December 12, 2022

Holly R. Anderson
Clerk of the Commission
112 State Street
Montpelier, VT 05620-2701

Re: Case No. 22-4968-INV, Public Utility Commission 2022 Investigation into Rates Related to Electric Vehicles

Dear Ms. Anderson,

In response to the Public Utility Commission's ("Commission's") November 15, 2022, Order Opening an Investigation and Requesting Comments, Burlington Electric Department ("BED") provides responses under each Commission question below.

1. Rate details. Details on the specific rate or rates offered, including eligibility by customer class or group. Utilities may provide either a descriptive narrative or the titles or numbers of any tariffs or pilot programs previously filed with the Commission. Please also identify the default residential and commercial retail rates and tariffs for point of reference.

BED currently has two approved electric vehicle ("EV") rate tariffs: BED's EV Rate and BED's Public EV Charging Station Rate.

EV Rate

BED's EV Rate was most recently approved in BED's 2021 rate case, Case No. 21-2186-TF.[1] Prior to that, BED received approval from the Commission to expand the EV Rate from its initial residential

[1] All of BED's other current tariffs, including tariffs for BED's residential and commercial rates, were also approved in Case No. 21-2186-TF.

class applicability, to include our small general and large general classes as well.[2] With this expansion, all non-time-of-use rate classes are eligible for enrollment in the EV Rate, other than lighting.

BED's EV Rate was initially approved for BED's residential rate class by the Commission on August 20, 2018, in Case No. 18-2763-TF for service starting on September 6, 2018. By doing so, the Commission authorized BED to become one of a handful of electric utilities in the United States to offer an EV rate. BED's rate uses an approach we have yet to see replicated elsewhere - our rate provides charging for EVs close to the marginal cost to serve and is administered without additional BED hardware. There is also no increased on-peak charging cost that could result in customers paying higher than expected monthly bills. Instead, BED designed a program where the greatest cost a customer could incur with EV Rate enrollment would be the loss of a monthly bill credit if charging outside of the EV Rate terms, and in effect, BED would bill the customer at their normal retail rate for electricity. This design enables a customer to be no worse off than at the underlying rate for the rate class, while justifying the lowest rate to charge electric vehicles in the state.

In the last year, BED has expanded this offering to all non-time-of-use rate classes and has included a real-time peak scheduling option. These two changes were implemented to reach more customers and provide flexible charging that meets a variety of customer needs. For example, workplace charging under the Fixed EV Charging Hours (10pm to 12pm the next day), would only be able to utilize morning charging. The table below specifies the three scheduling options under BED's EV Rate.

EV Charging Hours		
	Fixed EV Charging	10 PM - 12 PM (*next day*)
	Flexible Load	Hours designated by BED in advance
	Flexible Real-Time	Hours designated by BED
EV Charging Credit		
	Energy Credits	
		Residential Service: $0.072815 per kWh
		Small General Service: $0.072815 per kWh
	Demand Credits	
		Large General Service: $21.53 per kW*

