March 1, 2019

VIA ELECTRONIC FILING

Ms. Judith Whitney, Clerk
Vermont Public Utility Commission
112 State Street, Floor 4
Montpelier, VT 05620

Re: Docket 18-2660-INV, Investigation into promoting the ownership and use of electric vehicles in the State of Vermont.

Dear Ms. Whitney:

Tesla, Inc. ("Tesla") thanks the Public Utility Commission ("Commission") for the opportunity to provide comments in response to the topics in the Notice of Workshop issued on February 4, 2019. Tesla owns and operates more than 12,000 publicly accessible Supercharger stations globally, and in 2018, Tesla sold nearly 240,000 electric vehicles ("EV"). As a leading manufacturer of electric vehicles and operator of electric vehicle supply equipment (EVSE),Tesla's extensive interactions with customers, utilities, and others in developing charging stations can offer a unique perspective to the Commission's inquiries.

1. **Planned or currently available EV-specific rate offerings for both home charging and service to public charging stations, how they will be or are being implemented, how successful the offerings are expected to be or have been, and any difficulties expected to be encountered or that have been encountered in offering such rates.**

Utility rates can help encourage customers to purchase electric vehicles by providing a savings opportunity relative to gasoline, can encourage customers to consume electricity at beneficial times, and can promote investments in public charging stations.

When designing EV rates, it is important for the Commission to consider the various customer use cases for EVs, such as differentiating between home charging, fleets, and public charging. It is also critical to consider customer experience and potential issues that may arise that either prevent customers from enrolling, or even potentially purchasing an electric vehicle or investing in charging infrastructure.

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While it is unlikely that there is a one-size fits all rate, it is critical that rates remain non-discriminatory and technology agnostic to ensure all customers and charging operators are on a level playing field. Given the variety of uses cases and customer interests, flexibility and providing customers with rate options is also important.

For example, some utilities have offered have offered residential whole-home time-of-use ("TOU") rates as well as a separately metered TOU rates specifically for the EV. It is important that these rates not require a specific technology to participate because doing so would limit the potential participants and benefits that could accrue to all ratepayers. It is also important that the rates send the same price signals. For example, if there is interest in an EV-only TOU rate solely applicable to EV load, the rate design should be the same as a whole home TOU rate. This ensures that customers are receiving the same price signal, regardless of the technology they adopt and avoids customer confusion. Furthermore, any rate design should be relatively easy for customers to understand. TOU rates should include no more than three periods —such as peak, off-peak, and super off-peak— and provide a reasonable opportunity to switch the customer's consumption to off-peak periods. This means that peak periods should generally be less than 6 to 8 hours.

Examples of well-designed TOU rates include Georgia Power's. Their rate includes a super off-peak period from 11pm – 7am every day, and a peak period that is limited to 5% of hours in a year.[1] An additional best practice is to provide customers with some certainty about billing.

Given that many customers have little experience with TOU rates and may be wary of enrolling, some utilities have a provision that allows EV customers to receive a credit following the first year of enrollment in a TOU rate for the difference, if any, between what the customer paid on the TOU rate and what the customer would have paid on the non-TOU residential rate.[2] Essentially providing customers with a risk-free trial for switching to a TOU rate is a good way to encourage additional customers to enroll in the rate.

Unfortunately, user acceptance and education of TOU rates continues to be a barrier to widespread adoption, which is driven by customer savings. A recent Brattle Group survey found that only 3% of customers for which TOU rates are available are currently enrolled in the programs.[3] Primary causes

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[1] Georgia Power. Plug-in EV Rate. https://www.georgiapower.com/residential/billing-and-rate-plans/pricing-and-rate-plans/plug-in-ev.html

[2] See Con Edison's Time-Of-Use rate which includes a one-year price guarantee for EV owners: https://www.coned.com/en/save-money/energy-saving-programs/time-of-use See National Grid NY's SC-1 TOU rate which has a reconciliation mechanism for EV owners https://www.nationalgridus.com/Time-of-Use

[3] The Brattle Group. The National Landscape of TOU Rates Summary Presentation. November 2017. Slides 5-6. http://files.brattle.com/files/12658_the_national_landscape_of_residential_tou_rates_a_preliminary_summary.pdf

for this according to the survey include lack of marketing, inconvenient design or additional charges to cover cost of the TOU meter.[4]

