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In the Matter of the Petition of Public Service Electric and Gas Company for Approval of its Clean Energy Future - Electric Vehicle and Energy Storage ("CEF-EVES") Program on a Regulated Basis	STATE OF NEW JERSEY BOARD OF PUBLIC UTILITIES ENERGY DIVISION Commissioner Chivukula BPU DOCKET #EO18101111

DIRECT TESTIMONY OF KATHLEEN HARRIS ON BEHALF OF INTERVENORS, ENVIRONMENT NEW JERSEY, ENVIRONMENTAL DEFENSE FUND, NATURAL RESOURCES DEFENSE COUNCIL, AND SIERRA CLUB

September 11, 2020

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I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and professional title.

A. My name is Kathleen Harris, and I am the Eastern Clean Vehicles and Fuels Advocate for the Natural Resources Defense Council.

Q. Please describe your current work duties, work experience, and educational background.

A. My current position at NRDC is Eastern Clean Vehicles and Fuels Advocate. I manage the organization's legislative, regulatory, and administrative efforts to expand transportation electrification in the Mid-Atlantic and Eastern region of the United States. In this position, I am also personally familiar with NRDC's efforts on transportation electrification around the country.

I hold a Bachelor of Science in Environmental Science with a concentration in marine science and a minor in Political Science and a Master of Marine Policy: both from the University of Delaware. At the University of Delaware, I worked as a research assistant at the Center for Carbon-free Power Integration and served as project manager for a study around off-shore wind integration into the PJM grid. Additionally, I led a program to install electric vehicle charging stations throughout the state of Delaware to ensure no electric vehicle driver was more than 50 miles from a charging station anywhere in the state. For my Master's thesis, "Improving the Electric Vehicle Drivers Experience," I interviewed electric vehicle drivers to understand the challenges of using public electric vehicle charging stations.

Prior to working for NRDC, I was the Clean Transportation Planner for 4 years at the Delaware Department of Natural Resources and Environmental Control's Division of Climate, Coastal, and Energy. During my tenure there, I managed the state's Clean Vehicle Rebate and Electric Vehicle Charging Equipment Rebate Programs, which provided rebates for alternative

fuel vehicles, including electric vehicles, and electric vehicle charging stations. Additionally, I helped the Department intervene in matters with the Delaware Public Service Commission and developed and supported legislation related to transportation electrification. I also served as Delaware's Clean Cities Coordinator, which brought together over 50 stakeholders from around the state to promote clean transportation efforts. My work experience is summarized in my resume, provided as Exhibit KAH-100.

II. SCOPE OF TESTIMONY

Q. What is the purpose of your testimony?

A. I am testifying on behalf of Environment New Jersey, Environmental Defense Fund, Natural Resources Defense Council, and Sierra Club regarding the Clean Energy Future Electric Vehicle and Energy Storage Program ("CEF-EVES Program") filing from Public Service Electric and Gas Company ("PSE&G" or "the Company"). The purpose of this testimony is to ensure that any electric vehicle programs implemented by the Company will be designed and executed in a manner that lays the groundwork for successful, rapid, and affordable electrification of the transportation sector, and that the global and local environmental and public health benefits of vehicle electrification are maximized for communities in the Company's service territory.

Q. Are you sponsoring any exhibits?

A. Yes. I am sponsoring the following exhibits:

KAH-100: Resume of Kathleen Harris

KAH-101: Synapse Report on Best Practices for Commercial and Industrial EV Rates

Q. Should the proposed CEF-EVES electric vehicle subprograms proposed by the Company be approved?

A. Yes, with the modifications discussed in the following sections of my testimony. The program offerings proposed by the Company in this filing are consistent with New Jersey's ambitious clean energy policy and support electric vehicle ("EV") deployment in the state.

Q. Please summarize your recommendations.

A. The Company's proposal will move its service territory, and thus the state, in the direction of capturing the environmental and economic benefits that EVs can provide to New Jersey residents. In particular, by helping to increase the number of EV charging stations on the road and at other locations in New Jersey, the proposal lays the groundwork for individuals and entities to invest with confidence in an increasingly clean transportation technology. The Company has also proposed incremental steps to optimize charging of these vehicles, and thus their economic and environmental impact.

While the Company's proposal is a start, far more can be done to ensure that the transition to EVs has optimal results for its customers' wallets and their environment. New Jersey is in the position of being able to learn from states with more EV deployments already– and as a state with ambitious EV goals, New Jersey must proceed expeditiously and efficiently. Our testimony emphasizes the necessarily critical role in electric companies in making the transition to electric vehicles possible, and stresses ways in PSE&G's initial steps to support vehicle electrification could be developed to yield better near-term and long-term results for EV owners, non-EV owners, the electric grid itself, and the air and climate New Jersey residents experience.

This testimony highlights why electric utilities are well-suited to play a central role in EV infrastructure buildout, based on their expert knowledge of their own electric system and their ideal positioning to ensure EV charging is leveraged in a manner that optimizes that system. To that end, as I further discuss in this testimony, utilities should take a portfolio approach to address the main barriers to EV adoption for all on-road vehicle classes and types. Such a portfolio approach should include strategic deployment of charging infrastructure; actions that increase access for an equitable EV market and improve local air quality; managing load and maximizing fuel cost savings through strategies including sustainable rate design; fostering competition; data collection and metering that allow for seamless vehicle-grid integration that is standardized to the extent possible across utility service territories; and marketing, education, and outreach to customers.

The Company's proposal is heavily focused on the light duty passenger fleet, but regarding the medium- and heavy-duty fleet, only discusses specific incentives for school buses. My testimony goes on to discuss the importance of medium-and heavy-duty vehicle electrification in New Jersey to ensure clean transportation for all, improve air quality, achieve the states goal, and provide grid-resources through rate design for commercial and industrial customers and make-ready infrastructure programs. I provide additional recommendations to ensure that all New Jersey residents are able to reap the benefits of clean transportation.

Finally, I discuss the importance of the Company's proposal for market, education, and outreach and provide recommendations on how to ensure this effort is successful to maximize the benefits of transportation electrification for all of the Company's customers.

III. IMPORTANCE OF VEHICLE ELECTRIFICATION

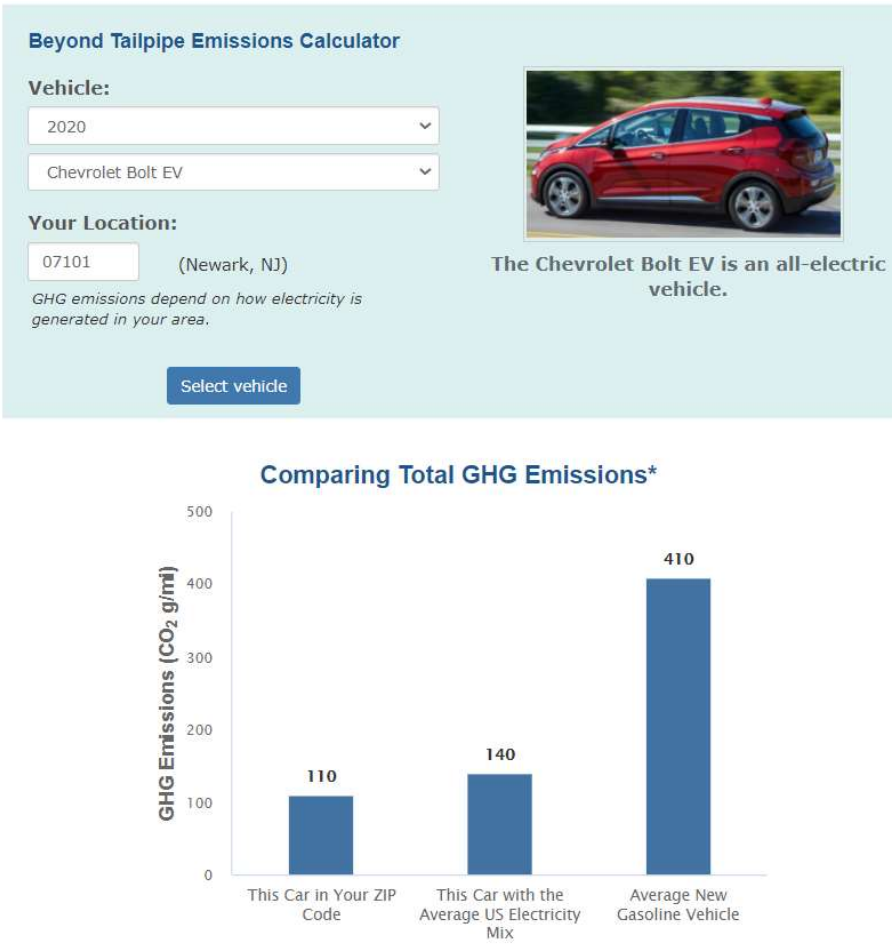
Q. What is the overall importance of vehicle electrification?

A. Vehicle electrification is critical from an environmental, health, and economic standpoint. Given that the transportation sector is responsible for 42% of New Jersey's greenhouse gas ("GHG") emissions,[1] and at least 71% of nitrogen oxide ("NOx") emissions[2] — emissions that are responsible for significant climate change and air quality impacts, respectively—ensuring that these vehicles are transitioned to zero emission models is critically necessary. According to the US Department of Energy, one battery electric vehicle in New Jersey reduces greenhouse gas emissions by approximately 7,335 pounds of carbon dioxide equivalent annually.[3]

As shown in Figure 1, driving a Chevy Bolt in Newark, New Jersey emits about a quarter as much carbon pollution per mile than the average conventional vehicle (providing emissions reductions greater than driving on the average US electricity mix because New Jersey's grid is cleaner than the average US grid). Electric Vehicles will emit even less carbon pollution per mile in coming years as New Jersey achieves its 100% clean energy goals.

