BURLINGTON
ELECTRIC
DEPARTMENT

February 15, 2019

Ms. Judith C. Whitney, Clerk
Vermont Public Utility Commission
112 State Street, Drawer 20
Montpelier, VT 05620

Re: Case 18 – 2660
Information response relative to per kWh fees on EV charging

Dear Ms. Whitney;

At the request of the Vermont Public Utility Commission ("Commission"), the City of Burlington Electric Department ("BED") and Vermont Public Power Supply Authority ("VPPSA") submit the following information responses relative to a potential per kWh tax on Electric Vehicle Charging. This filing responds to the three specific questions raised by the Commission in its Order dated February 4, 2019. In our filing, we also identify additional issues for the Commission to consider. Such additional issues relate to the current capabilities of Vermont's distribution utilities to collect a transportation tax under various interconnection arrangements on a kWh basis and the role of Vermont's distribution utilities as potential transportation tax collectors.

As an initial matter, BED and VPPSA assert that, given our experience and on-going difficulty with implementing net metering, in particular, the challenges associated with billing net metered systems, and the overall costs involved with managing the net metering program, it is important that all Vermont stakeholders clearly understand the difficulties that will be inherent in making Vermont's utilities responsible for calculating, billing, and collecting a tax on EV charging. Further, we contend that the expected costs associated with implementing any proposed tax regime for nonutility owned EVSE (i.e. privately owned charging equipment) should not be recoverable from a utility's general customer base. Vermont's distribution utilities should not be placed in the position of transportation tax collector. Transportation tax

collection is not a core competency of Vermont's utilities and they are not set up to enforce such tax payments (for example would a customer be subject to disconnection for non-payment of any transportation tax component of the electric bill).

Summary of Position

Below, BED and VPPSA summarize and highlight for the Commission some of the more significant concerns we have with respect to the State potentially directing the distribution utilities to calculate, bill, and collect a per kWh tax on electric vehicle supply equipment or charging (hereafter, generically referred as "EVSE"). In the sections that follow this summary, our concerns should become apparent.

1. Depending on the interconnection arrangement with publicly available, nonutility EVSE owners[1], distribution utilities may not have the capability to measure the kWh use of EVSE (e.g. in the absence of a utility owned, revenue-grade meter);
2. Because some EVSE technologies (i.e. level 1 and generic level 2 chargers) will be installed behind an existing utility owned, revenue-grade meter, EV and EVSE consumption may not be detectable by the distribution utility, thus a transportation tax could be avoided by some EV owners if it is assessed on a kWh basis;
3. Most, if not all, distribution utilities are not currently in a position to determine the costs or requirements of establishing the necessary IT infrastructure and billing systems to calculate, bill and collect taxes on a per kWh basis. Details of data presentation from nonutility EVSEs, the effects of their data presentations on other utility charges, and whether utility metering systems are available in all situations make the question of costs essentially impossible to answer at this time; and,

[1] In our January 9, 2019 filing, we referred to third party EVSE owners and third party data. In prior filings, we have also referred to third party EVSE owners as nonutility owners of EVSE. Such naming conventions have been used interchangeably. For the sake of consistency, we will shall use nonutility EVSE owners throughout this filing.

4. Many of Vermont's distribution utilities have not installed the necessary Customer Billing Systems ("CIS") that would be required to calculate, bill and collect taxes on a per kWh basis without manual interventions.

Public Utility Commission Questions

The specific Commission questions were:

1. **The costs and requirements that are expected to be incurred by Vermont distribution utilities if the State of Vermont were to impose a tax or fee on EV charging on a kWh basis and if Vermont distribution utilities were required to calculate, bill, and collect that tax or fee.**

Response:

To the extent that the Commission's above-noted question refers to nonutility EVSE owners, our answer to the Commission's first question is fairly straightforward. Any nonutility EVSE owner requesting service would be treated the same as all other commercial customers seeking electric service. As with other commercial customers, our utilities would provide a utility owned, revenue-grade meter at a specified location and establish a new account. Based on the type of requested electric service, the customer's account would, under current tariff regimes, generally fall under an existing C&I tariff. Some C&I tariffs include a demand charge; others do not. Additionally, all other applicable charges would apply. The cost of the new utility grade meter for a new account would be recoverable pursuant to traditional cost of service mechanisms. The nonutility EVSE owner would not have to pay for the meter upfront. Additional meter installation costs may, however, be charged to the requesting customer if BED or VPPSA members incur costs above and beyond the normal costs of providing a service drop to the specified location. Such additional costs include but are not limited to electric engineering design work, transformer upgrades or removal (if necessary), trenching and conduits, traffic control, and permitting. These types of additional costs can vary widely depending on the availability of infrastructure to serve the new EVSE load and location of existing infrastructure relative to the meter location. At present, we estimate that service drop costs typically range from $1000 to $4000 for level 2 type

