Report to the Vermont State Legislature

Submitted by the Vermont Public Utility Commission to the Senate and House Committees on Transportation, the Senate Committee on Natural Resources & Energy, and the House Committee on Energy & Technology

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Supplemental Electric Vehicle Report Submitted Pursuant to Section 35 of Act 59 of the 2019-2020 Vermont Legislative Session

December 13, 2019

VERMONT
Public Utility Commission

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This report is organized into three main sections.

- Section I provides an introduction and the statutory basis for the content of the report.
- Section II contains the Commission's analyses and recommendations on each of the five topic areas identified by Section 35. Section II is divided into subsections that address: (1) the collection of per-kWh fees on EV charging for the purposes of funding transportation infrastructure maintenance and transportation efficiency projects; (2) the use of tariffs for electric rates specific to EV charging; (3) the need for utility reporting on customer response to EV-specific rates and issues encountered in offering such rates; (4) expected revenues and costs from the new load caused by EV charging; and (5) the use of net-metering and net-metering credits for EV charging.
- Section III provides some concluding thoughts to the issues raised by Section 35.

I. Introduction and Statutory Basis

On June 27, 2019, the Vermont Public Utility Commission ("Commission") filed with the Vermont Legislature its report *Promoting the Ownership and Use of Electric Vehicles in the State of Vermont*. That report analyzed barriers to achieving more widespread adoption of electric vehicles ("EVs") in Vermont and included a range of recommendations to mitigate or remove those barriers. Removal or mitigation of those barriers will help accelerate the adoption of EVs, thereby reducing greenhouse gas emissions from Vermont's transportation sector, the largest single contributor to those emissions in Vermont.

The Commission's report was filed in response to Section 25 of Act 158 (H.917) of the 2017-2018 Vermont legislative session, which directed the Commission to conduct an evaluation and submit a report by July 1, 2019, concerning issues related to the charging of EVs.

On June 14, 2019, Section 35 of Act 59 (H.529) of the 2019-2020 Vermont legislative session took effect upon its signing by the Governor. Section 35 of Act 59 directs the Commission, in consultation with those Vermont electric distribution utilities that wish to participate, the Agency of Transportation, the Department of Public Service, and Efficiency Vermont, to file a supplemental report with the Legislature on or before December 15, 2019. Section 35 sets forth the following topics for the Commission to address in its report:

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1. Fees and assessments. Whether or not electric distribution utilities should collect both a transportation efficiency fee, as defined in subdivision (A) of this subdivision, and a transportation infrastructure assessment, as defined in subdivision (B) of this subdivision, or just a transportation infrastructure assessment and how best to implement:

   (A) A transportation efficiency fee. A per-kWh transportation efficiency fee on electricity provided by an electric distribution utility for electric vehicle supply equipment equal to the energy efficiency charge rate set by the Commission, and to be charged instead of an energy efficiency charge; and

   (B) A transportation infrastructure assessment. A per-kWh transportation infrastructure assessment on electricity provided by an electric distribution utility for electric vehicle supply equipment.

2. Electric vehicle charging tariff design. The design of an electric vehicle charging tariff for electric utilities with more than 17,000 customers, and other electric utilities at their discretion, that allows a customer, including a company that owns and operates electric vehicle supply equipment, to purchase electricity solely to charge a plug-in electric vehicle. The report should consider whether the tariff should:

   (A) contain either a time-of-day or off-peak rate, as elected by the electric utility that takes advantage of lower-cost electricity and minimizes adverse grid effects and investment costs, maximizes the grid benefits of PEV [plug-in electric vehicle] charging, including electric distribution utility control of charging, and reduces the negative environmental effects of burning fossil fuels for transportation and electrical generation;

   (B) include the per-kWh transportation efficiency fee;

   (C) include the per-kWh transportation infrastructure assessment;

   (D) offer a customer the option to purchase electricity from the utility's current mix of energy supply sources or entirely from renewable energy sources;

   (E) include a mechanism to allow the recovery of costs reasonably necessary to comply with electric vehicle charging tariff setting, such as costs to inform and educate customers about the financial, energy conservation, and environmental benefits of electric vehicles and to publicly advertise and promote participation in a customer-optional tariff;

(F) provide for clear and transparent customer billing statements including the amount of energy consumed under the tariff;

(G) incorporate any necessary costs of metering or submetering within the rate charged to the customer; and

(H) factor in other considerations as the Commission deems appropriate.

3. Reporting by electric distribution utilities. Whether there should be a mandatory periodic report from electric distribution utilities to the Commission and what should be included in those reports, consideration should be given to:

   (A) participation and impact highlights, including participation levels and new electric vehicle supply equipment installed by county;

   (B) the overall costs and benefits of the tariff, including any changes or issues encountered during the reporting period; and

   (C) other data required by the Commission.

4. Incremental revenue and costs. The amount of incremental revenue to electric distribution utilities expected to be generated by PEVs and all other financial benefits that PEVs may bring to electric distribution utilities over the next 10 years, whether there are necessary costs and technical feasibility problems to meter PEV charging separate from other electrical demand on the same account, and all other costs expected to be incurred by the electric distribution utilities related to PEV deployment and associated infrastructure.

5. Net metering. How to address the use of net metering energy and net metering energy credits for electric vehicle supply equipment.

In response to the directive of Section 35, on July 17, 2019, the Commission initiated an investigation to explore the issues identified by Section 35, as well as any other related issues that arose during the course of the investigation.[1] The purpose of the investigation was to gather the information necessary to provide the Legislature with a comprehensive report addressing the issues set forth in Section 35 of Act 59.

[1] Case No. 19-3009-INV. All of the documents issued by the Commission and filed by the various participants can be accessed via ePUC, the Commission's online filing and case management system.

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This report represents the product of the Commission's investigation and incorporates the thoughts and recommendations of many interested participants.[2] The investigation consisted of two workshops and several rounds of informational filings. Participants included relevant State agencies, Vermont's distribution utilities, EV charging industry representatives, and public interest groups. The Commission greatly appreciates the time and effort that participants put into the investigation and what ultimately became contributions to this report.

II. Analyses and Recommendations Re: Topics Identified in Section 35

This section of the report responds to each individual topic identified in Section 35 and provides recommendations or identifies options where appropriate. The topics are addressed in the same order as they appear in Section 35.

A. Whether Vermont's electric distribution utilities should collect both a per-kWh transportation efficiency fee and a per-kWh transportation infrastructure assessment, or just a per-kWh transportation infrastructure assessment, and how best to implement any such charges

The Commission recommends that the State *not* impose any new per-kWh fees on electric vehicle charging, either for contribution to the funding of transportation infrastructure or for transportation efficiency projects. The Commission believes there are better ways for EVs to contribute to the transportation infrastructure fund. The reasons for this recommendation are set forth under the discussion of each type of potential fee, below. Each subsection contains a discussion of how such fees would be collected if the State decides to impose them. Additionally, the subsection discussing per-kWh fees for transportation infrastructure funding provides the joint position of the Vermont Agency of Transportation, the Vermont Department of Public Service, and the Vermont Agency of Natural Resources (together the "State Agencies"), which differs from the recommendation of the Commission.

The Commission is not recommending that EVs never be required to contribute to the funding of Vermont's transportation infrastructure. On the contrary, if Vermont is

[2] Appendix A to this report sets forth the history of the Commission's investigation in Case No. 19-3009-INV, opened in response to Section 35. Appendix B to this report is a list of participants in the investigation.

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successful in reaching its goal of widespread transportation electrification, it will be essential for EVs to contribute on an equitable basis to avoid even greater shortfalls in the transportation infrastructure fund as more Vermonters switch from gasoline-powered vehicles to EVs. However, the Commission is concerned that a decision to commit to a per-kWh fee on EV charging may result in unintended consequences, discussed below.

The Commission recommends alternative approaches, not just for EV drivers, but for all vehicle operators – including drivers of high-efficiency gasoline cars and hybrid vehicles – to contribute to the maintenance of Vermont's transportation infrastructure. Alternatives to a per-kWh fee system are discussed below under "Recommendations."

As a general matter, additional taxes and fees imposed on any electric end-uses ultimately raise the price of electricity. To the extent possible, the State should avoid imposing additional taxes and fees on electricity because it is Vermont's stated objective to electrify the heating and transportation sectors. If electricity becomes more expensive – whether due to cross-subsidization, taxes, charges, or fees – it will be less attractive as a fuel to replace fossil sources.

1. Per-kWh transportation infrastructure assessment

The Commission recommends that the State decline to impose a per-kWh fee on electricity used to charge EVs at this time for five reasons. First, a per-kWh fee on EV charging would suffer from the same inherent flaws as the per-gallon tax on gasoline. Second, the EV market in Vermont is in an early growth stage and therefore contributes very little to the existing shortfall in the transportation fund. Third, a per-kWh fee alone would not collect sufficient revenue for EVs to contribute a fair share to the transportation fund and would therefore require a second additional source of revenue from operators of EVs. Fourth, requiring the necessary sub-metering at each home and workplace would impose additional costs on EV drivers and Vermont's electric utilities for the calculation, collection, and remittance of such a fee. Fifth, such a fee raises questions of enforcement and equity because of its ease of avoidance and difficulty of assessment.