[1] https://www.nj.gov/dep/aqes/oce-ghgei.html#:~:text=Transportation%20remains%20the%20largest%20source,19%25%20of%20Statewide%20GHG%20emissions.
[2] https://www.state.nj.us/dep/vw/BMPfinal.pdf
[3] U.S. DOE, Alternative Fuels Data Center: Emissions from Hybrid and Plug-in Electric Vehicles.

Figure 1: Greenhouse Gas Reduction Benefits of a Chevy Bolt in PSE&G's Service Territory[4]



In addition to reducing global warming impacts and improving air quality, the transition to EVs will also create significant positive health impacts as the NOx and particulate matter emitted by light-, medium- and heavy-duty vehicles will be greatly diminished. This is important given that the association of these pollutants with a variety of severe respiratory and cardiovascular diseases is severe in normal times and is even more dire now given the increasing evidence of underlying conditions exacerbating the impacts of COVID-19 and emerging

[4] United States Department of Energy's FuelEconomy.Gov, Beyond Tailpipe Emissions: Greenhouse Gas Emissions for Electric and Plug-in Hybrid Electric Vehicles

evidence directly linking increased exposure to NO_2 with increased risk of death from COVID.[5] These health ramifications are of course of utmost importance in those communities living near freight corridors, ports, railyards, and other transportation facilities, whose residents are disproportionately impacted by transportation pollution. As well, the EV sector can create jobs in installation and maintenance of charging infrastructure, particularly critical as New Jersey's economy begins to recover from the mass unemployment triggered by the Coronavirus epidemic.

Finally, PSE&G must recognize that EVs—coupled with proper rate design that incentivizes charging during off-peak hours— will provide benefits for all customers, regardless of whether they own an EV. If load from EVs is not managed and these vehicles charge disproportionately at peak times, particularly when those peak times fail to coincide with renewable energy availability, the maximum environmental benefit of these vehicles will not be realized. As discussed further in my testimony, proper rate design and market signals to reward grid services to incentivize charging behavior that helps—rather than unnecessarily burdens—the grid will, as discussed in more detail below, be imperative.

Q. Why is it important to make investments to support EV deployment in New Jersey?

A. The transportation sector accounts for 42 percent of greenhouse gas emissions in New Jersey, well above the national average of 28 percent.[6] To achieve the state's climate goals under the Global Warming Response Act ("GWRA") and Zero Emission Vehicle ("ZEV") program, electrifying the state's light-duty vehicles is an important first step.[7] New Jersey has already begun to set itself up as a transportation electrification leader on the East Coast. In early 2020, Governor

[5] S. Reilly, *Common pollutant linked to 11% higher virus death rate*, E&E News (Aug. 27, 2020).
[6] *See* NJ DEP, NJ's Emission Profile, *available at*: https://www.nj.gov/dep/aqes/oce-ghgei.html *see also* EPA, Fast Facts on Transportation Greenhouse Gas Emissions, *available at*: https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions
[7] N.J.S.A. 26:2C-37 et seq.

Murphy signed N.J.S.A. 48:25-3 into law ("PIV Act") which, in part, directs the Board of Public Utilities ("BPU") to develop one of the most robust EV rebate programs in the country, as well as set goals for infrastructure to support these vehicles.

Q. How mature are EV technologies for light-duty as well as medium- and heavy-duty vehicles?

A. In the light-duty sector, EVs are already competitive with gasoline vehicles on a lifetime total cost of ownership basis, and they are rapidly approaching parity for upfront cost as well. MJBradley forecasts that by 2021 there will be at least five EV models available for under $30,000 (*before* incentives) — all with ranges of over 250 miles[8] — and Bloomberg New Energy Finance anticipates that price parity will be achieved in most light duty segments in the middle of this coming decade, with some segments hitting that milestone as soon as 2022.[9]

According to the 2020 Bloomberg EV Outlook, in the immediate term, municipal buses are already electrifying quickly and delivery vans should become competitive in the near term.[10] In a state that has been severely impacted by COVID-19, both buses and delivery vans and trucks have been and are critically important to New Jersey's public health and economic recovery. Delivery vans and trucks have contributed to maintaining stability by assuring the delivery of goods across the state.

[8] D. Lowell and A. Huntington, MJ Bradley and Associates, *Electric Vehicle Market Status: Manufacturer Commitments to Future Electric Mobility in the U.S. and Worldwide* (May 2019) at 3, *available at:* https://www.mjbradley.com/sites/default/files/ElectricVehicleMarketStatus05072019.pdf.
[9] BloombergNEF, *Electric Vehicle Outlook 2020, Executive Summary* (2020), *available at* https://bnef.turtl.co/story/evo-2020/page/3/1?teaser=yes.
[10] *Id.*

Q. What are the main barriers to EV adoption generally?

A. Despite the clear environmental benefits of electric vehicles, and potential for reduced fueling costs, range anxiety[11] and initial upfront costs remain a barrier for wide scale EV deployment.

For fleet owners there are additional barriers for deployment of electric medium-and heavy-duty vehicle ("MHDV"). Enhanced marketing, education, and outreach must be implemented to ensure that information is disseminated effectively, in multiple formats, and targeted to particular audiences. Programs that speak effectively to battery range, state and utility programs that help provide charging stations for fleets, available rebates and incentives for vehicles and charging stations, and information about rates and grid services are all needed to create an ecosystem that maximizes the environmental and grid benefits of electric vehicles, and to help ensure that cost savings relative to diesel counterparts can be realized by fleets.

Ultimately all stakeholders to transportation electrification – policy makers, fleet owners, utilities and financiers – need to collaborate on the creation and deployment of more creative, progressive public policies that are crafted with a very clear intent to not only fully leverage public monies but, over time, de-risk investments and support the creation of defensible business models that will serve to unlock the private capital currently sitting on the sidelines and looking to engage.

[11] Range anxiety is the fear of running out of charge before a driver reaches their destination.

Q. What is the largest barrier to EV deployment in New Jersey?

A. I agree with the conclusion reached in the 2019 EMP that one of the largest barriers to greater EV adoption is range anxiety, exacerbated by a "chicken-and-egg" problem—where the private sector has not made a business case to install charging infrastructure without a critical mass of EVs on the road, and there will not be a critical mass of EVs on the road until there is sufficient charging infrastructure to eliminate range anxiety. Notably, there is a clear paucity of Direct Current Fast Charging ("DCFC") EV chargers, which are critical for EV drivers making either long commutes or day trips throughout the state.

Q. How many charging stations are currently located in New Jersey?

A. There are currently 96 locations with DCFC charging stations in New Jersey, with 407 charging outlets—the majority of which are along the New Jersey Turnpike and major North-South corridors in the state.[12]

Q. How many charging stations will New Jersey need to support the State's climate and EV goals?

A. According to EVI-Pro Lite, New Jersey will also need 786 public DCFC and almost 12,000 Level 2 charging stations at workplaces and public locations to achieve the state's goal of 330,000 EVs on the road by 2025.[13]

Q. Are the number of chargers proposed by PSE&G sufficient for New Jersey to meet its climate and EV Goals?

[12] U.S. DOE, Alternative Fuels Data Center, Alternative Fueling Station Locator, accessed on Aug. 31 2020.
[13] https://afdc.energy.gov/evi-pro-lite

A. No. New Jersey currently ranks 45th in the country in terms of charging stations per registered vehicle.[14] In its filing, the Company proposes the installation of 450 DCFC at 150 locations that would be available to all electric vehicle drivers—far less than what is needed to support the state's EV and climate goals.

Q. Do you believe investments by third-party providers alone are sufficient for New Jersey to meet its targets?

A. No. For New Jersey to achieve its climate and zero-emission vehicle goals in a needed aggressive timeframe, the state will need investments from both the third-party private and the regulated public utility sector. PSE&G's proposed programs look holistically at the EV market in the state to help alleviate barriers for widespread deployment and help to support the competitive EV market—through make-ready programs and rebates for charging stations—while also ensuring charging is done at optimal times to maximize benefits and filling in the areas of the market that third-party owners and operators have not, or are unable, to reach.

