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May 13, 2019

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

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

Dear Ms. Whitney:

The Public Utility Commission ("Commission") held a Workshop in the above captioned investigation into electric vehicles ("EVs") on April 23, 2019, and established May 13, 2019 as the deadline for final written comments. During the April 23, 2019 workshop, the Commission asked several questions to which the Department of Buildings and General Services ("BGS") is best positioned to respond. The Department of Public Service ("Department") respectfully submits these final recommendations regarding the topics contained within Section 25 of Act 158 (H.917) of the 2017-2018 legislative session as well as responses from BGS regarding the questions referenced above. These recommendations and responses were developed in collaboration with the Agency of Natural Resources; the Agency of Transportation; and the Department of Buildings and General Services.

Many other states have opened similar proceedings to examine issues related to plug-in electric vehicles ("EVs") and electric vehicle supply equipment ("EVSE"). Such proceedings have commonly addressed some, or all, of the following items:

1) The roles of utilities, regulators, and third-parties;
2) The regulatory treatment of EV charging station operators;
3) Rate design;
4) Interconnection;
5) Interoperability standards;
6) Consumer education;
7) Low-to moderate-income access;
8) Utility planning and forecasting;
9) Data access for customers and third-parties;
10) The role of EVs and EVSE in grid modernization;

11) Vehicle-grid integration;
12) Highway user fees for EVs;
13) The electrification of state-government fleets; and
14) The role of utilities in fleet electrification.

Over the course of several workshops and rounds of comments during this investigation, many of the issues identified above have been wholly or partially addressed through the participation of various stakeholders. Issue numbers 1 and 2 listed above have been adequately addressed by the Commission's letter and recommended statutory changes made to the Legislature (which are expected to pass this legislative session) regarding the regulatory treatment of EV charging station operators, including electric distribution utilities (the "utilities"). However, most of the other issues remain unresolved and the Department expects that additional work and continued conversations will be needed. For example, requests for new service, above a certain threshold, for EVSE should be incorporated into the Rule 5.500 update process. Additionally, many of these unresolved issues also overlap with those identified in Section 25 of Act 158 (H.917) of the 2017-2018 legislative session. As such, many of the Department's recommendations below also advance these topics and the Department will address them in turn.

(I) Act 158, Sec. 25 (d), Public Utility Commission; Report; Electric Vehicle Charging, report criteria

(1) Act 158 directed the Commission to provide its analysis and recommendations regarding the role of electric distribution utilities regarding the following issues. The Department has provided a recommendation for each issue in turn.

(A) removal or mitigation, as appropriate, of barriers to EV charging, including strategies, such as time-of-use rates, to reduce operating costs for current and future EV users without shifting costs to ratepayers who do not own or operate EVs;

Current rate design represents a barrier to the adoption of electric vehicles. The Department recommends that the Commission require the utilities to establish EV end-use or other rates that separately meter the EV usage for residential, public, and workplace charging. The rate design innovation needed includes controlled loads by distribution utilities, more dynamic forms of rates that can be managed by third parties, and relatively simple, but well-formed, time-of-use ("TOU") rates that ultimate consumers can manage. As the Commission has heard, a couple of Vermont's utilities have already implemented such rates. Burlington Electric Department offers a slightly less than $.07/kWh bill credit for off-peak EV charging. Green Mountain Power offered a $30/month unlimited off-peak EV charging rate in exchange for control over the charging during peak events. It is these type of rate designs that the Department recommends be developed by all utilities. The Commission has heard from the utilities regarding the challenges they would face in implementing such rate designs, most notably the ability to separately meter EV usage. It is the Department's position that the establishment of such

rates is not unduly burdensome to the utilities and that the benefits of such rates, which are discussed in more detail below, would outweigh the costs.

EV charging is a new source of flexible load that lends itself very well to managed charging, especially in the residential setting, but is also well suited to the workplace. On the residential front, household TOU rates are not enough. TOU rates must also be well-formed to the task. Many consumers would find it burdensome to understand both their entire residential load and how that may play out under a new TOU rate. Rates for both residential and workplace charging should offer steep discounts for off-peak or managed charging. Rates for publicly available charging stations may also offer these opportunities, but the ability to manage Direct Current Fast Charging ("DCFC") sessions may be limited.