(a) Inherent flaw in a per-kWh fee approach

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The two most significant reasons for the current shortfall in the transportation fund are (1) increasing vehicle fuel efficiencies and (2) a per-gallon gas tax that has remained flat and has not accounted for either inflation or growing fuel efficiency.[3]

These problems would also occur with a per-kWh fee. We learned in both this investigation and the Commission's prior EV investigation that EV technology will continue to improve and evolve, perhaps rapidly. One potential area of improvement is in EV "fuel efficiency," enabling EVs to travel a greater distance on each kWh of charge, much as increased fuel efficiency allows gasoline cars to travel farther on each gallon of gas. Committing to a per-kWh fee now creates the same potential outcome for EVs as for internal combustion engine vehicles, resulting in eroding transportation fund revenues over time as EV efficiency increases. If this is coupled with a reluctance on the part of the State to increase the per-kWh fee applicable to EV charging (similar to the hesitancy to raise the per-gallon tax on gasoline), the result will be a continuation of an ever-growing shortfall in the transportation fund.

(b) <u>EVs currently have little impact on the transportation fund shortfall</u>

In 2016, the Vermont Agency of Transportation ("VTrans") released a report that concluded that "EVs are an exceedingly small part of today's transportation revenue problem" and that introducing EV user fees in the immediate future would be "at cross purposes with the state's efforts to incentivize EV purchase and use."[4] Absent a more comprehensive solution to Vermont's declining transportation fund revenues, the 2016 Report recommended waiting until registered EVs represent 15% of annual automobile sales in Vermont (approximately 18,835 new EVs registered in a calendar year).[5] The 2016 Report states that, as of October of 2016, Vermont had a total of 1,395 registered electric vehicles. As of July 2019 there were only 3,288 passenger EVs in the Vermont Department of Motor Vehicles registration database.

Given the limited contribution of EVs to the current shortfall in the transportation fund, the Commission is concerned about the significant investment that would be incurred by utilities and their customers to develop and install metering capabilities that could

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[3] PUC Case No. 18-2660-INV, Joint Responses of Agency of Transportation, Agency of Natural Resources, and Department of Public Service dated 1/9/19 at 2-3; Vermont Agency of Transportation Sec. 15. 2016 Plug-In Hybrid and Electric Vehicle Registration Fees Legislative Report dated 12/2016 at 7-8; California Road Charge Pilot Program 2017 Final Report at 1 (available at http://www.dot.ca.gov/road_charge/resources/final-report/docs/final.pdf).

[4] 2016 Plug-In Hybrid and Electric Vehicle Registration Fees Legislative Report, Agency of Transportation, 12/2016 at 26 (the "2016 Report") (available at http://legislature.vermont.gov/assets/Legislative-Reports/2016-Legislative-EV-Study-FINAL-formatted.pdf).

[5] 2016 Report at 27.

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separately track and bill electricity consumed for EV charging, and to then apply the fee to that subset of electricity consumed at a home or business. Such a system would likely require the installation of either a second utility meter at a customer's premises or use of a specified EV charger that is capable of submetering EV charging and communicating data to the utilities' billing systems. Depending on changes in EV-related technology and the possible development of regional or even national programs to implement new models for the collection of transportation funding,[6] committing to the infrastructure costs necessary to collect a per-kWh fee at this time also runs the risk of creating significant stranded costs.[7]

(c) A per-kWh fee on EV charging would not collect sufficient revenue

A per-kWh fee on EV charging by itself would not be sufficient to replace the transportation funding lost when Vermont drivers switch from fossil-fuel vehicles to EVs. This is because a per-kWh fee can only be so high before it begins to both conflict with other desirable goals and cause some customers to charge their EVs using chargers that allow them to evade the fee.[8]

The Department of Public Service estimates that a per-kWh fee sufficient to replace the revenue lost to the transportation fund from Vermont drivers switching to EVs would be somewhere "north" of 4 cents per kWh, an amount the Department acknowledges is too high.[9] According to the Department, a per-kWh charging fee would have to be lower than what is actually needed for the transportation fund so that an EV-specific rate plus the per-kWh fee would still be low enough to attract customers. For example, a residential customer has no incentive to sign up for an EV rate if the EV rate plus the per-kWh fee is equal to or more than the general residential rate. Any customers that choose not to sign up for an EV rate would avoid the necessary metering infrastructure costs as well as the per-kWh fee. The electricity used for EV charging would simply appear on the customer's bill as regular household usage.

For a utility to bill and collect a per-kWh fee on electricity used for EV charging, it is necessary to measure EV charging separately from other consumption at a home or business. This can typically be done using a second, dedicated utility meter or a meter

[6] For example, Vermont is participating in the I-95 Corridor Coalition, a group of states that is considering options for mileage-based user fees. *See* https://www.i95coalitionmbuf.org/overview.

[7] Stranded costs are costs that a utility originally incurred properly but no longer has a reasonable opportunity to recover as the result of changes in circumstance, such as the introduction of competition or some other unanticipated policy change. In this context, the costs of implementing the per-kWh fee approach could become stranded if Vermont moved to a different funding model before those costs were recovered from ratepayers.

[8] EVs can "trickle" charge using any standard outlet.

[9] PUC Case No. 19-3006-INV, transcript of 8/22/19 workshop at 48 (Allen).

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embedded in the equipment used to charge the vehicle, both of which entail additional costs to a homeowner or business operator. As a result, an EV-specific rate would need to be sufficiently attractive to induce customers to incur these costs.[10] There was significant debate among the participants in the underlying investigation over how low EV-specific rates can be set.[11] However, all agreed that there is a limit to how much a utility can discount an EV rate without shifting costs associated with EV charging to non-EV customers.

Because an EV-specific rate can only be so low before cost shifting occurs, any per-kWh fee that is added to that rate can only be so high before the rate is no longer attractive to the EV customer, especially when combined with the other upfront costs associated with submetering.

Further complicating the attractiveness of an EV-specific rate is the requirement that customers would have to agree to time-of-use limitations on when they can charge their EVs at the beneficial EV rate, either by agreeing to charge only during specified times or by ceding control over charging their EVs to the utility. This "controlled" charging allows the utility to move EV charging loads to times when demand is low and certain costs to the utility can be avoided, justifying the lower EV rate. To be attractive, any EV rate plus a per-kWh fee must be sufficiently below the general residential or commercial rate to entice a customer to both incur any upfront costs associated with the charging program and to cede some level of control over when an EV can be charged.

An EV rate combined with a per-kWh fee that isn't low enough to attract customers would create two significant problems. First, if customers did not sign up for the EV rate, utilities would not be able to separately meter EV charging and therefore would not be able to assess any per-kWh fees. Second, utilities would also lose control over when the new demand associated with EV charging would occur – a consequence that all participants in the underlying investigation believed to be undesirable.[12]

Because of the natural ceiling on the per-kWh fee that can be collected without making an EV rate unattractive, the per-kWh fee would not generate the amount of money needed to replace transportation funding lost when fossil-fuel vehicles are replaced with EVs. To achieve the full amount of transportation funding required, a second source of

[10] A more detailed discussion of potential upfront costs to customers can be found in Section II.D.2. of this report.

[11] A more detailed discussion of issues related to setting EV-specific rates can be found in Section II.B. of this report.

[12] Because each EV that charges in the state of Vermont represents new electric demand for Vermont's utilities it is important that the utilities be able to direct the new demand to times that are beneficial to all users of the electric grid.

revenue would be required. The State Agencies did not specifically suggest what that second source of revenue would be.

The State Agencies and the utilities also disagreed on how low an EV-specific rate could be set—and consequently how much room could be made for a per-kWh fee—without causing cost-shifting issues. The State Agencies believe that an EV rate can be significantly lower than what the utilities believe is justified by traditional ratemaking principles. However, even at the State Agencies' lower rates, the maximum per-kWh fee would still result in shortfalls in the transportation fund that would require another revenue stream. The Commission sees no reason to incur the costs of developing multiple mechanisms for transportation funding to recover funds lost when drivers switch to EVs. Not only would it be an unjustified expenditure of resources, EV drivers might also perceive it as "being hit twice," even if the total amount collected would be the same whether it is collected from a single fee source or two fee sources.

(d) Cost and complexity of a per-kWh fee[13]

For the State to impose and collect a fee for the transportation fund on a kWh basis, all EV charging taking place at a home or a business with a multi-use account would need to be separately metered from all other electricity consumed at those accounts. The infrastructure required for separate metering imposes costs on the person or business doing the charging, and results in costs and billing complexities for the utility serving the account.[14]

Customers would face upfront costs associated with the installation of charging and metering equipment needed for the sole purpose of assessing and collecting the fee. This could take the form of a second utility meter or a charger with an embedded submeter capable of measuring the electricity used to charge an EV. Some of Vermont's utilities offer incentives designed to alleviate these costs, but even if a customer receives a free charger there are usually costs associated with installing the equipment. These upfront

[13] The discussion in this subsection does not apply to public charging stations that provide no services other than EV charging. Such stations will presumably have a dedicated utility meter with its own account. This discussion focuses on charging at home or work and possibly at public stations that are part of a larger business where the electric account covers general consumption in addition to EV charging.
[14] The concerns discussed in this subsection likely would not apply to fleet-wide charging -- for example, for school buses or a large fleet of delivery vehicles. Those customers would likely have either an economic incentive or a practical need to install dedicated charging facilities that would then allow the utility to separately meter EV charging.

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customer costs are estimated to be in the range of $500 to $3,000, depending on available incentives and how much work is needed to complete an installation.[15]

The impediment that results from these upfront costs is potentially greater for customers served by Vermont's smaller utilities. Section 35 refers to the possibility of legislatively mandated EV-charging rates for utilities with more than 17,000 customers.[16] If smaller utilities do not implement an EV-specific rate that is lower than the general rate, there is no rate incentive for a customer to incur the upfront costs that would enable the collection of a per-kWh fee.

