Alliance for Transportation Electrification

March 1, 2019

Judith C. Whitney
Clerk of the Commission
112 State Street
Montpelier, VT 05620-2701

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

Dear Ms. Whitney:

Enclosed for filing in the above-referenced matter please find the written comments of the Alliance for Transportation Electrification. We look forward to active participation in this important proceeding.

Respectfully submitted,

/s/ *Philip B. Jones*

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Executive Director
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Enclosure

STATE OF VERMONT
PUBLIC UTILITY COMMISSION

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

**COMMENTS OF
THE ALLIANCE FOR TRANSPORTATION ELECTRIFICATION**

The Alliance for Transportation Electrification (the Alliance) is pleased to submit the following comments in advance of the workshop scheduled for March 15, 2019 on the subject of electric vehicle charging generally, and in response to the questions posed in the February 4 Order specifically.

About The Alliance

The Alliance for Transportation Electrification, a 501(c)(6) non-profit corporation, is led by utilities, electric vehicle (EV) infrastructure firms and service providers, automobile manufacturers, and EV charging industry stakeholders and affiliated trade associations. We started with 20 organizations at the launch just over a year ago; by taking a "big tent" approach to advancing the industry, we have grown rapidly to include about 40 members today and are actively engaged in regulatory proceedings such as this across the country.

Our goals are to engage with public service commissions and other agencies to remove barriers to EV adoption by encouraging a collaborative and open approach to accelerate the deployment of EV charging infrastructure, supporting an appropriate utility role by complementing the private/competitive market, developing effective outreach and education measures, and promoting interoperability and open standards in all parts of the EV charging ecosystem.

Question 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.

Given the volume of rates across the country, not to mention the frequency with which they change, we are not in a position to cite them all. We will, however, offer general observations and best practices. We also point out that numerous reports have been published in recent years on the subject of EV charging that supplement decades of writing on time of use in general. One report that is particularly recent is "Beneficial Electrification of Transportation," by the Vermont-based Regulatory Assistance Project.[1]

Home Charging: Conducive to EV-specific rates, and aggregated demand response has great potential; but customers may resist initially.

Home charging, in general, is suited for EV-specific rates (by which we assume the Commission means a time-of-use rate) because vehicle charging typically does not need to occur at a particular moment. Unlike most other uses for electricity, when energy must be supplied at the precise instant that it is demanded, electric batteries consume energy at times other than when it is needed. This flexibility offers great opportunity to improve utilization of generation, transmission, and distribution resources. That said, customers historically have resisted time of use rates; moreover, for EV-specific rates in particular, the added monthly cost and installation

[1] Farnsworth, D., Shipley, J., Sliger, J., and Lazar, J. (2019, January). *Beneficial electrification of Transportation.* Montpelier, VT: Regulatory Assistance Project. (Available at https://www.raponline.org/wp-content/uploads/2019/01/rap-farnsworth-shipley-sliger-lazar-beneficial-electrification-transportation-2019-january-final.pdf (last visited March 1, 2019).

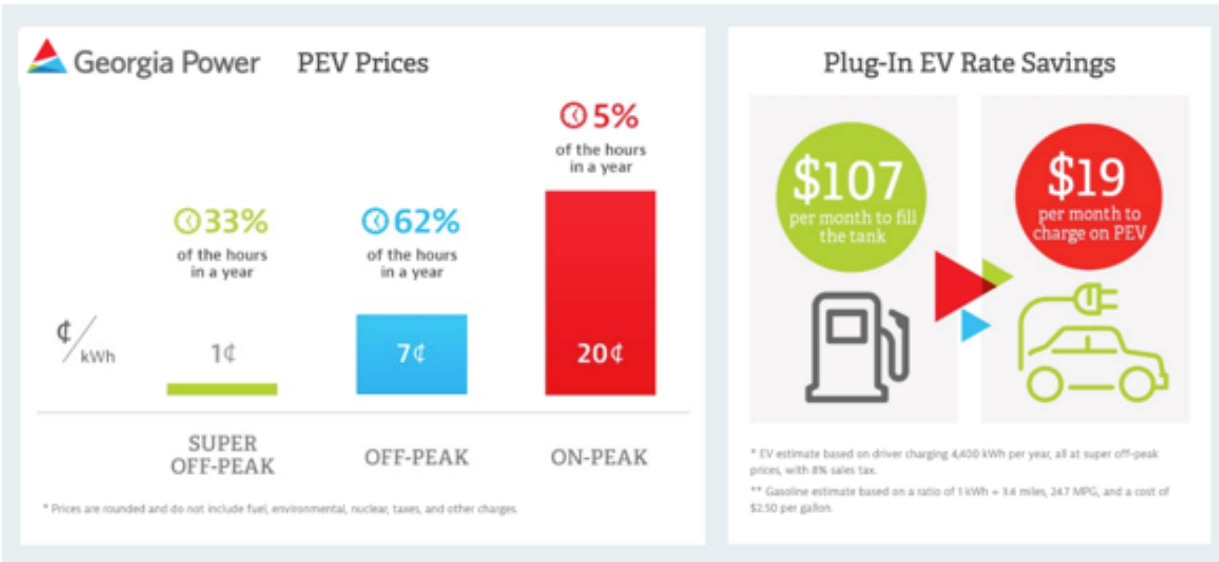
costs of a second utility meter (i.e., the work to install the meter, which can be extensive) could, although not necessarily, make time of use rates impractical, uneconomical, or both for a great many customers.

