KEYES&FOX LLP

February 20, 2020

Via Electronic Mail and US Mail

Debra Howland
Executive Director
New Hampshire Public Utilities Commission
21 South Fruit Streetm Suite 10
Concord, NH 03301-2429

RE: Docket No. IR 20-004: Investigation of Electric Vehicle Rate Design Standards, Electric Vehicle Time of Day Rates for Residential and Commercial Customers

Dear Director Howland:

Enclosed for filing please find an original and six copies of the *Comments of Chargepoint, Inc* in Docket No. IR 20-004.

Please do not hesitate to contact me with any questions.

Respectfully submitted,

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STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

Docket No. IR 20-004

Electric Distribution Utilities

Investigation of Electric Vehicle Rate Design Standards, Electric Vehicle Time of Day Rates for Residential and Commercial Customers

COMMENTS OF CHARGEPOINT, INC.

On January 16, 2020, the Commission issued an Order of Notice opening the above-captioned proceeding in accordance with SB 575-FN to determine whether certain rate designs should be implemented for electric vehicle charging stations and whether to implement electric vehicle time of day rates for residential and commercial customers. The Commission's Order invited written comments to be filed by February 20, 2020 addressing the questions set forth in SB 575-FN and in the Commission Staff's memorandum ("Staff Memorandum") filed in this docket on January 10, 2020.

The Commission stated that this proceeding raises questions related to what rate design standards applicable to electric vehicle charging stations would be consistent with New Hampshire Energy Policy designed in RSA 378:37 and likely to result in just and reasonable rates as required by RSA 374:2 and RSA 378:5 and :7, as well as whether the implementation of electric vehicle time of day rates for residential and commercial customers would be consistent with the restructuring policy principles defined in RSA 374-F:3, VI, would avoid undue or unreasonable preference as required by RSA 3878:10, and would likely result in just and reasonable rates consistent with RSA 374:2 and RSA 378:5 and :7.

Pursuant to the Commission's January 16, 2020 Order of Notice, ChargePoint, Inc. ("ChargePoint") files these comments.

I. Introduction

ChargePoint

ChargePoint is the world's largest electric vehicle ("EV") charging network, with charging solutions for every charging need and all the places EV drivers go: at home, work, around town, and on the road. With more than 105,000 independently owned charging spots, ChargePoint drivers have completed more than 69 million charging sessions, saving upwards of 83 million gallons of gasoline and driving more than 1.9 billion gas-free miles.

ChargePoint designs, manufactures, and deploys residential and commercial AC Level 2 and DC fast charging electric vehicle charging stations, cloud-based software applications, data analytics, and related customer and driver services aimed at creating a robust, scalable, and grid-friendly EV charging ecosystem. ChargePoint sells EV charging equipment and network services to a wide variety of customers, including residential EV owners, employers, commercial and industrial businesses, cities and public agencies, ports, schools, public transit, delivery truck fleet operators, and multi-unit dwelling owners. ChargePoint offers a broad array of products and services that can serve light, medium, or heavy-duty electric vehicles.

Electric Vehicles and Electric Vehicle Charging

The market for electric vehicles is taking off in New England and across the nation. There are nearly 1.5 million electric vehicles already on the road in the United States, and numerous car manufacturers have pledged to transition from internal combustion engines to EVs.

The EV charging market has similarly been experiencing rapid growth. On February 6, 2020, ChargePoint and the National Association of Truck Stop Operators ("NATSO"), which represents thousands of travel plaza, truck and fuel stop operators around the United States, announced the creation of a National Highway Charging Collaborative ("Collaborative") that will expand access to charging across the country. By 2030, the Collaborative plans to leverage $1 billion in capital to deploy EV charging at more than 4,000 travel plazas along highways and in rural areas.[1]

Electrification of the transportation sector brings many benefits, including potential benefits to electric ratepayers. According to a NARUC report published in October 2019, EV load that charges during off-peak hours can provide positive net revenue due to the efficient use of the existing electric grid.[2] A recent study by Synapse Energy Economics found that in the territories of PG&E and Southern California Edison, the revenue provided by EV programs exceeded the costs to the electric system by more than 3 to 1.[3] The addition of new dispersed load during off-peak hours can result in the wider distribution of fixed costs across customers, leading to lower rates for all ratepayers.[4]

EVs can also provide benefits to the electric system. As NARUC's recent report explains, "[b]ecause EV load is flexible, if charging can be moved to times of low demand or abundant renewable generation, EVs represent a significant opportunity for increased grid flexibility." The Regulatory Assistance Project similarly finds that EV load is capable of responding quickly to a signal, as well as being inherently flexible over time, therefore EVs are

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[1] For more information about the National Highway Charging Collaborative, please visit nationalhighwaychargingcollaborative.com.
[2] NARUC, "Electric Vehicles: Key Trends, Issues, and Considerations for State Regulators," at 21 (Oct. 2019) ("NARUC EV White Paper"), available at https://pubs.naruc.org/pub/32857459-0005-B8C5-95C6-1920829CABFE (citing Jones et al., "The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives," Lawrence Berkeley National Laboratory (2018), at http://eta-publications.lbl.gov/sites/default/files/feur_10_transportation_electrification_final_20180813.pdf).
[3] Synapse Energy Economics, "Electric Vehicles Are Driving Rates Down," at 4 (Feb. 2019), available at https://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf.
[4] NARUC EV White Paper at 21.

flexible over the course of a day as well as "within minutes and seconds."[5] EV load is a particularly good match to support increased volumes of variable energy resources like wind and solar on the grid, because it can be moved to times when variable renewable energy resources are more prevalent.[6]

Because electric vehicles represent a new and unique source of load for the electric system, state utility commissions are preparing for electric vehicles by developing appropriate rate structures, incentives, and planning processes. Broad consensus holds that two key policies can help ensure that all electric ratepayers receive the maximum benefit from transportation electrification: 1) rate structures that shift electrification load to off-peak periods, and 2) load and energy management measures that enable electric vehicles to provide grid benefits.

II. Comments on Rate Designs

ChargePoint appreciates the opportunity to provide these comments. SB 575-FN asks the Commission to "consider and determine whether it is appropriate to implement" any of seven rate designs, including time of day rates (also known as time of use or TOU rates), load management techniques, and demand charges. SB 575-FN also directs the Commission to "consider and determine whether it is appropriate to implement" electric vehicle time of day (i.e. time of use) rates for residential and commercial customers. With respect to its determination whether to implement electric vehicle time of use rates for residential and commercial customers, the Commission is asked to consider "whether such implementation would encourage energy conservation, optimal and efficient use of facilities and resources by an electric company, and equitable rates for consumers."

ChargePoint recommends that the Commission direct New Hampshire's investor-owned utilities to provide electric vehicle time of use rates and implement load management techniques for electric vehicles. Consistent with state policy established by RSA 378:37, these measures will help the state lower electric costs for all customers, maximize the use of demand side resources, and protect the health and safety of the state's citizens and physical environment, while aiding the integration of clean energy resources and improving the financial stability of the state's utilities. In addition, we encourage the Commission to establish statewide guidelines for the role of the utility in transportation electrification.

