STATE OF NEW HAMPSHIRE

BEFORE THE NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

Docket No. DE 21-030

Unitil Energy Systems, Inc.

DIRECT TESTIMONY OF CHRISTOPHER R. VILLARREAL

ON BEHALF OF

CLEAN ENERGY NEW HAMPSHIRE AND CONSERVATION LAW FOUNDATION

NOVEMBER 23, 2021

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I. INTRODUCTION & QUALIFICATIONS

Q. Please state for the record your name, position, and business address.

A. My name is Christopher Villarreal. I am the President of Plugged In Strategies, located at 9492 Olympia Drive, Eden Prairie, Minnesota, 55347.

Q. On whose behalf is this testimony being offered?

A. I am testifying on behalf of Clean Energy New Hampshire (CENH) and the Conservation Law Foundation (CLF).

Q. Please summarize your experience in the field of utility regulation.

A. I have over 20 years of experience working for and before state regulatory bodies, including nine years as Senior Regulatory Analyst at the California Public Utilities Commission and two years as Director of Policy at the Minnesota Public Utilities Commission. I started Plugged In Strategies in 2017 and since then I have advised state commissions around the country on issues related to rate design, grid modernization, advanced metering infrastructure, interoperability, electric vehicles, distribution system planning, and data access and privacy.

Q. Can you describe your experience with the issues raised in this proceeding?

A. On rate design issues, I worked on a number of rate design policy decisions and proceedings when I was a staff member of the California Public Utilities Commission, including assisting the Assigned Commissioner's dynamic pricing guidance issued in

Decision 08-07-045[1] and development of the Order Instituting Rulemaking that led to a review of existing rate design in California.[2] As Director of Policy for the Minnesota Public Utilities Commission, I participated in the development of the Minnesota Commission's review of its rate design policies.[3]

Additionally, from 2016-2017, I was staff chair of the National Association of Regulatory Utility Commissioners (NARUC) Staff Subcommittee on Rate Design, and lead the effort to publish the NARUC manual on Distributed Energy Resources (DER) Rate Design and Compensation. This document was one of the first comprehensive looks at the impacts of rate design on DER, which includes EVs.

Recently, I facilitated an effort for the Connecticut Public Utilities Regulatory Authority, with funding from NARUC, to look at the interoperability considerations for EV deployment in Connecticut, including the interaction between EVs, electric vehicle supply equipment (EVSE), and the utilities.

My work experience is summarized in my resume, provided as Exhibit CRV-1.

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[1] *Application of Pacific Gas and Electric Company To Revise Its Electric Marginal Costs, Revenue Allocation, and Rate Design*, Decision 08-07-045, California Public Utilities Commission (July 31, 2008), https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/85984.PDF.

[2] *Order Instituting Rulemaking on the Commission's Own Motion to Conduct a Comprehensive Examination of Investor Owned Electric Utilities' Residential Rate Structures, the Transition to Time Varying and Dynamic Rates, and Other Statutory Obligations*, Order Instituting Rulemaking, California Public Utilities Commission, Docket No. R.12-06-013 (June 28, 2012), https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/169782.PDF.

[3] *See*, *In the Matter of an Alternative Rate Design Stakeholder Process for Xcel Energy*, Notice Seeking Comment on Procedural Schedule, Minnesota Public Utilities Commission, Docket No. E002/M-15-662 (February 16, 2016), https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={AAB14AE3-EEDF-4188-8AE3-BD5BDA9EE5BA}&documentTitle=20162-118338-01.

Q. Have you testified before the New Hampshire Public Utilities Commission (Commission) or participated as an expert in any other proceeding before this Commission?

A. Yes, I submitted testimony in Docket No. DE-170. Additionally, I participated in several workshops before the Commission in Docket No. IR 15-296, Investigation into Grid Modernization.

Q. Have you testified before any other commission?

A. Yes, I have previously testified before the Michigan Public Service Commission and the South Carolina Public Service Commission. In general, I testified regarding utility distribution system planning efforts and the role of DER, including EVs, on those planning efforts.

Q. What is the purpose of your testimony?

A. I am testifying on behalf of CENH/CLF regarding the electric vehicle (EV) rate design proposals of Unitil in DE 21-030.