In addition, several utilities have proposed (and Commissions have approved) whole-house TOU rates. However, the experiences of utilities to date have demonstrated there is considerable resistance from ratepayers to whole-home TOU rates due to the fear of "paying more" for overall electricity consumption. One example of an effort to overcome this opposition was by ConEdison, in New York, which offers a one-year price guarantee for EV owners who elect the company's residential TOU rate. Under this program, the company will compare what the customer paid under time-of-use rates with what would have been paid under the standard residential rate; if the customer paid more under the TOU rate, the company will credit the customer's account for the difference.

Furthermore, the Alliance is encouraged by technology developments that will enable customers to set certain parameters around charging linked to driving patterns, vehicle state of charge, and energy price signals. Ideally, technology will handle this for customers through some type of default mechanism that does not require active operation by the user. This overall architecture and system, however, has not matured sufficiently in the marketplace yet.

One time-of-use variable we have witnessed is a rather significant disparity in the delta between peak and non-peak rates. The reasons are many and ultimately go to the core of ratemaking, involving (in no particular order) a multitude of system costs, corporate and regulatory philosophy, political influences, wholesale market prices, intermittent resources, industrial loads, legacy costs, fuel mixes, long-term contracts, and more. Some utilities offer massive discounts for "super off-peak" charging, while others offer only modest discounts. An example of a substantial discount is Georgia Power's TOU-PEV-6 rate (Rev. Original, Page No.

2.30), which charges $0.2317/kWh during peak hours and only $0.014164/kWh during super off-peak.



Public Charging: Predictability argues in favor of consistent pricing, but grid conditions could justify flexible pricing in times of extreme stress; that said, not all loads are equal, so consider impacting EV charging only as a last resort and give customers ability to opt-out at reasonable price.

In contrast to home charging, where TOU rates are typically encouraged by utilities to better utilize grid resources, public charging tends to be less responsive to price signals. One reason for this is that there are many different business models for public charging, with some service providers taking the position that simplicity and consistency is more important than managing demand. This does not necessarily mean that the charging provider cannot be charged variable pricing, only that they provider may choose not to pass that along to customers. To the extent grid conditions (i.e., where real-time price signals are available) warrant demand response, the Alliance suggests that decisionmakers take a ranked-order approach to deploying demand resources just as they do supply resources, so that chargers that are particularly important are dispatched after other resources that may be more flexible.

One example of a utility-managed program that imposes a surcharge during peak hours (non-holiday weekdays 3:00 PM to 8:00 PM) is Portland General Electric. Schedule 50 of PGE's tariff[2] establishes the following price schedule:

	Flat Fee (all hours)*	On-Peak Charging Price
Direct Current Fast Charger	$5.00 per Session	Flat fee + $0.19 per kWh
Level 2 Charger	$3.00 per Session	Flat fee + $0.19 per kWh
Monthly Membership		
Single Purchase	$25.00 per month	$0.19 per kWh
Multiple Purchase**	$20.00 per month	$0.19 per kWh

* The flat fee is also the total charge during the Off-Peak period.
** Monthly memberships may be purchased at a discounted price of $20 per month when buying at least 50 memberships at once.