2. **Demand charges and DC fast-charging stations, including the effects of demand charges on the deployment of such stations and how such effects can be mitigated or eliminated without undue impact to electric ratepayers.**

To help drive EV adoption and maximize ratepayer benefits, several utility commissions across the country have also directed utilities to implement DC fast charging ("DCFC") rates that include a reduced demand charge. Some examples include rates with National Grid Rhode Island,[5] PECO,[6] NV Energy,[7] Eversource Connecticut,[8] and Consolidated Edison,[9] among others. Some of these rates are time limited, such as lasting for three years, have forgiven a portion or all of the demand charge, or have converted the demand charge to an equivalent volumetric rate to ensure that the rate is revenue neutral for the commercial class.

Increasing access to DCFC charging enables the adoption of EVs as it allows for consistent, reliable, and affordable charging which will make the difference between buying an EV or a traditional gasoline-powered vehicle. While more than 80% of an EV driver's charging currently occurs at home or work, customer access to DCFC is essential for or long-distance travel or emergency situations, and for customers without access to at home charging, such as those who reside in multi-family dwellings.[10]

Demand charges represent a significant barrier to the development of DCFC infrastructure. A recent study conducted by the Rocky Mountain Institute found that when utilization of DCFC stations is low, which is common given the nascency of the technology and EV industry, demand charges can

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[4] Ibid
[5] *See* National Grid Rhode Island "DCFC Discount Pilot Program https://www.nationalgridus.com/media/pdfs/billing-payments/tariffs/ri/dcfc-disc-pilot-provision-(09-01-18).pdf
[6] *See* PECO "Electric Vehicle DCFC Pilot Rider" https://www.peco.com/SiteCollectionDocuments/ThirdPartyEV.pdf
[7] *See* NV Energy "General Service Electric Vehicle Recharge Rider – Time-of-Use" https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/about-nvenergy/rates-regulatory/electric-schedules-north/OGS_EVRR_TOU.pdf
[8] *See* Eversource CT "Electric Vehicle Rate Rider Pilot". https://www.eversource.com/content/docs/default-source/rates-tariffs/rider-ev.pdf
[9] *See* Consolidated Edison "Business Incentive Rate" https://www.coned.com/en/commercial-industrial/economic-development/business-incentive-rate
[10] Charging at Home," Department of Energy, Office of Energy Efficiency & Renewable Energy, available at https://www.energy.gov/eere/electricvehicles/charging-home; and *Evaluating Methods to Encourage Plug-in Electric Vehicle Adoption,* prepared by Plug In America for CalETC, October 2016, p. 23, available at https://pluginamerica.org/wp-content/uploads/2017/03/PIA-Incentive-Survey-Paper-Final-Oct.-2016.pdf.

account for up to 90% of a station's monthly electricity bill, resulting in prohibitively high operating costs.[11]

It is important to emphasize that any rate designs for DCFC stations should be non-discriminatory and not have any technology restrictions or requirements, thus allowing all EV charging providers to operate on the same level playing field.

3. Incorporation of growing EV charging load into the electric grid and issues associated with serving that new load.

With EV deployments still in the early stages, focusing on EV impacts and creating procedures to do so is likely unnecessary. For example, the three major California investor owned utilities conduct an annual load impact report given they have one of highest levels of EV penetration in the country and These annual reports demonstrate that the incremental demand that these EVs add to the utilities system is negligible currently. Over the last five years the reports indicated that less than 0.2 percent of EVs have necessitated utility infrastructure upgrades. The utilities found that the total amount of utility expenditures for system updates due to EVs accounted for only $610,000 of over $5 billion in distribution system upgrades.[12] Vermont can take the same approach as California, but utilities are constantly evaluating their distribution grid and identifying changes in technologies and customer behavior. New EV charging stations, particularly DCFC stations, typically go through utility new service request processes. Utilities conduct system studies during the new service request process to identify whether infrastructure upgrades will be required for the DCFC station to take service. Charging station operators are required to pay for any upgrade costs above the allowance amount. Therefore, a new approach may not be necessary since trends and impacts can be evaluated through existing utility planning and load forecasting processes.

In the context of integrating EVs and charging infrastructure into distribution system planning, the utility will need to have general insight and data on vehicle purchases and usage behavior, which is no different than the insights needed on other types of customers (retail, schools, homes, etc.) The information will help the utility understand and manage the needs of the customers.