EV Charging Behavior

Over 90% of EV charging takes place at home and at the workplace.[7] This charging can be supported by longer-duration and lower-powered EV charging stations. The new load associated with most such EV charging can be shaped to support the grid and reduce costs for ratepayers.

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[5] Regulatory Assistance Project, "Beneficial Electrification of Transportation," at 37 (Jan. 2019) ("RAP 2019 Electrification Report"), available at https://www.raponline.org/wp-content/uploads/2019/01/rap-farnsworth-shipley-sliger-lazar-beneficial-electrification-transportation-2019-january-final.pdf.

[6] *Id.*

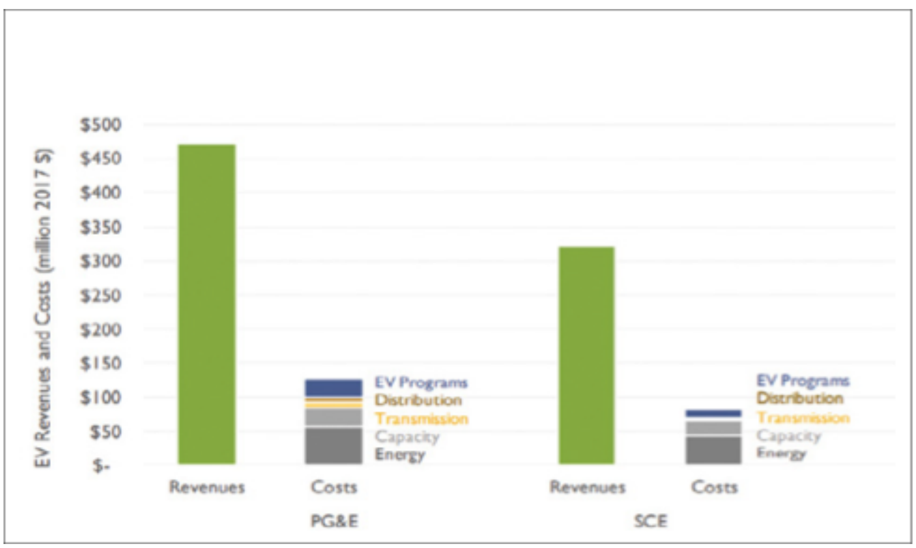
[7] Smart, John, "Lessons Learned About Workplace Charging in the EV Project," Idaho National Labs (2015), available at https://www.energy.gov/sites/prod/files/2015/07/f24/vss170_smart_2015_p.pdf.

Higher-powered, DC fast charging stations are also a vital component of the EV charging ecosystem. DC fast chargers complement the longer duration charging that takes place in the home and workplace and does not replace it. The availability of fast charging in public places can (i) increase EV driver range confidence, (ii) support community charging in dense urban areas, and (iii) enable the electrification of light- and heavier-duty fleets for municipal, state, and private entities.

Electric Vehicles Can Lower Rates for All Ratepayers

Electric vehicles can further state energy policy by spreading the costs of the electric system across more off-peak load, resulting in a downward pressure on unit energy costs that benefits all utility customers regardless of EV ownership. Time of use rates and load management programs allow utilities to capture the benefits of EV cost-reductions for all ratepayers by providing customers with EVs a signal to shift charging to off-peak times, thereby maximizing the efficient use of existing grid infrastructure and avoiding new grid infrastructure investments. For these reasons, utilities that are subject to a mandate to provide least-cost service and to maximize demand side resources[8] should implement electric vehicle time of use rates and load management techniques.

A report by Synapse Energy Economics depicts the following chart showing greater than 3 to 1 cost-savings between 2012 to 2017 in the two electric distribution territories in the United States with the highest penetration of EVs, PG&E and Southern California Edison.[9]



The 3 to 1 positive net revenue that PG&E and Southern California Edison saw over a five year period was due to an efficient use of the grid facilitated by the "smart" capacity of EV charging, which enables charging load to be conveniently and automatically shifted to match the

[8] *See* RSA 378:37.
[9] Synapse, "Electric Vehicles are Driving Electric Rates Down" at 3 Figure 4.

price signals offered by time of use rates. The flexibility of most EV charging, combined with the smart capabilities of EV chargers, makes it easy for price signals given to residential and commercial customers with electric vehicles to translate into greater system efficiency that yields cost-savings for all ratepayers.

Another study that modeled the costs and benefits of increased EV penetration in Massachusetts, Connecticut, New York, Maryland, and Pennsylvania found that net revenue from off-peak EV charging could lower electric rates in those states by 3-7%.[10]

These universal ratepayer savings are consistent with New Hampshire law and policy which seeks to ensure, among other things, energy at the lowest reasonable cost,[11] rate reductions for all customers,[12] and equitable benefits for all energy consumers.[13]

Electric Vehicles Can Provide System Benefits to the Electric Grid

Electric vehicles are flexible load as well as dispatchable and responsive. EVs can discharge power back onto the grid when called upon and they can store as much electricity as a house uses in a day. The California PUC has found that three characteristics of EVs make them good grid resources:[14]

1) They can provide operational flexibility because they possess a dual functionality of load when charging and generation when discharging back to the grid;
2) They have embedded communications and actuation technology; and
3) They have low capacity utilization, as they are idle more than 95% of the time and need to charge only about 10% of the time.

For similar reasons the Rocky Mountain Institute states that EVs can provide "a wide range of valuable grid services, from demand response and voltage regulation to distribution-level services."[15] The Regulatory Assistance Project concludes that "EV charging demand can be controlled—through smart charging, time-of-use (TOU) pricing, or a combination of both—meaning it can become an important tool and add flexibility to the grid."[16]

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[10] MJ Bradley, "Electric Vehicle Cost-Benefit Analyses," at 2 (March 2017), available at https://mjbradley.com/sites/default/files/NE_PEV_5_State_Summary_14mar17.pdf.
[11] RSA 378:37.
[12] *See* RSA 374-F:3, XI; RSA 374:2 and RSA 378:7.
[13] RSA 374-F:3, XI.
[14] California Public Utilities Commission, "Vehicle-Grid Integration: A Vision for Zero-Emission Transportation Interconnected throughout California's Electricity System," at 4 (Oct. 2013), available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M081/K975/81975482.pdf.
[15] Rocky Mountain Institute, "Electric Vehicles as Distributed Energy Resources," at 6 (2016), available at https://rmi.org/insight/electric-vehicles-distributed-energy-resources/.
[16] RAP 2019 Electrification Report at 36.