Submetering customer accounts would also result in costs to the utilities. In addition to any costs associated with incentives offered by a utility, each utility would have to modify its billing system to accommodate the separate metering and billing of EV charging to apply the additional per-kWh fee. GMP estimates the cost for such modifications to be in the range of $200,000 to $300,000.[17] The VPPSA utilities were unable to provide a cost estimate for the specific modifications that would be needed because of a lack of experience with such a system, but noted that their members spend approximately $200,000 annually to integrate net-metering data into their billing.[18]

Other potential utility costs are those associated with identifying and programming specific Level 2 chargers to work within a utility's billing system, negotiating with the Level 2 manufacturer for access to the customer's consumption data recorded by the charger, and annual costs associated with retrieving and applying the data.[19]

The utilities would also face complexities implementing a per-kWh fee on EV charging. Currently, GMP and BED have EV-specific rates, and they measure EV charging by using the meter embedded in a Level 2 charger. However, the information obtained from the Level 2 charger is manually applied to customer bills. At this time EV ownership is low enough that manual data entry is possible, but as ownership rises utilities would need to develop fully automated systems. While Vermont's larger utilities may be capable of developing the necessary systems, the need for billing system upgrades will have a much greater impact on our smaller utilities. The VPPSA utilities have already reported the difficulties and added costs they incur with billing adjustments for net-metering. Adding

[15] PUC Case No. 19-3009-INV, comments of City of Burlington Electric Department ("BED") and Vermont Public Power Supply Authority ("VPPSA") dated 8/15/19 at 2; comments of Vermont Electric Cooperative, Inc. ("VEC") dated 8/15/19 at 2; comments of Green Mountain Power Corporation ("GMP") dated 9/6/19 at 2.

[16] In Section II.B. of this report, the Commission recommends against legislatively mandating EV-specific rates.

[17] PUC Case No. 19-3009-INV, comments of GMP dated 9/6/19 at 2.

[18] PUC Case No. 19-3009-INV, comments of BED/VPPSA dated 8/15/19 at 2-3.

[19] For a more detailed discussion of costs, see the discussion in Section II.D.2., below.

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a new requirement for a fee applicable to only a subset of the electricity used by an individual account would add yet another layer of complexity for these smaller utilities.

Furthermore, imposing a per-kWh fee would require submetering or approved Level 2 chargers at every residence with an EV and at every business that offers charging under a multi-use account. Each utility would have its own approved set of Level 2 chargers that would be compatible with its billing system, meaning that the State would effectively be dictating to EV owners the specific make and model of EV charger they would be required to purchase and install. Additionally, not all locations in Vermont have access to Wi-Fi for transmitting consumption data to the serving utility. To collect data for the per-kWh fee from customers without broadband, the utility might have to revert to having someone "read the meter" manually. Given that many chargers will be set up inside garages, the utilities would face another potential barrier to obtaining the information needed to implement the per-kWh fee.

VTrans is already involved in the I-95 Corridor Coalition, a group of states considering options for mileage-based user fees. If Vermont commits to the per-kWh fee now, only to have the regional states adopt a system of mileage-based fees for all vehicles, both fossil-fuel and electric, Vermont would likely need to change its approach mid-stream, leaving utilities and ratepayers with significant stranded costs from implementing the per-kWh fee.

(e) Enforcement issues

Enforcement of a per-kWh fee on EV charging that is not done at a stand-alone public charging station comes with an array of challenges. First and foremost is the ease with which a person can avoid paying the fee. To accomplish this, a customer need only decide to use a Level 1 "slow charger." These chargers plug into a standard wall outlet, and the electricity used to charge the EV looks no different to the serving utility than the electricity used for any other purpose in the household or business. According to the State Agencies, the average EV driver in Vermont uses 11 kWh per day — an amount that can be recharged in approximately two hours using a Level 2 charger.[20] However, this is also an amount that can be easily recharged overnight using a slow charger.[21] Individuals who want to charge faster could also avoid the fee by using a Level 2 charger that is not part of the serving utility's list of approved chargers, leaving the utility unable to determine the amount of EV charging usage and the fee it should levy.

[20] PUC Case No. 19-3009-INV, comments of State Agencies dated 10/7/19 at 3.
[21] PUC Case No. 19-3006-INV, transcript of 8/22/19 workshop at 45 (Monger).

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As noted above, there is significant disagreement between the utilities and the State Agencies about how low an EV charging rate can be set. That disagreement cannot be resolved on a general basis but would need to be addressed on a utility-by-utility basis. It is possible that a per-kWh fee could be imposed that, when combined with the rate for EV charging for a particular utility, results in an EV rate higher than the retail rate. This would provide an incentive for people to avoid the EV-specific rate and the related per-kWh transportation fee and just charge their EVs under the general rate through a regular wall outlet.

Even if an EV charging rate plus the per-kWh fee were lower than the general rate, it would need to be sufficiently low to entice people to participate in a program that requires them to incur the costs of installing specialized charging equipment and to cede a measure of control over when they can charge their vehicle.

A per-kWh fee would also create a difficult situation for Vermont's utilities by placing them in the role of tax collector. While it is true that many entities engage in this type of activity, such as businesses collecting sales tax, in most of those instances there is no way for a person to avoid paying the tax. If you wish to purchase an item that is subject to sales tax, you pay the sales price and the tax at the same time. In the per-kWh fee scenario, customers can avoid paying the fee simply by not signing up for the EV rate or not installing the necessary submetering infrastructure. The utility that is responsible for collecting and remitting the fee to the State would have no reason to know that someone was avoiding payment of a State-imposed fee.

The Legislature would also need to determine the utilities' liability in circumstances where customers are avoiding the State-imposed fee. Additionally, what are the obligations of a utility that learns that a customer has been charging an EV "behind the scenes" for several months or years without paying the fee? Would the utility have enforcement responsibilities? Should electric service be terminated?

These are not merely hypothetical situations. For example, GMP estimates that there are 2,200 EVs in its service territory, yet only 350 are participating in GMP's EV charging program.[22] In a 2019 Vermont Electric Cooperative survey of its members who received an EV incentive, 42 of the 79 respondents stated that they did not have a Level 2 charger. When asked why they did not have a Level 2 charger, the top two answers were that plugging into a regular outlet was sufficient and Level 2 chargers were too expensive. In

[22] PUC Case No. 19-3009-INV, transcript of 8/22/19 at 106 (Monger).

other words, this is a real issue that will result in inequities in the collection of the fee and ongoing insufficient funding of the transportation budget.[23]

The State Agencies' position

The following two paragraphs were drafted by the State Agencies.

> The Public Service Department, Agency of Natural Resources, and Agency of Transportation support the implementation of a per-kWh fee to collect transportation infrastructure funding from owners and operators of electric vehicles. Currently, the shortfall to the transportation fund due to the adoption of EVs is not significant (falling transportation infrastructure funding is caused by the increased efficiency of internal combustion engine vehicles), but that shortfall is expected to continue to grow. The State Agencies believe that the solution to this long-term and growing problem needs to be identified in the near term with some lead time that allows for utility challenges to be addressed. As the State Agencies have previously recommended, a trigger could be set for phase in of an assessment when EVs reach 15% of new vehicle registrations.
>
> A per-kWh fee approach to the transportation infrastructure funding problem presents both opportunities and challenges. The opportunities include that it would capture out-of-state travelers who refuel their vehicles at public and semi-public charging stations in Vermont, it is roughly equivalent to the current gasoline tax in that you pay as you travel and those who travel more and cause more impact to the road system pay more, and when combined with rate design the fee would not represent a disincentive to transitioning to an EV. The challenges associated with this approach include metering or, more likely, submetering the EV's electric load; incorporating sub-metered load data into the distribution utilities' meter data management and billing systems; and the necessary nexus with rate design in order to make the rate that includes the assessment attractive to consumers.

Recommendation

The Commission recommends that the State not commit to a per-kWh fee at this time for the reasons discussed above. In broad terms: (1) it is not financially necessary to make such a commitment at this time because there are still only a small number of EVs in Vermont, (2) it would not raise sufficient revenue, (3) it would be easy to avoid paying,

[23] PUC Case No. 19-3009-INV, comments of VEC dated 8/16/19 at 1.

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and (4) establishing the infrastructure for collection of the fee could result in significant stranded costs for Vermont's utilities and their customers.

The Commission acknowledges that a per-kWh fee does have some characteristics that make it appear to be a reasonable option. For example, the fee is akin to the per-gallon gasoline tax that most drivers are accustomed to paying when they fuel their vehicles at the pump. Thus, it is easy for the average person to comprehend. It can also be perceived as more affordable than other alternatives because it would be billed to EV drivers regularly, every month, based on how much electricity is used to charge their vehicles.

However, there is a significant difference between the collection of a gas tax and the collection of a per-kWh fee that directly implicates the reliability of the per-kWh fee as a revenue source. The driver of a fossil-fuel vehicle cannot avoid the gas tax because gas must be purchased at public filling stations where that tax is collected. On the other hand, an EV driver will do most of his or her charging at home and, as discussed above, can avoid paying the fee through at least two simple workarounds.

Given the potential shortcomings discussed above, and the long-term funding issues that the transportation fund has faced as a result of the existing flaws in the gas-tax model, the Commission recommends that the State consider redesigning that system in its entirety to ensure both sufficient and sustainable funding and equity among all road users in Vermont, including the higher-efficiency gasoline and hybrid vehicles that are underpaying now.