Currently, utilities may lack visibility about who owns an EV in their service territory and how they are charging. Increasing visibility into EV ownership and charging behavior is important. Like EVs themselves, every utility's electric power system is unique, so it is important not only for utilities to

[11] Fitzgerald, Garrett and Chris Nelder, *EVgo Fleet and Tariff Analysis*, Rocky Mountain Institute, 2017, p. 1, available at https://www.rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.

[12] Avi Allison, Melissa Whited. Electric Vehicles Are Not Crashing the Grid: Lessons from California (November 2017). Page 2. Available at http://www.synapse-energy.com/sites/default/files/EVs-Not-Crashing-Grid-17-025_0.pdf

gain foundational insights into their own customer EV trends, but the insights are also important for other stakeholders, such as charging station developers. Given privacy agreements between customers and auto manufacturers and retailers, utilities can offer customers a nominal rebate for registering their EV with the utility as a way to increase visibility of EV location. Several utilities have implemented such programs through their websites, including ComEd in Illinois,[13] Baltimore Gas and Electric in Maryland,[14] and Salt River Project in Arizona.[15] Once there is visibility on EV ownership, electricity usage patterns can come through the existing utility meter infrastructure. The data can also help steer customers to programs that optimize and increase the utilization of the electric power system such as TOU rates.

4. The potential benefits of managed EV charging to the electric grid, including using EV batteries for purposes such as peak shaving and regulation, and the likelihood of realizing such benefits based on EV usage in Vermont and existing and expected technological capabilities.

When evaluating the need to adopt or encourage smart charging technologies or "managed charging" whether in programs or pilot projects, there are five principles the Commission should consider which include:

1) start from a place of universal understanding, including defining "smart charging" prior to considering if, how and when it may be utilized,
2) recognize that there are various technologies available and potentially under development,
3) consider driver charging use cases,
4) establish that customer experience is a key element of any program or pilot design, and
5) evaluate the costs, benefits and value proposition for impacted stakeholders (customers, companies, utilities/grid).

The terms "smart charging" and "managed charging" are increasingly being utilized in various regulatory settings yet it is often unclear what types of behaviors, technologies or programs are being referenced. The California Vehicle Grid Integration (VGI) working group developed a glossary of terms to distinguish between the many different terms utilized for charging discussions today. The glossary defines smart charging as "involving charging EV batteries based on utility-, third-party-, and user-defined criteria (such as electricity prices and renewable energy output) while still maintaining sufficient charge to meet EV drivers' needs."[16]

[13] Register your Electric Vehicle. ComED. https://secure.comed.com/SmartEnergy/SmartMeterSmartGrid/Pages/RegisterYourElectronicVehicle.aspx
[14] Register your Electric Vehicle, BGE https://secure.bge.com/SmartEnergy/SmartMeterSmartGrid/Pages/RegisterYourElectronicVehicle.aspx
[15] SRP EV community: https://www.srpnet.com/electric/home/cars/secure/evsignup.aspx
[16] Vehicle Grid Integration (VGI) CA PUC Working Group, Glossary of Terms, available at http://www.cpuc.ca.gov/vgi/.

Once smart charging has been clearly defined, it is important to evaluate the charging use cases for which smart charging is most applicable, weighing the costs and benefits, and what strategies to utilize (TOU rates, DR signals etc.). Whether light-, medium- or heavy-duty, the number of chargers deployed at a site, dwell time and level of congestion will all have an impact on which managed or smart charging strategy can be utilized effectively without harming customer experience. Considering light-duty for instance, a distinction should be made between Level 2 and Level 3 (direct current fast charging) as it is unlikely that actively managing charging in DCFC settings will provide a desirable customer experience today. At the same time, managed charging through TOU rates, when properly designed, can often serve as the building block for any smart charging and VGI strategy. Regulators should also be careful to not adopt any unnecessary requirements for enabling smart charging prior to analyzing customer acceptance of such programs, and the costs and benefits for various charging use cases. Any complex smart charging programs should, therefore, be designed as opt in pilots to maximize customer experience.

We appreciate the opportunity to provide these comments and for the Commission's consideration. Tesla looks forward to continue working with stakeholders to find ways to increase EV adoption and access to charging in Vermont.

Sincerely,

Patrick Bean
Sr. Managing Policy Advisor, Tesla Inc.