EVs Advance Other State Policies, Including Security, Jobs, Efficiency, and Health

Electric vehicles also advance other sound New Hampshire energy policies, including energy security,[17] economic development,[18] energy efficiency,[19] and emissions reductions.[20]

There is a 78% reduction in end-use energy consumption when switching from internal combustion ("ICE") vehicles to EVs.[21] Even an electric vehicle charged with 100% coal-fired power will be cleaner than a gasoline-fueled ICE vehicle.[22] Here in New England, the electricity system is substantially cleaner, therefore the emissions benefits of electric vehicles are far greater. An EV in New England is currently estimated to be the equivalent of an ICE vehicle with an efficiency of 114 miles per gallon.[23] EVs can also improve public health by substantially reducing air pollution emissions in New Hampshire, half of which is produced from transportation.[24] EV charging is important for tourism and can support local clean energy jobs.

A. Rate Designs Standards for Electric Vehicle Charging Stations

1. Cost of Service

Cost of service is a traditional form of regulation where the regulator determines the revenue requirement that must be collected in rates in order to enable the utility to recover its costs and to earn a rate of return. ChargePoint has no comments on this rate design.

2. Prohibition on Declining Block Rates

Under declining block rates, consumers pay less per kWh as they use more energy. ChargePoint has no comments on this rate design.

3. Time of Day Rates (i.e. Time of Use ("TOU") Rates, or Time-Varying Rates ("TVR"))

As explained in more detail elsewhere in these comments, in particular Section B, TOU rates and other load management techniques can help to ensure that EV charging takes place at times that are beneficial to the grid. This efficiency saves all electric customers money.

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[17] *See, e.g.*, RSA 387:37; RSA 362-A:1, RSA 374:F:3-IX.
[18] *See, e.g.*, RSA 125-O:1, I; RSA 125-O:1, IV.
[19] *See, e.g.*, RSA 378:37; RSA 125-O:5; RSA 125-I:1, VII; RSA 374-F:3, VI; RSA 374:F:3-X; RSA 378:39.
[20] *See, e.g.,* RSA 378:37; RSA 4-E:1, II; RSA 125:O:1; RSA 125-O:1, IV; RSA 374-F:1, I; RSA 374-F:3, I; RSA 374:F:3, VIII; RSA 378:37.
[21] Regulatory Assistance Project, "Regulatory Considerations for Transportation Electrification," at 11 (May 2017), available at https://www.raponline.org/wp-content/uploads/2017/06/RAP-regulatory-considerations-transportation-electrification-2017-may.pdf.
[22] *Id.* at 10.
[23] Union of Concerned Scientists, "Are Electric Vehicles Really Better for the Climate?" (Feb. 2020), online at https://blog.ucsusa.org/dave-reichmuth/are-electric-vehicles-really-better-for-the-climate-yes-heres-why?utm_source=twitter&utm_medium=social&utm_campaign=tw.
[24] *See* NH Department of Environmental Services, Driving Electric New Hampshire, at https://www.des.nh.gov/organization/divisions/air/drive-electric/e-vehicles.htm.

Forth-eight percent of U.S. utilities offer some type of time of use rate, with 14% of U.S. utilities offering residential time of use rates.[25] At least ten U.S. utilities have implemented TOU rates designed specifically for customers with EVs.[26] Among two-period time of use rate programs, 71% have a price ratio of at least 2:1.[27] As the price ratio increases, customers shift usage in greater amounts, though ultimately at declining rates[28] due to the inability to shift all load. Opt-in TOU programs typically have less than 20% enrollment, while opt-out, or default, TOU programs are much more successful with greater than 90% participation.[29]

TOU rates do not shift costs to other ratepayers; in total they can recover the same costs as flat rates but they also provide price signals designed to affect customer behavior. EV charging times are flexible and most EV charging customers can easily adjust their charging patterns in response to these price signals. TOU rates that target EV charging can reap substantial economic and system benefits with much less customer education than might be required for general residential TOU rates.

4. Seasonal Rates

Time of use rates can sometimes include seasonal variability based on seasonal peak costs. This would be a slightly more sophisticated rate structure and may not be necessary in all circumstances but could be considered.

5. Interruptible Rates

Interruptible rates are not typically used for EVs and are more appropriate for industrial practices that have flexibility as to which days they operate. Interruptible rates would have a severely negative impact on public charging and long-distance EV travel. However, managed charging, which allows the utility to throttle charging for long dwell time charging applications while ensuring that the driver gets the charge that he or she needs, is a great alternative.

Managed charging is particularly useful for EV fleets. It can allow a utility to slow down the rate of charge temporarily during times of high demand without materially impacting overall EV charging. When applied over an EV fleet or other aggregated group of EVs, this load management technique can provide significant system benefits as well as system-wide cost savings. It is discussed further in the next section.

6. Load Management Techniques
   a. Types of Load Management

There are a variety of strategies that states have implemented or are considering implementing to achieve cost savings and system benefits from EV load. One approach is

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[25] RMI, "DCFC Rate Design Study for the Colorado Energy Office," at slide 27 (Oct. 2019) ("RMI DCFC Rate Design Study"), available at https://rmi.org/insight/dcfc-rate-design-study/.
[26] *Id.* at slide 28.
[27] *Id.* at slide 27.
[28] *Id.*
[29] *Id.* (citation omitted).

behavioral load management. Another involves direct management of load, typically by a centralized system. Both can help to lower costs, support the electric system, and achieve policy goals such as reducing emissions or integrating more variable renewable energy.

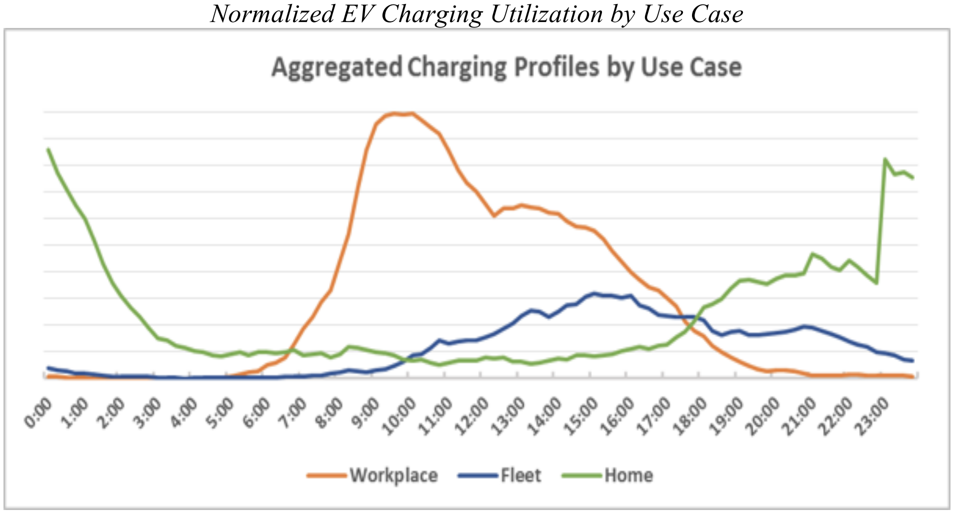
Managed charging refers to techniques to manage the time and rate of EV charging load.[30] Time of use rates are a form of "passive managed charging." This form of managed charging is often referred to as behavioral load management. It is very common and is easy to implement with respect to EV charging. It has more success with respect to EV charging than many other types of behavioral load management due to the flexibility of EV charging schedules and the ease with which they can be automated. In addition to time of use rates, other strategies that fall into this category include flat credits applied to the bills of customers who avoid charging at certain times.

