest pool of experience of driving and living with plug-in vehicles.¹

Usage Fees

1. Describe how usage fees would be calculated for Vermont customers using public EV charging stations. Please identify each component used in determining the final fee, and if a component is not always used in determining the final fee, explain the circumstances under which it is used and the reasons why.

EV charging stations in general employ a wide range of pricing structures. These fall into three general categories: by the time period (minute or hour), by the session, or by the kilowatt-hour (kWh). Some have minimum costs or escalating prices over time. Some are hybrids. A study by Jamie Dunckley of EPRI found over 350 unique cost structures for charging stations.

One example of a hybrid pricing structure is the Tesla Supercharger network. These stations charge a certain amount per minute or per kWh to charge, but also apply a higher per-minute fee for vehicles left in a spot after reaching full charge. The driver is notified through their app that the vehicle has reached full charge and needs to be moved. This is to ensure that fully charged vehicles are moved to make room for other vehicles to use the station. Some drivers have free lifetime access to the station, but even they would face this 'idle' fee. This component is *not* always used. It may apply after a specific grace period if the occupancy of the charging station is high. If there are no vehicles waiting to charge, and several available Supercharger stalls, the 'idle' fee may not apply.

Fundamentally, EVSE need to recoup the costs of electricity. The station may face such costs based on the energy (kWh) used and on the instantaneous peak demand (kW). Several states are experimenting with reducing the demand charges for DC fast charging stations and achieving a larger fraction of the cost recovery through kWh charges. These are often temporary measures that will be phased out as the stations increase their utilization over a period of years.

EVSE also need to recoup their capital costs and their O&M costs. Thus, the cost paid by an EV driver to use a public charging station is typically higher than the cost a driver pays for charging at home.

¹ More information available at: www.pluginamerica.org



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2. Are usage fees variable based on factors such as time spent at the charging station, time of day when charging occurs, type of vehicle charging at the station, etc.? For example, if a kWh charge applies to the first hour of charging and a vehicle remains at the station charging beyond that hour, could or would an additional fee above and beyond the kWh fee apply to all subsequent hours? Please explain your company's approach to setting and applying fees at charging stations.

Site hosts often choose the pricing structure based on their goals and customer dwell time. For example, a grocery store that seeks to use a "destination charger" to attract business may offer free charging for the first hour, then escalate the rates rapidly past that. It is rare that a shopper spends more than an hour in a grocery store. However, a stadium or theater may have a longer period of free or low-cost charging. A hotel or ski lodge would have even longer 'dwell time' and might choose to not charge by the hour at all, offering either free charging of a nominal per-connection cost.

3. Describe any limitations imposed on the fee structures for EV charging station use in states other than Vermont.

Several states (including Massachusetts, Connecticut, and New Hampshire) require that EVSE located at publicly-available parking spaces not require a subscription or membership in an organization or association to access the stations. EVSE *are* permitted to offer different pricing for network subscribers.

4. Do or should the fees charged to consumers at public EV charging stations vary based on the electricity rates charged by the utility that serves the charging station?

Since EVSE need to recoup their costs, their rates do vary based on the electricity rates they face. However, these are generally not conveyed directly to the customer (i.e. the customer does not pay a demand charge), but rather rolled into the minute-based or kWh-based rates. An operator of an extensive EVSE network may have different prices in different utility territories.

5. Will or should variations in electricity rates due to time-of-use rate structures offered by the electric utility serving a public charging station be passed through to the users of public EV charging stations?

Relatively few EVSE employ time-variant pricing. Plug In America encourages greater use of this option to promote low-cost off-peak charging.

6. Can the charging capabilities (e.g., speed) of the EV affect the rates that a consumer will be charged at the EV charging station? Please explain and offer examples from your experience.

Yes, and there are other charging parameters that can be varied. For example, a Southern California Edison 'smart charging' pilot project offered customers a lower cost for a Level 2 charge that could be interrupted to provide demand response to the utility, a medium cost for a charge that would be throttled back to Level 1 during a demand response event, and a higher cost for a charge that would not be interrupted or throttled back.



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In general, DC fast charging stations have high capital costs and so will typically have the highest cost per kWh of any charging option. The customer in these cases is paying for the convenience of a fast charge.

7. How would drivers charging their vehicles at a public EV charging station pay for their usage (e.g., by credit card)?

There are numerous ways to pay for a charge. Even specifying “by credit card” leaves a range of possibilities. Some options include the following:

- Credit Card reader on the EVSE (swipe, chip, or tap)
- RFID or NFC card
- Apple Wallet / Android Pay / similar apps: (credit card through cell phone)
- Cell phone app for EV charging provider
- 1-800 number
- Pay by text
- Vehicle-based credentialing
- 3rd party e-mobility interoperability network (i.e. Hsubject, used in Europe)
- Refillable pre-paid card

There are advantages and disadvantages to each payment option. It is important to evaluate each method with a series of criteria which could include the ease of use for the driver, the ongoing cost to the driver, how secure the method of payment is, any retrofit costs to current charging stations, and whether or not the option is suitable for low-income PEV drivers. Also, given the rapid pace of developing technology, another consideration is how “future-proof” the method of payment may be. Finally, whether or not the charging station is networked (connected to the internet) or not might also be a consideration. There can also be a combination of payments used at a charging station.