Q. **What is being considered in this docket?**

A. In its Order of Notice establishing this docket, the Commission stated that these proceedings raise, *inter alia*, issues "related to whether [Unitil's EV] rate proposals are consistent with Order No. 26,394 (August 18, 2020), *Order Determining the Appropriateness of Rate Design Standards for Electric Vehicle Charging Stations Pursuant to SB 575*."[4] The Commission also stated that several of Unitil's proposed rates relating to electric vehicle charging would offer residential customers, small general

[4] Docket No. DE 21-030, Order No. 26,467, at 4 (April 6, 2021).

service customers, and large general service customers time of use rates for separately-metered electric vehicle charging, including a limited duration demand charge holiday for small and large general service customers."[5]

Q. Are you sponsoring any exhibits?

A. Yes, I am sponsoring the following exhibit:

Exhibit CRV-1: Resume of Christopher R. Villarreal

II. TESTIMONY OVERVIEW

Q. What is the purpose of your testimony?

A. My testimony discusses key components of rate design and rate design principles, impacts of rate design on adoption of EVs, and addresses the EV rate design proposals of Unitil as submitted in docket number DE 21-030. I recommend the following:

1. The Commission reject Unitil's demand charge proposal and require Unitil to implement a demand charge holiday (1) of at least 10 years (with zero demand charges for at least the first five years) and (2) until DCFCs reach a utilization factor of 30% across Unitil's service territory
2. The Commission accept Unitil's time of use rate design proposal, except for direct-current fast chargers (DCFCs);
3. The Commission should require Unitil to collect information regarding EV adoption and usage rates to help inform the pace of evolution for rate design for

[5] *Id.* at 3.

EVs until such time as utilization rates for DCFCs reach a level at which demand charges can be recovered across more usage;

4. The Commission should require Unitil to make available public hosting capacity maps to help identify optimal locations for the citing of EV charging infrastructure, including DCFCs; and,
5. At a minimum, the Commission should consider developing state-wide EV rate design policy and implementations, including prohibiting full demand charges for EV charging, regardless of charging level, for a period of at least 10 years to minimize the potential for rate shock at site host locations, and to provide certainty to the emerging EV marketplace in New Hampshire.

III. <u>ELECTRIC VEHICLE POLICY</u>

Q. How should the Commission address EV policy?

A. A good first step in this effort is to focus on the rate design, as the Commission directed in Order 26,394 in Docket IR 20-004. However, with the current levels of EV adoption across New Hampshire, the Commission should consider taking additional actions that will do much to support the growth of EVs in New Hampshire. For example, at this early stage of adoption, making a statement that adoption of EVs is a priority of the Commission would show that the Commission is ready and willing to take necessary steps to support the EV market in New Hampshire.

Q. What are some benefits of making EV adoption a policy priority?

A. By making EV adoption a priority, the Commission can ensure that EV adoption and growth is considered across Commission actions. Additionally, making such a statement would allow further discussion and action on identifying opportunities to leverage EVs on the electric system and create a more efficient distribution system. EVs are expected to be an important component of the future electricity system and, as such, the distribution system will need to be planned to ensure EVs can be integrated without adding costs to the system, but also to take advantage of the various services EVs can provide to the system. If the system is not adequately planned for leveraging these services, then it will cost more later on and after EVs are deployed. In other words, it is cheaper to build a system planning for EVs than to bolt on those investments afterwards. A way to ensure that EVs are integrated with the distribution is through sending appropriate price signals such that fleets could be charged during off-peak hours and not negatively impact afternoon peak hours; this type of managed charging would reduce operational costs while also increasing utility sales. Enhancing the efficiency of the distribution system means not only shifting charging times to off-peak periods, but also, during times of low wholesale prices, EV charging infrastructure could be used to charge during times of excess electricity.

Finally, adoption of EVs provides a benefit to New Hampshire's customers and residents by electrifying transportation, be it single-vehicle EVs, a town's transit system, or electric school buses. The costs of operating EVs are lower than internal combustion engines, and EVs do not emit emissions, creating cleaner air for all who live and visit New Hampshire.

Q. What is the status of electric vehicle adoption in New Hampshire?

A. At this time, low. For example, Unitil's EV forecasts are based on a model developed by the Edison Electric Institute, then scaled to their New Hampshire territory.[6]

Nevertheless, expanded EV production targets that have been announced by the major EV producers, coupled with new incentives for EVs and charging infrastructure in the recently passed Infrastructure Investment and Jobs Act,[7] means that EVs will make up an increasing amount of the transportation sector in New Hampshire in the coming decade. Unitil still estimates a rather low projection of EV deployment in New Hampshire, which provides the Commission with a significant opportunity to enact policies that support EV adoption at this early stage and that will help grow the EV market in New Hampshire. Ensuring that there are no unnecessary barriers to EV adoption at this stage will help the EV market mature, support EV adoption, and allow New Hampshire residents to benefit from the savings and environmental benefits that electrification of transportation promises. Providing policy support to help this transition, such as avoiding demand charges, can go a long way to make EV adoption a priority for the state.