In contrast, "active managed charging" enables a centralized entity or the customer to take direct control of charging load. By taking direct control over charging load, a utility or aggregator can, for instance, slow down the rate of charge temporarily during times of high demand without materially impacting overall EV charging. When applied over an EV fleet or other aggregated group of EVs, this load management technique can provide significant system benefits as well as system-wide cost savings. Direct control over charging load can be achieved via the charging station, automaker telematics, or via a smart circuit breaker.

b. Value of Load Management for Different EV Charging Use Cases

The types and levels of benefits to the grid from EV charging taking place under a load management program will vary greatly by EV charging use case, as illustrated by the graphic below. We encourage the Commission to "right-size" the rate design and load management approach for each use case weighing factors such as potential coincidence with peak load, absolute proportion of charging in such use case, EV driver's flexibility in charging time and requirement, program complexity, and alignment of incentives throughout the EV charging ecosystem.

Normalized EV Charging Utilization by Use Case



[30] Managed charging may also be referred to as V1G, intelligent charging, adaptive charging, or smart charging.

Effective load management techniques including managed charging must take into account the charging customer's needs and preferences. ChargePoint urges the Commission to keep in mind two questions when considering the relative value of load management programs in different EV charging use cases: (1) how will it impact the driver experience, and (2) is this the best use case for energy management?

- **Residential charging** is perfectly suited for demand-side management programs due to the long dwell times available for charging, the ability to shift charging within that time period, and the EV driver typically serving as their own "site host." EV drivers charge their vehicles at home 64% of the time.[31] Numerous studies have shown that residential charging is very responsive to TOU rates.

- **Fleet charging** is an ideal use case to support demand-side management and smart charging of EVs. This is due to long dwell times, certainty around vehicle operational needs, and the direct relationship between the vehicle's owner and the charging station's owner.

- **Workplace** charging presents opportunities to shape charging during the day due to the extended dwell times and repeat users of such charging stations. Workplace charging can be incentivized to avoid early morning peaks or to serve as a "sponge" for overgeneration of solar in the middle of the day.

Publicly available fast charging is the least optimal use case for demand-side management programs for a few key reasons. First, a very small percentage of total EV charging is, or will be, conducted at publicly available stations. Only 2-3% of charging takes place outside of home and workplace,[32] and such charging is often randomized and occurs throughout the day. While publicly available charging will likely grow as vehicles begin to support longer-distance travel, the majority of all charging will continue to take place at longer dwell-time, more predictable locations. Fast charging is also less flexible due to the need for long-distance drivers to get back on the road.

ChargePoint recommends that the Commission consider directing the utilities to implement load management techniques designed to take advantage of electric vehicle charging. The Illinois Citizens Utility Board, in a report published in January of 2019, found that optimizing EV charging patterns could save Illinois utilities and customers $2.6 billion by 2030.[33] The Commission should consider and test the benefits available to New Hampshire ratepayers of appropriate load management techniques.

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[31] Smart, John, *Lessons Learned About Workplace Charging in the EV Project*, Idaho National Labs.
[32] *Id.*
[33] Illinois Citizens Utility Board, *Charging Ahead: Deriving Value from Electric Vehicles for all Electricity Customers* (March 2019), available at https://www.citizensutilityboard.org/wp-content/uploads/2019/03/Charging-Ahead-Deriving-Value-from-Electric-Vehicles-for-All-Electricity-Customers-v6-031419.pdf.

c. Ensuring flexibility for EV charging site hosts

With respect to charging stations located outside the home, it is important to ensure that site hosts maintain discretion to promote their preferred charging behaviors, rather than being required to pass through utility rates directly to users. For instance, a convenience store or gas station might decide that a pay-per-use DC fast charger is a good way to attract customers to visit, while a big box store might prefer to offer free Level 2 charging for the first hour but require a nominal payment for additional time beyond the first hour in order to encourage patrons to move on and make the space available to others. The owner of a multi-family dwelling may choose to offer free charging in order to attract tenants. These choices are important to reserve for site hosts based on their circumstances. This holds especially true for fleet operators, which must balance a variety of factors (e.g., operating requirements, variable routes, energy prices) when managing fleet charging behavior.

7. Demand Charges

According to the Regulatory Assistance Project, "demand charges should be reconsidered in light of their impacts on the economics of EV charging…. Demand charges can effectively become a fixed charge that cannot be avoided by better managing EV charging into lower-cost times of day."[34]

Public and private entities that invest in DC fast charging are typically subscribed in a traditional commercial and industrial (C&I) electricity rate. Like residential rate structures, C&I electricity rates require customers to pay for the amount of energy used. However, C&I rates often also include fees for the amount of energy that **could** be used, which is collected through a "demand charge."

For traditional C&I customers (e.g., factories), it may be appropriate to allocate electricity costs based on peak demand to let utilities ensure that there is adequate capacity for all customers. However, C&I demand charges were not designed for the type of electricity load profile of a DC fast charger.

Demand charges are typically based on the highest average 15-minutes of energy use in a monthly billing cycle. DC fast charging stations are currently characterized by having a "low load factor," with sporadic instances of high energy use. Site hosts can face high demand charges due to the few peak charging sessions that occur each month, which effectively penalizes site hosts for providing charging services in earlier-stage EV markets. As EV charging providers deploy higher-power stations, demand charges grow as a share of operating costs, which makes it increasingly difficult for station operators to offset costs.[35] In some markets, demand charges can account for as much as 90% of electricity costs.[36]