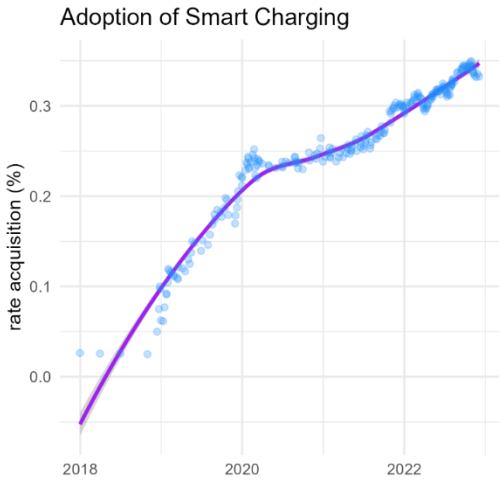
Public EV Charging Station Rate

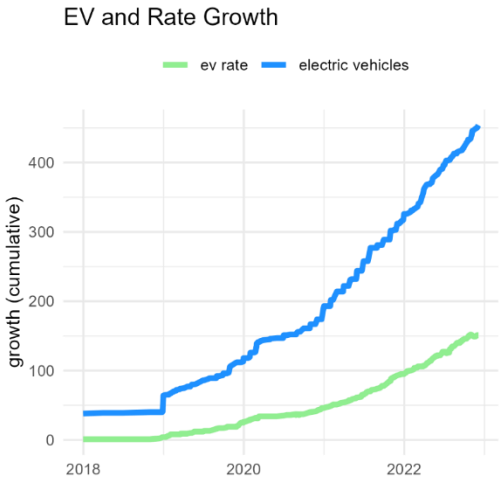
[2] The Commission approved the eligibility expansion of BED's EV Rate to include small general and large general rate classes in addition to BED's residential rate class on July 1, 2021, in Case Numbers 21-1832-TF, 21-1833-TF, and 21-1834-TF.

BED's tariff for its public EV charging stations was also most recently approved by the Commission in BED's 2021 rate case, Case No. 21-2186-TF. This tariff was initially approved by the Commission on February 10, 2015, for service starting on April 1, 2015.

2. Enrollment. The number of customers enrolled in such rates and the percentage of customers who utilize utility incentives related to EVs (Tier III, for example) who are also enrolled in the rate or rates.

Enrollment into BED's EV Rate (previously the Residential Electric Vehicle Rate) began informally at the end of 2018. After a BED press conference on the EV Rate in early 2019, we began to see increased customer enrollment. The plots below tell a story of growth in EV adoption as well as an accelerated uptake in EV Rate enrollment. We are seeing increased EV Rate enrollment as a percentage of Tier 3 incentives provided to plug-in electric vehicles (including both plug-in hybrid – PHEV, and all electric vehicles - AEV).





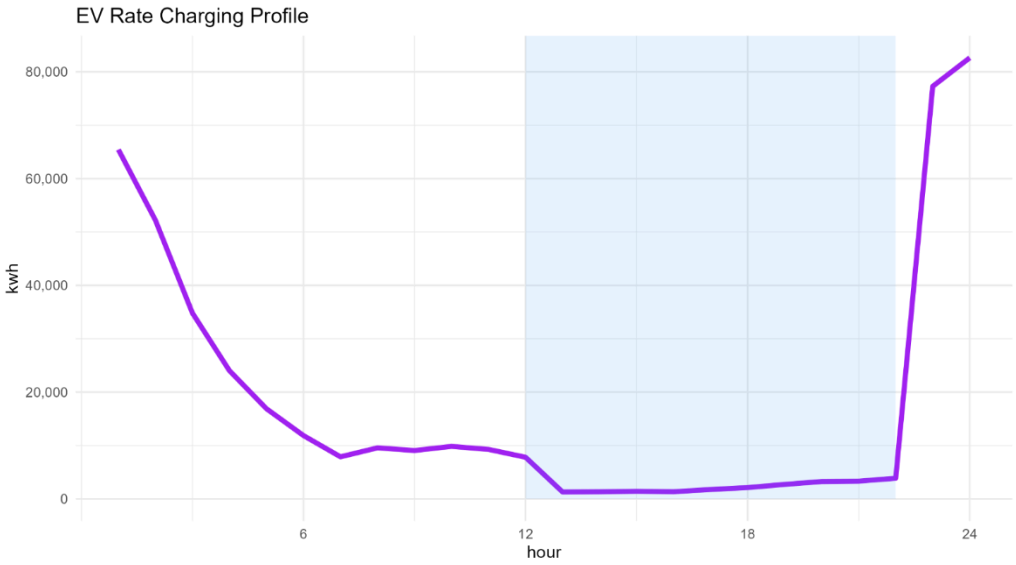
Since 2017, one third of customers who have received an EV Tier III incentive in BED's territory have enrolled in the EV rate and this number continues to rise. This increased enrollment rate indicates that the combination of increasing customer awareness of the EV Rate and BED's incentives (which reduce the cost of purchase of the vehicle, charger, and charger installation costs) are encouraging EV owners to opt for smart charging and limiting the peak impact of EV charging on BED's system. Of the enrolled customers, the vast majority qualify for the monthly credit by voluntarily observing the charging constraints to receive the credit (see answer to question 3).