Q. Can you explain the benefit of acting while adoption rates are low?

A. With its current low adoption estimate for EVs, Unitil's proposed rates will have minimal impact on its revenue requirement and will not rely on substantial cross-class subsidies. Simply put, at low adoption levels, the costs to customers are relatively low. As such, any potential subsidization from other customer classes is likely to be minimal as any cross-subsidization is likely to be intra-class, so that impacts on rates will be focused within the

[6] Unitil CSV-3.
[7] Infrastructure Investment and Jobs Act, H.R. 3684, P.L. 117-58.

class; even then, with EV adoption a priority for the state, and the Commission, it would be reasonable to allow for customers to bear some of the uncollected costs from these rates to support such a policy priority as supporting EV development in New Hampshire. Not collecting demand charges should not have a substantial impact either to the site host or to customers since the low utilization rates of EV charging infrastructure means substantial costs are not being incurred. Furthermore, as proposed by Unitil, these rates are optional—customers can choose to remain on their otherwise applicable general service tariff.

Q. What types of actions should the Commission consider to support EV adoption?

A. First, it is important that the Commission use this time to support EV adoption across the state. This would include development of time of use rates, identification of locations for the siting of DCFCs that will not have significant impacts on the electric system, and ensuring that distribution utilities do not leverage their own market power to interfere with a competitive marketplace. For example, encouraging Unitil to develop and make public EV hosting capacity maps would go a long way to minimizing customer and system costs while maximizing efficiency and leveraging available locations to locate DCFCs.

Second, by proactively stating that EV adoption is a priority for the Commission, it can recognize that EV adoption and deployment is at a nascent stage, so its policies and principles can reflect that determination.

Lastly, the Commission can adopt forecasting and reporting metrics regarding EV adoption so that Unitil, other utilities, the Commission, and the public can project an adoption rate over time. This forecast is important as it can be used by utilities and the Commission to identify when certain policies can sunset and new policies adopted.

Q. Can you describe the different types of EV use cases?

A. Yes. I identify six basic use cases for EV adoption:

- Residential Level 1, 110 volt charging
- Residential Level 2, 220 volt charging
- Commercial/Public Level 2, 220 volt charging
- Commercial/Public Level 3, DCFC
- Commercial Fleet, Level 2, 220 volt charging, and
- Transit, DCFC

Each of these use cases comes with different technology options, rate design options, impact on utility systems, and pace of adoption. As such, questions remain regarding which rate to apply to which use case. Different rate designs can also apply to these different use cases. For example, for residential customers, a utility could offer a whole-home rate, where the energy used to charge an EV is rolled into the total consumption of the premise, or an EV-only tariff, where the energy used to charge the EV is measured separately from the home and billed at a different rate. However, the impacts of each use case can be very different.

Q. Please explain.

A. A cluster of residential Level 2 charging will have a different impact on utility operations and cost recovery than public DCFC, which will have a different impact from transit and fleet charging use cases. Residential customers are served by one size of transformer, typically, so changing the size of the residential transformer may be needed to address increased demand from EV charging. Of course, a residential transformer may also need to be upgraded in response to any number of new residential investments like installing a hot tub or a pool, adding a new refrigerator and freezer, or building an addition. None of those investments require the homeowner to notify the utility, and any costs incurred by the utility in response to those types of customer actions are recovered through rate base.

On the other hand, DCFC, which could draw up to 1 MW of demand per DCFC in the future, can only be located in certain areas across the distribution and transmission system and where there is available capacity to add such demand. Being able to identify those locations will help customers and developers install DCFC in locations that will not exacerbate potential constraints or overwhelm the location, and will minimize project development costs for charger installers and site hosts. In this case, having access to a utility's hosting capacity map would be useful to identify those locations with available capacity to cite a DCFC. Unitil currently provides hosting capacity information for its Massachusetts service territories; while hosting capacity does not guarantee interconnection, identifying areas of available capacity that can be provided by a hosting capacity map, and that is updated regularly, can guide deployment of EV infrastructure, notably DCFC, to areas that will not negatively impact utility reliability or service, which will be a benefit to customers and the utility.