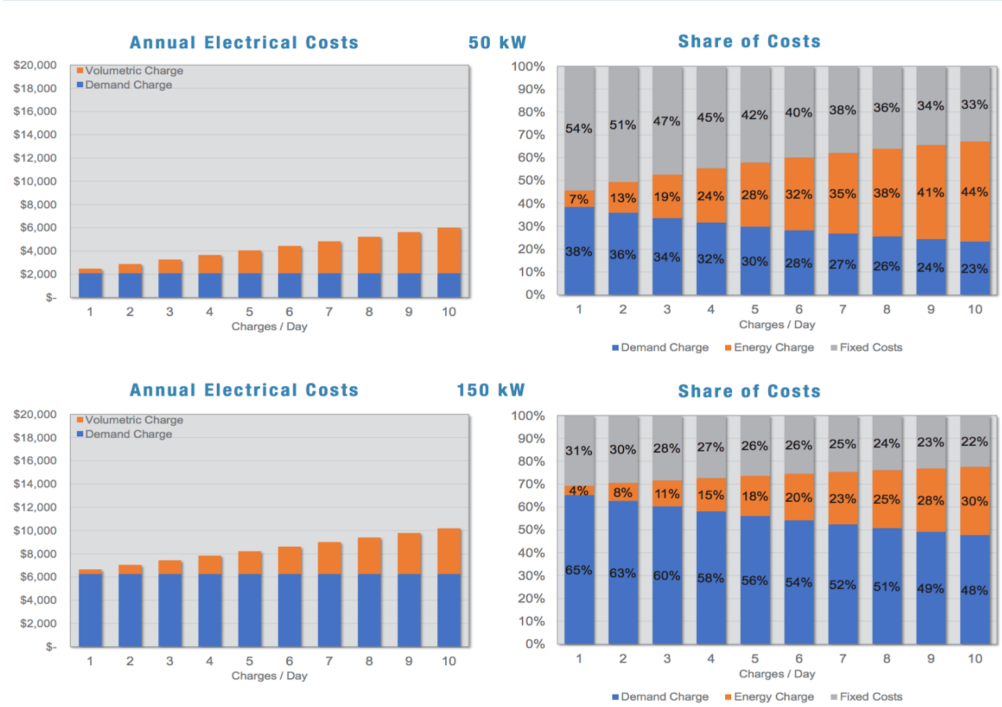
[34] RAP 2019 Electrification Report at 68.
[35] Great Plains Institute, "Overcoming Barriers to Expanding Fast Charging Infrastructure in the Midcontinent Region" (2019), available at https://scripts.betterenergy.org/reports/GPI_DCFC_Analysis_July_2019.pdf.
[36] Rocky Mountain Institute, "EVgo Fleet and Tariff Analysis" (2017), available at https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.

Load from DC fast charging is unpredictable and is ill-suited to being managed through demand response or load curtailment, due to the inherent need of drivers to charge when they need to charge at public stations. DC fast charging along highway corridors, while essential to supporting long-distance travel, represents a fraction of the 10% of the charging that takes place outside of home and work. The DC fast charging load profile is unlike residential and workplace EV charging loads, which are much more appropriately suited to load management techniques.[37]

If a deployment of multiple DC fast chargers experiences an instance where several drivers charge at the same time, that single event can result in charges of several thousand dollars and station operators paying significantly more for electricity than the average commercial electricity customer. Given the limited flexibility for EV charging site hosts to pass on demand charge costs to customers, this dynamic creates the risk of economically unsustainable losses.

Recently, the Great Plains Institute released an analysis of over 5,000 DC fast charging scenarios according to costs from volumetric, demand, customer, and facilities charges across many utility rate schedules. Low utilization rates were demonstrated to present challenging economics for DC fast charger operators, driven in large part by the significant share of operating costs attributable to demand charges. Demand charges can account for as high as 38% of electricity costs for a single 50 kW DC fast charger, which would increase dramatically to 65% for a deployment of one 150 kW charger or multiple 50kW chargers, as illustrated below.

Figure 7. DCFC station costs by charges per day: 50 kW and 150 kW chargers



[37] *See, e.g.*, Electric Power Research Institute, "Duke Energy: Charging Demos Inform PEV Readiness Planning" (2013), available at http://www.ripuc.ri.gov/eventsactions/docket/4780-ChargePoint-Packard-Exh3.pdf; Nexant, "Final Evaluation for San Diego Gas & Electric's Plug-in Electric Vehicle TOU Pricing and Technology Study" (Feb. 20, 2014), available at https://www.sdge.com/sites/default/files/SDGE%20EV%20%20Pricing%20%26%20Tech%20Study.pdf; EPRI, "DTE Energy: Driving the Motor City Toward PEV Readiness" (2014).

It should also be noted that demand charges present a barrier for electrifying public- and private-sector fleets. Addressing unique fleet charging needs will support EV adoption, as fleet operators are uniquely suited to maximize the operational cost savings of transportation electrification. It is also in the public interest to specifically consider rate-related barriers to electrifying medium- and heavy-duty ("MHD") fleets. MHD vehicles touch the lives of everyone in New Hampshire, from school and transit buses to municipal service vehicles to delivery trucks. Reducing barriers for MHD fleet operators to electrify their vehicle fleets will create widespread and equitably accessible benefits for ratepayers and the general public.

Fortunately, there are many sustainable ways to alleviate demand charges, which are being piloted or are already common practice in other jurisdictions. For example:

- Replacing or pairing demand charges with higher volumetric pricing to provide greater certainty for charging station operators with low utilization. This rate could be scaled based on utilization or load factor as charging behavior changes over time.[38]
- A monthly bill credit representing a percentage of the nameplate demand associated with installed charging stations behind a commercial customer's metered service.[39]
- Implement a "rate limiter" as EV adoption increases, in which the average cost equivalent of a customer's demand charges would be limited to no more than a set cents/kWh value.[40]
- A retroactive and variable credit based on the difference of the effective blended per kWh distribution charge, including demand charges, and an agreed upon target blended rate, multiplied by the volumetric energy throughput in a given billing cycle for commercial customers with dedicated EV charging stations.[41]
- Forgiving a portion of billed demand when the customer has a low load factor.[42]

B. *Electric Vehicle Times of Day Rates for Residential and Commercial Customers*

SB 575-FN directs the Commission to consider whether it is appropriate to implement electric vehicle time of day rates for residential and commercial customers. It also asks the Commission to apply a three-part standard in considering this question. That standard is whether implementation of electric vehicle time of day rates for residential and commercial customers would encourage 1) energy conservation, 2) optimal and efficient use of facilities and resources by an electric company, and 3) equitable rates for electric customers. ChargePoint is excited to participate in this inquiry and recommends that the Commission find that well-designed electric vehicle time of use rates further energy conservation by supporting energy efficient transportation and charging, send effective price signals to maximize the use of the transmission and distribution systems, and promote equitable and lower rates for all customers.