The Commission recommends that the Legislature consider four potential alternatives to transportation funding, described below, before deciding to implement additional fees for EV drivers. Each of these approaches has both strengths and drawbacks, with some of the drawbacks more easily mitigated than others. Whatever the State decides, the Commission recommends that these new fees not be implemented until EVs constitute 15% of registered vehicles in Vermont, as recommended by the State Agencies.

Ultimately, there is no perfect solution to the shortfall in the transportation fund. However, the Commission is concerned that some people may already have concluded that the per-kWh approach is the proper mechanism for ensuring that EV drivers pay a fair share into the fund. This presumption signals a continued reliance on the gas-tax model that has contributed to the long-term transportation fund shortfalls. The Commission recommends consideration of the options presented below, not only for EVs, but also as possible mechanisms to move away from the gas-tax model to a more sustainable revenue source based on fair contributions from the drivers of all vehicles.

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1. Per-kWh fees

As discussed above, this approach would be based on and assumes the continued use of the gas-tax model, which has already proven to be problematic.

Also as discussed above, there are a number of potential drawbacks to this approach, especially when it comes to home and workplace charging. These drawbacks could lead to insufficient revenue in both the short and long term, inconsistent and inequitable imposition of the fee, potential stranded costs for utilities and customers, and significant costs associated with collecting such a fee. Additionally, depending on the size of the fee, it could interfere with desirable load-management efforts by the utilities and require a second additional revenue stream to meet funding needs.

The per-kWh approach does have the benefits of being easy to understand and a relatively direct relationship between road usage and the amount of the fee paid. This relationship is only relatively direct because more efficient EVs, like fossil-fuel vehicles, may eventually go farther on less "fuel" and thereby contribute less on a per-mile basis over time.

2. Vehicle-miles-traveled fees

Vehicle-miles-traveled fees, or VMT fees, are directly related to the actual amount of road usage by an individual driver. They can also be used to account for the increased wear and tear done to Vermont's roads by heavier vehicles by creating different fees for different weight classes.

The simplest way to implement a VMT fee would be to use the mileage figures recorded at each annual inspection and report them to VTrans for use in issuing bills. One drawback of this approach is that users would be billed once annually for their total mileage in the previous year, which could be substantial depending on the miles travelled. This drawback could be ameliorated to a degree by issuing quarterly bills. While this would not make these payments equivalent to the "pay-as-you-go" model of a gas tax, it would move closer to the lump-sum monthly payments for all charging done at home under the per-kWh fee model.

A VMT fee also would apply to out-of-state travel by Vermont-registered vehicles. However, the same issue exists with the current gas tax and the potential per-kWh fee model. Vermont drivers often purchase gas in Vermont, paying taxes here, and use some portion of that gas while driving in neighboring states. The same would be true for EVs

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charged in Vermont and then driven out of state.[24] Application of such fees to out-of-state travel can be avoided by using trackers to identify miles driven in Vermont and to exclude miles driven elsewhere. However, such an approach raises significant privacy concerns and would require investment in additional technology in individual vehicles.

The Commission understands that adopting a VMT approach would entail significant analysis and work on the part of the relevant State agencies. This is why the Commission recommends that the Legislature begin consideration of this and other approaches now, so that there is time to design and implement the desired approach before EV registrations in Vermont result in larger transportation fund shortfalls.

Another criticism of the VMT approach is that it fails to collect revenue from out-of-state drivers using Vermont's roads. However, this shortcoming can be mitigated by having a per-kWh fee apply to charging performed at publicly available charging stations, where out-of-state drivers are most likely to recharge their cars. Many of these stations will have dedicated utility meters, simplifying the billing and collection of such fees.[25]

The State Agencies raised two other potential shortcomings with the VMT approach. First, they saw a potential for drivers of Vermont-registered EVs to overpay because they would pay a fee based on their annual mileage, plus any kWh fees that result from any public charging that they may do. This can be addressed by adjusting the mileage fee to account for the average amount of charging done at public stations.[26] Second, the State Agencies point out that a percentage of Vermont vehicles do not comply with the annual inspection requirement and that more may ignore this obligation if it resulted in a new fee. The Commission does not see non-compliance with existing law as a reason to discount this approach. In the event the State is concerned about existing non-compliance, it could address it through better enforcement of annual inspection requirements.

A final consideration associated with the VMT fee approach is the potential perception that this constitutes an "extra" fee for EV ownership and use. An important part of

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[24] The converse is also true. Drivers purchase gas in neighboring states and then use some of that gas to drive in Vermont without paying for the use of Vermont's roads.

[25] When these public stations do not have dedicated meters (i.e., a publicly available charging station that is billed as part of a larger commercial account) the operator can be required to have accurate submetering equipment in the charger and tender the per-kWh fee to the State based on the kWh sold as registered by that submeter.

[26] Most EV drivers do 80% or more of their charging at home. *See* https://www.energy.gov/eere/electricvehicles/charging-home.

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adopting any of the potential EV fees will be educating Vermont drivers about the fact that the fee is not one that is additional, but rather is an alternative to the gas tax. Appropriate public outreach would educate EV drivers about the fact that they are being treated as equally as possible to the drivers of fossil-fuel vehicles and that they are only doing their part to help support Vermont's transportation infrastructure.[27]

The VMT-fee approach could be used for all vehicles, not just EVs, and would ensure greater – and equitable – contribution from the efficient gasoline and hybrid vehicles that are currently contributing to the shortfall in the transportation fund.

3. Annual registration fee

This approach would apply a fee based on the average miles travelled by all Vermont-registered vehicles each year. The drawback of this approach is that the fee would not bear directly on the actual amount of road usage by each vehicle. However, the fee could be adjusted based on weight class in an attempt to capture the increased wear and tear caused by heavier vehicles. An annual up-front payment would also pose a potential barrier to some. However, the State could structure such a fee so that it would be due quarterly. Payment of past-due amounts could be required as a condition to re-register a vehicle. As of this report, approximately 20 states have implemented annual registration fees for EVs, ranging from $50 to $200 in addition to the generally applicable annual registration fee.[28] On the low end, these fees likely do not compensate for the loss of transportation fund revenue that occurs when drivers switch to EVs. On the high end, they may prove to be a barrier to EV adoption.[29]

The annual registration fee approach has the same limitations as the VMT approach with respect to out-of-state miles driven by Vermont vehicles and in-state miles driven by non-Vermont vehicles. For this reason, an annual registration fee could be combined with a per-kWh fee on public charging, as discussed above.

This approach could be used for all vehicles, not just EVs.

4. Fees based on battery capacity

This approach would assess a fee based on the battery capacity of an EV – which correlates well with the weight of the vehicle, one of the major determinants of road wear

[27] This holds true for any fee that applies to EVs only, including the per-kWh fee that would appear monthly on consumers' electric bills.

[28] *See* https://pluginamerica.org/policy/ev-road-usage-fees/.

[29] This again emphasizes the need for appropriate public outreach to educate consumers about these types of fees.

and tear, because higher-capacity batteries are heavier. It also may roughly correlate to road usage if you assume that drivers who use the roads more will purchase EVs with larger battery capacities so they can drive farther without needing to charge.

This fee also has the same shortcomings discussed above with respect to payment of a VMT or annual registration fee and use of Vermont's roads by non-Vermont vehicles. The suggested hybrid approach for capturing out-of-state drivers through a per-kWh fee at public charging stations is also applicable to the battery-capacity model.

This approach would apply only to EVs.

Implementation of a per-kWh fee

If the State ultimately determines to implement a per-kWh fee on EVs, it would create what is essentially a new tax.

With respect to public charging stations, the gas-tax model would be appropriate because it obligates the operator of the station to collect and remit that tax. This would require either a dedicated utility meter or an accurate submeter to measure the electricity consumed by EV charging at the station. The taxes collected, like the gas tax, would presumably be tendered to the Commissioner of the Department of Motor Vehicles.

With respect to private charging, such as charging done at home or at a workplace, the Legislature would need to impose on each of Vermont's utilities the obligation to collect the tax as part of its regular billing practices and to remit the taxes collected to the appropriate State entity, again presumably the Commissioner of the Department of Motor Vehicles. Implementing this system would require that each person charging an EV at home, and each business offering charging to its employees, install either a dedicated utility meter or a charging station that is capable of submetering electricity consumed by an EV. If consumption is measured by the charger instead of a dedicated utility meter, the customer must be required to install a charger that has been approved by the serving utility for compatibility with the utility's billing system.

The Commission believes that the requirements for a customer to pay the tax and to install a meter capable of allowing the serving utility to calculate and collect the tax would need to be contained in legislation. Without a legislative mandate for customers to comply with these requirements, the State risks people taking the steps described above to avoid the tax, thereby raising issues of inequity, lack of adequate funding, and placing the utilities in an uncertain position concerning potential liability for unpaid taxes by a customer. In no case should the utility be liable for taxes that are unpaid as a result of customer avoidance.

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The Legislature would also need to specify which State agency is responsible for setting the tax amount, receiving the remittances from utilities and businesses, administering the funds, and undertaking enforcement against non-compliant persons and entities.

Regarding the process for creating the tax, the Commission believes that the tax amount should be set by the Legislature, like the gas tax, with the advice of the Department of Motor Vehicles. The Agency of Transportation has the information and knowledge related to the needs of the transportation fund, the registration rates for EVs in Vermont, and information on the driving habits of Vermont residents that would be needed to calculate the proper amount. Tax revenues from a per-kWh fee should be sent to the Commissioner of Motor Vehicles and handled in the same manner as the portion of the gas tax that is used for transportation infrastructure maintenance. The Commission also believes that enforcement authority should rest with Motor Vehicles and the Attorney General in a manner similar to enforcement of the gas tax (*see* 23 V.S.A. §§ 3108-3116).