Q. Do EVs provide benefits to other utility customers—including those who do not own EVs?

A. Yes. EV investments, including those by utilities, can put downward pressure on rates for all utility customers—regardless of whether they own an EV. A recent analysis by Synapse Energy Economics entitled "Electric Vehicles are Driving Electric Rates Down" analyzed real world data from the two utility service territories with the highest number of EVs in the country, Pacific Gas & Electric ("PG&E") and Southern California Edison ("SCE"), and found that EVs are already putting downward pressure on rates. Accordingly, the benefits of EVs are not just

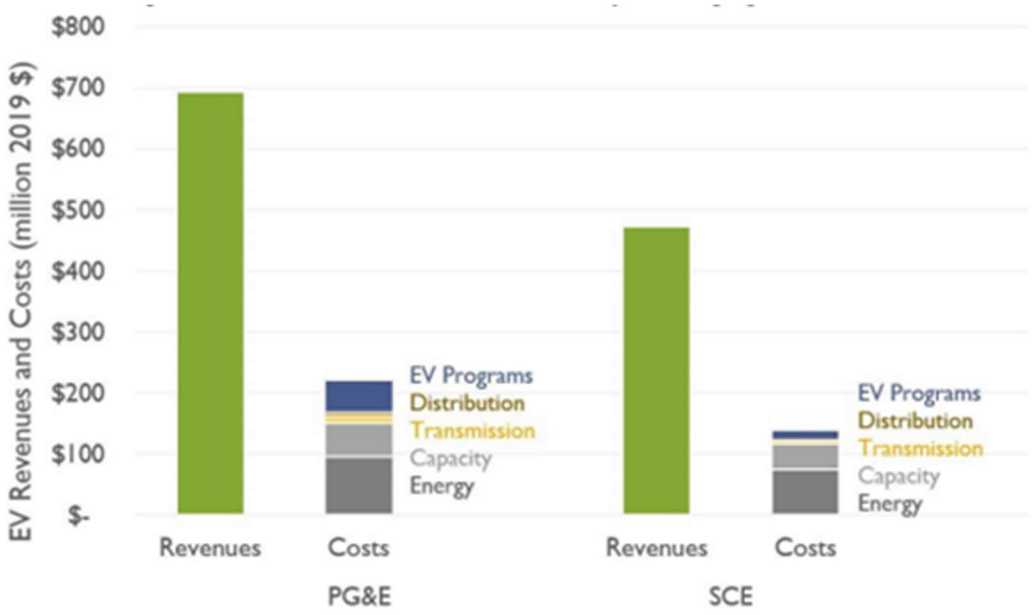
[14] New Jersey, 2019 Energy Master Plan: Pathway to 2050, at 65. [hereinafter, "EMP"].

environmental; as that study appropriately concluded: "EVs offer a key opportunity to reduce harmful emissions and save customers money at the same time."[15]

Synapse evaluated the revenues and costs associated with EVs from 2012 through 2019 in PG&E and SCE service territories. They compared the new revenue the utilities collected from EV drivers to the cost of the energy required to charge those vehicles, plus the costs of any associated upgrades to the distribution and transmission grid and the costs of utility EV programs that are deploying charging stations for all types of EVs. In total, EV drivers contributed an estimated $806 million more than the associated costs. And this finding is not merely a result of the fact most EV drivers in PG&E and SCE territory remain on default rates and pay high upper tier prices as a result. Even if three in four were on time-of-use rates designed for EVs, those drivers would still have provided approximately $621 million in net-revenues.

[15] Frost et al., Synapse Energy Economics, Electric Vehicles are Driving Electric Rates Down, at 1 (June 2020), available at: https://www.synapse-energy.com/sites/default/files/EV_Impacts_June_2020_18-122.pdf

Figure 2: PG&E and SCE Revenues and Costs of EV Charging, 2012-2019



Were comparable analysis done in New Jersey, the results would almost certainly be similar, though the net revenue would be smaller given the current lower number of EVs in New Jersey. Nonetheless, EV drivers in New Jersey are likely already putting downward pressure on utility rates to the benefit of all customers. And those benefits will continue to grow in the future as additional vehicles are added to the grid.

Another study completed by M.J. Bradley & Associates demonstrates similar benefits on the East Coast. The study found that the EV adoption levels needed to meet New York's climate goals would provide more than $75 billion in net benefits, including $24 billion in reduced utility bills for all utility customers stemming from the same effect already observed in the real world by the Synapse study.[16] The New York analysis also estimates that drivers in

[16] Electric Vehicle Cost Benefit Analysis, MJ Bradley & Associates, available at: https://mjbradley.com/sites/default/files/NY_PEV_CB_Analysis_FINAL.pdf

the state could realize $34 billion in reduced fuel and maintenance costs. Utility customers in New Jersey deserve to realize the same cost savings.

The Energy Information Agency tracks "household energy insecurity" and documents that "nearly a third of U.S. households reported facing a challenge in paying energy bills or sustaining adequate heating and cooling in their home in 2015."[17] That number will likely only increase as a result of the current economic crisis. Utility regulators, consumer advocates, and environmentalists have a robust history of working together to reduce utility bills, especially for low-income households. But it's time for utility policy to target the total household energy bill. It would be a mistake to focus solely on the average American household's $1,300 annual electric bill while ignoring the $2,000 that the average household spends every year on gasoline.[18] For the last 40 years, driving on electricity has been the cost equivalent of driving on dollar-a-gallon gasoline, and it is projected to stay that way for the next 30 years.[19] In contrast, while gasoline prices are low now, they tend to fluctuate significantly more than the price of electricity. Because electricity is generated from a diverse set of domestic fuels and because it is carefully regulated by state agencies, its price is inherently more stable, delivering energy cost savings households can bank on for the long-term.

[17] EIA, Residential Energy Consumption Surveys, One in three U.S. households faced challenges in paying energy bills in 2015, available at: https://www.eia.gov/consumption/residential/reports/2015/energybills/

[18] See EIA, 2018 Average Monthly Bill-residential, available at: https://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf; see also U.S. Bureau of Labor Statistics, Economic News Release, Consumer Expenditures (Annual) News Release (Sept. 10, 2019), available at: https://www.bls.gov/news.release/cesan.htm, and EIA, U.S. household spending for gasoline is expected to remain below $2,000 in 2017 (Oct. 6, 2017), available at: https://www.eia.gov/todayinenergy/detail.php?id=33232

[19] Max Baumhefner, Go Electric to Avoid the Holiday Gas Price Roller Coaster, NRDC, 2018

Q. Can you explain more how increased EV use can put downward pressure on rates for all utility customers?

A. EV drivers increase electricity consumption, and if increased consumption is met without increasing fixed costs, those additional kWh dilute systemwide fixed costs, meaning rates can be lower. For utilities with full revenue decoupling,[20] this money is automatically returned to the customers in the form of lower rates and bills. For the utilities who do not implement symmetrical revenue decoupling, there may be a lag for customers to see this downward pressure on rates until the utility's next rate case.

To ensure that the increased electricity consumption does not increase fixed costs, it is important that EV charging, to the extent possible, is done during off-peak hours, when there is excess load available on the grid, and in a manner that minimizes spikes in demand, and that EV drivers see price signals that incentivize them to charge in such a manner.

Q. How do these barriers implicate utility involvement?

A. Regulated electric utilities have several characteristics that make them well-suited to play a central role in EV infrastructure buildout. First, they have specific, expert knowledge of the distribution system and the potential impact of vehicle charging on load shape and shifting. It is critical that New Jersey's investment in the distribution system happen in close coordination with its build out of EV charging infrastructure given the potential load impacts of widespread EV adoption. Moreover, utilities are well positioned to optimize the electric grid and ensure that most electric vehicle charging occurs during off-peak hours, if granted regulatory approval for

[20] Revenue Decoupling is a ratemaking mechanism that "decouples" utility sales from utility revenues. After a utility revenue requirement is determined in a rate case, rates are adjusted upwards or downwards via a true-up mechanism to ensure a utility does not under-or over-earn based on fluctuations in energy consumption. If EV charging increased consumption, rates would automatically decrease under a decoupling mechanism.

demand response, education programs, programs and tariffs/rate designs that encourage and enable managed charging. To address the main barriers to EV adoption—cost, charging infrastructure, and lack of awareness—utilities should take a portfolio approach to address these concerns across the board for all on-road vehicle classes and types. NRDC published an issue brief, "Guiding Principles for Utility Transportation Electrification Programs," which explores these opportunities further. The brief recommends that utilities:

- Deploy Charging Infrastructure Strategically—a lack of access to charging stations is a critical barrier to the expansion of the EV market and utilities should prioritize charging investments in areas that will grow the market. This includes residences, workplaces, public fast-charging stations, and public long dwell times.

- Increase Access for an Equitable EV Market and Improve Local Air Quality—this is especially important in communities where residents are disproportionately burdened by air pollution and transportation fuel costs.

- Manage Load and Maximize Fuel Cost Savings—to ensure that the benefits upon which proposed utility transportation electrification investments will materialize, load management practices and innovate rate design is essential. This will ensure that EV drivers realize fuel costs savings, which is one of the most important motivators for EV purchase decisions. Additionally, proper load management, rate design, and ensuring that drivers see these price signals will put downward pressure on rates for all utility customers.

- Foster Competition—utilities should leverage the experience of third-party charging equipment and service providers in the development of charging infrastructure programs.

• Educate Customers—a comprehensive strategy to engage customers is a necessary component of a successful program. To expand the EV market, a general lack of consumer awareness must be overcome, and misconceptions about EVs, must be corrected. Luckily, utilities are uniquely positioned to conduct this type of broad customer education effort, as they have at least monthly communications with their customers.

Further, data collection and metering should be structured to allow for seamless vehicle-grid integration and should be standardized to the extent possible across utility service territories. The four subprogram EV offerings proposed in PSE&G's CEF-EVES Program take this portfolio approach and look holistically at the EV market and its need for support from many different angles (i.e., time-of-use rate support, rebates for charging stations, limited utility ownership, etc.).

IV. NEW JERSEY POLICY

Q. What other policies or agreements affect New Jersey's EV commitments and goals?

A. New Jersey has several policies to support transportation electrification that vary in implementation status, agency responsibility, and funding streams. Currently, the Board of Public Utilities administers a plug-in vehicle rebate program that offers up to $5,000 in rebates for qualifying vehicles. Next, the Department of Environmental Protection runs the "It Pay$ to Plug-in Program," the administration of the VW settlement fund, and will be responsible for setting MHDV goals as required by the PIV Act passed earlier this year." Finally, the Economic Development Authority is currently designing a program that focuses on medium-and-heavy duty vehicle electrification using auction proceeds from the Regional Greenhouse Gas Initiative.