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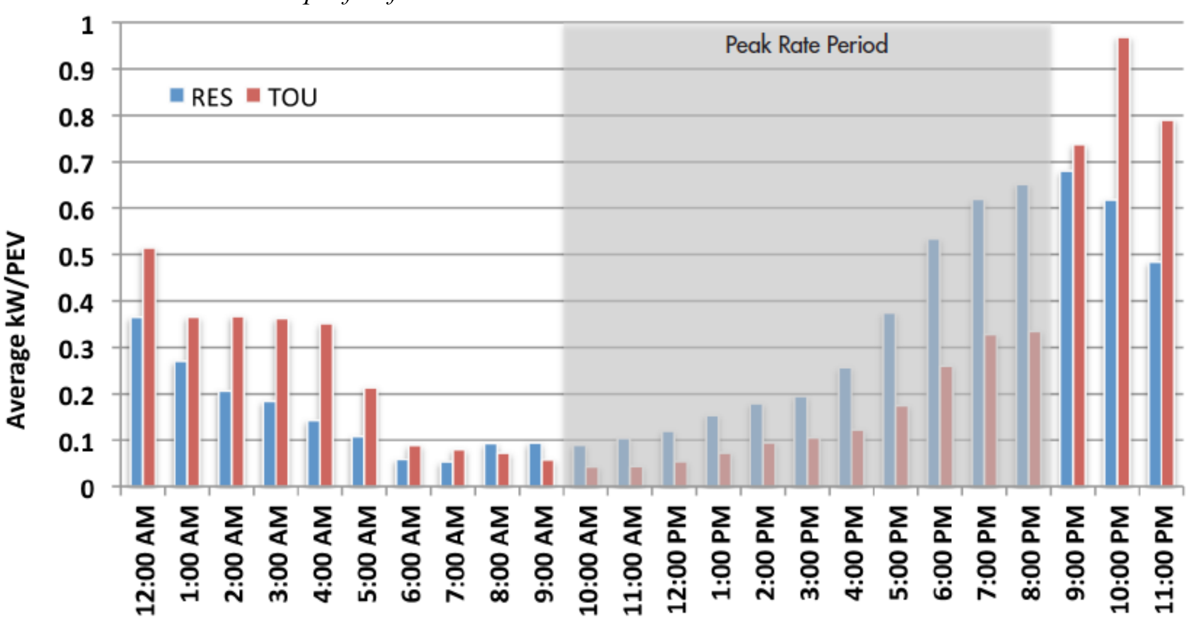
[38] An example of this is Pacific Power's *Public DC Fast Charger Optional Transitional Rate*.
[39] Such as PECO's EV-FC Rider, which was recently approved by the Pennsylvania PUC.
[40] For example, Ameren Illinois has implemented "rate limiters" during difficult transition periods that were raised over time in steady increments until it was phased out (e.g., rates DS-3 and DS-4).
[41] LIPA proposal in New York PSC Matter No. 14-01299: *PSEG Long Island Utility 2.0 PLAN.*
[42] Examples of this include Xcel Minnesota's general service rates.

The Commission can consider implementing time of use rates in two ways. The utilities can provide time of use rates to all residential and commercial customers, or they can provide time of use rates for EV charging only. Both of these options may have benefits. However, the metering infrastructure necessary to implement general time of use rates is currently lacking in most of New Hampshire, whereas time of use rates that apply to EV charging only can be rolled out immediately, with no additional metering costs. This is because EV smart chargers include embedded revenue-grade metering.

Before implementing time of use rates, a preliminary question is whether such tariffs will actually have an impact on EV charging behavior. In a study commissioned by the Electric Power Research Institute on EV charging behavior in Duke Energy's service territory, customers that were already on a whole-house TOU rate charged their EVs 50% less during on-peak weekday hours compared to customers who were not on a whole-house TOU rate.

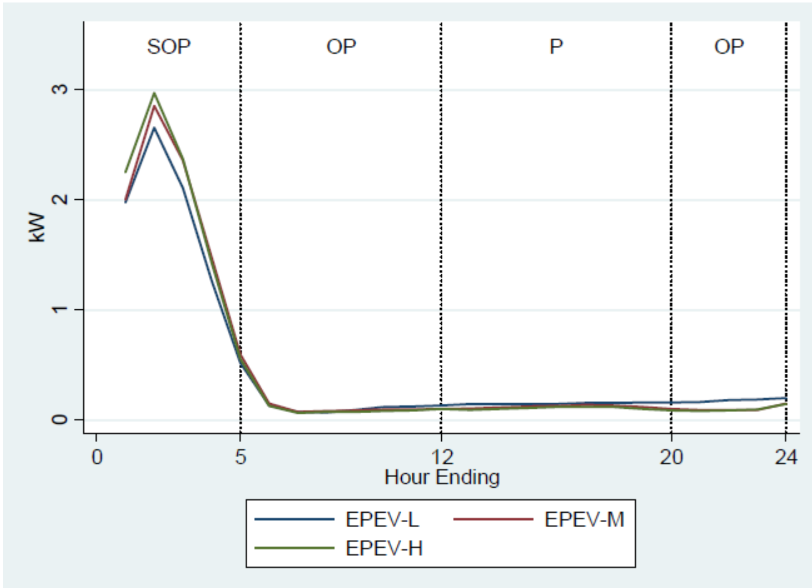
EV load profile for standard residential vs. whole-house TOU rate[43]



There are opportunities to more precisely shape charging behavior by creating additional TOU periods (i.e., peak, off-peak, and super off-peak). A study of three experimental TOU rates offered by San Diego Gas & Electric showed that the vast majority of all charging took place during a super off-peak period. The three experimental TOU rates were designed to test low, medium and high price ratios between the on□peak and super off□peak periods. The graph below shows that roughly 80% of all charging behavior for the three TOU rates took place during the super off-peak period, specifically between 12 AM and 2 AM. Charging patterns that begin during super off-peak periods can be facilitated using technologies such as connected EVSE, which can automatically defer charging until specified times regardless of when the vehicle is plugged in.

[43] Electric Power Research Institute, "Duke Energy: Charging Demos Inform PEV Readiness Planning."

Average daily EV load shapes for customers on experimental TOU rates[44]



In implementing TOU rates, it is important to consider that TOU rate structures are ideal for situations where the consumer has some ability and flexibility to shift their own behavior, such as charging at home. Public charging station usage is one of the most difficult use cases for TOU rates as drivers are highly transient, infrequent, and often need to charge immediately leaving no flexibility to adjust their charging time to a different, cheaper period.

Stakeholders in New Hampshire have already expressed strong support for time of use rates. In Docket IR 15-296, Investigation into Grid Modernization, a diverse set of stakeholders considered whether the utilities should implement time of use rates. At that time, the non-utility stakeholders were in consensus that time-varying rates should be offered, while the utilities expressed certain reservations.[45] However, since that time, Unitil has opened a proceeding (Docket DE 19-033) to explore offering TOU rates for all of its customers, while Liberty has proposed to apply TOU rates to battery storage customers (Docket DE 17-189) and to customers with electric vehicles (Docket 19-064).

Lastly, the Staff Memorandum notes that RSA 378:10 requires that utility rates avoid "undue or unreasonable preference or advantage to any person or corporation, or to any locality, or to any particular description of service in any respect whatever."[46] Staff also assert that, by extension, this requires rate treatment of electric vehicle supply equipment that is consistent with treatment for other end uses within a given rate class under which electric vehicle charging equipment is provided service.

[44] Nexant, "Final Evaluation for San Diego Gas & Electric's Plug-in Electric Vehicle TOU Pricing and Technology Study."
[45] *See* Final Stakeholder Report in IR 15-296, at 14-15, 17-19 (March 20, 2017), available at https://www.puc.nh.gov/Electric/IR15-296/NH%20Grid%20Mod%20Final%20Report%203-20-2017.pdf.
[46] Staff Memorandum at 5.