Issues related to more creative charging services would also need to be resolved. For example, a business may offer free or deeply discounted charging as an amenity to its customers. Still others may charge a flat fee for a charging session or charge by the amount of time spent at the charging station rather than by the kWh. Issues such as these further highlight the differences that exist between purchasing gasoline by the gallon and the myriad ways that charging services will be offered to EV drivers, all of which need to be resolved before the State commits to the per-kWh funding model.

Lastly, the State would need to address the fact acknowledged by the State Agencies that a per-kWh fee cannot be set high enough to replace the money lost to the transportation fund when people switch from fossil-fuel vehicles to EVs (or continue to drive increasingly efficient gasoline and hybrid vehicles). As noted above, the State Agencies made no specific proposal on the source of the additional revenue required to supplement a per-kWh fee.

In summary, before implementing a per-kWh fee on the charging of EVs, the State would need to:

- Establish the fee through legislation and impose a requirement to collect and tender the fees on operators of public charging stations, and on Vermont's utilities for charging performed at homes or businesses.
- Establish a legislative requirement for consumers to pay the per-kWh fee for EV charging.
- Establish a legislative requirement that all charging stations – public, private, residential, or business – install metering or submetering equipment that is

capable of separately measuring the amount of electricity consumed in charging EVs and that is approved by the serving electric utility for compatibility with its billing system.

- Clarify questions of liability and consequences for non-payment.
- Identify the State agency responsible for pursuing enforcement actions in cases of non-payment and establish a mechanism for pursuing such actions.
- Identify the State agency responsible for receiving funds collected through the per-kWh fee and determine how the funds are to be administered.
- Determine whether and how to assess the fee when charging services are offered on a basis other than by the kWh, such as flat fee, time-based, or complimentary charging.
- Assuming the State Agencies are correct that a per-kWh fee cannot be set high enough to address shortfalls in the transportation fund, establish a second mechanism for collecting additional revenues from EV drivers.

2. Per-kWh transportation efficiency fee

Section 35 of Act 59 defines a transportation efficiency fee as a "per-kWh transportation efficiency fee on electricity provided by an electric distribution utility for electric vehicle supply equipment equal to the energy efficiency charge rate set by the Commission, and to be charged instead of an energy efficiency charge."

If the State decides to implement a transportation efficiency fee, the Commission agrees that it should not be an additional fee on electricity used for EV charging but should be in lieu of paying the existing energy efficiency charge. However, the Commission recommends, consistent with the positions of most, if not all, participants in the underlying proceeding, that utilities not be required to create a separate line item on bills for this fee. This would add yet another layer of complexity in the billing process and potentially increase costs.

The Commission recognizes that additional funding will be necessary to assist in transitioning Vermont's transportation sector into one that is more renewable, causes less pollution, and is more efficient. The Commission does not recommend that electric ratepayers bear responsibility for this additional funding. However, if the State determines that electric ratepayers should bear these costs, the Commission believes that the average annual amount of electricity that is used for EV charging in Vermont could be used to determine what percentage of the funding collected by the energy efficiency charge could be redirected to transportation efficiency projects. If necessary, information could be included on utility bills clarifying that a percentage of the energy efficiency charge is being applied to transportation efficiency projects.

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The Legislature would also need to resolve at least two major issues if it decides to implement a transportation efficiency fee. First, it would need to define what types of projects would be eligible to receive funding from the fee. The statute currently lacks any information in this regard. Standards should be put in place to prevent the new transportation efficiency funds from being used for non-electric projects – for example, the construction of rotaries, which would be a use of electric ratepayer funds that provides no savings or benefit specifically to electric customers. It is long-standing Vermont policy that electric ratepayer funds should be used to achieve savings for electric ratepayers.

Second, the Legislature would need to determine what entity or entities would receive and administer these funds. Whatever the Legislature decides, it is imperative that any funds collected from electric ratepayers be overseen with an appropriate and robust regulatory process and structure in place.

It is beyond the scope of this report to resolve these questions. However, the Commission will be considering them in the context of its ongoing Act 62 investigation (Case No. 19-2956-INV).[30] A more detailed analysis of these questions will be presented as part of that investigation. A preliminary report is due to be filed with the Legislature on January 15, 2020, with a final report to be filed on January 15, 2021.

B. The design of an electric vehicle charging tariff for electric utilities with more than 17,000 customers, and other electric utilities at their discretion, that allows a customer, including a company that owns and operates electric vehicle supply equipment, to purchase electricity solely to charge a plug-in EV

The Commission is now actively engaged in an EV rate-design case, so it cannot comment in this report on the specific design approach that may be most appropriate.[31] As a quasi-judicial body, the Commission must provide due process to the parties that appear before it in contested matters. The Commission expects to issue a decision in that case in the spring of 2020, and the Commission will provide that document to the Legislature as soon as it is issued.

The Commission recommends that the Legislature not *require* any utilities to implement special EV rates, including those with more than 17,000 customers. There are three

[30] *Investigation pursuant to Act 62 into the creation of an all-fuels energy efficiency program, expansion of energy efficiency utility programs and services, and funding options for those programs*, Case No. 19-2956-INV, commenced July 11, 2019.

[31] PUC Case No. 19-3586-INV, *GMP/electric vehicle charging rates tariff filing*.

utilities in Vermont with more than 17,000 customers: GMP, BED, and VEC. Two of these, GMP and BED, already have, or have proposed, specific end-use EV rates. The third, VEC, with approximately 32,000 members, has very few EVs in its largely rural service territory. VEC offers a whole-house time-of-use rate. EV customers in VEC's territory can enroll in the whole-house time-of-use rate to maximize savings when charging their vehicle by charging at the lower off-peak rate.

The State Agencies supported a requirement for utilities to offer an EV-charging rate. Other participants opposed a legislative requirement for end-use EV rates.

The design of electric rates, including EV rates, is a highly technical process. There are long-standing methods, industry practices, and legal precedent surrounding the appropriate design of rates. These include methods for determination of hours, rates, terms and conditions, and the evaluation of cost-causation.[32] Vermont's utilities, stakeholders, the Department, and the Commission are best positioned to engage in the process of rate design and are accustomed to using data and testimony to establish whether certain rates are appropriate or not appropriate in a given utility's service territory. For this reason, the Commission recommends against legislatively mandated rate structures.

The Commission recognizes the important role of beneficial electrification in reducing carbon emissions. In this regard, the Commission agrees that special EV rates are desirable because they can be used to direct charging away from costly "peak" times when energy and capacity are at their most expensive. If the EV rate is lower than the standard rate, it may also create another incentive to purchase an EV. However, mandated EV rates are not necessarily the best way to achieve these goals.

While favorable EV rates could potentially drive more EV purchases, there is little data on how low an EV rate would need to be to affect overall EV adoption by consumers. The top barriers to EV adoption are up-front purchase cost and range anxiety. The Commission has no data to support the view that lower-than-retail charging rates will affect adoption of EVs on a meaningful scale, especially when EV drivers already enjoy significant "fuel" cost savings when compared to gasoline.

As VPPSA and BED pointed out in their comments, there are many ways to achieve beneficial electrification and encourage charging during off-peak times without the use of an EV rate. Some examples include high up-front Tier 3 incentives for vehicle purchases, whole-house time-of-use rates, rates specifically for *public* charging stations, or other programs that utilities may envision. Legislatively mandated EV-end-use rates are not

[32] The principle of "cost-causation" is recognized in long-standing Vermont precedent. Under cost-causation, a rate should reflect the actual costs that the customers who use that rate cause the utility to incur. In other words, one group of customers should not subsidize another.

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necessary to achieve the policy objectives of off-peak charging and beneficial electrification.

Contents of EV tariffs

Although the Commission strongly recommends against legislatively mandated EV rates, Section 35 directed the Commission to consider whether EV-rate tariffs (assuming they are required) should contain the following elements:

1. Time-of-day or off-peak rates

If utilities are implementing time-of-day or off-peak EV charging rates, those rates must be included in a tariff. Such rates should generally be designed to direct charging away from "peak" times either through rate structures or direct utility control. Time-of-day or off-peak rates can be an effective means for achieving this goal.

When customers use electricity during "peak" times, the utility incurs more costs than when customers use electricity during "off-peak" times. However, these costs are varied and complex. They include ISO-NE-imposed costs such as Forward Capacity Market (FCM) charges – based on an annual peak, usually during an afternoon in the summer when EVs are unlikely to charge – and Regional Network Service (RNS) charges – incurred monthly, usually in early evening when uncontrolled EV charging is likely to occur. Other "peak-related" costs are specific to the utility, such as the design and size of its distribution grid components.

As a general rule, directing customer charging away from peak times is desirable. However, this is only true if it is less expensive to direct electricity use away from peaks (e.g., through a discounted off-peak rate or direct control) than to pay those peak costs. For some utilities, certain peak costs may be minimal (for example, if the distribution grid has room to add load because efficiency has lowered use in recent years).

All participants to the proceeding agreed that at current and medium-term volume, EV charging will not stress the distribution grid in most areas. Therefore, no costly grid upgrades will be required in the immediate term even if utilities do not direct customer charging to off-peak times. However, there are likely savings in ISO-NE costs (FCM and RNS) that could be achieved by directing charging to "off-peak" times. There are several ways of accomplishing this objective.