Discounts are needed to encourage off-peak charging and can be accomplished without cross subsidy. For example, BED's EV charging tariff costs approximately $.08/kWh for off-peak charging. This includes a contribution to the infrastructure necessary to submeter the load as well as a contribution to joint-and-common costs. The margin that exists in the rate, i.e. the contribution to joint-and-common costs, may not be as high as that of other rate classes, but that is appropriate for loads that are new and elastic (growable) as it does not place a burden on other ratepayers. Rather the new loads provide a new source of value to the system and the margins provide a new contribution to joint and common costs.

Rate design applied to public charging stations requires reform. Currently only a few utilities offer EV specific tariffs for EV charging stations and those tariffs only are available to EVSE owned or operated by that utility. The Department recommends that the Commission require the utilities to address the barrier that demand charges present for public charging. Demand charges are commonly cited as an economic barrier to the business case for privately owned and operated public charging stations, particularly DCFC stations. DCFC stations are increasingly important to overcoming one of the largest barriers to adoption, that of range anxiety. Traditional demand charges represent a dated and increasingly flawed price signal, at least in their current form. The price element is especially challenging for customers with poor load factors that typify a category of customer or service demand. If the price signal was cost-based and provided an appropriate match between the customer demand and system costs, then there would be little basis for concern. But public charging stations are increasingly malleable loads that can provide a good match with the system, provided the price signal sent could be sharpened to better match system cost drivers. Alternative approaches to demand charges exist and they could provide relief from demand charges *while also avoiding a cross subsidy*. One example is the incorporation of the demand charge component of the rate into the usage fee, but even better examples exist that preserve and sharpen the demand-related element of the price signal.

(B) strategies for managing the impact of EVs on and services provided by EVs to the electric transmission and distribution system;

Managing EV loads is critical to minimizing the impact of EVs on the electric transmission and distribution system. Absent load management (including rate design containing price signals), EVs will likely contribute to a utility's load at peak times, increase costs, and potentially result in infrastructure investment. In order to mitigate these issues, utilities should know where and when most EVs are likely to charge. Utilities know when a customer takes advantage of a utility program for an EV or EVSE.

However, if a customer doesn't take advantage of such a program, a utility does not currently have a way of knowing that they have an EV. The Department's recommendations related to rate design would help to alleviate some of this problem. If utilities offer attractive residential EV end-use rates, it is likely that a high percentage of EV owners would sign up for such a rate. An alternative, or perhaps supplemental, approach would be for the Commission to recommend that the legislature establish some sort of notification process whereby the Utilities are notified when a customer purchases an EV.

The Department maintains that EVs can provide significant benefits to the system when they are managed appropriately. Those benefits include upstream benefits (i.e. those realized at a transmission level) such as, energy arbitrage, provision of ancillary services, reduction of Forward Capacity Market ("FCM") and Regional Network Services ("RNS") charges, as well as smoothing variable generation.

Benefits can also be realized at the distribution level including alleviation of local distribution constraints (if the charging can be choreographed to align with the constraint), passive voltage support, passive frequency control, reduction of system losses, as well as smoothing variable generation. It is important to note that the Department believes these benefits can be realized without the so-called vehicle-to-grid capability, which refers to using an EV battery to push power back onto the grid. These benefits can be realized simply by turning off, or ramping down or up, the level of EV charging that is occurring on the grid.

(C) electric system benefits and costs of EV charging, electric utility planning for EV charging, and rate design for EV charging; and

The Department has outlined above the potential electric system benefits associated with EV charging. The result of appropriate management of EV charging related loads is that EVs can contribute to downward rate pressure. When EV charging is not appropriately managed, costs could include additional FCM and RNS charges. It is also possible that as transportation electrification continues, clusters of adoption could necessitate infrastructure upgrades such as a new transformer. These potential costs highlight the need for utilities to conduct planning regarding where and when EVs are likely to materialize on their systems as well as engage in some type of load management. Utilities should consider the projected deployment of EVs within their service territories when conducting planning efforts such as integrated-resource planning or grid modernization efforts.