V. ROLE FOR UTILITIES IN ELECTRIFICATION

Q. What is your general vision for the role of utilities in vehicle electrification?

A. The role of utilities in New Jersey's vehicle electrification needs to be flexible. The Company's filing aligns with this approach, highlighting PSE&G's key role in building out Make Ready and contemplating utility ownership of EV charging stations in certain contexts. Overall, we envision utilities playing a central role in building out EV infrastructure.

Q. What makes utilities such as the Company suitable for this central role?

A. Installation and deployment of charging stations and their components, for example, fits squarely within the core competencies of utilities, given both their technical expertise and the relationship they have with their customers. As such, it makes sense for utilities to play the role of program administrator and to be able to effectively monitor the progress and success of these programs designed to increase the infrastructure necessary to support vehicle deployment; they can also weigh in effectively and concretely on identifying and filling gaps in infrastructure coverage, since they don't have the same sole impetus to profit that third party charging station providers have.

This should be differentiated from other areas, such as marketing, education, and outreach, where utilities – while it is critically important for them to participate in these kinds of efforts – should potentially play a supporting role on disseminating information about the environmental and financial (insofar as it relates to items like operations and maintenance) benefits of vehicles, given that other entities, such as community-based organizations and fleets, may be better equipped to provide messaging on many topics. On topics such as rates and managed charging, utilities should play a co-equal role, given their interest to ensure minimal

impact to the grid, but potentially leave matters such as how to convey information about fuel cost savings to more business and community-minded organizations.

As well, more interaction with industry, including car manufacturers, fleet owners, and infrastructure providers, is prudent. For example, by including input from industry about constraints on the increased offering of these services and what tariffs are needed in order to bring fleets and other customers to the table.

Q. What should utilities be doing to prepare their systems for vehicle electrification?

A. EDCs should evaluate grid hosting capacity to identify locations with constraints or surplus electric capacity.[21] Although hosting capacity must not be the sole or major determinant of where charging infrastructure is located – transportation, transit, market, and equity considerations will also be vital – grid hosting capacity information is critical for helping utilities and developers select sites for potential build-out in the near term. In connection with considering the challenges that vehicle charging can pose for the grid, it is important to keep in mind that with the right enabling technology and market signals, some EV charging loads may be capable of functioning as significant grid assets – for example, improving the ability of the grid to integrate variable renewable resources, whether overall or at a particular location on the grid. EV charging load may be relevant to the system's hosting capacity with respect to distributed renewable generation, and vice versa.

[21] *See generally,* Interstate Renewable Energy Council, *Optimizing the Grid: A Regulator's Guide to Hosting Capacity Analyses for Distributed Energy Resources* (Dec. 2017), *available at* https://irecusa.org/wp-content/uploads/2017/12/Optimizing-the-Grid_121517_FINAL.pdf.

Q. What else should utilities be doing to prepare?

A. Each EDC should perform a distribution grid impact study ("DGIS"), which would evaluate longer term grid impacts and build-out that are foreseeable based on projections of what vehicle electrification will entail. Such a study would consider the impact of incremental electric load resulting from the electrification of light-duty, medium-duty, and heavy-duty vehicles on transmission and distribution systems (i.e., any required electric system investments and the associated costs), including at the feeder level.[22] Needs identified can potentially be met through conventional wire infrastructure and/or through non-wires solutions including batteries, demand response programs, and/or vehicle-grid integration ("VGI") optimized through efficient price signals.

Together, an understanding of hosting capacity and the likely impacts of vehicle electrification on existing grid infrastructure will give utilities and unregulated market actors insight that will be critically important to minimizing the costs and maximizing the benefits of electrification. By examining the impact of incremental electric load resulting from the electrification of light-duty, medium-duty, and heavy-duty vehicles on the distribution system, utilities can identify preferred locations for EV chargers based on distribution grid capacity. Determining grid hosting capacity is also critical for helping utilities and developers select sites for potential distribution/transmission buildout to accommodate EVSE in places with insufficient existing capacity for EVSE, while a good understanding of distribution grid impacts will help the marketplace predict the nature and cost of grid upgrades that electrification is likely to entail. These studies will also help utilities evaluate the potential for managed charging, enabled by rate

[22] See, e.g., J. Coignard et al., "Will Electric Vehicles Drive Distribution Grid Upgrades?: The Case of California," in IEEE ELECTRIFICATION MAGAZINE, vol. 7, no. 2, pp. 46-56 (June 2019), available at https://ieeexplore.ieee.org/document/8732007.

design or demand response programs, to mitigate burdens on the grid that would otherwise be imposed by EV charging, as well as the effect of vehicle electrification on the grid's resiliency.

Q. What incentives can utilities offer to accelerate the adoption of EVs in New Jersey?

A. Utilities can offer upfront rebates on the cost of charging infrastructure and the cost of make-ready infrastructure in front of and behind the meter. As discussed further in my testimony, utilities can also design rates to encourage drivers to shift charging to off-peak hours, putting downward pressure on rates and providing savings for all customers.

Q. What other incentives can utilities offer to accelerate the adoption of MHDV in New Jersey?

Organizations like CALSTART, which is a consortium of fleet and industry representatives, have indicated in a proceeding before the California Public Utilities Commission (CPUC) that the cost of infrastructure is one of the predominant barriers to electrification of commercial fleets, stating that "agencies such as the CPUC and the [California] Energy Commission need to help fleets put in place the core infrastructure assets needed to provide readiness to meet their future expansion and full build-out plans . . . funding assistance aimed at future readiness would be extremely valuable and can ensure that public dollars are used most effectively, and not to fund "throw away" infrastructure."[23] The same is surely true for New Jersey, which, given its place as one of the top states for growth in freight by value (it ranks in the top 20, with a forecast of 93% percent growth between 2016 and 2045[24]), will need to plan for rapid growth if that expansion is to be completed cost-effectively and cleanly.

[23] https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M344/K014/344014442.PDF at 4
[24] https://tripnet.org/wp-content/uploads/2019/10/Freight_TRIP_Report_October_2019.pdf at 6

As well, utilities can aid in ensuring that price signals are structured to induce optimal customer behavior—for example, to incentivize customers to charge primarily off-peak, to manage their demand (especially at peak times), and to provide grid services (including through bidirectional (V2G) charging)—while working with customers to ensure that rate structures do not stand in the way of commercial fleets that are making this challenging transition achieving fueling/operating cost savings.

Q. How should utilities be involved in expanding Make-Ready infrastructure?

A. Given the inherent expertise of utilities necessary to connect a customer to the grid, tasking utilities with installation of make-ready infrastructure is a natural extension of their core competencies. As such, a blanket rule allowing utilities to own and install make-ready infrastructure, as multiple parties have indicated is the appropriate path in California,[25] is prudent.

Q. When should utilities be able to own EV charging equipment?

A. Utility ownership of charging stations may be particularly valuable in certain segments, such as MUDs and in LMI and EJ communities. In addition to the upfront cost of purchasing an EV, access to charging infrastructure and lack of awareness have inhibited EV adoption in these communities. In many cases low-income drivers face heightened barriers relative to other drivers, with diminished access to financing, less access to information on EVs, and a lack of public charging infrastructure in their neighborhoods. When considering investments in electric vehicle charging infrastructure, especially in LMI and EJ communities, it is important to look at examples and lessons learned from other utilities, such as Pacific Gas and Electric's ("PG&E")

[25] *See* California R. 18-12-006, *DRIVE OIR,* available at https://www.cpuc.ca.gov/General.aspx?id=6442452724 ; *See also:* California AB-841§ 3.

widely supported, approved LMI program. PG&E's Empower Electric Vehicle Charger Incentive and Education Program was designed to address all of these barriers and could serve as a model program for expanding the benefits of transportation electrification to historically underserved households in New Jersey.

It is also important that the BPU consider how to get investments in underserved communities, including rural communities, whose charging needs are not being met by the competitive market. We don't need to wait and see where these communities are—charging station maps already show where the major gaps are, and where investment is needed.

At this point in the evolution of the EV market in New Jersey, no sector can realistically be considered mature enough to thrive without utility intervention. Indeed, as recognized by PSE&G in its filing, New Jersey lags significantly behind other states in EV adoption. This is highly problematic not only from a pollution and public health perspective, but also means the state will need to gain ground quickly to achieve goals set forth in state legislation, as well as the goals set forth in multi-state memoranda of understanding for light-duty vehicles and, more recently, trucks and buses.[26] To that end, measures that may help to close that gap should be considered. In some instances, such as at multi-unit dwellings and some large fleet applications, utility ownership of charging stations may provide more incentive for the customer to purchase and install a charging station. As such, if utility ownership of charging stations-- beyond the traditional make-ready components-- is beneficial for a customer, it should be provided as an option.

[26] *See*: NESCAUM, *Multi-State ZEV Action Plan: 2018-2021*. Available at: https://www.nescaum.org/topics/zero-emission-vehicles. *See also:* Patricio Portillo. *15 States Take Historic Action on Transportation Pollution*, NRDC, 2020.

While PSE&G's contention that they should be allowed to own charging stations in the event of a market failure is sound, the permission should in fact be broader for the time being, provided that utility-owned charging stations must use the same open-source standards and protocols as will be required of third-party charging stations.

Q. Have other public service commissions in the United States approved programs similar to the programs that PSE&G is proposing?

A. Yes. States across the nation with similar EV targets have also identified utility investments in EVSE, such as those proposed by PSE&G, as a critical utility service to overcome the barriers to faster and more wide-spread EV adoption by their residents. In fact, 26 different state utility regulatory commissions have approved 81 applications submitted by 45 different electrical utilities, representing a collective investment of nearly $2.2 billion in utility customer funds in programs that deploy charging infrastructure and undertake other actions to accelerate the electrification of the transportation sector.[27] $1.6 billion of that collective investment is in programs that prioritize under-served communities, and $545 million is allocated directly to disadvantaged communities and low-income customers.