Plug In America supports the credit card method of payment as one standard method of payment that all charging stations should have. The credit card is the simplest way to ensure a smooth transition to driving electric. Furthermore, credit cards (including prepaid cards using the same transaction equipment) are a suitable option for low-income PEV drivers.

Legislation in California under the Electric Vehicle Charging Stations Open Access Act (SB 454) states that, “An electric vehicle charging station that requires payment of a fee shall allow a person desiring to use the station to pay via credit card or mobile technology, or both.”² New Hampshire legislation SB 575 states that, “The owner or operator of a public electric vehicle charging station that requires payment of a fee shall provide multiple payment options that allow access by the public.”³

² http://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB454

³ <https://legiscan.com/NH/text/SB575/id/1685285>



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EV Charging Station Technology

8. What factors affect the charging speeds for different EVs?

All EVs have limits to the rate of charge they can accept. These depend on vehicle design, battery chemistry, and battery management systems. It is necessary to keep the battery temperature in an optimal range during charging, and the battery management systems are designed for a given amount of power influx. There are costs and tradeoffs in increasing the maximum rate of power an EV can accept.

9. How will a utility determine the electricity usage of a charging station connected to its distribution grid?

Through a utility meter at the site.

10. Would utilities prefer to install their own meters or rely on meters included in the EV charging stations?

We believe that utilities typically install their own meters (generally smart meters to facilitate TOU rates and data collection).

11. If a utility relies on the meter in a charging station to measure electricity service to that charging station, will the utility be able to determine the time of sale for each kWh delivered to the charging station for the purpose of applying time-of-use-rates to the electricity delivered?

The utility is not likely to rely on the meters in the charging stations to measure the electricity service to that charging station. In part, this is because an EV charging station may have multiple units or stalls, each with their own meter. The utility is supplying power to the EV charging provider as one account, and the charging provider in turn supplies power through several systems to vehicles.

12. Can EV charging stations be configured so that more than one vehicle can charge at a single station at the same time (e.g., multiple cables or automatic disconnect when one car is fully charged) to avoid the need for one car to move to a new parking space in order for the second car to charge?

Yes, "multiplexed" EV charging stations exist.

Consumer Protection

13. Does any State of Vermont entity currently have the authority to verify the accuracy of the electricity meters in EV charging stations? If yes, which agency? Please describe an appropriate regulatory oversight structure for that role. If no, what agency is best positioned to take on that oversight role and why?



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The Weights and Measures Program in the Vermont Agency of Agriculture has that authority. The Secretary of Agriculture has authority over all weights and measures except for electricity meters *when they are operated in a public utility system*. If they are not operated in such a system, the Secretary of Agriculture has authority.

14. What recourse would consumers have for complaints arising from public EV charging station usage absent Department of Public Service and Commission jurisdiction?

They could file a concern with the Weights and Measures program. Particularly egregious violations could be addressed under fraud statutes. Plug In America is not aware of significant problems in this area.

15. What information should be available to the users of public EV charging stations at the time they are charging their vehicles (e.g., phone number for technical assistance from station operator, phone number for consumer protection assistance, etc. posted in plain view on the charging station)?

A phone number for technical assistance is important. We would prefer that this be a single point of contact that, to the extent possible, can resolve all or nearly all issues that might arise in accessing the station, rather than multiple numbers for different aspects of station operation.

Utility Participation

16. Do third-party charge providers compete directly with utilities in any other states?

To a degree. In some cases, this is due to the charging provider offering capabilities or speed that local utility-owned stations may not. For example, Tesla Supercharger stations exist even in areas where utilities have installed public EVSE.

However, most proposals for utility ownership of EVSE have focused on underserved market segments that are not met by the third-party charging providers.

17. Do any Vermont utilities have an interest in offering their own charging facilities? If so, how would that arrangement be structured (e.g., facilities and services subject to traditional utility regulation or services provided by an affiliate subject to the same level of regulation applied to non-utility providers of charging services)?

Utilities may have an interest in operating stations for their employees, for fleet vehicles, and for learning about vehicle-grid operations. Stations owned by utilities would not be subject to the Weights and Measures Program, but would rather be subject to traditional utility regulation. It would be important to ensure they do not unfairly undercut market participants.

18. Are there states that treat charging stations owned by utilities differently than they treat charging stations owned by non-utilities? If so, please identify those states and describe the differences in treatment and the reasons therefor.

As noted above, state utility commissions (or municipal utility boards) typically have oversight over utility-owned EVSE.



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19. If a utility offers time-of-use rates to a residential customer for charging an EV at home, or to a business customer for charging employee EVs at work, would or should that utility also offer the same time-of-use rates to non-utility operator of a public EV charging station? What considerations would go into determining whether to tariff such an offering?

Plug In America would support the offer of time-of-use rates to EV charging providers. Time-of-use rates encourage off-peak charging which reduces the costs of EVs to the grid. We do not expect this option would be heavily used by DC fast charging stations but it could be used by public level 2 stations.

General

20. Are there other considerations that these questions do not reflect, and if so, what are they?

Any public investment in charging infrastructure in Vermont – whether utility-owned, rebate-supported, or grant-funded (such as through the VW Appendix D settlement) should be publicly accessible, consumer-friendly, and highly reliable. Plug In America is working with NESCAUM to articulate key principles and policy suggestions in this regard. Vermont state officials have participated in this process and we look forward to continuing to work with Vermont stakeholders.