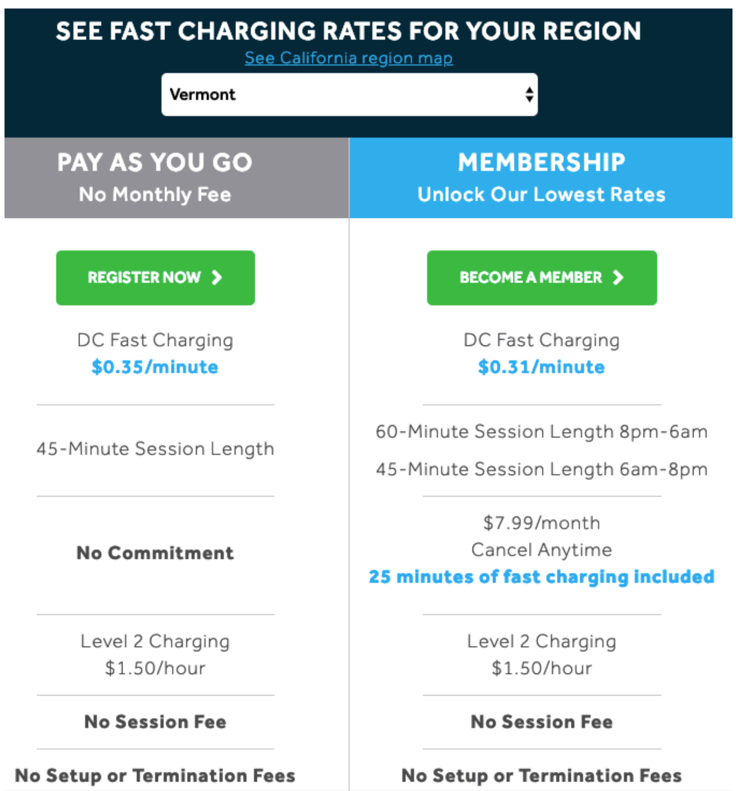
Certain service providers, meanwhile, do offer the ability to change price based on factors such as wholesale or distribution system conditions (in addition to other conditions unrelated to energy prices such as lunch hour, busy shopping times, etc.). One concern about this variability is the notice given to customers about the price changes that could happen in the middle of a charging session. The National Institute of Standards and Technology (NIST) is addressing this issue in Section 3.40 of Handbook 44. The section, which is not yet finalized, is titled "EV Fueling Systems," and provides in relevant part that "Except when the conditions for variable price structure have been approved by the customer prior to the sale, a system shall not permit a change to the unit price during delivery of electrical energy."[3]

[2] Portland General Electric Company, P.U.C. Oregon No. E-18 (Original Sheet No. 50-1), effective Dec. 1, 2018). (Available at https://www.portlandgeneral.com/-/media/public/documents/rate-schedules/sched_050.pdf (last visited March 1, 2019.)

[3] NIST Handbook 44, available at https://www.nist.gov/document/3-40-19-hb44-finalpdf (last visited March 1, 2019).

While some charging providers charge by the minute, others by session, and others by kWh. This variation exists due to business decisions in some cases, and in others because of a prohibition on non-utilities to charge by the kWh. State offices of weights and measures, following guidance from NIST, are moving towards requiring electricity dispensed for fuel to be measured and priced by the kWh. This will become an issue in states where non-utilities are not permitted to sell electricity by the kWh. Tesla Superchargers, for example, charge by the kWh at some locations and by the minute at others (this distinction is not necessarily due to regulations, it could simply be a business decision). When charging by the kWh, the price is $0.28. When by the minute, the price is $0.13 per minute at or below 60 kW and $0.26 per minute above 60 kW.