In addition to the impacts that this equipment can have on a system, these policies will also have an effect on adoption. If the tariffs include burdensome requirements or otherwise act as a barrier to adoption, then there will be a delay in customers installing charging equipment and purchasing EVs. This may also negatively impact the ability of New Hampshire to attract EV-driving tourists, who may prioritize visiting locations with available charging infrastructure and policies that support the development of EV charging infrastructure. This means understanding not only how adoption of EVs will impact the electric system and being able to forecast the adoption rate of EVs, but also how the technology can be used to respond to prices or other programs and services.

Q. How does EV policy impact the Electric Vehicle Supply Equipment (EVSE)?

A. The EVSE is likely the main point of engagement between the customer and the grid, so the EVSE will need to be able to communicate information to the customer about the cost to charge, length of time to charge, and, potentially, other signals to better manage the charging of the vehicle. However, for DCFC, it is unlikely that usage will be elastic as the role of the DCFC is different than a Level 2 charger. Notably, the use of a DCFC means that the customer needs a fast charge in order to get home or continue on their trip; in other words, the DCFC mainly needs to provide customers with a charge in under 20 minutes. A Level 2 charger, on the other hand, will take several hours to completely charge a customer's battery. In this case, demand is more elastic and can be responsive to price or grid signal needs or managed by a third party. Level 2 EVSEs for fleets or public or workplace charging where a customer may be connected to the equipment for several hours would likely fit into this category. As such, understanding how rate design impacts adoption and utilization of the type of charger being installed and the application is important. As described above, because demand charges are ill-suited for low-utilization public chargers, time of use rates rate may be the most optimal way for a utility to recover its costs and send a price signal that reflects the marginal cost to serve at that location and can serve as an effective substitute for demand charges to recover costs.[8] However, due to demand for DCFCs being inelastic, and with few DCFCs currently in New Hampshire, it may not be appropriate for DCFCs to be on a time of use rate at this time.

IV. RATE DESIGN

Q. Please describe the set of principles that cover rate design.

A. It is important to ensure that any rate design offerings are done in accordance with a set of goals and principles. Generally speaking, commissions around the country tend to rely upon the rate design principles first detailed by Professor Bonbright in 1961.[9] These principles are fairly broad and require the regulator to make some tradeoffs. For example, one principle addresses rate stability but another addresses cost causation, that is, the person who caused the cost should pay for it. Clearly, the principles may conflict, which is why it is important to balance the principles.

While cost causation is an important component of rate design, it is not the only one, and is often balanced against other principles such as fairness and equity. For example, with

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[8] "EVGo Fleet and Tariff Analysis: Phase 1 California," Rocky Mountain Institute at 21 (April 2017), (RMI Report), https://rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf,

[9] James C. Bonbright, "Principles of Public Utility Rates" (New York: Columbia University Press, 1961); *see also*, "Distributed Energy Resources Rate Design and Compensation: A Manual Prepared by the NARUC Staff Subcommittee on Rate Design," NARUC at 20-21 (November 2016), (NARUC Manual), https://pubs.naruc.org/pub/19FDF48B-AA57-5160-DBA1-BE2E9C2F7EA0.

average cost ratemaking, one customer class, say the residential class, will pay the same for electricity regardless of the actual cost to serve each individual customer. In this case, this leads to intraclass subsidies to ensure certain public goals—affordability and accessibility. Other rate design preferences, such as ensuring industrial customers maintain their competitiveness, also results in purposeful cross-subsidization as public policy goals outweigh a specific focus on cost causation in such an instance. For EV rate design, other public purposes are also important, in addition to cost causation.

Similarly, rigidly applying the cost causation principle to EV rate design may not strike the right balance between conflicting regulatory principles. In order to achieve the public policy priority of increased EV adoption, the Commission should consider other rate-making principles, such as "diffusion of benefits." That is to say, increased EV adoption will benefit the community as a whole, and as such, at this early phase in the adoption of EVs, charging infrastructure need not be held strictly to cost causation.