First, utilities could offer whole-house time-of-use rates and aggressively advertise them to customers who use Tier 3 incentives to purchase EVs. Electric vehicles are a significant new load per household. Each EV added to a home adds about another 50% to average

household electricity consumption.[33] Although whole-house time-of-use rates have very low uptake so far, the large load associated with EV charging and the ability to charge EVs off-peak (i.e., overnight when they are typically parked) should make whole-house time-of-use rates more attractive to customers.

Whole-house time-of-use rates avoid many of the costly upgrades required by EV-specific time-of-use rates. EV-specific rates require either a second utility meter or a Level 2 charger, which range in price from $550 to $1,200. See Section II.D.2 for a robust discussion of the costs associated with metering and billing for EV rates. Those up-front costs are a deterrent to some customers enrolling in an EV rate. For those customers, a whole-house time-of-use rate is likely an attractive option.

Second, utilities could create time-of-use rates specifically for EVs. In this type of time-of-use rate, the utility measures EV charging separately from general use and offers a lower rate for off-peak charging during certain hours (such as late-night hours).

Some utilities have the capability to use Level 2 chargers with wireless broadband telemetry at the customer premises to monitor charging. In these cases, the utility uses Level 2 charger data to differentiate EV charging from general household load. In its billing system, the utility subtracts the kWh used to charge the EV from the total household kWh to determine how much consumption should be billed at the EV rate and how much at the general rate. Not all utilities have sophisticated billing systems, the technological capacity, or enough staffing to apply this approach.

Third, some utilities may be able to remotely control when vehicles are charging by using wireless broadband connectivity at the customer's location and utility control software platforms. Direct utility control is likely the most effective method for ensuring least-cost charging and maximizing the potential grid benefits of electric vehicles, including the integration of renewable generation. Unlike time-of-use rates that have set hours that are difficult to change, controlled charging can evolve easily on a given day to minimize costs within customer-imposed parameters (e.g., set a vehicle to be fully charged before a long trip).

[33] After a new EV is added to the home, it accounts for about 1/3 of the new total use. Adding two EVs to a household would roughly double that household's load and be 1/2 of the total load after the EVs are added. This increased demand from EV charging could provide an incentive for customers to choose whole-house time-of-use rates. EV charging is more easily directed to the hours when lower time-of-use rates are available than is other electricity consumption in a household, such as refrigerators or other appliances.

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Utilities differ widely in their service territories in terms of how beneficial utility-controlled charging may be. Some rural utilities may never have significant day-time workplace or station charging because their territory is primarily rural residential. Other utilities are proposing to use utility-controlled charging today, with customers already seeing a benefit.

The Commission notes that EV rate design is a utility-specific issue that depends on the needs of the utility's customers, the utility's specific power supply profile, the nature of the grid in the territory, and the administrative and technological sophistication of the utility.

2. Per-kWh fees for transportation efficiency and transportation infrastructure

For reasons discussed in Section II.A, above, the Commission recommends that the State refrain from imposing a new per-kWh fee to fund transportation infrastructure or transportation efficiency at this time.

However, if the State does impose these new fees on EV drivers, the Commission recommends that they not be included in utility tariffs.[34] Participants unanimously agreed that such fees should not be tariffed. All agreed that they should be treated the same way the energy efficiency charge is treated and should be included on customers' bills without being addressed in utility tariffs.

The Commission agrees with this approach for two reasons. First, if the fee were to vary over time, each utility would have to amend its tariff every time the fees changed – a costly and time-consuming process.

Second, Section 35 describes a requirement only for utilities with more than 17,000 customers, but this could create inequities. If such a requirement were adopted, then only Vermont's three largest utilities would be collecting the fee. While utilities may have differing tariffs, fees are normally collected consistently throughout the state.

3. Option for a customer to purchase energy solely from renewable sources

There is no need to create a special requirement or program to accomplish renewable energy charging for EVs. Through net-metering and other programs, all customers may obtain energy from renewable sources. To claim renewable charging, however,

[34] A tariff is a formal document, filed with the Commission, that specifies the rates, terms, and conditions for products that the utility offers. Each time these documents are updated, the utility is required by 30 V.S.A. §§ 225 – 230 to follow a potentially lengthy regulatory process.

customers must retain and retire the renewable energy certificates associated with net-metering.[35]

Additionally, all of Vermont's utilities with more than 17,000 customers already offer "green power" purchase programs like Cow Power or VEC's Community Solar program or are already 100% renewable (e.g., BED). Requiring more would create unnecessary complexities and expenses for utilities to design, offer, meter, and bill for new programs when existing programs already meet this need.

4. Mechanism for the recovery of costs reasonably necessary to comply with implementing an electric vehicle charging tariff, such as costs to inform and educate customers about the financial, energy conservation, and environmental benefits of electric vehicles, and to publicly advertise and promote participation in a customer-optional tariff

As noted above, the Commission is actively engaged in an EV rate-design case that will likely consider the specific details of cost recovery in EV rates. The Commission cannot comment in this report on which costs may be recovered in EV rates.

5. The provision for clear and transparent customer billing statements, including the amount of energy consumed under the tariff

All parties, and the Commission, agree that customers enrolled in EV rates should clearly see usage billed at the EV rate separately from usage billed at the general retail rate.

6. The necessary costs of metering or submetering within the rate charged to the customer

As noted above, the Commission cannot comment in this report on which costs would rightly be included in EV rates.

[35] Currently almost all net-metering customers elect to transfer their renewable energy certificates to the utility and cannot claim renewable charging.

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C. Whether there should be a mandatory periodic report from electric distribution utilities to the Commission and what should be included in those reports

1. Tariff participation levels and impact highlights, including tariff participation levels and new electric vehicle supply equipment installed by county
2. The overall costs and benefits of the tariff, including any changes or issues encountered during the reporting period
3. Other data required by the Commission

If utilities offer EV-specific tariffs, the Commission has existing authority to require reporting. Requiring reports on participation levels, EV equipment installed, costs and benefits of the tariff, and any other issues or problems related to implementing an EV tariff would provide useful information about the tariff and help improve the tariff design going forward.[36] Examples of other topics could include technical issues related to data collection, billing, and changes or developments in EV technology that could affect EV tariff requirements.[37]

Utilities that commented on reporting requirements did not object to submitting information if an EV tariff is required but asked that it be combined with an existing report to avoid creating an additional reporting obligation. The general consensus was that information related to an EV tariff could be included as part of the utilities' annual Tier 3 compliance reports and that any reporting requirement should not result in a substantial additional burden on the utilities.[38] The participants also agreed that any reporting requirement should include a sunset provision, with five years being a suggested duration.[39] The Commission agrees with this approach.

[36] Case No. 19-3009-INV, transcript of 10/16/19 workshop at 82-83 (Allen).
[37] *See also* Case No. 19-3009-INV, comments of Sierra Club dated 10/7/19 at 5.
[38] *Id.*; Case No. 19-3009-INV, comments of VEC dated 10/7/19 at 2; comments of BED-VPPSA dated 10/7/19 at 2-3. GMP stated that it did not believe that additional reporting was needed but did not object if it was required. GMP comments of 10/7/19 at 3.
[39] Case No. 19-3009-INV, transcript of 10/16/19 workshop at 83-84; comments of GMP dated 10/30/19 at 3.

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D. The amount of incremental revenue to Vermont's electric distribution utilities expected to be generated by plug-in EVs and all other financial benefits that plug-in EVs may bring to electric distribution utilities over the next 10 years, whether there are necessary costs and technical feasibility problems when metering plug-in EV charging separately from other electrical demand on the same account, and all other costs expected to be incurred by the electric distribution utilities related to plug-in EV deployment and associated infrastructure

1. Incremental revenues

Any incremental utility revenues from EVs will depend on the design of any EV rates ultimately required or adopted and the volume of EV adoption.[40]

The utilities and the State Agencies offered different views on the best way to implement an EV-specific rate. The State Agencies described beginning with a very low base rate with little to no contribution to common costs. Under the Department's rate design, EV charging would generate little or no incremental revenue because the rate would be set to cover incremental costs.[41] According to the Department, beginning with a low base rate would create room in the rate for State-imposed taxes such as a transportation infrastructure assessment. The Department states that EV rates may depart from traditional ratemaking principles and contributing to common costs because EVs represent a new class of load.[42]

GMP provided a table showing its expected EV-related incremental revenues over the next 10 years.[43] This table, shown below, modeled incremental revenues using GMP's current residential rate and a reduced EV-specific rate. GMP explains that the more an EV-specific rate is reduced beyond the power-cost-savings reduction, the less rate-reducing benefit the additional EV usage will have on non-EV rates.[44]

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[40] *See, e.g.*, Case No. 19-3009-INV, comments of Plug In America dated 8/15/19 at 2; comments of Greenlots dated 8/15/19 at 4; comments of Alliance for Transportation Electrification Comments dated 8/15/19 at 5; comments of Siemens dated 8/15/19 at 5.

[41] Case No. 19-3009-INV, transcript of 8/22/19 workshop at 55-56 (Allen).

[42] Case No. 19-3009-INV, comments of State Agencies dated 10/7/19 at 2.

[43] Case No. 19-3009-INV, comments of GMP dated 8/15/19 at 3-4.

[44] Case No. 19-3009-INV, comments of GMP dated 9/6/19 at 2-3.

