GREEN ENERGY CONSUMERS ALLIANCE

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

Investigation by the Department of Public Utilities on its own Motion into the Modernization of the Electric Grid - Phase II	D.P.U 20-69

GREEN ENERGY CONSUMERS ALLIANCE
INITIAL COMMENTS

Respectfully submitted,

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Dated: August 13, 2020

I. INTRODUCTION

Green Energy Consumers Alliance, Inc., is a non-profit organization based in Boston, MA, with a mission to harness the power of energy consumers to speed the transition to a low-carbon future. We appreciate the opportunity to submit written comments to the Department of Public Utilities' (D.P.U.) 2020 Request for Comments.

Since 2016, Green Energy Consumers Alliance has been running an education and group-buy program for electric vehicles (EVs), called "Drive Green". In that time we have interacted with thousands of prospective EV drivers and facilitated over 800 purchases. Through running this program, we have gained valuable insight into the benefits of and barriers to EV adoption, from the perspective of both consumers and car dealerships. This experience and our own research informs our response to the D.P.U's request for comments, which we have organized by question from the July 2 Request for Comments.

II. QUESTION 1

Please discuss all factors the DPU should consider when determining whether a targeted deployment of advanced metering functionality to EV customers is appropriate. As part of your response, identify any unique factors that should be considered for particular EV customer segments (residential customers, low-income customers, C&I customers, EV charging site hosts.)

Green Energy Consumers Alliance believes that the deployment of advanced metering *functionality* (AMF) to EV customers is not only appropriate but imperative. The DPU should consider the substantial public benefits of EV drivers charging their vehicles off-peak and order the deployment of AMF in order to incentivize this behavior through time-varying rates (TVR). Incentivizing EV drivers to charge off-peak is *not* a cross-subsidy but a self-sustaining incentive based on the true costs and benefits to the system. And EVs, as a very flexible load, are a prime candidate for such load-shifting. There are a few forms of AMF that deserve serious consideration.

When EV drivers are sufficiently financially incentivized via TVR to charge off-peak:

- The electric grid operates more efficiently as EV load smooths out demand throughout the day and even soaks up excess renewable generation that would

otherwise be curtailed, and grid operators avoid costly transmission and distribution upgrades;
- The public enjoys health benefits and greenhouse gas emissions reductions as a result of the reduction of peak demand[1];
- EV drivers benefit from lower fuel costs;
- Non-EV drivers benefit from the avoided costs of transmission and distribution upgrades and because the fixed costs of maintaining the system are distributed across more kilowatt-hours of consumption, both of which lower electricity costs[2];
- Society as a whole benefits because lower fuel costs further incentivizes EV adoption, which in and of itself engenders significant environmental and public health benefits.The state's economy also benefits: every EV that replaces a car with an internal combustion engine produces economic benefits through the multiplier process because Massachusetts imports all of its oil. This keeps a tremendous amount of money circulating in the state's economy, creating jobs indirectly and broadening the tax base as well.

We believe that AMF that enables TVR should be made available to all residential customers, including low-income residents, on an opt-in basis. And we assert that the TVR should include the benefits of reduced transmission and distribution costs in addition to supply, generation, and capacity costs, which we will discuss in more detail in our answer to Question 2.

As the D.P.U. considers a targeted deployment of AMF, we would like to underscore the importance of not equating the enablement of TVR with the deployment of advanced meters. Shifting EV charging to off-peak times can be accomplished with a variety of technologies, including advanced meters, Wi-Fi-enabled Level 2 charging stations, and onboard diagnostic devices plugged into the vehicle. We remain neutral to which technology is deployed to enable TVR and neutral to the method by which customers receive the benefits of off-peak charging (on-bill discounts or rebates), so long as EV-owning customers can clearly recognize the cost savings from charging off-peak.