Network operator EVgo offers the following time-based price schedule in Vermont:



Utility-sponsored education and outreach (E&O) is essential

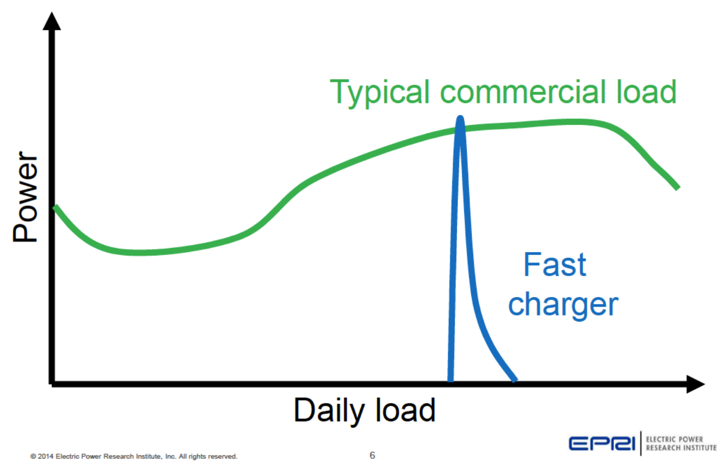
The Alliance strongly believes that education to consumers about EVs and charging infrastructure is a vital task today and, while auto manufacturers, dealers, and other stakeholders have a big role to play, electric utilities have an important role to play as well due to their expansive reach and close relationship with thousands of potential EV owners. We also believe that such program costs should be included in the tariffs and rates paid by all ratepayers, subject to a reasonable budget and Commission oversight.

The unfortunate reality today is that, even in higher penetration states like California, less than one-half of consumers can remember the name or make of an electric vehicle (other than Tesla). Moreover, they have little understanding of how electricity is used and consumed in a Level 2 charger at home or publicly accessible (in fact, the survey data shows that thousands of EV owners are reverting to simple “drip charging” overnight at 120 volts). They have little understand of how electric rates are set, how dynamic rates like TOU may work in practice, and how overall electric prices (per kWh) stack up against gasoline or diesel prices at the pump.

While we recommend that the Commission allow robust education and outreach activities (such as improved web portals, ride and drive events, gasoline to kWh price comparisons, etc.) in regulated utility programs, we urge the Commission to defer to the evolving marketplace in the next several years as the various business models and pricing systems mature. In any case, a robust utility-led outreach and education program would greatly assist the public in learning about what is, to many, a rather complicated new world.

Question 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.

Demand charges constitute a disproportionate cost of an average month's kWh charges when loads are "peaky," or generally low or zero punctuated by relatively high and brief periods of demand. In other words, the exact use case for many DC fast chargers today which sit idle for hours at a time and then are called on to dispense 50 kWh for a few minutes before ramping down and, typically within 30 minutes, settling back to zero as shown in the following graph produced by EPRI:



The problem is that the demand charge has relatively few kWh over which it is spread, thereby causing the per kWh cost in a particular period to be substantially higher than if the same demand charge was spread over a greater number of kWh. Over time this problem will diminish for many DC fast chargers as utilization increases, but at the moment and for the next few years in most cases utilization will continue to be low.

Demand charges serve an important function and cannot simply be dismissed

The Alliance believes that demand charges should not, as a general matter, be waived. Demand charges serve an important function in the overall ratemaking of setting just and reasonable (J&R) rates for regulated utilities, while at the same time ensuring that the prudently incurred fixed costs of utilities are recovered in a reasonable way. Accordingly, we believe there is neither a regulatory nor an economic reason to exempt certain types of loads or customers permanently from these requirements. That said, we certainly recognize the need to consider new structures, and for that reason we encourage commissions to try new solutions, perhaps via pilots at first.

The Edison Electric Institute just a few weeks ago issued a report prepared by the Brattle Group on the subject of increasing DC fast charger deployment.[4] We agree with the report's conclusion that "[d]esigning the 'perfect' DCFC rate may not need to be the top priority initially," that "[e]xperimentation and learning what works . . . may be more appropriate near-term objectives," and that "[e]ach option will need to be evaluated with respect to the electric company's ratemaking principles, appropriate cost recovery, and broader policy and regulatory objectives."

One example of a way to manage the adoption curve is Southern California Edison's demand charge "holiday"[5] or economic development tariff approved by the California PUC a couple years ago. This works best when there is line of sight to sufficient utilization (which appears to be the case in California) so that a business can plan for the eventual and (ideally) predictable return of demand charges.