chargers. Higher voltage DC fast chargers could cost a nonutility EVSE owner substantially more. With respect to modifying our existing IT systems[2] to calculate a line item tax on the nonutility EVSE owner's kWh consumption, we expect that those costs would not be too significant.

The above scenario describes a typical commercial arrangement and our existing IT and CIS (i.e. billing) infrastructure. Under the above described arrangement, our utilities could calculate a transportation tax based on the utility-owned, revenue grade meter readout, bill the customer of record for that tax and collect and remit such taxes to the State. How the nonutility EVSE owner calculates, bills, and collects these expenses from its EV customers and/or patrons would be up to them to decide.

For utility owned EVSE where the customers are charged for consumption, BED and the VPPSA members may also be able to modify our existing tariff structures and billing systems relatively inexpensively to collect a per kWh transportation tax. To the extent that BED or VPPSA utilities incur additional back office costs associated with imposing such a tax on our EV customers, the distribution utilities would recover those costs through traditional cost of service principles. However, the specific requirements that the State's taxing authority imposes on Vermont's utilities relative to how such a proposed kWh tax will be calculated, the presentation of the tax on a customer's billing statement and the collection and processing of such taxes under a variety of interconnection arrangements (as further discussed, below) will materially add to the cost, complexity, and time to implement this proposed kWh tax. Examples of situations that could lead to significant costs include but are not limited to specific bill presentation requirements, modifications to other charges that would require software modifications, or any other requirement other than a straight-forward application of a kWh tax in EV related charging.

It is our understanding however that the Commission is seeking information about a wider range of plausible nonutility EVSE interconnection arrangements and what it would cost to accommodate such arrangements for the purposes of billing all

[2] These systems include, for example, meter data management systems, customer service and billing.

nonutility EVSE owners on a per kWh basis and collecting taxes on such a basis. The short response to this modified question is: costs will vary depending on the situation but are expected to be significant.

As noted in our initial comments, BED and VPPSA are not in a position at this time to provide an informed cost estimate because doing so would necessitate knowing specifically how a per kWh tax would be implemented. For instance, the costs incurred by the host utility and the customer (either a nonutility EVSE owner or a residential customer with an home EVSE) paying the tax would depend, to a large extent, on whether a utility-owned meter shall be required to measure EV charging on a kWh basis or if such a tax were to be calculated using the metrology embedded in a nonutility owned EVSE.

Rather than provide such an estimate it may be informative for BED and VPPSA to describe for the Commission, and others, our perspective on the various types of nonutility EVSE interconnection arrangements and how such arrangement might affect our capability to calculate, bill and collect taxes. Some of these scenarios were first identified in our filing dated November 5, 2018. Possible arrangements include but are not limited to the following:

a. *Nonutility owned commercial EVSE that is publicly available and is directly interconnected to the local distribution grid but does not have a utility owned, revenue grade meter measuring kWh consumption.*[3]

Under this scenario, distribution utilities would be forced to rely on nonutility EVSE embedded metrology to calculate, bill and collect taxes. But before we can quantify the cost of perform these duties, nonutility EVSE owners would need to make arrangements with our IT subject matter experts to discuss and evaluate the exact nature of the nonutility meter data and communication capabilities. However, such discussions have not taken place. As a consequence, we have no way of knowing

[3] As an example, if it were determined by the Commission that the internal metrology of a nonutility EVSE could displace traditional utility metering – Admittedly, this type of an arrangement would not likely be acceptable, at least under today's interconnection procedures.

precisely what it would cost to utilize non-utility meter data to calculate, bill, and collect a tax or fee on a per kWh basis from these types of nonutility EVSE interconnection arrangements. Although these meetings could form the foundation of longer term business relationships, it is critical that these meetings take place before we can provide a reasonably informed opinion relative to the specific cost of communicating with nonutility owned EVSE systems that are outside of our existing IT ecosystem.