As previously stated, Vermont's distribution utilities should be required to establish EV rates for home and workplace conditions, and to reform public charging station rates. Public charging stations should have features which take full advantage of the flexible character of these loads to provide an additional contribution to covering overhead components of costs with potentially reduced operating margins relative to standard rates. Rate design can facilitate these features. Even DCFC stations should be afforded an opportunity to pay their way with alternatives to the current demand charge regime. Ideally, alternative approaches would preserve an effective price signal related to related system costs associated with the higher cost periods including annual and monthly peaks. With sharper price signals, DCFC stations can manage costs through retail rate design options that differentiate rates based on time, management practices, and battery storage solutions.

(D) the appropriate role of electric distribution utilities with respect to the deployment and operation of EV charging stations;

The Commission's recommended scope of jurisdiction over EVSE for the Commission and the Department is appropriate. The Department does not have additional recommendations for the role of the electric distribution utilities beyond the roles envisioned therein. The proposed language would allow a utility to invest in EVSE on an unregulated basis through an affiliate or on a regulated basis with approval granted by the Commission.

There may be areas of the State that will not be well served by the private market. This may be especially true of the highway corridor fast charging network, which is necessary to give EV motorists confidence that they can conveniently travel long distances through and across the State and to provide filling-station-like charging capacity to Vermonters who may not be able to charge at home or at work. In these areas, Vermont utilities can play an important role through the strategic use of rate design reforms, incentives, and strategic placement of the utilities own charging network. The Commission should continue to monitor the development of the EV market and EVSE deployments in Vermont and revisit this issue as necessary.

(2) Act 158 directed the Commission to provide its analysis and recommendations regarding the following issues for EVSE owned or operated by non-utility entities. The Department has provided a recommendation for each issue in turn.

(A) how and on what terms, including quantity, pricing, and time of day, such charging stations will obtain electric energy to provide to EVs;

The Department recommends that the Commission consider the requirement of EV specific rate designs. This could alter the current practice whereby such stations generally obtain electricity under a small commercial or general services rate with inappropriately high margins for easily managed loads that can be molded to avoid high energy prices as well as capacity and RNS charges. The traditional demand charge structure is also inappropriate in that it neither serves the system (all ratepayers) nor efforts to move the market for workplace or public charging. As discussed above, these rates should contain price signals or load management elements in order to minimize impacts to the grid and maximize potential benefits.

(B) what safety standards should apply to the charging of EVs;

If a utility is offering incentives for the purchase and installation of EVSE, the Department recommends that any devices eligible for such an incentive must be UL listed.

(C) the recommended scope of the jurisdiction of the Commission, the Department of Public Service, and other State agencies over such stations;

The Department does not have any further recommendations regarding the scope of the jurisdiction of the Commission, the Department of Public Service, and other State agencies over EVSE. The Department is supportive of the proposed statutory language sent by the Commission to the

Legislature, including giving the responsibility for EVSE meters with the weights and measures authority of the Agency of Agriculture, Food, and Markets ("AAFM").[1]

(D) whether such stations will be free to set the rates or prices at which they provide electric energy to EVs, and any other issues relevant to the appropriate oversight of the rates and prices charged by such stations, including the transparency to the consumer of those rates and prices; and

The owners and operators of EVSE should be free to set the prices at which they provide electric energy to EVs, in accordance with the Department's previous filings in this case as well as the proposed statutory language sent by the Commission to the Legislature regarding the scope of the jurisdiction of the Commission, the Department of Public Service, and other State agencies over EVSE.

Regarding transparency to the consumer, the Department recommends that the owners and operators of EVSE be required to clearly indicate the prices that will be charged to the consumer prior to the consumer initiating a charging session. It is possible that the recommended scope of jurisdiction by AAFM covers this topic. Owners and operators of EVSE should also be required to display a price conversion that allows the customer to understand the price they are paying for a charging session. This requirement could be phased out once EV adoption reaches a certain percentage of the light-duty vehicle fleet.