As I discussed above, making EV adoption a policy priority for New Hampshire would mean that the Commission can balance the rate design principles in ways that better align with the societal and policy goals. In essence, with EV adoption as a goal of the state, other rate design principles, like supporting public policy or conservation, may be weighted more favorably than other principles, like cost causation, in order to support the policy goal. So, the Commission can decide that for some period of time, developing rates that will promote EV adoption should be prioritized over other rate design principles. This also applies to goals for revenue neutrality in rates—that is, that rates should recover the costs and not be recovered by other rate classes. Much like how residential rates subsidize those customers with higher costs to serve (*i.e.*, rural customers), and lower cost to service customers (*i.e.*, city customers) pay more than their cost to service, such cross-subsidies are done on purpose in order to promote equity, affordability, and access to electricity.[10]

Cost causation is an important principle that commissions, including this Commission, point to regarding the development of any particular rate or program. However, it is important to note that while cost causation is an important principle, it is often relegated below other principles as a commission sees fit, such as for residential rates. In the development of appropriate rates, a commission may request or require the utility to submit a class cost of service study, which attempts to identify which customer class is responsible for some percentage of a utility's revenue requirement. The ultimate determination of that responsibility is litigated before state commissions, so any rate that is ultimately adopted by a commission includes a balancing and weighting of principles by the commission itself. This also is apparent when looking at the rates inside each class. For the residential class, all customers inside the class usually pay the same price for electricity, regardless of the actual costs to serve. So, a residential customer who lives in an apartment, or lives in a house in the suburbs, or lives in a rural area will all pay the same price for electricity. In this instance, the regulator has decided that affordability or equity is more important that strictly sticking to cost causation as the main principle. To be sure, some states may have variations to this model; for example, in Xcel Energy's territory in Minnesota, customers who live in areas with undergrounded distribution lines pay a higher customer charge.[11]

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[10] NARUC Manual at 107-108.

[11] Northern States Power Company, Residential Service, Rate Code A03, Section No. 5, 31st Revised Sheet No. 1, https://www.xcelenergy.com/staticfiles/xe-responsive/Archive/Me_Section_5.pdf.

Q. Can you describe the role and purpose of time of use rates?

A. Time of use rates are a rate that endeavors to provide a price signal that is more aligned with the costs to serve a customer at that time. So, during higher cost hours, such as a hot summer afternoon, the cost of electricity is likely to be higher as demand increases; a time of use rate would have an afternoon price that reflected these higher prices and when prices are low, typically in overnight hours, the price would be low to reflect these costs. Time of use rates can be used to encourage customers to shift consumption to lower cost hours, which would make the system more efficient and increase load factors. The rates and schedules for a time of use tariff are pre-determined and approved by the regulator.[12]

Time of use rates are typically implemented by a jurisdiction to provide a price signal to customers to shift consumption away from peak periods and into lower cost periods. It is possible that a time of use rate is all that is needed for integration of EV charging into the utility systems as the site host (or its charging manager or aggregator) can then optimize the operations of the EVSEs with the price signal. A customer could then set its vehicles' telematics system or the EVSE to charge below a certain price or set a time for when the vehicle needs to be at a certain charging level and allow the car or EVSE to manage the charging rate.

V. UNITIL'S ELECTRIC VEHICLE RATE DESIGN PROPOSAL

Q. Please provide your perspective on Unitil's time of use proposal.

[12] NARUC Manual at 26.

A. Unitil proposes four different EV tariffs: (1) domestic "whole-house" TOU (TOU-D); (2) domestic EV TOU (TOU-EV-D); (3) small general service EV TOU (TOU-EV-G-2); and (4) large general service EV TOU (TOU-EV-G1).[13] The first two are tariffs available to residential customers and neither include a demand charge. There are two main differences between the two residential tariffs. First, the whole-home rate rolls any EV charging usage into the total usage of the home, whereas the second tariff requires the installation of a parallel meter to separately meter the specific EV charging load. Secondly, for the whole-home tariff, transmission and service is time-differentiated while in the second tariff, transmission, service, and distribution are time-differentiated. The peak, off-peak, and mid-peak time periods and seasonal adjustments are the same.

For the small and large general service proposals, the time of use rate is a three-part rate, with off-peak, mid-peak, and on-peak time periods. The on-peak time period is from 3:00 PM to 8:00 PM, Monday through Friday, except holidays, while the off-peak period is from 8:00 PM through 6:00 AM, Monday through Friday and all-day weekends and holidays. These time periods apply to each of the proposed EV rate design tariffs. These tariffs also include a demand charge, which I discuss in more detail below.