We would also have to fully evaluate the processes and protocols for managing the incoming flow of data from these various nonutility owned EVSE. Once we have evaluated their capabilities and have determined whether our existing IT systems can seamlessly accept these third party data streams, BED and VPPSA would then be able to provide an estimate of the upfront capital costs of building new systems and/or adding to existing systems, as well as the on-going expense of maintaining such systems. To be clear, there will be a cost to incorporate new data sources in our billing processes, it is only the magnitude of such costs that is hard to estimate based on what we know today. At this point, however, we presume that the cost of modifying our IT infrastructure and ancillary systems could well exceed the cost of simply installing a utility owned, revenue-grade meter at each publicly available nonutility EVSE site.

With respect to the above referenced interconnection arrangement, it is important for BED and VPPSA to also highlight our concerns about what the Commission's question seems to imply. Our reading of the Commission's question appears to suggest that Vermont's distribution utilities should be prepared to fully accommodate potentially dozens of EVSE market actors who wish to bypass the traditional, revenue-grade, utility owned meter. It is our hope that the Commission acknowledges that each of these actors could have propriety and/or unique data communications and data management protocols and systems. Each actor could also have very different data reporting systems or any variety of operational quirks that our utilities would need to accommodate. Without having first-hand knowledge of these disparate communications and data management capabilities, the Commission could be asking our utilities (and Vermont's other utilities) to incur substantial costs on behalf of

their ratepayers to further accommodate nonutility EVSE owners. Some of whom are large international corporations. As we have noted in previous filings, managing data streams for various market actors, each with their own operational characteristics (which may change periodically overtime) will not be cost – free. At present, neither BED nor VPPSA can imagine, under current Vermont policy, a scenario that does not include a utility owned, revenue-grade meter at each and every nonutility owned EVSE station. From our perspective, the situation that the Commission appears to be contemplating is not unlike the net metering and group net metering situation that Vermont's utilities continue to grapple with today, at significant cost to customers.

b. *Nonutility owned commercial EVSE charging located, along with other customer loads, behind an existing utility owned, revenue-grade meter.*

Under this scenario, the customer of record would be an establishment whose main business is unrelated to the provision of EV charging services. This type of nonutility EVSE owner could be offering EV charging services to their employees as a perk, or it could be offering EV charging as an ancillary service to its customers. Because the nonutility owned EVSE would be located behind an existing utility owned, revenue-grade meter, BED and VPPSA propose that the customer of record should be responsible for calculating, billing, collecting, and remitting any and all transportation taxes from its customers or employees.

c. *Residential home charging – level 1*

EV owners have the ability to slow charge their vehicles from a standard 120 volt outlet in their garage using equipment that comes with the EV. This type of charging is referred to as level 1 charging. All an EV owner needs to do to charge their vehicle is plug into an existing 120v circuit. However, because the 120v circuit is typically connected to the household's main electrical panel located behind the main utility meter, the electricity dispensed into the EV will be indistinguishable from the electricity consumed through the other 120v outlets in the house. Unless the circuit used for EV charging is separately metered, BED and VPPSA do not believe there is a viable process for accurately measuring kWh consumption by a level 1 charged EV. Installing a

separate utility meter for the sole purpose of measuring EV related kWh consumption would be, in our opinion, cost prohibitive for most households. Such an additional meter would be billed just like any other residential account and would incur a monthly customer charge, plus energy efficiency charges and other taxes.

d. Residential home charging – generic level 2

If a household has a 240volt outlet in their garage, an EV owner could also purchase a generic, level 2 charger on Amazon or from a wide variety of market actors or directly from a manufacturer. Generic level 2 chargers do not include "smart" functions such as an application protocol interface ("API") or data storing. These types of level 2 chargers are incapable of communicating with local distribution utilities. Even if the EV owner did purchase a "smart" level 2 charger but decided not to enroll in BED's program or register their device, the electricity dispensed into the EV would be indistinguishable from all other household consumption as there would be no way to track EVSE or EV related consumption separate from other devices in the household (see section below for additional information relative to "smart" level 2 EVSE). In this way, a generic or unregistered smart level 2 would look the same as a level 1 charger to the distribution utility. As a consequence, utilities would be unable to calculate, bill and collect a transportation tax or fee on a per kWh basis.