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	GREEN MOUNTAIN POWER CORPORATION		
	Analysis of Revenue Impact of Electric Vehicles		
	Total Sales from EVs (New & Existing) (kWh)	Revenue at Current Residential Rate 1 ($/kWh) $ 0.16446	Revenue at Reduced [1.] EV-specific Rate ($/kWh) $ 0.12950
Jan-20	9,736,124	$ 1,601,203	$ 1,260,828
Jan-21	13,621,124	2,240,130	1,763,936
Jan-22	18,430,124	3,031,018	2,386,701
Jan-23	24,644,124	4,052,973	3,191,414
Jan-24	32,638,124	5,367,666	4,226,637
Jan-25	42,870,124	7,050,421	5,551,681
Jan-26	55,873,124	9,188,894	7,235,570
Jan-27	72,257,124	11,883,407	9,357,298
Jan-28	92,676,124	15,241,515	12,001,558

[1.] Example EV-specific rate is lowered from Rate 1 rate by expected capacity savings and energy cost differences due to utility control.

VEC provided a similar table containing expected EV-related incremental margins under its existing rates.[45] VEC's table, below, includes revenues associated with both plug-in electric EVs (EVs) and plug-in hybrid EVs (PHEVs), and adjusts the final margin for the EV-related incentives that it offers.

[45] Case No. 19-3009-INV, comments of VEC dated 8/15/19 at 4.

Projections of Incremental Margins Due to EVs and PHEVs							
	Full EV (cumulative)	PHEV (cumulative)	EV kWh (annual)	PHEV kWh (annual)	Total kWh (annual)	VEC Margin (annual)	VEC Margin Minus Purchase Incentive (annual)
Pre-2019	55	46	151,690	78,108	229,798	$22,474	($16,526)
2019	87	78	239,946	132,444	372,390	$36,420	$12,420
2020	140	121	386,120	205,458	591,578	$57,856	$20,606
2021	226	178	623,308	302,244	925,552	$90,519	$33,269
2022	366	253	1,009,428	429,594	1,439,022	$140,736	$51,986
2023	592	350	1,632,736	594,300	2,227,036	$217,804	$80,554
2024	955	471	2,633,890	799,758	3,433,648	$335,811	$124,061
2025	1,536	616	4,236,288	1,045,968	5,282,256	$516,605	$189,855
2026	2,462	779	6,790,196	1,322,742	8,112,938	$793,445	$289,695
2027	3,901	910	10,758,958	1,545,180	12,304,138	$1,203,345	$451,095
2028	6,176	990	17,033,408	1,681,020	18,714,428	$1,830,271	$672,771

2. Necessary costs and technical feasibility problems

Several utilities provided an overview of estimated incremental costs associated with the infrastructure, monitoring, and processing that would be required to separately track EV kWh consumption.[46]

According to BED and VPPSA, it costs roughly $1,200 to install either a separate utility meter or a Level 2 charger capable of providing energy usage feedback to the utility. If needed, upgrading the residence to a 200-amp service adds another $3,000.[47] GMP's estimate of per-EV customer infrastructure costs including installation was approximately the same at $1,000 to $1,200.[48] VEC's estimate for installing a separate meter was slightly lower at $550 to $950.[49] The magnitude of the total incremental costs will depend on the volume of EV adoption.

If an EV charger is used for metering purposes, each type of charger—of which there are many—requires preliminary programming work to integrate the EV charger data into the utility's billing system. BED estimated a one-time up-front cost of approximately $6,865 for each type of EV charger that it integrates into its billing system and allows its

[46] Case No. 19-3009-INV, comments of BED dated 9/6/19; comments of GMP dated 9/6/19.
[47] Case No. 19-3009-INV, comments of BED dated 9/6/19 at 2.
[48] Case No. 19-3009-INV, comments of GMP dated 9/6/19 at 2.
[49] Case No. 19-3009-INV, comments of VEC dated 8/15/19 at 2.

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customers to use with BED's EV rate.[50] As EV charging technology develops, BED and VPPSA predict that they will be required to pay application programming interface ("API") fees to the manufacturers of EV chargers for access to the charging data although no API fees are currently required.[51] BED and VPPSA estimate they will spend an additional $568 per year to troubleshoot issues with EV charging data and billing. These costs are related to developing the capability of separately monitoring EV usage and will not depend on the volume of EV adoptions.

VPPSA did not provide an estimate of the costs of automating the billing system for its 12 municipal utilities to allow for EV metering but did describe its experience automating the net-metering billing process. According to VPPSA, the initial estimate for the project was $70,000, but was ultimately quoted at $200,000 due to the complexity.[52] GMP estimated its costs to modify its back-office systems to separately track EV usage and accurately calculate a per-kWh tax at $200,000 to $300,000, which is consistent with VPPSA's experience. VEC did not know the cost of upgrading its own billing system to allow for metering and using data from EV charging equipment but stated that an upgrade would be required because its billing system cannot currently monitor EV usage using a meter in an EV charger. These costs are related to developing the capability of separately monitoring EV usage and will not depend on the volume of EV adoptions.

No utility stated that separately measuring EV energy usage was technically infeasible. BED explained that it is already using data from Level 2 EV chargers to calculate charges for its EV-specific rate. BED also stated that it is currently entering the billing data manually and will need to automate the process if there is a significant increase in customers taking advantage of its EV rate.[53] GMP also reported that it had developed interfaces to extract data from certain EV chargers for the purpose of developing an EV-specific rate.[54] GMP explained that it had identified no feasibility problems or incremental costs with its project, but also stated that its back-office processes were not yet in live production.[55] GMP and BED also explained that they limit the specific

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[50] Case No. 19-3009-INV, comments of BED dated 9/6/19 at 3. BED explained that it has to negotiate contracts to obtain access to charging data with each manufacturer of an EV charger that BED allows on its EV-specific rate. Transcript 8/22/19 workshop at 102-103 (Gibbons).

[51] *Id; see also* Transcript 8/22/19 workshop at 110 (Powell) (explaining that the biggest barrier WEC is experiencing is paying for the API because each vendor is proprietary).

[52] *Id.* at 3-4.

[53] Case No. 19-3009-INV, comments of BED dated 8/15/19 at 3.

[54] Case No. 19-3009-INV, comments of GMP dated 8/15/19 at 5.

[55] *Id.*; *see also* transcript of 8/22/28 workshop at 95-96 (Otley). Although GMP stated it did not incur any incremental costs in modifying its system to collect EV charger data, GMP estimated that it would incur

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chargers that their customers can use because each charger has its own API and must be separately interfaced with the utility's billing systems.[56]

No utility expected increasing EV usage to require any substantial expansion of the transmission and distribution system to meet EV demand.[57]

3. Other potential costs related to PEV deployment

Some distribution utilities explained that they are paying for the cost of their Tier 3 EV incentive programs with the additional revenues generated by the new EV load. The VPPSA utilities, for example, have structured their Tier 3 EV incentives to be revenue neutral—the incentive amount equals the expected additional revenue generated by customers who receive the incentive and purchase a new EV and then pay the general retail rate for EV charging.[58] Under this approach, the incentives offered by the VPPSA utilities are paid for by the customers who receive them rather than all ratepayers. GMP, BED, and VEC are using their Tier 3 budgets for EV-related incentives, although they did not state that they have structured their EV-incentive programs to be revenue neutral as the VPPSA utilities have done.[59]

The VPPSA utilities explained that requiring a deeply reduced EV-specific rate, as proposed by the Department, would make it impossible to maintain the revenue neutrality of their EV-related incentive programs. As a result, the cost of EV incentives would need to be recovered from non-EV kWh revenues, which would include customers who do not own an EV and did not receive the benefit of an EV incentive.[60] While the cost of the EV incentive is not new to the VPPSA utilities, requiring EV rates for VPPSA would cause general retail rates to rise because of this historical revenue-neutral design for Tier 3 incentives.

Additionally, the lower an EV rate is set, the smaller the contribution to a utility's common costs from the EV charging revenue. Many commenters referenced the opportunity for downward rate pressure (lower rates) that results from a utility's ability

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incremental costs of approximately $200,000 to $300,000 to modify, test, and implement its back-office system to collect a per-kWh tax. Comments of GMP dated 9/6/19 at 2.

[56] Case No. 19-3009-INV, transcript of 8/22/19 workshop at 97 (Otley) and 102 (Gibbons).

[57] Case No. 19-3009-INV, comments of GMP dated 9/6/19 at 1.

[58] Case No. 19-3009-INV, transcript of 10/16/19 workshop at 72-73 (Bailey).

[59] Case No. 19-3009-INV, transcript of 8/22/19 workshop at 12 (Morris), 63 (Gibbons), 98 (Otley); comments of BED-VPPSA dated 8/15/19 at 2.

[60] Case No. 19-3009-INV, comments of BED-VPPSA dated 8/15/19 at 2; comments of State Agencies dated 8/15/19 at 3; comments of GMP dated 9/6/19 at 2.

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to spread fixed costs across more kWh sales due to EV charging loads.[61] This downward rate pressure would be lost if EV rates were set too low. The new revenue from EVs can help to offset upward rate pressure from net-metering and RES Tiers 1 and 2. One of the significant benefits of including Tier 3 in the RES is the addition of new sales (beneficial electrification) to offset the added costs of Tiers 1 and 2. However, if fixed utility costs are not recovered from new EV revenue , the beneficial downward pressure on rates due to EVs disappears. All commenters agreed this is not a desirable result.[62]

Some of the potential downward rate pressure due to EV load is already reduced by EV incentive programs offered by the various utilities. The costs of the VPPSA utilities' revenue-neutral incentive programs, for example, are currently designed to be recovered through the additional revenue generated by customers receiving an incentive by purchasing an EV. If utilities continue to offer EV incentives and are further required to implement an EV-specific rate that is limited to actual energy costs, what would have been downward pressure on rates could become upward pressure as utilities seek to recover EV incentive costs from general retail rates.