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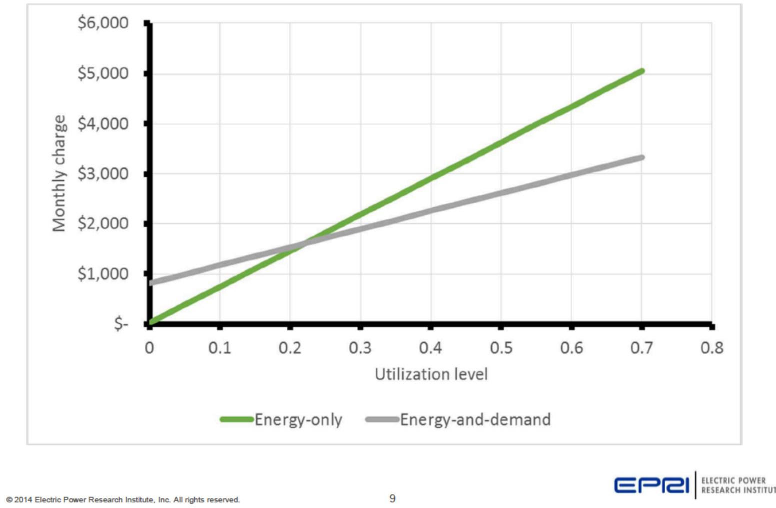
[4] Hledik, R. and Weiss, J. (2019, January). *Increasing Electric Vehicle Fast Charging Deployment; Electricity Rate Design and Site Host Options*: Brattle Group. (Available at http://files.brattle.com/files/15077_increasing_ev_fast_charging_deployment_-_final.pdf (last visited March 1, 2019).

[5] Schedule TOU-EV-6 (Submitted Dec. 17, 2018, Effective Jan. 1, 2019, Cal. PUC Sheet No. 65392-E) (available at https://www.sce.com/NR/sc3/tm2/pdf/ce379.pdf) (last visited March 1, 2019).

An alternative to an express "holiday" was recently approved by the New York PSC for a "consensus agreement" between NYPA, the seven Joint Utilities (JU) and other state agencies in Case No. 18-E-0138, where the Commission authorized annual credits for DC fast charging that are designed to mimic and thereby offset the anticipated uneconomic portion of demand charges. The Commission did not expressly rescind or even suspend the demand charges. In fact, the Commission was clear in stating its preference that accurate and sustainable price signals for electricity be delivered to customers, and that any incentive approach should be interim (to "kick start" the DCFC market) and not technology specific. The New York credits vary by utility and by charger output (i.e., credits are higher for higher-output chargers), and the credits decline over time as utilization is expected to increase, thereby spreading the demand charges across enough kWh that the cost will be manageable.

Another option is to base the demand charge on volume rather than peak and collect it through the energy portion of the bill. When demand costs are recovered solely through energy prices, the energy price is considerably higher than when the energy price is supplemented with a demand charge. While this may appear suboptimal from the customer perspective, the reason is fairly straightforward: In the long run, utility costs have to be paid one way or another. And as utilization increases, high-volume chargers will indeed pay less overall under the current regime of energy plus demand. In other words, the challenge many DC fast chargers face today with low utilization is temporal and will fade over time as utilization increases, as shown in the following graph:



However the exact price is ultimately defined, we believe that, over time, customers will come to understand that delivering a kWh of energy at a publicly accessible DC fast charger is simply more expensive than buying the same kWh at home, and that is why prices are different. Tesla is leading the way in this regard by charging, as shown above, $0.28/kWh at public DC fast charge locations where it is permitted to do so. This price is higher than at home, but it reflects (at least some of) the significant cost of getting that energy to parking spaces, and that those kWh are a scarce resource and quite valuable (not unlike a cold 20-ounce soda at the drug store, where the cost per ounce is more than 5x higher on a per-ounce basis than a warm 2-liter bottle of the same beverage).