Q. How does PSE&G's proposed EV Subprograms support the successful implementation and attainment of New Jersey's Climate and Clean Energy Goals?

A. The EV subprograms are critical to achieving the main goal of New Jersey EMP: the reduction of energy consumption and emissions from the transportation sector.[28] The EMP sets the ambitious policy goal that "the transportation sector should be almost entirely decarbonized

[27] (https://www.atlasevhub.com/) Atlashub is a tool that allows users to examine different EV policies across the country.
[28] *Id.*

by 2050."[29] Therefore, the EMP recommends the state take "concrete steps to start to phase out motor gasoline and conventional diesel consumption as quickly as possible." The EMP goes on to identify a goal of 330,000 light-duty electric vehicles on the road by 2025. This target is based on New Jersey's participation in the California Clean Cars program, which requires an aggressive ramp-up of EVs leading up to 2025. New Jersey was the first state in the country to pass legislation to join the California Clean Cars program, which led to eight other states joining the program and ultimately led to the national codification by USEPA and USDOT of clean car and fuel efficiency standards (which the Trump Administration is working to weaken).[30] To meet this ambitious target, the EMP concludes New Jersey will require a "comprehensive 'EV Ecosystem' that provides consumers with easy access to charging infrastructure for EVs. . . ," and is done in partnership with New Jersey's public utilities.[31]

The proposed PSE&G programs address the goals of the EMP by helping to expand the amount of charging infrastructure available and reducing fueling costs for customers-- thereby supporting the increase of EV adoption.

VI. RATE DESIGN

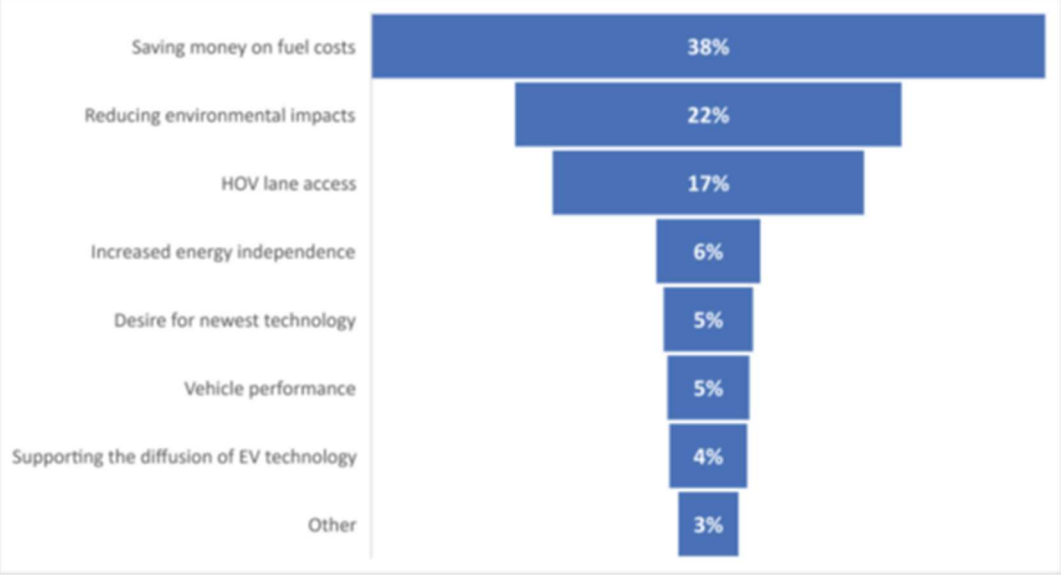
Q. Why is it important that the Company propose sustainable rate-design options for its customers?

A. Sustainable rate design, such as time-varying rates, can provide many benefits to New Jerseyans: reducing fueling costs, putting downward pressure on rates, and shifting charging to off-peak hours. Transportation electrification programs that use price signals to encourage drivers

[29] *Id*.
[30] See Clean Cars Law; 2011 Clean Car Standards.
[31] EMP, at 46-65

to shift charging to off-peak hours will help EV owners reduce their fueling costs while simultaneously making it more likely that all PSE&G customers (including non-EV owners) will realize economic benefits from transportation electrification. A survey of nearly 20,000 EV drivers reveals "Saving money on fuel costs" is the single biggest motivator of EV purchase decisions in California.

Figure 3 Drivers Top Reasons for Purchasing an EV[32]



Rates that are designed with EVs and the various types of end-use drivers in mind—especially those that have strong price signals that are seen by the end-users—help EV drivers save money on fueling costs and, by doing so, will motivate additional EV purchases.

Q. How can EV charging help lower the costs of managing the electric grid?

A. As EVs charge when they are parked, most of the light-duty vehicle charging occurs at home and can be charged when the grid is underutilized. Price signals that direct drivers to charge during

[32] Center for Sustainable Energy, California Plug-in Electric Vehicle Owner Survey Dashboard, available at: https://cleanvehiclerebate.org/eng/survey-dashboard/ev.

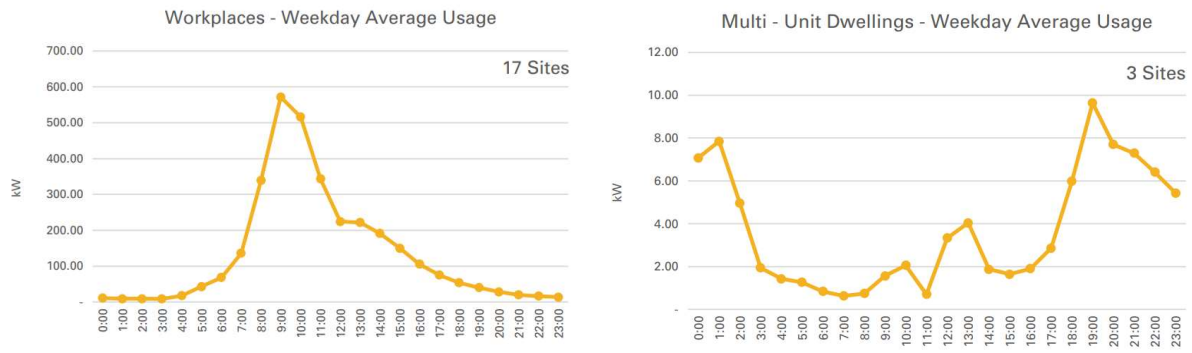
off-peak hours, and not immediately when they arrive at their destination, can help to move charging when there is spare capacity on the grid. The billions of dollars in new utility revenue from EV charging in excess of associated costs can put downward pressure on electric rates to the benefit of all customers. Further, EVs can also serve as distributed energy resources and act as additional storage for the grid through technologies such as vehicle-grid-integration, as discussed further in my testimony [33]

However, in order to realize the same benefits that PG&E and SCE utility customers have experienced, it is not enough for the Company merely to establish a TOU rate—the existence of the rate must also be communicated to EV drivers, and they must actually see price signals intended to encourage them to shift charging to off-peak hours. Drivers that do not see time-variant price signals generally charge as soon as they arrive at their destination regardless of grid conditions or underlying utility rates.

This is best evidenced by SCE's Charge Ready Pilot, in which drivers at multi-unit dwellings ("MUDs") and workplaces who did not see price signals had no incentive to change their behavior and simply plugged-in their vehicles when they reached their destination. In that pilot, site hosts were required to take service on TOU rates, but there was no requirement that those price signals were passed through to EV drivers. The charging profiles in the Charge Ready pilot program report show that the lack of time-variant price signals seen by EV drivers resulted in those drivers charging immediately upon arrival at their destination with no correlation to grid conditions or time-of-use periods.[34]

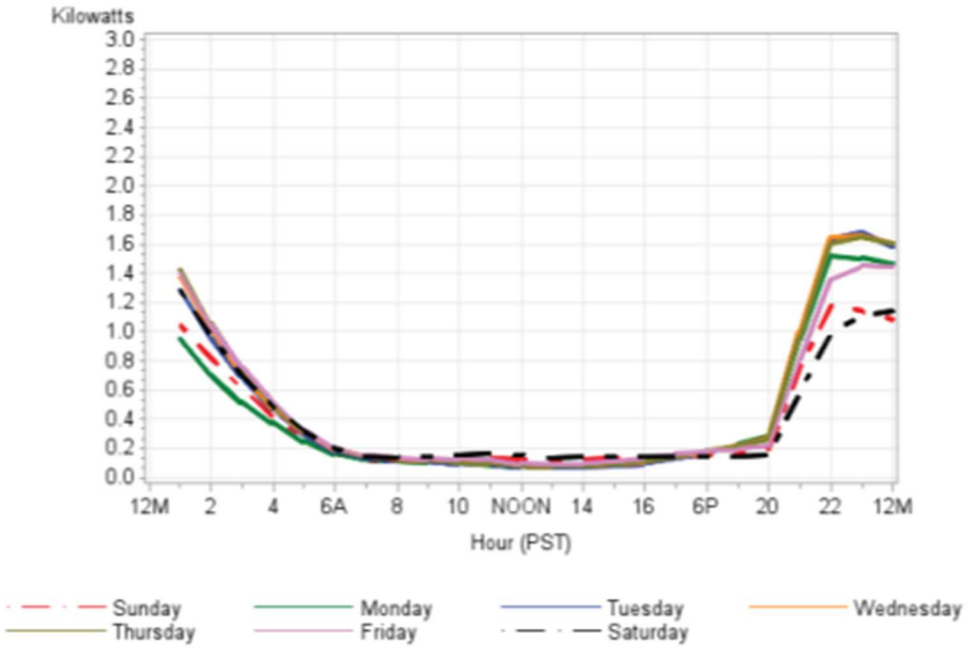
[33] Pamela MacDougall, The Missing Piece to Energy Storage Is in Your Driveway, NRDC, (Aug 2018).
[34] SCE Charge Ready Pilot Program Report at 21-22 (indicating that charging in many segments was occurring primarily during late afternoon and evening hours).