Wi-Fi-enabled ("smart") Level 2 charging stations collect real-time charging data, allow charging to be scheduled by the user, and transmit data wirelessly. Wi-Fi connectivity enables a two-way exchange of communication between the smart charging station and

[1] According to Synapse Energy Economics' recent study for E4TheFuture, *New England Electriciation Load Forecast*, "if the [New England] states are going to meet their climate goals... managed charging will be important by the end of the 2020s to avoid nearly 10 percent peak demand increases, as all managed charging scenarios increase peak demand by less than 1 percent by 2029" (p. 30).
[2] See Synapse Energy Economics' recent study, *Electric Vehicles Are Driving Electric Rates Down*, June 2020.

the utility. In addition, smart Level 2 charging stations as a data-collection method for TVR have the added possibility of introducing "managed charging," in which the utility has the power to slow down or stop charging rates during peak events.[3]

For example, Green Mountain Power in Vermont provides a free ChargePoint smart Level 2 charging station to its EV-owning customers to encourage participation in TVR and active charging management.[4] The smart charger takes the place of a second advanced meter to monitor EV charging. A smart Level 2 charger is not just charging equipment, but a tool to understand charging behavior and implement TVR for EV load.

Onboard diagnostic devices are plugged into the vehicle's computer and collect EV driving and charging data, including efficiency, battery health, energy consumption, and more.[5] Charging data is collected and transmitted to the utility via telemetry, so no Wi-Fi connectivity is required. For example, FleetCarma is a third-party company that manages "smart-charging" devices that are currently being used by utility companies to administer monetary rewards to drivers for charging off-peak. ConEdison runs a "SmartCharge" program administered by onboard diagnostic devices in New York City and Westchester.[6] Participants are rewarded for avoiding charging from 2pm to 6pm during the summer and earn $20 a month through PayPal.

In each of these technologies, relevant time-of-use data for TVR can be transmitted from the customer to the relevant authority for billing. This data is easily accessible to both energy supply companies and utilities in order to provide TVR for supply, distribution, and transmission costs. Consumers are shown to change their EV charging behavior to off-peak when rewarded with adequate price signals, providing the greatest cost savings for the customer and the greatest benefit to the overall system.

The method of data collection is a means to the end of providing accessible, easy-to-understand price signals to shift charging to off-peak times. The technology adopted to facilitate smart charging should be chosen with the purpose of encouraging participation by consumers.

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[3] According to the Smart Electric Power Alliance, managed charging can provide a variety of benefits to the grid, including energy supply cost reductions by making greater use of lower-cost resources and limiting the highest cost energy; economic benefits to all utility customers through the grid efficiencies captured by managed charging; and economic returns to EV owners through access to dynamic, off-peak rates.
[4] Green Mountain Power offers a free in-home Level 2 EV charger when customers buy a new or used electric vehicle.
[5] A C2 device from FleetCarma can collect important EV charging data for consumers and the energy system.
[6] SmartCharge New York collects EV charging data and rewards participants for avoiding charging during off-peak times.

Residential & low-income customers

Residential customers are most likely to participate in a TVR program when TVR provides a clear benefit to the customer, is easy to understand, and easy to sign up. Having consistency across utility service areas (in terms of pricing, technology, data collection, and definition of peak hours) will help provide this clarity for the consumer.

EV adoption among low-income customers has been low, but that should not warrant their exclusion from smart EV charging rates. The sticker price of a new electric vehicle is anticipated to match the price of a new gas-powered car by 2024,[7] and as more used EVs enter the market at affordable prices, low-income customers should be eligible to participate and reap the benefits of off-peak charging. If possible, low-income customers should receive a larger discount for charging off-peak, in the same way that low-income customers pay a lower rate for electricity under the current rate structure.

C&I customers

C&I customers that install Level 2 charging stations should be eligible for TVR. While EV charging at Level 2 consumes between 6.6 and 11.2 kW per vehicle (easily double average household power demand), a DC fast charger at a C&I site could consume as much as 350 kW per charger.