I think it is still important for the rate design to provide customers with a price signal to encourage charging in lower cost hours, or, if charging occurs during peak hours, that the utility be allowed to recover its marginal costs via the volumetric rate (as opposed to through a demand charge, as discussed later). On the other hand, I think that the Commission may want to consider how the various use cases I identified above may

[13] Testimony of Carrol, Simpson, and Valianti at 15.

respond to a time of use rate and it may be appropriate to develop use case specific rate designs with different attributes and prices. For example, for DCFCs, which are less elastic than other use cases, an alternative to a time of use rate may be more appropriate. As a public policy priority, the Commission should consider DCFCs differently than the other use cases that make use of Level 2 charging infrastructure. DCFCs provide an important piece of the EV adoption puzzle and rate designs that make the installation of DCFCs harder will delay adoption of EVs. I recommend that Unitil's rate design not apply to DCFCs until higher utilization rates are realized by these locations, consistent with the discussion on demand charges. This would be similar to the rate design as proposed by Unitil in Massachusetts in Docket No. D.P.U. 21-92 where Unitil does not propose a time-of-use rate for DCFCs. Rather than propose time-of-use rates for DCFCs in Massachusetts, Unitil, instead, proposes to balance volumetric, distribution, and demand rates over a period of 10 years, with demand charges gradually increasing as utilization factors of individual EVSEs increase over time. In essence, Until proposes to maintain a revenue neutral rate by increasing the volumetric rate and reducing the demand charge in proportion as utilization is low, and as utilization increases, the demand charge increases and the volumetric rate decreases.[14]

Q. To what extent do demand charges impact rate design principles?

A. Demand charges can play a significant role in delaying EV infrastructure roll-out especially at low utilization rates, as New Hampshire is currently experiencing. EV charging can

[14] *See* John Taylor Testimony, Mass. D.P.U. 21-92 at 8 (July 14, 2021), https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/13758188.

result in substantial demand when the EVSE is in use, which can trigger high demand charges. However, if a public charger is used only occasionally, it will not generate enough volumetric sales to pay for the high demand charge. As such, demand charges can be crippling to the economics of public EV charging.

As Unitil notes, "one goal of EV rate design should be to promote charging at times of low demand," yet the demand charge proposed by Unitil would not follow this goal.[15] The non-coincident peak demand charge sends the opposite signal.

Unitil's proposed EV general service tariff includes a non-coincident peak demand charge for commercial and industrial customers who sign up for this tariff. In other words, the demand charge is based upon the individual customer's peak regardless of when it occurred, rather than the greatest amount of demand during the system peak. Arguably, this is to recover the distribution costs associated with serving that location regardless of when that customer's peak occurs. In this regard, I disagree with Unitil Witness Taylor's blanket assertion that distribution costs "are fixed in nature."[16] The only distribution costs that comfortably fit in that characterization are related to the size of the transformer serving the end use customer—all other costs, especially into the future, are variable in nature.[17] There is no guarantee that any customer's usage will occur at a given point in time, for a certain amount of demand, over a certain period of time.

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[15] Carrol, Simpson, Valianti Testimony at 25.
[16] John Taylor Testimony at 17.
[17] See "Smart Rate Design for a Smart Future," Jim Lazar and Wilson Gonzalez, Regulatory Assistance Project at 18 (July 2015). https://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-gonzalez-smart-rate-design-july2015.pdf

In an effort to align its rate design with the principle of cost causation, Unitil applies a demand charge to its commercial and industrial tariffs; however, demand charges do not promote EV adoption.[18] Indeed, this customer-specific, distribution peak may, in fact, occur during periods of otherwise low system demand, which is when a time-of-use rate would signal for charging to occur. This creates a series of mixed messages to the customer around when to charge, especially at low utilization rates for charging infrastructure.

Furthermore, from a rate design perspective, demand charges create three main problems:

1) At low utilization rates, a location charged a demand charge for EV charging, especially for DCFC, may see their bill rise substantially. In an analysis done by RMI for EVGo looking at their locations in California, RMI determined that in some locations, site hosts could incur a bill up to $3,114 a month with 94% of that bill due to demand charges.[19] As further detailed by RMI, under the different proposals by the California utilities, those rate designs that included demand charges would continue to be a significant component of the site hosts' bills. Even at 15% utilization, RMI estimates that locations could see 70% to 88% of their bill be attributable to the demand charge.[20]

   What this research shows is that as utilization rates go up, the impacts of the demand charge are reduced, but that even at 15% utilization, it remains a substantial part of the bill for that location.