Customer's experiences at EV charging stations and the perceived ease of use of these stations will have an impact on the deployment of EVSE and the adoption of EVs. To that end, the Department suggests that the Commission recommend statutory updates that define interoperability billing standards and provide the authority for a State Agency or Department to adopt such standards. For the specific language and further background, please see the Agency of Natural Resource's filing dated December 14, 2018.

(E) the recommended billing and complaint procedures for such charging stations; and

The Department further recommends that all stations be required to provide a consumer with a receipt or invoice, physical, or electronic which clearly displays all charges incurred by the consumer during the charging session. Also, each station should be required to provide a phone number for a consumer to call in the event of a billing complaint or station malfunction. Again, it is possible that the recommended scope of jurisdiction by the AAFM covers this topic.

(3) Act 158 further directed the Commission to provide its analysis and recommendations regarding the following more general issues. The Department has provided a recommendation for each issue in turn.

[1] The Department recognizes AAFM's assertion that it would need additional resources to implement a regulatory program for EV charging stations, and that the National Institute of Technology and Standards code that AAFM would rely on has not yet been finalized.

(A) jointly with the Secretary of Transportation, recommended options to address how EV users pay toward the cost of maintaining the State's transportation infrastructure, including consideration of methods to assess the impact of EVs on that infrastructure and how to calculate a charge based on that impact, the potential assessment of a charge to EVs as a rate per kilowatt hour delivered to an EV; varying such a charge by size and type of EV; and phasing in such a charge;

On January 9, 2019, the Department filed the recommendation that EV users pay towards the cost of maintaining the State's transportation infrastructure through a per-kWh fee. Such an approach is largely dependent on the practices regarding rate design recommended by the Department. Favorable rates provide an independent basis for measurement of EV usage and to ensure that such a fee does not significantly diminish the level of discount needed to incentivize uptake of the rate, which could result in consumers avoiding the EV rate. Alternatives to favorable rates exist, but would require separate notice and measurement of service, that would impose other administrative burdens that potential conflict with creating a favorable climate for EV adoption. The Department recommends that a per-kWh fee be phased in over time. At this time a small fee could be implemented to gain experience with the proposed approach, with the full fee being implemented fee when the market could support the additional fee without deterring EV uptake, the fee could be increased. The Department suggests 15% of fleet penetration, or alternatively, 15% of new registrations in Vermont as potential milestones for escalating the highway user fee to point that will represent a reasonable substitute for the motor vehicle fuel tax. Utilities should be permitted to recover their reasonable costs of re-working their billing systems to account for EV charging rates and highway-user fees.

(B) the accuracy of electric metering and submetering technology for charging EVs;

The Department recommends that the Commission clarify for both utilities and EVSE providers that submeters built into Level 2 charging stations should be accurate enough to measure the usage of an EV for the provision of EV end-use rates or other rate designs that seek to incentivize EV adoption. Over time, meters used for billing should meet the same high standards of metering services that are otherwise available to customers on their usual household or business meters. In the interim, a lesser standard of accuracy may be appropriate provided the Level 2 EVSE is backed up by a utilities' revenue grade meter.

(C) strategies to encourage EV usage at a pace necessary to achieve the goals of the State's Comprehensive Energy Plan and its greenhouse gas reduction goals, without shifting costs to electric ratepayers who do not own or operate EVs; and

Three of the most commonly cited barriers to EV adoption in Vermont are 1) upfront cost of the vehicles, 2) vehicle range, and 3) availability of charging infrastructure.[2]

The State of Vermont has proposed an EV incentive program in order to address the upfront cost barrier. Additionally, all the utilities offer a purchase incentive through Tier III of the Renewable Energy Standard.

[2] See Drive Electric Vermont's Presentation that was filed in this Docket on April 23, 2019.

The limited range of EV models is a barrier and remaining a Zero Emission Vehicle state is critical to ensuring that EV models that are available continue to be offered for sale in Vermont. The EV market and model availability is in a period of rapid expansion, and vehicle range should become less of an issue as battery technologies continue to improve.