Non-coincident peak demand charges, which are based on large commercial customers' maximum 15-minute interval demand regardless of the time of day, are an indirect barrier to EV adoption for both C&I customers and EV charging site hosts. As many C&I customers are charged additional fees for every additional kW they use, regardless of whether that usage is coincident with transmission or distribution peak times, demand charges slap C&I customers with higher costs that do not necessarily reflect the true cost of service for EV charging.[8] Demand charges make the operation of DC fast charging expensive while ignoring the flexibility of EV charging load; think of a transit depot to charge a fleet of electric buses, which can be managed to happen at night when prices are low. Rates should be adjusted to incentivize EV adoption and encourage off-peak charging; non-coincident demand charges for C&I customers do neither.

Rates alone may not be the best way to manage high-power loads from DC fast charging. It should be a policy priority to co-locate storage and solar projects with DC fast charging

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[7] For more insight on the growing EV market, see Bloomberg New Energy Finance's Electric Vehicle Outlook 2020 report.

[8] See Best Practices for Commercial and Industrial EV Rates by Synapse Energy Economics

sites in support of the Commonwealth's goals for each of these respective energy resources.

EV charging site hosts

As a point of clarification, many C&I customers (such as hospitals and auto dealers) have chosen to install EV charging stations for their employees and visitors. Such C&I customers with EV charging could reasonably be defined as EV charging site hosts. However, for our response, we use "EV charging site hosts" to mean charging locations specifically designated for charging on-the-go to enable long distance travel or support ride-share (Uber and Lyft) electrification.

Level 2 EV charging is a flexible load that has been proven[9] to respond to price signals from TVR. However, DC fast chargers for long-distance travel are meant to compete with the five-minute refuel time of a gas-powered car. Users expect to be able to charge their car as quickly as possible within an hour of arriving at a station. Compared to Level 2 charging for homes, workplaces, and large fleets, it is difficult for EV charging site hosts operating DC fast chargers and drivers to respond to price signals to decrease demand during peak times.

Similarly, travelers using a network of DC fast charging should be able to expect some consistency in pricing in order to spur EV adoption. Because distributed fast-charging infrastructure enables long-distance travel in an EV, it is essential for EV adoption. TVR programs should distinguish between flexible DC fast charging loads (such as charging for a transit bus depot) and inflexible loads (such as roadside DC fast charging).

In each of the four segments mentioned above, the existing rate structure does not take into account the benefits that EVs bring to society. An EV charged in Massachusetts decreases carbon emissions by 75%[10] compared to a gas-powered car, making EVs a critical tool for reducing greenhouse gas emissions in the transportation sector. EVs also have zero tailpipe emissions, which is good for local air quality and for mitigating the health costs associated with respiratory illnesses exacerbated by noxious tailpipe fumes.

[9] EV drivers in California in California on TVR consume little energy during system peak power, according to Electric Vehicles Are Driving Electric Rates Down and Electric Vehicles Are Not Crashing the Grid: Lessons from California, two reports from Synapse Energy Economics.
[10] See the Union of Concerned Scientists' EV Emissions Tool.

Despite these benefits, the average retail rate for electricity in Massachusetts is fourth-highest[11] in the country, under-cutting the value of owning an EV to the consumer. TVR mitigates high electricity rates to spur EV adoption in a way that reflects the value that charging off-peak brings to the entire electric system.

III. QUESTION 2 (a)

Please describe generally what basic service supply TVR design options each company should make available to the following EV customer segments: (1) residential EV customers; (2) C&I EV customers; and (3) EV charging site hosts. Identify and discuss the basis for any differences between TVR design options for each EV customer segment.

The D.P.U should ensure that TVR supply options are not restricted to Basic Service supply customers and should be available to all customer segments. As community choice aggregation takes hold across the state, an increasing number of residential customers are not on the utilities' basic service rates. By 2022, the vast majority of Massachusetts residents will be in cities and towns with an aggregation program and thus not on Basic Service. Limiting TVR to Basic Service would deny these residents, the electric grid, non-EV drivers, and society writ large the benefits of off-peak charging.