2. **For any Vermont utility that currently has in place a program or tariff that provides a rate specific to EV charging, an explanation of how EV charging is tracked and accounted for when billing a customer using that rate and whether such tracking could also be used for calculating and billing for a kWh tax or fee applied to that same usage. Please explain any differences in your response for at-home charging versus charging at a public charging station, and any differences based on the use of Level 1, Level 2, or DC fast-charging facilities.**

Response:

As the Commission knows, BED currently has in place a residential EV rate program and tariffed EV charging service at BED owned, publicly available EVSE. Currently, BED owns and maintains 14 EVSE stations with 26 ports. Twelve of the EVSE

are level 2 Charge Point devices; two are 25 kW, single port DC fast chargers. Among the VPPSA members, Swanton owns one publicly available Level 2 charger. In the sections below, we explain how EV charging is tracked and accounted for when billing a customer using the BED EV rate and whether such tracking could also be used for calculating and billing for a kWh tax or fee.

a. BED Residential EV rate program

In Case 18 - 2763[4], the Commission approved BED's residential EV rate program. Under the approved terms and conditions of this program, BED issues participating customers a credit of $0.067735 per kWh credit of EV charging, provided the customer charges their vehicle between 10:00PM and 11:59AM the next day. To participate in the program, customers agree to install a WIFI-enabled, BED approved level 2 "smart" charger. Currently, customers may choose among three approved vendors: Charge Point, Flo and Packetized Energy Management.

In general terms, kWh credits will be calculated on a daily basis and stored in a separate BED database. At the end of each billing cycle, BED will enter each participating customer's kWh credit into BED's customer information system for billing. The customer's bill shall include the household's total kWh consumption as calculated by the existing utility meter and the total amount of the EV charging credit applied for the billing period. The following provides, in a stepwise manner, a summary of the process BED has developed thus far to track EV consumption:

- Customer installs their BED approved level 2 EV charger and connects it to their home Wi-Fi;
- Customer enrolls in BED's residential EV Rate program by establishing a unique EV Charger ID with BED and granting BED access to all necessary data to enable billing;
- This unique EV Charger ID is then registered by a device manager hired by BED with a cloud-based data service that is capable of establishing

[4] See Order of August 30, 2018.

communication links with the customer's level 2 charger (via an API) and BED.

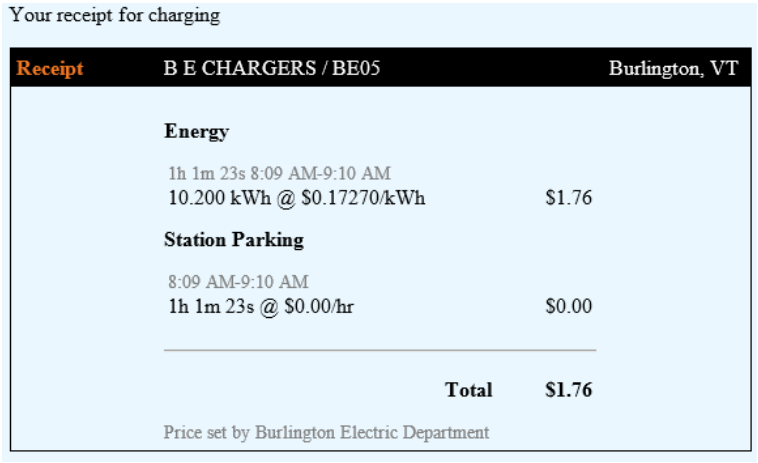
- Each day, BED uses the unique IDs to query the cloud-based data service for the kWh consumption of each participating customer's device and downloads the data. In addition to kWh consumption, BED will also be able to query and download the time of such consumption.
- The EV charger ID is cross-linked to the customer's existing household customer and location ID maintained by BED;
- Using the EV charger ID, BED will link the EV consumption to the customer's existing utility meter for monthly billing purposes. Of note, the EV charger is capable of storing EV consumption data for a several weeks in the event the EVSE is disconnected from the cloud based data service.
- On a daily basis, BED will also perform specific billing calculations on the downloaded data set to ensure that data quality is maintained and to determine whether the customer's EV charging time has occurred during the specified hours. If charging has occurred outside of the approved hours, the credit shall automatically be set to zero for the billing period;
- After data quality has been tested and verified, all EV charging credits earned during the billing cycle shall be manually entered into BED's billing system as a kWh credit. In essence, customers who have adhered to the program rules will pay approximately $0.08 per kWh to charge their vehicle.[5]

This program has just recently commenced and it is too early to assume whether it can be scaled up to accommodate nonutility EVSE owners. And, as further described above, households that do not have an approved, "smart" level 2 charger that has been registered with BED would be unable to export kWh consumption data. As a consequence, BED would not be able to calculate, bill and collect taxes or fees on a per kWh basis.