Figure 5: Load Profiles from Charge Ready Pilot



Workplace charging presents a powerful opportunity to benefit the grid and the planet, as solar generation peaks in the afternoon, but drivers in the SCE Charge Ready pilot -- who did not experience a time-variant price signal -- charged as soon as they arrived at work, with demand peaking at 9 a.m., with the bulk of charging complete before the afternoon. Similarly, at MUDs, drivers charged as soon as they arrived at home in the evening, with demand peaking at 7 p.m. (exacerbating system-wide peak demand), the bulk of charging complete before 1 a.m., and very little charging occurring in the early morning hours when the system is significantly underutilized. This is unfortunate, but entirely predictable; if given no reason to do otherwise, drivers will charge whenever they arrive at their destination. It is also entirely avoidable; residential customers taking service on SCE's "TOU-EV-1" rate almost certainly arrive home at the same hour as do the drivers participating in the Charge Ready Pilot, but as SCE noted, they do not charge upon arrival—instead, they "commence charging promptly at the beginning of the off-peak interval at 10:00 p.m.," as illustrated in Figure 6.

Figure 6: Average Hourly Load Profile for Each Day of the Week on SCE's "TOU-EV-1" Rate[35]



A simple nudge in the form of a TOU price signal seen by EV drivers is sufficient to push EV charging to hours of the day when it benefits the grid and when fuel cost savings can be maximized. Recognizing this problem, SCE modified its successor program, Charge Ready 2, to make the default arrangement that participating site hosts pass price signals onto drivers. The California Public Utilities Commission found that "establishing a default arrangement that site hosts pass through TOU price signals to drivers would promote charging in a manner that is consistent with grid conditions, offer the opportunity for drivers to realize fuel cost savings, and preserve flexibility to accommodate site host operational needs."[36] The Company should similarly modify the proposed EV-TOU to incorporate this default arrangement and ensure that

[35] 6th Joint IOU Electric Vehicle Load Research Report, at 61 (Dec. 2021).
[36] Decision 20-08-045, Decision Authorizing Southern California Edison Company's Charge Ready 2 Infrastructure And Market Education Programs, at 92, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K230/346230115.PDF.

EV drivers generally see price signals that encourage them to charge in a manner that both supports the electric grid and maximizes fuel cost savings.

Q. What are the best practices for utilities to shift charging to off-peak hours?

A. The Company should provide customers with a variety of options to encourage customers to charge during off-peak hours - allowing the Company to manage load (passively or actively) and shift charging to off-peak hours through price signals, while reducing program costs. Without in-car submeters or smart-charging stations, to implement EV-TOU rates, the Company would need to install a second meter or submeter at a customer's home to separate out the EV load. According to the Minnesota Public Utilities Commission, installation of a separate meter would cost between $1,700-$3,500 on electrical wiring and metering costs to enroll in Xcel Energy's EV tariff.[37]

Q. What are the benefits of the smart-charger rebates offered by PSE&G?

A. As previously discussed, smart chargers provide an opportunity for the utility to manage load and actively shift charging to off-peak hours, without the need for the customer to install a second meter or device in their vehicle. This in turn maximizes the ability of increased electricity demand and places downward pressure on rates.

Q. Is the proposed $0.02/kWh rebate enough of an incentive to shift charging to off-peak hours?

A. PSE&G has a rebate that does not vary depending on the day of the week or on the season, with an emphasis on simplicity over maximization of the peak-to-off peak ratio. For a

[37] Minnesota Public Utilities Commission, Order Approving Pilot Program, Granting Variance, and Requiring Annual Reports. Docket No. E-002/M-17-817, at 2 (May 9, 2018).

more effective price signal, PSE&G could design a rate that has more variation—which will be less simple—but has a higher peak to off-peak ratio. PSE&G should also look to best practices from other jurisdictions when considering the appropriate and most successful price ratios, as well as consider including time periods for off-peak, shoulder, and peak rates. The larger the peak to off-peak price ratio, the larger the price signal to encourage drivers to charge during off-peak hours. For example, San Diego Gas and Electric (SDG&E) found that a peak to off-peak ratio of 6:1 shifted an additional 10 percent of all charging (around 90 percent total) to off-peak hours compared to a ratio of 2:1.[38]

Q. What are your thoughts on the proposed demand charge rebates to support DCFC development?

A. The Company is right to consider ways to reduce fueling costs and improve the economics of charging for customers and charging station owners, but should implement long-term, sustainable solutions rather than short-term "fixes" that rely upon explicit subsidies or discounts (like the nameplate capacity discount). Instead of explicit discounts, it is critical to develop rates that more accurately reflect the unique characteristics and costs of EV charging, rather than forcing stations to take service on commercial and industrial rates designed for large buildings and factories. Demand-based rate designs for high-powered transportation electrification use cases must be designed in a manner that is manageable for those users— and for some users, including public DCFC customers (who do not directly control their load shape), cost recovery through alternative rates that are more predictable may be necessary.

[38] Nexant, Final Evaluation of SDG&E Plug-in Electric Vehicle TOU Pricing and Technology Study (2017).

Demand charge costs can be prohibitively high for DCFC stations during the nascent EV market—making it difficult for the private market to justify investments in infrastructure in locations that may not be highly utilized in the near term. Therefore, I appreciate the Company's efforts to address this major barrier for widespread DCFC deployment. However, instead of implementing temporary solutions to small subsets of transportation electrification, PSE&G should follow the lead of utilities such as PG&E and SDG&E which developed a suite of new cost-based rates designed to improve the long-term economics of public fast charging, multi-family charging, and medium and heavy-duty vehicle electrification.[39] The Board should require the utilities under its jurisdiction to propose comparable, long-term, comprehensive rate design solutions as opposed to short-term "band-aids." The Board should direct the utilities to 1) replace the proposed DCFC demand charge rebates in this application with cost-based solutions akin to those recently implemented by PG&E and SDG&E and 2) develop and propose additional reformed rates designed for other C&I EV customers and use cases (like medium- and heavy-duty vehicle charging or multi-unit dwelling sites).

Synapse Energy Economics recently released a report on best practices for C&I EV rate reform which the Board should consider in addressing the proposed DCFC demand charge rebates.[40] In its report, Synapse notes that "[t]raditional C&I rates were generally designed for large buildings, rather than for public fast charging of passenger vehicles or for depot charging of truck and bus fleets" and those rates "do not reflect the unique costs or flexibility of EV charging and can charge commercial EV customers much more than their true cost of service." Time-

[39] Miles Muller, *Agreement Proposed to Reform San Diego Commercial EV Rates*, NRDC (Jul. 1, 2020), *available at*: https://www.nrdc.org/experts/miles-muller/agreement-proposed-reform-san-diego-commercial-ev-rates

[40] M. Whited *et. al.*, Best Practices for Commercial and Industrial EV Rates, Synapse Energy Economics, Inc. (Jul. 13 2020), *available at*: https://www.synapse-energy.com/sites/default/files/Best_Practices_for_Commercial_and_Industrial_EV_Rates_18-122.pdf

limited discounts are not a sustainable solution, and utilities and regulators should develop new C&I rates designed with EV use cases in mind that are both cost-reflective and take advantage of the unique characteristics and flexibilities of EV load. Drawing on the insights from the Synapse report and other research, we suggest the considering the following principles:

- Rates should promote efficient use of fixed system resources, which will reduce rates for all utility customers;
- Rates should be easy to understand and predictable;
- Rates should be designed with end users in mind;
- Non-coincident peak demand charges should generally be avoided;
- It may be appropriate to set rates to recover marginal costs rather than embedded costs; and
- Programs that rely on price signals inherent in rate design to deliver grid and user benefits should ensure users actually see those price signals.

In conclusion, instead of implementing short term solutions and demand charge holidays that do not address the larger issues associated with C&I EV loads, we recommend the Company develop sustainable, long-term rates that address the unique characteristics of EV load.

Q. Should PSE&G also consider other commercial and industrial customers when looking at comprehensive solutions to demand charges for EV charging?

A. Yes. As I discuss in more detail earlier in my testimony, one of the major gaps that is missing in PSE&G's filing is widespread support for commercial and industrial customers. In addition to providing reformed rates that improve the economics of charging for DCFC customers, the Board should direct the utilities to develop and propose (in a later proceeding) reformed rates for the broader suite of C&I EV customers—including medium- and heavy-duty vehicle charging as well as multi-unit dwelling customers. Medium-and heavy-duty electrification will be vital to help the state achieve its greenhouse gas reduction goals, while also

helping to improve air quality—especially in environmental justice and LMI communities. As this market is anticipated to grow rapidly in the near-term, it is important that the utility begin to consider and implement programs and rates that will support these high-load vehicles, considering emerging best practices and principles such as those described in the Synapse report while bearing in mind that a portfolio of rates will likely be needed to best serve the diverse MDHD customer segment and fleets with varying characteristics (including price structures that moderate the demand imposed by very large fleets of trucks and buses in a high-penetration MDHD EV future). [41]

Q. Should MUDs, workplaces, and customers be eligible for TOU rates?

A. Yes. In the Company's proposal, it does not appear that large MUDs, workplaces, or fleets are eligible for a TOU rebate that would shift charging to off-peak hours. I strongly encourage the Company to expand rate offerings to these customers as well, as it is important to maximize the number of EVs charging during off-peak hours, no matter where they are parked. To be effective, as previously described using examples from SCE's Charge Ready Program Pilot in California, EV drivers (the end users) -- who are not themselves direct customers of the utility -- need to see some version of the price signals that incentivize utility customers to manage their charging.