We recognize that the electric utilities cannot control the supply rates offered by competitive electricity suppliers or municipal aggregations. We expect these entities to also offer TVR once AMF is available. We also want to underscore that TVR should not be limited to supply and generation; transmission and distribution benefits must be captured as well, as discussed below.

In addition, we posit that the value of greenhouse gas emission reductions should be included in the TVR as well. We calculate these benefits to amount to about $0.041/kWh.[12] Technically, this benefit exists even during most on-peak charging hours too, but we can choose to apply it as an incentive for TVR to further shift load and increase those GHG benefits.

[11] See Choose Energy's Electricity rates by state.

[12] Applied Economics Clinic reports that the recognized value for avoided carbon dioxide emissions in Massachusetts is $41 per ton, per the Global Warming Solutions Act, and that the average EV in Massachusetts is responsible for producing 3 tons of CO_2 less per year than a gas-powered car. 3 tons/year * $41/ton = $123/year. If we assume an EV uses 3,000 kWhs per year, that amounts to $0.041/kWh ($123/year ÷ 3,000 kWh/year = $0.041/kWh.)

Finally, we note that right now, electricity consumers pay into the MassSave energy efficiency program with each kWh of electricity they consume. When a driver switches from a gas-powered car to an electric car, they will purchase more kWh, which means the amount they pay into this state program for energy efficiency increases. We recommend rebating that additional revenue right back to the driver or exempting off-peak EV usage from the efficiency surcharge.[13] After all, the mere fact that they are switching to an EV (regardless of when they charge, but *particularly* if they charge off-peak) is fulfilling the goals of the state's energy efficiency program; it's causing the more efficient use of energy and saving all consumers money.

IV. QUESTION 2 (b)

With respect to the C&I EV customer segment, discuss whether a separate TVR design option should apply to EV fleets;

We believe that C&I EV customers should absolutely have access to TVR rates. Fleet vehicles generally drive more miles per day than personally-owned vehicles, which means that replacing a gas-powered fleet vehicle with an EV has greater public health benefits,greenhouse gas emission reductions, and economic development benefits (i.e. from the multiplier effect mentioned above). This increased use also means that EV fleet vehicles need to replenish more kWh than personally-owned vehicles and are therefore more likely to charge on-peak if not disincentivized. From our perspective, ensuring that fleet vehicles do not charge on-peak is one of the main reasons to roll out AMF that enables TVR.

As mentioned above, C&I fleets face the additional barrier of demand charges when contemplating rolling out DCFC, particularly for medium- or heavy-duty vehicles.

V. QUESTION 2 (c)

For each identified basic service supply TVR design option, discuss whether there should be an accompanying distribution TVR design option;

[13] An EV that uses 3,000 kWh per year would pay about $60 into the Mass Save program. Currently, National Grid customers pay $0.018/kWh and Eversource customers pay $0.019/kWh into the energy efficiency programs.

We strongly believe that there should be an accompanying distribution TVR design option for each customer segment. One of the largest benefits of off-peak charging are the benefits of avoided distribution (and transmission) upgrades. The values of this benefit should be incorporated into the off-peak discount seen by consumers, since the larger the difference between the off-peak and on-peak price, the more likely a consumer is to consistently shift charging.[14] In 2019, in response to National Grid's proposed off-peak charging rebate for EV drivers of 5 cents/kWh during summer months and 3 cents/kWh in winter months, the Applied Economics Clinic estimated the value of these avoided upgrades to amount to 2.6 cents/kWh.[15]

TVR should be available to all customers, regardless of whether they are on basic supply, have signed up with a competitive electricity supplier, or participate in an aggregation program. This approach would allow the distribution TVR to complement the supply TVR, regardless of supplier.