[5] BED is currently evaluating how to automate this last step as part of its IT investment project.

b. BED owned, publicly available EV Charging

Any EV owner with a compatible plug (and most are compatible) can use a BED station at any time. EV owners are charged approximately $0.17 per kWh, plus a $1.00 fee for each hour their car is parked at the station for more than 4 hours. EV customers, who hail from all parts of our region, can initiate charging sessions using a credit card or their Charge Point fob. EV customers receive an electronic receipt via email that is generated and sent by Charge Point. As illustrated in the figure below, the customer's receipt reflects the session duration (1 hr, 1min, 23 secs), the quantity of kWh (10.20 kWh), per kWh charge ($0.1727) and the total cost of the session. Embedded in the per kWh charge are VT state taxes, local option taxes, city franchise fees and the energy efficiency charge.



Your receipt for charging

Receipt	B E CHARGERS / BE05	Burlington, VT
	Energy	
	1h 1m 23s 8:09 AM-9:10 AM 10.200 kWh @ $0.17270/kWh	$1.76
	Station Parking	
	8:09 AM-9:10 AM 1h 1m 23s @ $0.00/hr	$0.00
	Total	**$1.76**
	Price set by Burlington Electric Department	

In the case a. and b. above, BED could – if requested by the Commission – further evaluate the costs and benefits of modifying its existing IT systems, as well as inquire about Charge Point's abilities to modify its billing systems (& the costs to do so) to include a separate line item on each customer's electronic receipt to reflect a transportation tax. However, for the reasons noted below, we do not recommend that the Commission issue such a directive at this time.

c. Swanton Electric Department

The Village of Swanton Electric Department ("Swanton") is the only VPPSA member to currently have an EV charging tariff. Swanton's tariff t is specific only to public charging stations owned and maintained by Swanton. Swanton owns two dual-port electric vehicle charging stations located in a municipal park and ride about 0.5 mile from I89, right off of Route 78. The stations are equipped to deliver "Level 1" and "Level 2" charging, where Level 1 charging is at 3.6 kW and Level 2 is at 7.2 kW. The station billing software charges the EV driver's credit card based on the length of time the vehicle is charging its battery in one hour increments. The software does not have the ability to charge EV drivers on a "per visit" access fee or charge on a per kWh basis. Swanton does have meters that record the total kWh used by the stations but cannot identify kWh on a per user basis.

EV usage at these stations is paid for by the customer, at the time of charging, through a third party credit card processing arrangement. Swanton has no direct billing relationship with the customers of these charging stations; in fact some or all of the customers using the stations may or may not be customers of Swanton Village Electric Department. Because Swanton has meters at these stations, a kWh tax based on the station's total usage could be calculated and paid to the State. In order to collect the tax Swanton would need to modify the applicable tariff rates at these stations to collect the tax from customers. While this sounds like a simple enough process, collecting the correct tax amount from the station users will be problematic for Swanton, as these EVSE stations are unable to charge on a per kWh basis. Swanton will also need to modify current processes to include the meter reads (usage) from these stations in its normal billing process and effect payment of the tax to the State.

d. Potential future technologies

BED and VPPSA are aware of two other communications technologies that have been explored by others in the industry that could, in theory, measure EV kWh consumption. The first is the "ConnectDER" device; the other is Sense. Both technologies may, at some point the future, prove to be viable alternatives but that time

is not now. In addition to technical and safety concerns, a ConnectDER device is expensive. BED's current cost estimate ranges between $1,000 and $1,200 per installation. Although the ConnectDER device may, in the future, become an elegant solution, we would note that the current estimated costs exceed the cost the installing a second utility owned meter at this time. Additional information about ConnectDER can be found on the manufacturer's website located here: www.connectDER.com. The Commission may also be interested in reviewing a 2017 report published by Rocky Mountain Power relative to the technical and safety concerns that have surfaced about the ConnectDER device.[6] That report can be found here: http://tinyurl.com/yxaryv2q.