Electric vehicle time of use rates do not preference customers with EVs. If desired, time of use rates can recover the same total cost as flat rates, by combining a higher rate and a lower rate to reach the same total. Combining rates that vary over time sends price signals that can shift the timing of a specific energy use – vehicle charging – in a non-discriminatory and non-preferential fashion. Implementing a rate for a specific consumption pattern that is designed to save all customers money is sound regulatory policy. Conversely, the failure to implement basic load management measures such as time of use price signals can result in the need for increased grid investments that will drive up costs for all customers.

1. Alignment with Principles

As noted, regulatory policies such as time of use rates for residential and commercial customers align with New Hampshire energy policy because they encourage energy efficiency and the optimal use of electric grid infrastructure, while lowering costs for all ratepayers by spreading the same grid costs over more load.

In addition, time of use rates, which have been adopted successfully in many states, are consistent with the Commission's rate design principles. As described in the Staff Memorandum, the Commission has already approved certain time of use rates that are offered by Liberty and Eversource now, with Liberty Utilities most recently having received Commission approval to offer a seasonally varying time of use rate applicable to energy, distribution, and transmission service comprised of three rate blocks with a differential of 6:1 in summer and 3:1 in winter.[47]

2. Distribution, Energy, and/or Transmission

The Commission should consider applying electric vehicle time of use rates to distribution, transmission, and energy rates. The distribution and transmission systems are built to meet system peak demand, therefore shifting electric vehicle charging to off-peak periods will reduce transmission and distribution investment costs. It will also spread the costs of infrastructure over more units of energy, reducing transmission and distribution costs per unit. In addition, time of use rates drive down energy costs. Producing energy is more expensive at times when there is higher demand because ISO-NE typically must call on older, less efficient, and more costly units to serve demand during those times. For these reasons, time of use rates should be considered for all three components of the utility customer bill.

3. Adequacy of Current and Proposed Rate Offerings

As indicated in the Staff Memorandum, the New Hampshire utilities currently offer only limited time of use rates, primarily to commercial customers. The utilities should be directed to develop additional time of use rate offerings.

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[47] Staff Memorandum at 3 (citation omitted). Staff also note that in its ongoing rate case, Liberty has proposed to use the same TOU rate structure for residential electric vehicle charging, pursuant to a new Rate D-EV. Staff Memorandum at 3 (citing Direct Testimony of Heather Tebbetts for Liberty, at II-239-40, Docket No. 19-064 (April 30, 2019), available at https://www.puc.nh.gov/Regulatory/Docketbk/2019/19-064/INITIAL%20FILING%20-%20PETITION/19-064_2019-04-30_GSEC_DTESTIMONY_TEBBETTS_PERM_RATES.PDF).

4. Metering, Communication, and Billing Costs

The successful implementation of EV TOU rate designs for residential or commercial customers, as well as other load management techniques, hinges on being able to accurately measure the energy usage that is solely attributable to charging an EV on a per station basis. This can be achieved through the installation of an additional utility meter. However, the upfront costs of secondary meters can be a significant barrier.

Commission regulations typically require separate utility metering to measure kWh for billing purposes. However, it is not necessary to install an additional utility meter to ensure accurate measurement of kWh fees included in EV charging services. Innovative technological solutions can ensure that smart charging stations provide accurate and verifiable data for the electricity dispensed to an EV. This data is easily accessible to utilities, secure, and reliable.

For example, ChargePoint's residential EV charging solution, ChargePoint Home, meets or exceeds the requirements set forth in the electricity-as-motor-fuel sections of NIST Handbooks 44. In utility terms, ChargePoint Home meets the accuracy requirements of ANSI C12.1-2008 (1% class) as applied to embedded EVSE metering. The embedded metering capabilities that ChargePoint includes, and that other competitive solution providers also provide, have been vetted for accuracy in other states and are already in use to support utility time-of-use rate billing. For example, the Minnesota Public Utilities Commission recently approved a pilot proposal by Xcel Energy to reduce the upfront cost burden for customers looking to opt into EV tariffs by implementing the tariff directly with smart EV charging stations.[48]

Networked charging solutions can provide the utilities with visibility of, and access to, port-level data for EV behavior that takes place on the customer's side of the meter. This provides a more granular and valuable data set than just collecting data from a metered service standpoint, which may contain multiple charging stations downstream or even other loads.

5. Potential Load Factor Improvements

When combined with time varying rates, electric vehicles exert a downward pressure on unit energy costs that lowers rates for all utility customers. A substantial portion of electricity costs accrues from serving system peak demands. It is the system peak that drives up distribution, transmission, and energy costs, while also increasing emissions. By avoiding charging at these times, customers with EVs introduce new load on the system at times that other load is low. This results in a flatter overall systemwide load shape, meaning that the grid is being used more efficiently over time. This efficiency reduces grid and energy costs per unit of energy sold by the utility. As a result, each unit of energy consumed by all customers – including non-EV customers – will be lower.

[48] *See* Petition for Approval of a Residential EV Service Pilot Program, Minnesota PUC Order dated May 9, 2018, Docket E002/M-17-817.

It is worth noting that in a 2018 study using data from California, currently the largest U.S. market for EVs, Synapse Energy Economics found that, "Over the past six years, fewer than 0.2 percent of EVs have resulted in a distribution system or service line upgrade."[49]

6. Customer Engagement Strategies

ChargePoint supports the general concept of targeted customer engagement. We also reiterate that new EV load can be cost-saving rather than cost-inducing if planned for and managed appropriately.

7. Venue

The Commission has multiple options for venues to approve residential and commercial time of use rates. Rate cases are often the appropriate venue for reviewing such proposals. However, ChargePoint encourages the Commission to allow for flexibility in determining the appropriate venues to review and approve residential and commercial time of use rates. These could include a statewide proceeding or pursuant to a utility-specific application. The Commission could issue an order in a new docket announcing the launch of a statewide proceeding applicable to all investor-owned utilities, or alternatively could issue an order in this docket directing Eversource, Unitil, and Liberty to file utility-specific proposals in three separate dockets.

8. Role of the Utility

Utilities have very important roles to play in supporting transportation electrification. First and foremost, utilities are ideally situated to ensure that the associated new load is incorporated in a safe, reliable, and efficient manner. ChargePoint is proud to be a partner of utilities around the country in deploying utility-supported charging infrastructure and pilot programs that incorporate capability for load management. We believe that there is a vital role for utilities in supporting efficient integration of EV load and that the right program design can encourage the installation of more charging stations around the state in a manner that complements, and does not duplicate or conflict with, the private market.

There are a number of ways in which ratepayer-funded investments in EV charging can expand access to charging while also complementing the competitive EV charging market. These include make ready and rebate programs.