VII. MEDIUM- AND HEAVY-DUTY ELECTRIFICATION

Q. What are New Jersey's statutory goals for Medium-and Heavy-Duty Vehicle MHDV electrification?

[41] *Id.*

A. New Jersey's PIV ACT[42] sets definite targets for transit electrification:

> "By December 31, 2024, at least 10 percent of the new bus purchases made by the New Jersey Transit Corporation shall be zero emission buses, and (b) the percentage of zero emission bus purchases shall increase to 50 percent by December 31, 2026, and 100 percent by December 31, 2032 and thereafter."[43]

In addition to this specific glidepath with respect to transit, the PIV law clearly signals that goals for the entire MHDV sector are to be set by the end of 2020,[44] less than a year after the law passed and less than four months from now.

Q. Has New Jersey adopted goals for the Medium-and Heavy-Duty Vehicle (MHDV) electrification in advance of the PIV law's deadline for the MHDV sector?

A. Yes. New Jersey recently joined an interstate memorandum of understanding ("MOU")[45] committing to accelerate the widespread electrification of the medium- and heavy-duty vehicle ("MHDV") space. This MOU commits New Jersey to ensure that at least 30 percent of all MDHV sales are zero-emission vehicles ("ZEV") by 2030 and that 100 percent of such sales are ZEVs by 2050.[46]

[42] N.J.S.A. 48:25-1 et seq.
[43] N.J.S.A. 48:25-3(a)(9).
[44] *Id*. at (a)(10).
[45] Signatory States and the District of Columbia, "Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Initiative - Memorandum of Understanding" (July 10, 2020). Available at http://d31hzlhk6di2h5.cloudfront.net/20200714/dc/3a/2b/58/794e750e808dd4a82ae402dd/MHDV_ZEV_MOU_7-14-20.pdf.
[46] *Id*. at 3-4. *See also:* Hilary Sinnamon, *Accelerating to 100% Clean: Zero Emitting Vehicles Save Lives, Advance Justice, Create Jobs,* EDF, August 2020. Available at: https://www.edf.org/sites/default/files/documents/TransportationWhitePaper.pdf

Q. Why is achievement of these statutory goals and other commitments, at a minimum, important to environmental advocates?

A. MHDVs contribute to the large greenhouse gas footprint of the transportation sector as a whole, and they are responsible for an outsize portion of harmful, localized pollution from transportation, including nitrogen oxides ("NOx") and particulate matter.[47] This pollution disproportionately impacts certain communities across the state, often low- and moderate-income and environmental justice communities.[48] This is especially true of diesel vehicles, which contribute to heightened levels of diseases such as asthma and heart disease.[49] Far more than for the light-duty vehicle sector, electrifying the MHDV sector will result in significant air quality benefits for communities historically and continually experiencing the highest pollution burdens, many of which have also been hit hardest by the COVID-19 crisis.

Q. Does the Company's proposed CEF-EVES Program do what is necessary to ensure New Jersey will meet its obligations and commitments with respect to MHDVs?

A. No.

Q. How does the Company's proposed CEF-EVES Program fall short of ensuring New Jersey will meet its statutory obligations with respect to transit buses?

A. Despite the clear statutory goals with respect to electrification of transit buses, and despite the fact that several NJ Transit depots are located in the Company's service territory, the Company has proposed nothing whatsoever pertaining to the electrification of transit buses,

[47] New Jersey Bureau of Public Utilities, *2019 New Jersey Energy Master Plan: Policy Vision to 2050* at 59 (June 10, 2019), *available at* https://www.nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf [hereinafter *NJ EMP*].
[48] *Id*. at 61.
[49] Y. Huang *et al.*, "Global climate and human health effects of the gasoline and diesel vehicle fleets," *GeoHealth* (2020), *available at* https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2019GH000240.

outside of the Vehicle Innovation subprogram, which does not provide clear guidance on its intended sectors. Preparing the grid and depots for charging infrastructure at the scale that the PIV Law states will ultimately require is a multi-year undertaking, and the filing contains no evidence that the Company has taken any steps to begin this process.

Q. Other than with respect to transit buses, how does the Company's proposed CEF-EVES Program fall short of ensuring New Jersey will meet its obligations and commitments?

A. The Company's proposed CEF-EVES Program makes limited provision for MHDV electrification, addressing it solely in the $45 million Vehicle Innovation Subprogram, which includes a proposed $33 million investment for school buses and $12 million for open solicitation. The Company has stated that the target market for this subprogram is school districts interested in deploying electric buses, and ports, airports, transit authorities or other entities with specialized medium and heavy-duty electrification needs.[50]

School buses are a comparatively small share of the MHDV sector as a whole, yet the small portion of the Vehicle Innovation subprogram that is set aside for the rest of the sector is only being allocated at a rate of $2 million/year based on an open solicitation -- a process that might succeed in identifying some number of interesting pilots that could yield important insights, but that does not seem well calibrated to lay the groundwork for electrifying the entire sector given its small overall size and very long, slow timeline.

[50] Karen Reif testimony at 27, lines 2-7.

Q. How has the Company explained its failure to prepare for MHDV electrification?

A. The Company has taken the position that it is too soon to prepare for MHDV electrification, stating in its answer to discovery request ENVR-PSEG-0035 that "[t]he Company has no plans to update the CEF-EVES filing at this time. PSE&G's vehicle innovation subprogram includes support for MHDV electrification. Furthermore, as stated in the EV Straw Proposal, New Jersey's goals for MHDV electrification are to be developed by December 31, 2020[51] at which time the Company will evaluate the best way to support those goals."

Q. Is this approach to MHDV electrification appropriate?

A. Certainly not. The PIV law provides that:

> "By December 31, 2020, the department [Department of Environmental Protection], in consultation with the board [Board of Public Utilities], shall establish other goals for vehicle electrification and infrastructure development that address medium- and heavy-duty on-road diesel vehicles and associated charging infrastructure, similar to the State goals for light duty vehicles and consistent with the technology and plug-in electric vehicle markets for those vehicle types."

In other words, the PIV law requires that the relevant goals will be set before or not long after any Board resolution of the instant proposal is likely to occur, such that it is unreasonable for any EV program implemented during this period not to lay the groundwork for meeting goals that are about to be issued, at least by studying the market and distribution system capabilities and needs.

[51] In its original discovery response, the Company incorrectly stated "2025," but later admitted this was a typo.

Q. Will the school bus portion of the subprogram as proposed achieve its stated purposes?

A. Not necessarily. Although the Company's testimony contemplates air quality improvements that would improve public health, especially in less affluent communities,[52] and speaks of "ensur[ing] that the benefits of electric vehicles are directly shared with low- and moderate income communities,"[53] the proposed program does nothing to guarantee that the diesel buses that are replaced by electric ones will be buses that currently operate in frontline communities with diesel-related air quality problems.

In addition, the Company proposes to test V2G or V2B technology in a portion of the electric school bus fleet, but characterizes this opportunity primarily as a cost-saving opportunity for school districts and makes the extent of this testing subject to the participating school districts' interest in it.[54] In reality, electric school buses that are idle during the summer represent a promising grid storage opportunity that could be beneficial to all ratepayers in summer-peaking system such as the Company's, and testing this opportunity to harness electric MHDVs as a grid resource would have been appropriate to include as a priority item as part of the Energy Storage program, an important opportunity for synergy that has been overlooked.

Q. What specific actions should the Company be doing to prepare for MHDV electrification in general?

A. Because medium- and heavy-duty vehicle electrification is a nascent sector compared to the light-duty sector, the Company should be studying the market potential for MHDV

[52] *See* Reif testimony at 28-31.
[53] *See* Reif testimony at 32, lines 3-4.
[54] *See* Reif testimony at 34, lines 6-11.

electrification in New Jersey. This would entail undertaking affirmative outreach to customers within its territory to identify those who are or may soon be undertaking electrification initiatives. A market potential study can be an important first step for any EDC to understand the task ahead of them, while also providing an opportunity to educate their customers about the process – which may take several years – of arranging for the charging capacity needed to support a major fleet electrification initiative. A distribution grid impact study that takes medium- and heavy-duty electrification into account is another foundational step that should be taken now.

VIII. VEHICLE-GRID INTEGRATION

Q. What is the purpose of Vehicle-Grid Integration, and what are its benefits?

A. Vehicle-grid integration (VGI) is the concept wherein electric vehicles are integrated into the grid in a way that harnesses their inherent benefits. By utilizing the storage capability of batteries, vehicles can draw on those energy stores during times of high demand and low renewable energy availability - and concentrate charging when grid conditions are cleaner and more favorable to preventing overloading the system or local circuits. Failure to do so will result in inefficient use of the grid that will necessitate grid upgrades that could have been avoided with better planning and incentives. As well, providing grid services, enabling bidirectional charging (V2G) at those times and providing ancillary services such as frequency response that can build a clean, reliable, resilient grid will be important to maximizing the lifecycle emissions of these vehicles and minimizing their impact on the grid.