With respect to the Sense, BED is currently running a series of trials to evaluate our ability to effectively measure, collect and analyze data generated by the Sense device. The Commission may be aware that Sense technology can be installed in an existing residential electrical panel for the purpose of measuring electrical signals or signatures flowing through a household's main circuit. According to Sense, every electronic device in a home has a unique signal that can be detected, measured and stored. With the customer's permission, the data associated with this signal could also be sent via a Wi-Fi connection to the local utility for measurement and verification. However, the Sense is not a revenue grade meter and, to the best of our knowledge, is unable to detect EVSE signals at this time. For more information about Sense, the Commission may wish to review the company's website.

Irrespective of the viability of these new technologies, including registered and unregistered "smart' level 2 chargers, it is important for us to highlight that members of VPPSA have not deployed AMI in their service areas. Thus, they would be unable to take full advantage of reported functionality of these new technologies. In addition, VPPSA members do not currently have in place the IT infrastructure, including customer information systems and billing capabilities to manage the expected data streams flowing from these types of technologies. Because these systems do not

[6] Please note that BED and VPPSA are providing this report for informational purposes only. We do not take a position relative to the accuracy of the report.

currently exist, VPPSA would not be able to automatically calculate, bill and collect transportation taxes on a per kWh basis.

3. **Any information or reference materials on other jurisdictions that have implemented, whether by pilot program, statute, or otherwise, a kWh fee on EV charging for the purpose of collecting contributions from EV users. Information explaining how such a tax or fee was implemented and collected and how successful the program has been would be particularly useful.**

Response:

Neither BED nor VPPSA have conducted this type of literature review. Consequently, we are unable to provide the Commission with additional information or reference material relative to how or if other jurisdictions have implemented a transportation tax on EV owners. BED and VPPSA do, however, look forward to the opportunity to review the materials submitted by other participants to this proceeding. Should we have any questions or concerns about the information and reference material entered into the record, we will provide additional commentary, if necessary.

Conclusion

Given the nascent EV market, the relatively small amount of additional potential revenue that would be generated from such a tax (at this time) and the potential costs and challenges that Vermont's utilities would face under this new policy, BED and VPPSA urge the Commission to postpone any recommendation to the legislature relative to the imposition of a transportation tax on EVs and PHEV. As noted in earlier VTRANs reports, EVs are still in the "early adopter" phase. Therefore, imposing a new tax on EVs and PHEV would impose yet another barrier to early EV/PHEV adoption and use. An EV tax would also reduce the effectiveness of the incentives that Vermont's utilities have implemented under Tier 3 of the Renewable Energy Standard.

Although BED and VPPSA would, if required, perform the necessary functions to calculate, bill, collect and remit taxes on behalf of the State for EV-related consumption where a utility owned, revenue grade meter is measuring electricity, Vermont's distribution utilities should not be responsible for performing such functions

when there is not a utility owned, revenue-grade meter directly connected to a nonutility EVSE or if the EVSE is located behind a customer's main utility meter.

Lastly, it is important to reiterate that any specific requirements that might be ultimately imposed on Vermont's utilities relative to how such a tax will be calculated, the presentation of the tax on a customer's billing statement and the collection and processing of such taxes under the above-noted, unmetered interconnection arrangements will likely add significant cost, complexity, and time to implement any proposed kWh tax. Examples of situations that could lead to significant costs include but are not limited to specific bill presentation requirements, modifications to other charges based on the addition of the tax that would require software modifications, or any other requirement other than a straight-forward calculation of a "per kWh" tax on EV related charging (i.e. supported by existing CIS). It is not entirely clear to us that imposing this type of a tax at this time is so critical as to warrant the risk of forcing Vermont's electric utilities to pass onto their ratepayers the cost of implementing the proposed EV tax on behalf of nonutility EVSE station owners.

BED and VPPSA appreciate the opportunity to provide this feedback to the Commission in the above referenced proceeding. We also look forward to working with other stakeholders to evaluate other mutually acceptable interconnection arrangements. Indeed, the Commission may want to consider allowing the parties to this proceeding additional time to continue exploring such options.

Should you have any additional questions or concerns, please feel free to contact us directly.

Sincerely,

Thomas Lyle
Programs and Policy
Burlington Electric Department

Melissa Bailey
Legislative & Regulatory Affairs
Vermont Public Power Supply Authority