[18] RMI Report at 20-21.
[19] RMI Report at 16-17.
[20] *Id.*

2) A non-coincident demand charge is not related to system use, so charging a demand charge to a peak that occurs in off-peak hours sends a poor price signal to customers. As the NARUC Manual notes, a non-coincident peak demand charge occurs regardless of when that peak occurs and may act more as a fixed charge than an effort to send a price signal.[21] In other words, a non-coincident peak demand charge is being used to collect the fixed costs of serving that customer rather than sending a price signal around time of use, which would be more of a reflection of system availability. Since a location's peak could occur during the middle of the night when overall system demand is low, this would be a more optimal time to charge, and a time of use rate would encourage charging during these hours; however, a non-coincident peak demand charge would also penalize these locations from doing what the rate design encouraged them to do.

3) A utility may note that a non-coincident demand charge is there to recover the utility's fixed costs to serve. This, however, is focused on short-term marginal costs and ignores long-term marginal costs, where more of the utility's costs are variable.[22] Of course, a higher fixed charge may also result in a lower volumetric rate, which dilutes the price signal to shift consumption or increase consumption since a customer cannot avoid a fixed charge.[23]

[21] NARUC Manual at 108.
[22] NARUC Manual at 22.
[23] *Id.* at 118.

All of this is to say that at low utilization factors, demand charges act as a penalty for installing EV charging infrastructure, especially DCFC, when the state should be trying to encourage deployment of EV charging infrastructure, including DCFC.

Q. Can you define what you mean by "utilization factor"?

A. Utilization factor or utilization rate refers to the number of hours in a given time period, say one month, where the charger is in use. Generally, I use the description provided by RMI in its Colorado report which defines utilization as:

> the total time a charger is actively charging divided by the duration being evaluated. In this report, we use a one-month time period to calculate station utilization. For example, in a month with 30 days, there are 720 hours. If a charger were in use for a total of 36 hours over the course of the month (on average, 72 minutes a day), the charger would have a 5% utilization rate (5% of 720 hours is 36 hours).[24]

Q. How is Unitil proposing to implement demand charges?

A. Unitil notes in its testimony that a demand charge can have a negative impact on the operation of an EV charging location.[25] As such, demand charges at this time do not support the growth of EV charging infrastructure; this was also recognized by the Commission in Order No. 26,394 and was recognized by Unitil, which is proposing a reduced demand charge in for EV charging applications in this docket. Unitil proposes a sliding scale for its demand charge proposal whereby over three years the demand charge

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[24] RMI Colorado Report at 12.
[25] Carroll, Simpson, and Valianti Testimony at 19. See also, John Taylor Testimony at 29-30.

would be reduced by 75% to start in year 1 and then each year thereafter, the reduction would be decreased by 25% each year (i.e., in year 2, the demand charge would be reduced by 50% total and in year three, the demand charge would be reduced by 25% total) until, in year 4, the customer would be charged its full demand charge under its proposed EV rate.[26]

Q. Would Unitil's proposal address your concerns about the use of demand charges?

A. No. Simply reducing the demand charge does not result in an equitable rate, nor will it reduce the barrier to installing EV charging infrastructure. For Unitil, its three-year ratchet is entirely arbitrary and not aligned with any forecast or expectation of EV growth in its territory. There is no rush to implement a demand charge at this time, especially absent more accurate forecasting based on actual utilization of EV charging infrastructure. Indeed, in its Massachusetts territory, Unitil proposed an EV rate design with a demand charge based on four tranches of load factors (*i.e.*, utilization rates), and would be in place over 10 years.[27] From 0-5% of load factor, the customer would not have a demand charge; from 5-10% load factor, the demand charge would be reduced by 75%; from 10-15% load factor, the demand charge would be reduced by 50%; above 15% load factor, then the full demand charge would apply. However, as noted from the RMI Report, even at 15% utilization, that could still be up to 70% of the bill at a given location.

The Massachusetts "demand charge holiday" proposal would be more in line with examples from around the country. Notably Southern California Edison Company ("SCE")

[26] Carroll, Simpson, and Valianti Testimony at 19, lines 8-9.
[27] John Taylor Testimony, Mass. D.P.U. 21-92.

has a $0.00 demand charge for the first 5 years, ending in 2023, and then demand charges are scaled up over the following 5 years. SCE's demand charge holiday was developed for commercial and industrial customers to support the growth of EV and EV charging infrastructure in its service territory.[28] Even then, after 10 years, SCE's EV demand charge implements 60% of its otherwise applicable demand charge. In other words, after 10 years, SCE will only charge up to 60% of its demand charge. In comparison, Unitil's proposal in New Hampshire will charge 75% of its demand charge in year three, before moving to 100% imposition in year four.