E. How to address the use of net-metering energy and net-metering energy credits for electric vehicle supply equipment

There was consensus among participants in the underlying investigation that net-metering energy credits should not be used to pay account balances that are associated with the resale of electricity for profit by EV charging stations. The reasoning behind the opposition is that Vermont's distribution utilities, and ultimately their customers, pay a premium price for electricity generated by net-metering systems. To then allow the credits received for that energy to be used to pay for electricity that is resold for a profit by a charging station would result in ratepayers subsidizing the unregulated, for-profit sale of electricity. GMP also advocated, consistent with Commission Rule 5.103, that net-metering credits not be allowed to pay rental or lease charges for EV equipment that are part of a customer's bill.

Currently, 30 V.S.A. § 8002(16) defines a net-metering system in part as "a plant for generation of electricity that . . . (C) is intended primarily to offset the customer's own electricity requirements and does not primarily supply electricity to electric vehicle supply equipment, as defined in section 201 of this title, for the resale of electricity to the public by the kWh or for other retail sales to the public, including those based in whole

[61] Case No. 19-3009-INV, comments of GMP dated 9/6/19 at 2-3; comments of GMP dated 10/30/19 at 4; comments of BED-VPPSA dated 10/31/19 at 2-3.

[62] Case No. 19-3009-INV, transcript of 8/22/19 workshop at 30 (Allen); comments of BED-VPPSA dated 10/31/19 at 3.

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or in part on a flat fee per charging session or a time-based fee for occupying a parking space while using electric vehicle supply equipment."

The existing definition's use of the undefined term "primarily" in the phrase "does not primarily supply electricity to electric vehicle supply equipment" is problematic. Because the term is undefined, it could be construed to mean that net-metering energy credits could be used to offset account balances that are composed of up to 49% of the for-profit resale of electricity by EV charging stations.

Recommendation

The Commission recommends that the second use of the word "primarily" be stricken from the statutory definition of a net-metering system and the words "for-profit" be added to allow not-for-profit resale as an amenity to certain EV users. The changes would read: "a plant for generation of electricity that . . . (C) is intended primarily to offset the customer's own electricity requirements and does not ~~primarily~~ supply electricity to electric vehicle supply equipment, as defined in section 201 of this title, for the for-profit resale of electricity to the public by the kWh or for other for-profit retail sales to the public, including those based in whole or in part on a flat fee per charging session or a time-based fee for occupying a parking space while using electric vehicle supply equipment."

The intent of the recommended statutory amendment is to avoid Vermont ratepayers providing a subsidy in the form of net-metering credits that are then used to purchase electricity for resale at a profit at EV charging stations. This would still allow net-metering credits to be used on accounts associated with EV-charging services where those services are not provided on a for-profit basis. For example, a hotel or inn with a net-metering account might provide free charging as an amenity to its guests, or a business or State agency might provide EV charging for a fee that is designed only to recover the costs of providing the charging services without generating any net revenues.

The Commission also agrees with GMP that net-metering credits should not be used to pay rental or lease fees for EV charging infrastructure that appear on an electric customer's bill. Given that this approach is consistent with the existing Commission Rule 5.103, no further action is required from the Legislature.

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III. Conclusion

It is the goal of the State of Vermont to reduce emissions of greenhouse gases to make an appropriate contribution to achieving the regional goals of reducing emissions of greenhouse gases ("GHG") from the 1990 baseline by:

(1) 25 percent by January 1, 2012;

(2) 50 percent by January 1, 2028;

(3) if practicable using reasonable efforts, 75 percent by January 1, 2050.[63]

Vermont's transportation sector accounts for 47% of the state's GHG emissions, and only 5% of the energy used in the transportation sector in Vermont is from renewable sources.[64] If the State is going to meet its ambitious GHG reduction goals, it is imperative that it develop an environment in which more Vermonters choose forms of transportation that reduce GHG emissions so that Vermont can reduce that 47% number to a level consistent with the State's GHG reduction goals.

In its report *Promoting the Ownership and Use of Electric Vehicles in the State of Vermont*, the Commission analyzed barriers to achieving more widespread adoption of EVs in Vermont and included a range of recommendations to mitigate or remove those barriers.

In this report, the Commission provides further analyses and recommendations designed to assist the State in meeting its GHG reduction goals while at the same time providing needed funding for the maintenance of Vermont's transportation infrastructure. This includes a recognition that Vermont's model for transportation funding should be reconsidered to ensure equitable contributions from all users of Vermont's roads without creating obstacles to the adoption of EVs by Vermont's residents, that utilities should be granted some discretion in how to address the anticipated demand from EV charging, and that increasing EV-charging demand should benefit all ratepayers by contributing to the overall costs of Vermont's electric system.

[63] 10 V.S.A. § 578.

[64] *Report on Vermont Renewable Energy Programs – A Biennial Report to the Vermont General Assembly Prepared by the Department of Public Service*, March 1, 2019, at page at 5.

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Appendix A – History of PUC Case No. 19-3009-INV

The Commission initiated Case Number 19-3009-INV on July 17, 2019, in response to Section 35 of Act 59 (H.529) of the 2019-2020 Vermont legislative session. The investigation was conducted as a series of workshops and several rounds of written requests for information, each addressing one or more specific topic areas.

Workshops were conducted as follows:

Date	Topics Addressed
August 22, 2014	(1) Whether Vermont's electric distribution utilities should collect both a per-kWh transportation efficiency fee and a per-kWh transportation infrastructure assessment, or just a per-kWh transportation infrastructure assessment and how best to implement any such charges. (2) The amount of incremental revenue to Vermont's electric distribution utilities expected to be generated by plug-in EVs and all other financial benefits that plug-in EVs may bring to electric distribution utilities over the next 10 years, whether there are necessary costs and technical feasibility problems when metering plug-in EV charging separately from other electrical demand on the same account, and all other costs expected to be incurred by the electric distribution utilities related to plug-in EV deployment and associated infrastructure.
October 16, 2019	(1) The design of an electric vehicle charging tariff for electric utilities with more than 17,000 customers, and other electric utilities at their discretion, that allows a customer, including a company that owns and operates electric vehicle supply equipment, to purchase electricity solely to charge a plug-in EV, and what such tariffs should include. (2) Whether there should be a mandatory periodic report from electric distribution utilities to the Commission regarding electric vehicle charging tariffs and what those reports should contain. (3) How to address the use of net-metering energy and net-metering energy credits for electric vehicle supply equipment.

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Written comments were solicited as follows:

Date	Topics Addressed
July 17, 2019	(1) Utility collection of per-kWh fees, including the costs and challenges associated with collecting and tendering those fees to the appropriate State agency. (2) The incremental revenue and other benefits to distribution utilities associated with EV adoption. (3) The costs and the technical feasibility for distribution utilities to separately meter EV charging. (4) Any other costs associated with EV deployment and infrastructure that distribution utilities expect to incur. (5) Estimates of staffing requirements, employee and contractor hours, and infrastructure spending that would be required to implement and operate a system capable of collecting per-kWh fees. (6) The incremental revenues that would result based on different estimates of the future rate of EV adoption.
August 22, 2019	Supplemental written comments and recommendations from participants in the August 22, 2019, workshop
September 9, 2019	(1) Electric vehicle charging tariffs, including time-of-use rates, per-kWh fees for transportation efficiency and transportation infrastructure, an option for a customer to purchase energy solely from renewable sources, a mechanism for the recovery of costs reasonably necessary to comply with implementing an electric vehicle charging tariff, provision for clear and transparent customer billing statements, the necessary costs of metering or submetering within the rate charged to the customer, and other considerations deemed appropriate. (2) Mandatory periodic report from electric distribution utilities to the Commission and what should be included in those reports, including tariff participation levels and impact highlights, including participation levels and new electric vehicle supply equipment installed by county, the overall costs and benefits of the tariff, including any changes or issues encountered during the reporting period, and other necessary data.

Date	Topics Addressed
October 16, 2019	Supplemental written comments and recommendations from participants in the August 22, 2019, workshop, including any final recommendation for inclusion in this report.

The workshops were conducted as presentations and discussions addressing specific issues. Materials were filed with the Commission in advance of the workshops to allow the Commission and participants to develop questions in advance of a workshop. The requests for written information were used to elicit specific information and recommendations, to help prepare for workshops, or to obtain information to supplement the information provided during the workshops.

The Commission also engaged in a significant amount of self-directed research based on the information it obtained throughout the investigation.

The Commission reviewed all of the information collected throughout this proceeding and consulted with relevant staff in developing this report and the recommendations it contains.

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Appendix B – List of Participants in PUC Case No. 19-3009-INV

Vermont Department of Public Service

Vermont Agency of Transportation

Vermont Agency of Natural Resources

Green Mountain Power Corporation

Swanton Village, Inc. Electric Department

Village of Johnson Water & Light Department

Vermont Electric Cooperative, Inc.

Town of Stowe Electric Department

City of Burlington Electric Department

Village of Enosburg Falls Water & Light Department

Town of Northfield Electric Department

Town of Hardwick Electric Department

Village of Lyndonville Electric Department

Village of Jacksonville Electric Company

Village of Ludlow Electric Light Department

Village of Orleans Electric Department

Village of Morrisville Water & Light Department

Washington Electric Cooperative, Inc.

Barton Village, Inc. Electric Department

Village of Hyde Park Electric Department

Vermont Public Power Supply Authority

Greenlots

Siemens

Plug In America

Tesla Energy

evconnect

Vermont Vehicle and Automotive Distributors Association

Sierra Club

Renewable Energy Vermont

Alliance for Transportation Electrification

Vermont Energy Investment Corporation

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