To facilitate expansion of charging opportunities for BED customers who rent their homes and are not able to install level two chargers at home to participate in the EV Rate (60% of Burlington homes are renter occupied) BED has developed a multifamily charger program and as noted above, BED has expanded eligibility of the EV Rate to include the Small General rate class – which is typically used for a house-meter owned by a multifamily property owner, and Large General rate

class. Additionally, BED has published a Charger Installation Page[3] to help customers navigate the charger installation process and incentive and financing options.

3. Effectiveness. Do the rates appear to be directing load away from peak times related to cost? Are there other value streams or opportunities presented by EV rates? For example, will EV rates be effective in avoiding upgrades to the distribution grid or reducing other power supply costs? What are the "lessons learned" during implementation so far?

The majority of customers who have enrolled in the EV Rate are using the Fixed EV Charging Hours option, which provides charging credits to customers for charging only between 10pm and 12pm in any particular month. Under this charging arrangement, 93% of home charging under the EV Rate has been kept outside of these peak hours. This indicates that the credits provided by the EV Rate are effective at motivating enrolled customers to charge during off-peak hours. As part of this rate, customers can opt out of the charging hours by cancelling the charging schedule.



Lessons learned:
BED is closing in on four years of offering this rate to its customers. From the start, BED decided to run this rate in-house, and has been involved with the following tasks:

- Running evaluation, measurement and verification (EM&V) for approved chargers;
- Establishing data pipelines, engineered databases;
- Developing customer enrollment processes;
- Calculating bill credits; and,
- Ongoing customer support

[3] See https://www.burlingtonelectric.com/evchargers

From our involvement in nearly every step of this program, we have learned a number of things. BED has outlined these lessons below.

- Make it easy for the customer
    - Make the enrollment instructions straightforward with pictures and simple steps
    - EV charging is a routine task, establishing a preset schedule or utility control is ideal
    - Give customers ability to opt out at any time to maximize participation
- PHEV owners have different charging behavior
    - The average PHEV has a range of ~20 miles (likely lower in the winter)
    - As more people work from home and can charge during the day, having more daily charging hours may help to increase decarbonization (hence the expansion of BED's rate to allow more dynamic options which would serve to expand available charging hours)
- Hardware and software issues are present
    - Chargers are not foolproof – there are bugs and glitches
    - Double-pump issue – for ChargePoint chargers a customer who plugs in, unplugs, then re-plugs will void the charging schedule. Unclear if this issue applies to other charger types.
    - Customer connectivity issues have occurred a few times
- Dynamic peak scheduling has potential, and is constrained to vehicles being actively plugged in. This includes potential benefits of discharging a vehicles battery to the building or grid (V2X).