Having a demand charge tied closer to utilization rates is important, because at some point in the future, at a certain utilization factor, it may be appropriate to start implementing demand charges for EV charging infrastructure. This also preserves the business case for installing EV charging infrastructure at low utilization rates and low EV adoption levels, but as more EVs come onto the road, it also ensures that other ratepayers are not unduly paying for the costs of the EV charging infrastructure.

Q. To what should the imposition of a demand charge be tied?

A. Again, at some point in the future, the establishment of a demand charge may be warranted. In a separate study looking at Colorado-specific DCFC rate design options, RMI suggests phasing in demand charges over time as utilization increases and not imposing full demand charges until a 30% utilization factor is reached which provides a sufficient level of usage

[28] Southern California Edison Schedules TOU-EV-8 and 9, https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_TOU-EV-8.pdf; https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_TOU-EV-9.pdf.

for the site host to spread higher or full demand charges across customers.[29] In my opinion, that seems a reasonable threshold for the Commission to establish for when full demand charges could be implemented for EV charging infrastructure under an EV-specific rate.

Q. How else can EV rate design be improved in New Hampshire?

A. The Commission should consider adopting a statewide approach where all three utilities start at the same place—begin with a time of use rate with no demand charges—then monitor adoption of EVs across the state and the respective service territories so that any modification to the rate design can be done when utilization rates of fast chargers are at a level where a demand charge will not act as a barrier. Treating adoption of EVs as a policy goal of the state means that the Commission should also consider how best to encourage EV adoption. Having consistency in rate design across the state would be one way to support adoption by minimizing differences in charging experiences across the state.

Additionally, the Commission should consider adopting reporting requirements for each utility to collect information about EV adoption, develop forecasts for EVs, and collect utilization rates for DCFCs across its service territory. Collecting this information will inform the utilities, the Commission, and stakeholders about trends and can help identify

[29] DCFC Rate Design Study for Colorado Energy Office, Rocky Mountain Institute at 5 (September 2019), https://rmi.org/wp-content/uploads/2019/09/DCFC_Rate_Design_Study.pdf. To expand upon this structure to illustrate RMI's recommendation of gradually increasing demand charges over time, an example of an expanded demand charge application tied to utilization could resemble the following: 0-5% utilization, no demand charge; 5%-10% utilization, 15% demand charge; 10-15% utilization, 30% demand charge; 15-20% utilization, 45% demand charge; 20-25% utilization, 60% demand charge; 25-30% utilization, 75% demand change; >30% utilization, 100% demand charge.

when it is time to transition to an alternate rate design, including imposition of demand charges.

VI. RECOMMENDATIONS

Q. Please provide your recommendations for the EV proposals.

A. I recommend that the Commission:

1. Approve Unitil's time of use rate proposal, except for DCFC applications;
2. Reject Unitil's demand charge implementation proposal and require it to modify its demand charge proposal in line with my general recommendations, below, regarding demand charges.

More specifically, I also recommend that

1. The Commission issue an order stating that full demand charges should not be applied to EV charging for (1) at least 10 years (with no demand charges for at least the first five years), and (2) until DCFCs reach a utilization factor of 30% across Unitil's service territory;
2. Unitil should monitor EV adoption rates across their and neighboring utility service territories to help inform trends and identify timelines for rate design modifications;
3. Monitor utilization rates of DCFC in their service territories to help inform trends and identify timelines for rate design modifications; and
4. Unitil should make available hosting capacity maps that can help inform developers and customers to identify optimal locations for the placing of EV charging infrastructure, especially DCFC.

Q. Do you have any other rate design recommendations?

A. Yes. I think the Commission should consider more specific rate design options, by use case. For example, demand charges affect DCFC more than commercial or public Level 2 charging, so utilities could propose a DCFC-specific rate, a fleet-specific rate, or a public charging-specific rate. Since adoption of EVs is still fairly low in New Hampshire, these use case-specific rates may not be needed immediately, but by looking at the different use cases and applications of EVs, their impacts on utility operations will be different, as I explained previously.

Q. Does that complete your testimony?

A. Yes.