The Department recommends that the State continue to prioritize and invest in the build-out of EVSE. This type of work is currently ongoing through the inter-agency implementation of the EVSE Grant Program, funded by the VW Settlement. The Department also recommends that the State work to identify additional funding sources for the EVSE Grant Program once the existing funds have been exhausted. Finally, the EVSE Grant Program should focus on building out the State's DCFC backbone in order to combat the range anxiety barrier and to facilitate ease of travel for Vermont residents and tourists alike.

(D) any other issues the Commission considers relevant to ensuring a fair, cost-effective, and accessible EV charging infrastructure that will be sufficient to meet increased deployment of EVs.

Many of the issues identified in Section 25 of Act 158 (H.917) of the 2017-2018 legislative session will require continued conversation and engagement. The Department recommends that the Commission continue the investigation process in some form to bring stakeholders together to discuss these issues on an ongoing basis. A few of the topics discussed above which could benefit from additional process and discussion include future proofing of EVSE, low to moderate income access, utility planning, data access, the role of EVs and EVSE in grid modernization proceedings, and the role of utilities in fleet electrification. These discussions are currently ongoing at a regional level which may be useful to inform Vermont specific discussions moving forward.

(II) Additionally, during the most recent workshop, the Commission asked several questions to which BGS is best positioned to respond. The Department has included BGS' response to those questions below.

(A) Why aren't all of the new vehicles purchased by BGS EVs?

Some vehicles do not have EV alternatives. The function of the vehicle must be considered when purchasing its replacement. A large portion of BGS' fleet is SUVs, trucks and vans which are required to perform certain tasks related to an agency or department's mission. In order to purchase an EV, vendors must offer and bid an EV option for these class vehicles, which they have not yet. Additionally, EVSE must be available at the location where the new EV will be housed overnight, which requires funding for EVSE purchase and installation. It should be noted that this is a rapidly changing market and only in the last two years have longer range plug-in EVs been available at competitive prices. BGS was an early adopter of EV technology (hybrids and plug-in hybrids). We are moving to the next phase of adoption with plug-in electric vehicles this summer as funding allows.

(B) What are the barriers to adoption of EVs into the fleet from BGS perspective?

Charging infrastructure for overnight charging is not yet in place to support additional fleet EVs. In addition, we are only able to purchase vehicles which are bid through the State contracting process; if vendors don't offer an EV model in their bid, they will not be available for us to purchase.

(C) What is the status of EVSE availability in parking lots where fleet vehicles are parked?

EVSE is available at 7 Green Mountain Dr in Montpelier, 108 Cherry Street in Burlington and at the Waterbury State Office Complex to charge fleet vehicles. There is also charging available at VTrans' office on Airport Rd in Berlin for their assigned EV fleet vehicles and at National Life which is available for state fleet vehicles assigned to all agencies and departments at this location.

(D) Is BGS discussing EVSE in state parking lots with charging station providers such as Chargepoint?

BGS is not aware of any EVSE vendor willing to install their Level 2 charging stations for free on BGS property with the expectation that they can turn a profit on charging payments. ChargePoint has reached out to BGS with respect to one location close to the I-89 where they wanted to place a Level 3 DC Fast charge station. The expectation was that BGS would work with ChargePoint to submit a Grant application for VW funding. ChargePoint would own and maintain the station. ChargePoint liked this model because the VW money would pay a significant portion of the initial installation cost. BGS felt the location was not appropriate for public charging but we are willing to consider it at a later juncture dependent upon available VW funding.

BGS is in the process of developing an EVSE strategic plan. This plan will evaluate funding requirements and establish a comprehensive approach to deploying EVSE at BGS owned and leased property.

The Department and the other agencies participating in this docket appreciate both the Commission's and the Legislature's focus on the advancement of EVs and EVSE in Vermont. EV deployment is one of the necessary strategies needed to advance the State's energy and climate related goals.

Sincerely,

/s/ Alex Wing
Alexander Wing, Special Counsel
Vermont Department of Public Service

cc: ePUC Service List