VI. QUESTION 2 (d)

For each identified TVR design option in (a) through (c), discuss whether the TVR should apply only to the EV-charging portion of the customer's load or to the customer's entire load;

The question of whether to apply TVR to a customer's entire electricity load is determined in part by the technology used to collect charging data. Either a smart Level 2 charging station or an onboard diagnostic device would be able to apply a TVR to solely the EV-charging portion of a customer's load, while a smart meter would continue to collect household electricity usage data.

In any case, TVR better matches the cost of supplying and delivering electricity to the cost that the customer pays and provides public benefit to all customers. Since EVs are high-demand load with high flexibility, the public benefit to smart-charging EVs is significant whether the rate is applied to the EV only or the entire residential household. (It should be noted that for C&I customers, EV load may be a smaller percentage of overall load.)

For example, California is in the process of transitioning to TVR as the default option for all customers for all electricity use. In addition, Pacific Gas & Electric offers two EV rate options for EV-owning customers: one that charges all household electricity-use under the EV TVR

[14] Charge for Less: An Analysis of Hourly Electricity Pricing for Electric Vehicles

[15] Applied Economics Clinic lists the value of avoided transmission & distribution investments to be between 2.6 and 5.2 cents per kilowatt-hour, on top of the capacity and energy savings of 3 and 5 cents per kilowatt-hour, depending on season.

and one that requires the installation of a second smart meter to track EV charging separately.[16] An analysis by Synapse Energy Economics confirms that both metering configurations are effective at encouraging customers to shift their electricity usage to off-peak times.[17]

Regardless of whether the chosen technology enables whole-home TVR, TVR is only effective if customers participate, so the technology chosen to implement TVR must facilitate participation. Customers should not bear the burden of installing the TVR-enabling technology. National Grid's proposal for Phase II of its Make Ready plan included a request to provide $1,000 rebates to help customers pay for the installation of smart Level 2 charging stations. Although a smart Level 2 charger is a TVR-enabling device, the request was denied by the DPU. We intervened in support of National Grid's proposal and maintain that covering the cost of TVR-enabling technology is in the interest of *all ratepayers* because of the public benefits of off-peak charging described in our answer to Question 1.

We have also observed that states throughout the country that have steadily offered rebates for EV purchases have higher adoption rates than states that do not. But purchase rebates do not promote smart charging; the rebate for smart Level 2 EV charging units proposed by National Grid with its Phase II proposal would. We question whether the Commonwealth will have funds to support continued funding of the MOR-EV program all the way until we meet our ZEV goal of 300,000 EVs. But a modest $1,000 rebate tied to smart charging is financially self-sustaining because the EVs will contribute to the rate base.

VII. QUESTION 2 (e)

For each identified TVR design option in (a) through (c), discuss how it is designed to provide effective price signals to EV customers so that they can take actions that will contribute to reducing system peak demand;

EV drivers are already lowering the costs of the system for all customers, as utility revenue from EVs has increased more than utility costs to accommodate EVs. Without TVR, EV-owning customers are not recognized for the benefits they bring to the grid.

The benefit that EV owners bring to the grid can be maximized through price signals, which are effective at changing consumer behavior. Rather than increasing demand on the system, EV customers on TVR rates typically hit their monthly maximum demand when the system is least taxed. When the benefits of off-peak charging align and are incorporated in

[16] See Pacific Gas & Electric, EV rate plans.
[17] See Electric Vehicles Are Not Crashing the Grid: Lessons from California from Synapse Energy Economics

the price that customers pay for electricity, customers see a larger price differential and therefore have a larger incentive to change charging behavior.

According to Synapse Energy Economics, EV customers in California on TVR respond to the price signals by avoiding charging during peak times. In the areas studied, between 9% and 14% of EV charging occurred during peak times depending on the service area, roughly half of what EV owners on traditional tiered rates contributed to peak demand.[18]

In order to further promote EV adoption and maximize savings to the consumer, EV drivers should be compensated for the full extent of benefits they bring to the system and to society. This includes not just the savings in supply costs due to better use of existing capacity generation, but also savings in transmission and distribution upgrades and greenhouse gas and efficiency benefits. By our calculations, EV owners bring at least 11 cents[19] of value for every kWh they use to charge off-peak; returning that to the customer not only decreases the cost of owning an EV and incentivizes EV adoption, but also ensures that customers continue to charge off-peak.