Of course, utilities cannot expect that these capabilities will appear without intervention. Appropriate enabling technology as well as price signals that incentivize managed charging and

appropriate payments that allow grid services to be placed on an equal footing with other forms of distributed energy resources will be essential to actually bringing these services to the table.

Q. Please define "managed charging" and "smart charging".

A. Managed charging consists of charging in a strategic manner to optimize outcomes, such as avoiding charging during peak periods, smoothing load in general or during peak periods, and maximizing the use of clean energy that might otherwise be curtailed.

Q. What are the relevant technologies and standards that should be adopted by the Company to effectively prepare for and apply VGI?

A. PSE&G must look beyond just what kind of charging station is employed and where it is located, but also explore how to make sure that charging stations and vehicles are well-equipped to maximize benefits to the customer and the grid. This includes ensuring that utility billing operating systems offer seamless transitions to residential and commercial time-variant rates and provide easily understandable energy usage data and comparisons to other rates in a way that allows customers to understand how they can best take advantage of the rate to save money. As well, utilities must adequately monitor energy usage and standardize data formats across service territories as they collect data from third party-operated submeters in order to prevent a situation where the third party providing the submeter has to reformat the data for different parts of the state.

Of course, to avoid a charging station thereby becoming a stranded asset, an open charge point protocol (OCPP) that allows other companies to take over a charging station and OpenADR that standardizes participation in demand response will be critical. As well, the Commission needs to adopt an industry-supported standard related to communication between

the vehicle and the charging station that meets the cybersecurity standards and vehicle-grid integration goals described elsewhere in these comments.

There is a need to align with NIST standards, which include the following, at a minimum:

- Physical access protection for public infrastructure: removing all jacks accessible from the external electric vehicle supply equipment (EVSE), encryption algorithms on controller boards that meet National Security Agency standards, and ensuring that a signal allows an EVSE provider to easily see if the charging station has a network connection.
- Protecting against remote threats by ensuring all data storage services housing information on remote services contain FedRAMP certification and any remote access to the EVSE through a web server requires the use of secure HTTPs communication
- Combined charging system protection, such that the only data collected is that which is required for the charging, secret digital signature and encryption is used for all vulnerable messages, and storage of signature keys and certificates is as protected as possible.
- Ensuring these minimum standards will mean that utilities are in line with general industry best practices, as well as those set out by the National Electrical Manufacturers Association.

In addition, all communication that takes place between the EV and EVSE should include Transport Layer Security (TLS). If ISO 15118 is used as a standard – which incorporates TLS, but does not do so automatically – the utility and third party charging station provider, as appropriate, should be sure that TLS is used at all times to further protect sensitive customer information from cyber-attacks; in the alternative, if Commission staff require use of OCPP, this presents an ideal scenario, as the cyber security embedded automatically into OCPP meets industry standards.

IX. INCREASING CUSTOMER ACCESS TO TRANSPORTATION ELECTRIFICATION

Q. Will PSE&G's programs to support the expansion of charging stations oversaturate the charging station network in New Jersey?

A. No. As discussed previously in my testimony, New Jersey still needs a vast number of EV charging stations on its roads to support the state's zero-emission vehicle goals. Providing rebates for charging stations—as long as they are smart, networked stations—is appropriate as it will allow the Company to manage load when needed, help shift charging to off-peak hours, and collect data on charging behaviors of customers for future EV programs. It is important that utilities support the expansion of this market through make-ready infrastructure programs, and in some cases, utility ownership of charging stations.

Q. Should the Company be given the flexibility to own and operate charging stations at MUDs?

A. Yes. Offering 3 provides rebates for Level 2 charging stations. While the private market providers ("EVSE Companies") have a key role to play in the build out of infrastructure across the state, utilities' expertise and status as regulated entities make them uniquely well-positioned to play a central role in EV infrastructure build-out both statewide as well as in the MUD space in particular. Landlords at MUDs are not generally in the business of procuring, operating, and maintaining charging stations, and therefore without utility involvement, may be deterred from participating in programs. This has been clearly evidenced by previous pilots implemented by Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E). In SCE's Charge Ready pilot, which included no ownership option and provided a rebate to cover 100% of the make-ready costs for participating sites, only three percent of all deployments were in MUDs. In

the SDG&E Power Your Drive pilot which included utility ownership of charging stations, over forty percent of all deployments were in MUDs—suggesting landlords would rather have the utility procure, operate, and maintain charging stations. Incorporating the lessons learned in those pilots and building upon the success of SDG&E's pilot, SCE redesigned its successor Charge Ready 2 Program to include a turnkey utility-ownership solution, providing MUDs with both the make-ready infrastructure and the electric vehicle charging station. The BPU should use the lessons learned and best practices from other utilities as guidelines when designing their programs to improve participation at MUDs and support more equitable and widespread transportation electrification.

Q. Should the Company own and operate equipment behind the customer meter ("make-ready infrastructure,")?

A. Yes. Utility-side make-ready is a core utility function that has been repeatedly authorized by regulatory commissions across the country. EV charging is expensive to install, and by installing and owning all of the behind the meter portions of charging, costs to developers can be significantly reduced. Utility provision of this necessary infrastructure can increase the speed of installation of charging stations, while also reducing costs for site-hosts and EV charging station developers. Over $2.2 billion has already been approved by commissions across the nation for the provision of such infrastructure for light, medium, and heavy-duty vehicles. In New York, the Public Service Commission released a $701 million make-ready infrastructure program that would help the state achieve its 2025 zero-emission vehicle goals by installing over 50,000 EV charging stations.

Rather than seeking repeated, individual authorizations for the provision of utility-side electrical infrastructure, the Company should also consider simply adopting new rules or tariffs

that make the provision of such necessary infrastructure part of the normal course of utility business.

X. SUPPORTING TRANSPORTATION ELECTRIFICATION BY OTHER MEANS

Q. What are your thoughts on the Company's proposed Innovation Fund?

A. The Vehicle Innovation fund proposed by PSE&G appears to be similar to the NYSERDA EJ Prize component recently approved in New York. These prizes are specifically designed to help increase access to clean transportation in New York, and a similarly designed program in New Jersey should be considered.

Q. What types of projects should this Innovation Fund focus on?

A. In addition to the aforementioned focus on MHDV electrification, other selected projects for the Innovation Fund should focus on efforts that help to improve access to clean transportation and mobility in environmental justice and low-and-moderate income communities. This could include—emobility, such as ebikes and escooters, electric vanpools, and electric rideshares.

XI. MARKETING, EDUCATION, & OUTREACH

Q. What should be the general scope of the Company's marketing, education, and outreach ("ME&O")?

A. ME&O should be broad in scope, and include information on vehicles, available rates, how to manage charging in a way that allows for fuel cost savings, environmental, and grid benefits, information about infrastructure and charging station availability, and grid services. As well, ME&O should be targeted to the audience (e.g. information and messages that resonate

with disadvantaged or low-income communities) and be available in multiple formats and languages in order to be as broadly useful as possible.

Q. What are the relevant groups of stakeholders that the Company needs to reach with their ME&O efforts and what role should the utility play?

A. While it is critically important for utilities to participate in these kinds of efforts, it may be appropriate for them to play a supporting role on disseminating information about the environmental and financial (insofar as it relates to items like operations and maintenance) benefits of vehicles. PSE&G may consider allocating some ME&O funding to community-based organizations for harder to reach sectors, including those in disadvantaged communities. These other entities may be able to more authentically engage with communities and fleets, and they may be better equipped to provide messaging on many topics.

Utilities throughout the country have received approval to develop and implement education and outreach programs. For example, in Maryland, the PSC approved a Statewide EV Portfolio with a dedicated education and outreach component. The Commission stated in their order that "…customer education and outreach is a vital component of a viable strategy to increase EV penetration in Maryland..."[55] In Michigan, the PowerMIDrive program provides education and outreach to residential and commercial customers through a variety of means, including social media and direct mail.[56] Further, some utilities have specific outreach to communities, such as PG&E who has an innovative model of education and outreach for LMI communities that leverages partnerships with local community-based organizations.[57]

[55] Order No. 88997 Case No. 9478. (ML 223588)
[56] Michigan Public Service Commission Issue Brief, *Utility Electric Vehicle Pilot Programs*. Available at: https://www.michigan.gov/documents/mpsc/EV_Pilot_Issue_Brief_05-02-2019_653974_7.pdf
[57] Miles Muller, *California Approves Novel Low-Income EV Charger Program*, NRDC, September 2019.

Q. Is it important for the Company to be proactive in its ME&O efforts?

A. Yes. If customers are unaware of the program offerings available to them, they are unlikely to take service on the new rates or apply for the incentives offered by the PIV program. Therefore, it's important that education and outreach efforts by the Company be approved by the BPU.

As previously discussed, additional EV charging that occurs during off-peak hours can put downward pressure on rates for all utility customers. Therefore, the company should promote the opportunities for and benefits of EV adoption in their education and outreach efforts.

Further, it is vital that PSE&G take the initiative to contact transit entities, school districts, and private fleets about the benefits and opportunities for MHDV electrification.

Q. Have other utility commissions approved education and outreach components of EV filings?

A. Yes. Almost $69 million of investments from 22 utilities have been approved by utility commissions for education and outreach programs on the benefits of EVs and the program offerings.[58]

Q. How can the Company help ensure their ME&O efforts are adequate?

A. The Company should develop concrete targets and metrics for success regarding their ME&O efforts. The Company should make these targets and metrics publicly available and make hold themselves accountable for adhering to them.

[58] *Id.*

XII. CONCLUSION

Q. Does this conclude your testimony?

A. Yes.