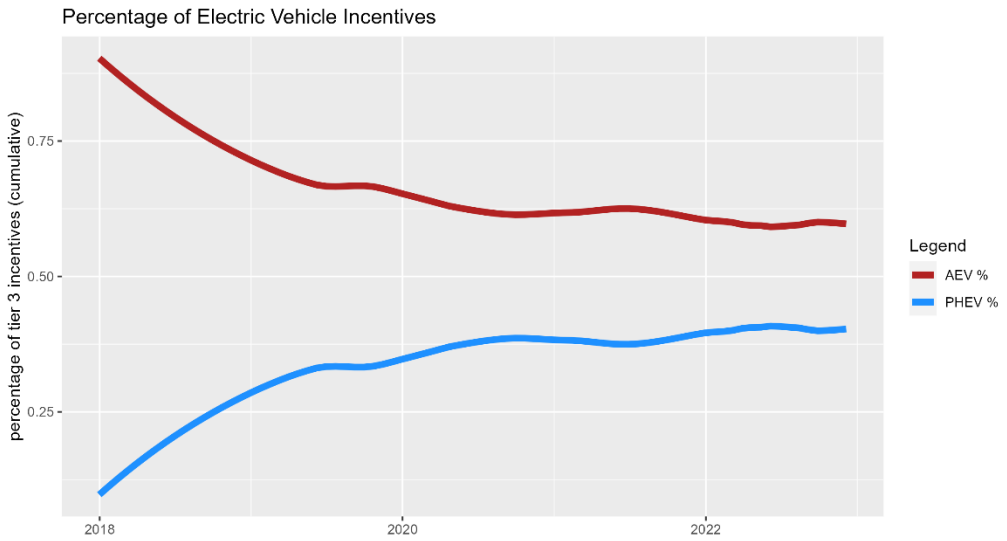
4. Progress. Please describe (1) progress toward developing new or additional EV or EVSE rates, (2) any barriers the utility is facing as it attempts to implement the requirement, (3) pathways to overcoming any such barriers associated with the development of rates for EV and EVSE rates in Act 55, and (4) concrete steps the utility is taking to prepare to propose rates in advance of the June 30, 2024 deadline for implementation.

BED is not working on implementing any new or additional EV or EVSE rates at this time. As noted in #1, BED already has two approved EV rate tariffs in effect. Further, because the exemption language in Section 33(d) of Vermont's Act 55 of 2021[4] applies to BED, the June 30, 2024, deadline in Act 55 is not applicable to BED.

5. Addressing barriers. In last year's report, utilities identified several barriers to implementing EV and EVSE rates including metering, changing technology, cost, and broadband access. Please describe the specific actions the utility is taking to overcome these barriers.

[4] Vermont Act 55 of 2021, Section 33(d) Electric distribution utilities with PEV rates approved by the Public Utility Commission prior to July 1, 2021 currently implemented as tariffs by those electric distribution utilities are exempt from subsection (b) of this section for the relevant rate classes, market segments, or customer segments in which the PEV rates are offered.

The main barrier that BED is working to address is the final step of automating the process of adding a monthly EV Rate bill credit to a participating customer's bill. Currently, this is a manual process that is handled monthly for each of the 150 customers enrolled on the EV Rate. BED is currently working to upgrade its multi-million-dollar Customer Information System ("CIS") and Meter Data Management System ("MDMS") for this (and for many other reasons). A key goal for these upgrades is to allow for system rate and billing flexibility in ways that are currently and historically lacking. When these system upgrades are completed, BED expects to have the ability to fully automate the billing of the EV Rate and will have greater latitude to develop further dynamic rate options.



The above graph illustrates that a significant number of BED customers who purchase EVs continue to choose to purchase PHEVs instead of AEVs. BED has found that PHEV owners may not choose to make the investment to install a level two charger since they find slower level one charging sufficient. Additionally, as mentioned above, BED's high number of customers who rent their homes may not be able to install level two chargers at home. As a result, these customers have not been able to participate in the EV Rate. To address this limitation, BED is working alongside Washington Electric Co-Op ("WEC") and Vermont Electric Co-Op ("VEC") to test metering and controls technologies to provide a smart level 1 charging option that customers could use to participate in the EV Rate. This work is being supported by the State of Vermont Flexible Load Rate Design Pilot Projects Grant #: 02240-FY22-SEP-03. The project kicked off during the Summer of 2022 and will run for one year.

Lastly, BED is in the process of upgrading two of its legacy Fujitsu DCFC (Direct Current Fast Chargers) units that provided electricity at a peak rate of ~25kW. These will be replaced with faster chargers, rated at ~60 kW. As BED goes through this process, new rates are being developed to focus on cost recovery of these faster units and to send the proper price signals to mitigate idling.

Thank you for the opportunity to provide information about BED's EV rates. Should the Commission have any concerns or questions about this submittal, please do not hesitate to contact us.

Sincerely,

Amber Widmayer
Regulatory Specialist
Burlington Electric Department
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