Benefit	**Value (cents/kWh)**	**Notes**
Supply/generation/capacity	3 (winter) - 5 (summer)	Based on National Grid TOU pilot rates
Transmission & distribution	2.6 - 5.2	Applied Economics Clinic report; see footnote 15
Greenhouse gas emission reductions	4.1	See footnote 12
Energy efficiency fund rebate	1.85 (National Grid) or 1.9 (Eversource)	See footnote 13; Rebated back or simply not charged on off-peak EV load
Total	*11.55 - 16.2*	

Although customers are proven to respond to price signals, passive TVR is not the only option for electric utilities. Some charging-monitoring technologies, specifically the smart Level 2 charger, can also regulate charging according to data from the customer. As an example, in addition to its TVR program, Green Mountain Power in Vermont also has a “off-

[18] Electric Vehicles Are Driving Electric Rates Down, a study by Synapse Energy Economics
[19] Taking the original $0.05/kWh from National Grid’s TOU pilot proposal + $0.026/kWh from AEC’s calculation of transmission and distribution benefits + $0.041/kWh for GHG benefits.

peak charging program," which notifies customers via smartphone notification 4-24 hours in advance of a "peak event," which is determined by the utility.[20] In response to a peak event, Green Mountain Power can slow down or stop charging rates on behalf of the customer. If a customer ignores the peak alert, overrides charging control, and charges during a peak event, they are charged the peak rate. Otherwise, customers receive a discounted rate. Both the TVR and off-peak active managing program are enabled by a smart Level 2 charger, which Green Mountain Power provides for free to the customer. Active load control would be impossible with advanced meters or onboard diagnostics data collection devices.

VIII. QUESTION 3

Please discuss how municipal aggregators can facilitate the participation of their EV customers in TVR to achieve the benefits of advanced metering functionality.

Within a couple of years, the vast majority of small customers in Massachusetts will be served by municipal aggregators and many of the newer aggregations are explicitly looking to support clean energy, so this is an important question.

As we state in our answers to other questions, it is important to understand that TVR offerings should not be applied to only Basic Service. They should also apply to supply offered by municipal aggregation programs and also to the distribution and transmission charges assessed by distribution companies.

With regard to the supply portion of the customer's bill, we come at this with two points in mind. The first is that even if the distribution system has installed interval meters in a community with municipal aggregation (e.g. Worcester), the data from that meter could be easily shared with the aggregator and/or aggregation supplier in order to facilitate appropriate retail pricing for some form of TVR. The second point is that other technologies that could work well in terms of facilitating TVR would create data streams that could just as easily flow to the aggregator/supplier as the distribution company and the aggregator/supplier could then use that to facilitate retail billing. Examples of such technologies include WiFi-enabled smart Level 2 charging equipment and vehicle telemetric devices.

The preferred approach would be for the distribution company to display the TVR from the aggregator/supplier on the consolidated bill. However, in cases in which there is a benefit

[20] See Green Mountain Power's Rate Schedule for Offpeak Residential Electric Vehicle Charging

to the consumer for charging off-peak, it is also possible to manage the distribution of such benefits through an online portal administered by the aggregator. As mentioned previously, ConEdison's SmartCharge program in New York delivers off-peak charging rewards through PayPal. [21]Participants are rewarded with both a lower rate (10 cents per kilowatt-hour during off-peak times) and a flat bonus ($20 during summer peak events).

Municipal aggregations already offer multiple rate types from which a customer can choose; a TVR could be offered as another opt-in or opt-out rate.

[21] SmartCharge New York is administered by ConEdison via PayPal. EV drivers on the utility's TVR offering for household electricity use are eligible to participate in the SmartCharge program as well.