Make Ready Programs

"Make ready" refers to the line extension on the distribution side of the meter as well as wiring, conduit, and sub-panels that are often needed to provide power to EVSE located in a site host's parking lot on the customer side of the meter. Make-ready infrastructure is essentially an extension of distribution system infrastructure, except that most of it is located behind the site

[49] Synapse Energy Economics, "Electric Vehicles Still Not Crashing the Grid: Updates from California," at 2 (March 2018), available at http://www.synapse-energy.com/sites/default/files/EV-Not-Crashing-Grid-17-025.pdf.

host's meter and so would usually be considered the responsibility of the site host. However, deploying and maintaining distribution system infrastructure is one of a utility's core competencies. Accordingly, one of the most effective ways for a utility to support EVSE is for it to support make-ready deployments. A make ready program could take the form of a rebate or upfront payment to a site host to use toward make-ready costs, or the utility could use existing personnel and resources to construct the make-ready for interested site hosts. Either way, the utility can receive valuable charger utilization information by providing this consideration and prepare for future load management programs to better integrate vehicles and the grid.

One advantage of make ready programs is that the utility effectively leverages the private capital of the site host to purchase the actual EVSE. When site hosts share in the total cost of installing the EVSE, program dollars can go further. A make ready program also has the advantage of focusing the utility on one of its core competencies – long-lasting distribution infrastructure – and allowing the site host to choose the charging equipment and network services that best meet its needs and support its own goals for installing the EVSE.

As long as the utility spends funds prudently in a way that minimizes costs and maximizes benefits to ratepayers and meets criteria established for the program by the Commission, a utility should be allowed to recover the full cost of a make-ready program from ratepayers, including administration costs. Program criteria should be established in advance and be based on the principles we discuss below. Because make-ready is essentially the extension of distribution infrastructure, a utility should be allowed to recover make ready costs in the same manner as it recovers the cost of distribution system investments made in the ordinary course of business, namely, by putting the value of the make-ready investments into its rate base. Recovering make-ready costs in this manner would allow a utility to earn its authorized rate of return on the value of these investments, thereby incentivizing and rewarding a utility for supporting the deployment of public EVSE and helping it maintain visibility in to this new and unplanned load.

Utility Rebates

A rebate program would work similarly to a utility's demand-side management (i.e. energy efficiency) rebate programs in that it would offer a specific dollar amount to site hosts for installing qualifying EVSE. It is important that the utility create a list of equipment that qualifies for the rebate to ensure that any EVSE that is installed meets functional requirements and supports the goals of the program, such as providing an open network and managed charging capabilities. The utility should also update the list of qualifying equipment regularly to keep up with the pace of innovation and allow site hosts to install the newest products.

As with make-ready programs, if the utility spends funds prudently in a way that minimizes costs and maximizes benefits to ratepayers and meets the program's criteria, a utility should likewise be allowed to recover the full cost of a rebate program for customers, including both the cost of rebates and administration costs. Such costs can be recovered similar to how the utility recovers costs for its DSM programs. Alternatively, the Commission could consider allowing a utility to treat the rebate program costs as a regulatory asset and earn its authorized rate of return on the amortized amount. While rebates are not typically included in a utility's rate base, doing so provides an efficient and effective mechanism to reward and incentivize the utility for supporting the nascent transportation electrification market and promote efficient grid integration of EV load.

Prior to a utility proposing a transportation electrification program, the Commission should consider establishing standards and guidelines for any utility proposal leveraging industry best practices and input from industry stakeholders.

Standards and Guidelines for Reviewing Utility Proposals

Under the oversight of the Commission, New Hampshire's utilities can play an active role in preparing for, integrating, and advancing EV charging in the state. ChargePoint recommends that the Commission consider developing standards and guidelines for approving utility proposals to support electric vehicle charging infrastructure. Massachusetts reviews utility-proposed EV infrastructure programs under a three-pronged standard. A proposal will be approved if it is (1) in the public interest; (2) meets a need regarding the advancement of EVs that is not likely to be met by the competitive EV market; and (3) does not hinder the development of the competitive EV charging market.[50] This standard is applied in addition to traditional regulatory tests to determine the reasonableness of costs and bill impacts.[51] New Hampshire could apply such a standard to ensure that utility investments do not hinder customer choice, discourage private innovation, or harm competition.

New Hampshire Utilities' Prior Experience

In New Hampshire, New Hampshire Electric Co-op ("NHEC") has led the way in piloting and implementing EV charging incentives for its members since 2013.[52] In 2017, NHEC began to offer an EV charger incentive as a standard commercial incentive program, providing up to 50% of the installed cost of an EV charger up to $2,500 per charger, with two chargers allowed at each member site per year.[53] Also in 2017, NHEC began a pilot program to offer incentives to its members to buy or lease plug-in electric vehicles.[54] These incentives then became a standard offering of the coop in 2018.[55]

Eversource has been leading transportation electrification initiatives in Massachusetts for several years, including by providing make ready infrastructure.[56] Eversource is also piloting a voluntary program in Massachusetts to directly control EV chargers by reducing the rate of

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[50] *See, e.g.*, Order Establishing Eversource's Revenue Requirement, at 501-03, Massachusetts DPU Docket No. 17-05 (Nov. 30, 2017), available at https://www.mass.gov/files/documents/2018/01/26/17-05_Final_Order_Revenue_Requirement_11-30-17.pdf.
[51] *Id.* at 501-02.
[52] NHEC Presentation, "Electric Vehicles and NHEC," slide 3 (Sept. 28, 2018), provided to the SB 517 Electric Vehicle Charging Station Infrastructure Commission, available at https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm.
[53] *Id.*
[54] *Id.* at slide 4.
[55] *Id.*
[56] Eversource Presentation, "Electric Vehicle Update," slide 12 (Sept. 28, 2018), provided to the SB 517 Electric Vehicle Charging Station Infrastructure Commission, available at https://www.des.nh.gov/organization/divisions/air/tsb/tps/msp/sb517.htm.

charging to Level 1 rates during times of high system demand, with a total of 5% of participating customer charging sessions subject to these overrides to date.[57]

III. Conclusion

In conclusion, ChargePoint supports the Commission's inquiry into time of use rates and the potential benefits of electric vehicles. Electric vehicles, in combination with time of use rates, can exert a downward pressure on unit energy costs that lowers rates for all utility customers. Electric vehicle load is a flexible and beneficial grid resource susceptible to simple and cost-effective load management techniques. In addition, electric vehicles are energy efficient and clean and promote energy security and local jobs. For these reasons, in accordance with state policy established by, *inter alia*, RSA 378:37 and SB 575-FN, the Commission should direct the New Hampshire utilities to offer electric vehicle time of use rates and to implement load management techniques for electric vehicles.

Respectfully submitted,

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[57] RMI DCFC Rate Design Study at slide 31 (citation omitted).

STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

Docket No. IR 20-004

Electric Distribution Utilities

Investigation of Electric Vehicle Rate Design Standards, Electric Vehicle Time of Day Rates for Residential and Commercial Customers

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document has, on this 20th day of February 2020, been sent by email to the service list in Docket No. IR 20-004.

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Melissa E. Birchard