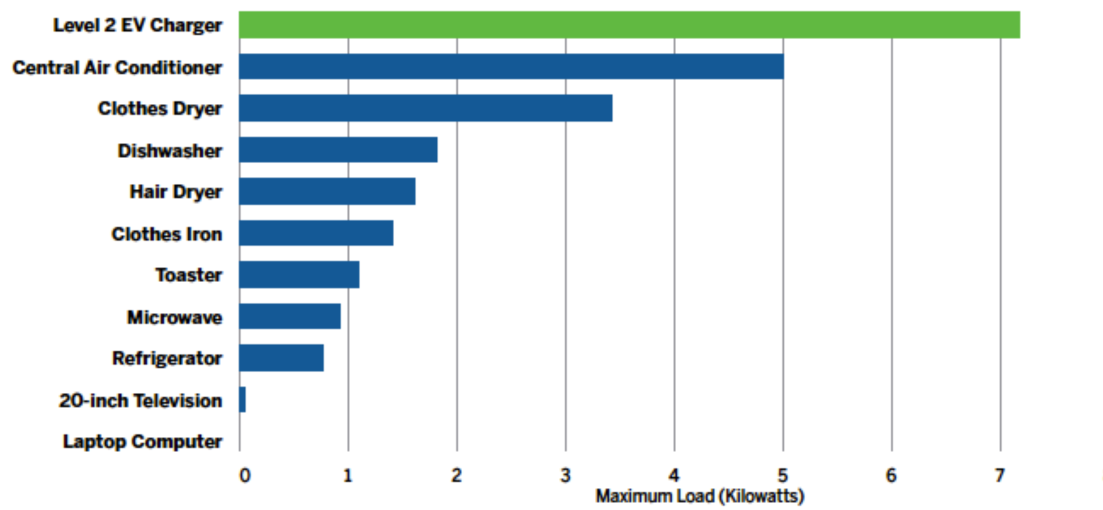
Question 3: Incorporation of growing EV charging load into the electric grid and issues associated with serving that new load.

and

Question 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.

These questions are closely related, so we will answer them together. The issue of managing a growing load has been a long been a concern because of the substantial additional load that even a single EV brings, particularly in rural and suburban residential settings. But even in commercial and urban settings, the load stacks up quickly and installing more than two to four Level 2 chargers often quickly exhausts a facility's space capacity. The following chart, which is from the recent Regulatory Assistance Project report (at page 23) cited above, illustrates the magnitude:

Figure 5. Level 2 Charger Load Compared With Other Household Loads



Source: Allison, A., and Whited, M. (2017, March 2). *A Plug for Effective EV Rates.*

It is a testament to the expertise and resilience inherent in utilities across America that the grid is able to support EVs, and we are confident that utilities will continue to modernize their distribution grids and offer "safe, reliable, and affordable electricity" to all classes of customer in the future – rich and poor, rural or urban, and commercial-industrial or residential. The Alliance believes that regulated utility investments in the distribution system to support EV charging infrastructure should be regarded generally as another necessary type of grid modernization investment.

But we cannot rely on hope alone. While it is true that utilities have not, to date, experienced widespread problems caused by EV charging, penetration remains too thin to rule out some combination of infrastructure upgrades and managed charging. While energy efficiency, weatherization, and demand response have certainly impacted utility load, revenues, and planning, it will be essential for the utilities to engage in the proper planning on a distribution level basis for increased loads due to EV charging in the future, and try to project their impacts by location (feeders and substations), load curves during the day, impact on coincident peaks, and other key measures that relate to reliability and cost.

This will be the case not only with consumer adoption, but also with fleets and large commercial/public installations that could require hundreds of kW or even 1 MW+ per site. To date, most upgrades are focused relatively far down in the distribution system, but that does not mean they are inexpensive. And as EV penetration continues to increase, we are likely to see the load curve continue to evolve so the ultimate response (when combined with the other variables such as intermittent resources, storage, and solar) is unpredictable.

We do not necessarily think that a prices to devices approach is appropriate for all EV applications. As discussed above, customers charging at public locations are likely doing so because they have to; they cannot realistically wait for prices to come down, off-peak to begin, or a demand response event to end. And if they are forced to pay more than the usual price as a disincentive to charging during peak times, this will serve to depress the market for EVs overall. So, finding the right levers to pull when it comes to managing charging is important.

Our recommendation today is that there is not one size fits all solution, either for use-cases or between states and localities. For these reasons, we encourage the Commission to endorse a wide range of approaches with the goal of reaching tailored, effective, and reasonably priced solutions.

Question 5: The accuracy of electric metering and submetering technology for charging EVs.

This is an extremely important and technical issue, but a substantive response requires additional context. For that reason, we decline to elaborate at this time but we encourage the parties to continue the discussion.

Respectfully submitted,

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