Jersey Central
Power & Light
A FirstEnergy Company

300 Madison Avenue
P. O. Box 1911
Morristown, NJ 07962-1911

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Via email to EVStakeholder.Group@bpu.nj.gov

Michael Winka
New Jersey Board of Public Utilities
Office of Clean Energy
44 South Clinton Avenue
P.O. Box 350
Trenton, New Jersey 08625

Re: Request for Comments – New Jersey Electric Vehicle Infrastructure

Dear Mr. Winka:

Jersey Central Power & Light Company ("JCP&L" or the "Company") is pleased to submit this response to the Board of Public Utilities ("BPU") Staff's ("Staff") "Follow-up Task 1 Questions" posed in support of the Staff's Electric Vehicle Stakeholder Work Group proceeding. JCP&L thanks the BPU for allowing the EDCs as well as other interested parties to have the opportunity to comment on this important emerging innovative issue. The Company is a supporter of electric vehicles and electric vehicle supply equipment ("EVSE"), including charging infrastructure development.

Staff has proposed a number of questions in a variety of topical areas. In this submittal, JCP&L will address selected questions within those topics, which it hopes is helpful to Staff as it completes its review. The Company will begin by providing its response to questions 2.2 and 2.3 which were as follows.

> *2.2 Would an EV fueled by a New Jersey electric generation mix meet the definition of **conserving energy** in the definition for energy efficiency as set forth in N.J.S.A. 48:3-98.1? If so why? If not why not?*
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> *2.3 Would an EV fueled by a New Jersey electric generation mix meet the definition of **using less electricity or natural gas** in the definition for energy efficiency as set forth in N.J.S.A. 48:3-98.1? If so why? If not why not?*

JCP&L does believe that an EV fueled by a New Jersey electric generation mix would meet the definition of conserving energy in the subject statute. N.J.S.A. 48:3-98.1.d, defines, "Energy efficiency and conservation program" as any regulated program, including customer and community education and outreach, approved by the board pursuant to this section for the purpose of conserving energy or making the use of electricity or natural gas more efficient by New Jersey consumers, whether residential, commercial, industrial, or governmental agencies. In this instance, due to EVs being an energy efficient technology when compared to their gasoline counterparts, the use of electricity as compared to using gasoline as a fuel would be considered conserving energy because the energy input to propel an electric vehicle a set distance is less than the amount of energy required to propel an internal combustion vehicle that same distance. In this respect, you would be using less energy to provide the same service.

Further supporting this, EVs convert about 59%–62% of the electrical energy from the grid to power at the wheels. Conventional gasoline vehicles only convert about 17%–21% of the energy stored in gasoline to power at the wheels.[1] Consequently, as supported by the Electric Power Research Institute (EPRI) studies, the lifetime cost of ownership of an EV is lower than the lifetime cost of gasoline powered vehicles.

EVs are a cost-effective, energy efficient technology. Reductions in battery costs in recent years have made EVs affordable, making EVs a cost-effective technology. Also, depending on electricity and gasoline prices, the fuel cost for EVs is about half of the cost of conventional gasoline-powered motor vehicles. For example, for EVs, if electricity costs $0.11 per kWh and the vehicle consumes 34 kWh to travel 100 miles, the cost/mile is about $0.04[2]. For conventional gasoline powered motor vehicles, if the cost of gasoline is $2.50/gallon and the fuel efficiency is 30 miles/gallon, the cost/mile is about $.08. Recent research by EPRI indicates that the average electric vehicle typically goes 3.5 Miles per kWh; approximately 29 kWh per 100 miles or $0.039 per mile.

In the same manner, an EV fueled by a New Jersey electric generation mix would meet the definition of using less electricity or natural gas in the definition for energy efficiency. The amount of energy required for an electric vehicle to travel a set distance is less than the amount of energy required for a gasoline powered vehicle to travel the same distance.

The next set of questions posed that the Company will address concern the potential electric system impacts that may be expected due to the increase in electric vehicles and the associated charging infrastructure. These questions were as follows:

> *3.1 What could be the expected percentage increase in electric energy attributable to EVs result in by 2025, 2030 and 2050?*
>
> *3.2 What could be the expected impacts and costs (positive and negative) on generation, transmission and distribution systems by the years 2025, 2030 and 2050?*

In order to answer these questions, a number of assumptions must be made. However, there appears to be agreement among the EDCs and the stakeholders that there will be impacts to the electric system within the state, with some estimates of the associated costs to support charging infrastructure included within the research conducted by the ChargEVC coalition, which has been an active participant in this stakeholder proceeding.

The Company has performed the analysis to estimate the increase in electric energy attributable to EVs but has not done an estimation of the expected impacts and costs on generation, transmission and distribution systems. The answer to this question is highly dependent on the level of plug-in vehicle adoption in the State of New Jersey. It is JCP&L's understanding that

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1 See US DOE website on Fuel Economy https://www.fueleconomy.gov/feg/evtech.shtml#end-notes.
2 See US DOE Alternate Fuels Data Center at https://www.afdc.energy.gov/fuels/electricity_charging_home.html

the average PEV travels between 10,000 and 12,000 miles per year and the average PEV gets between 3.5 and 3.9 miles per kWh, each PEV will contributed between 2,564 and 3,429 kWh per year in energy use. The expected electric energy attributed would be based on the number of vehicles on the road and the actual miles driven in each of those years identified in the question.

There are a number of different projections for the vehicle amounts that attempt to estimate the level of PEV vehicle adoption across the US. For 2050, it is premature from a technology standpoint to understand if these numbers would increase or remain flat. Nonetheless, EPRI has forecast for JCP&L various kWh scenarios for 2025, 2030 and 2050 for the increase in electric energy attributable to EVs as a percentage of JCP&L's 2017 kWh as follows.

EPRI JCP&L EV Load %*

Year	Low	Medium	High
2025	0.1%	0.7%	1.6%
2030	0.2%	1.4%	4.5%
2050	0.7%	9.5%	18.8%

*JCP&L service territory EPRI EV forecast scenario kWh as a percentage of 2017 kWh

The Company wishes to point out that the load requirements of chargers may have a substantial impact on the distribution system, particularly if EVSE is DC fast charge equipment. Exacerbating any effects would be the potential installation locations and the presence of adequate electric facilities required to serve the load. Many locations would be expected to require a substantial investment in infrastructure, which may include line extensions, reconductoring or transformer replacement to serve intended load.

Impacts to electrical infrastructure (both transmission and distribution), will be highly dependent on the nature of the vehicle charging and the possible incentives that are applied to encourage charging during off peak times. To the extent that vehicle charging takes place during peak times (roughly noon to 7 pm) and it causes the utility to see increased power demands (peaks) on the system, it increases the likelihood of required infrastructure upgrades. To the extent that EV charging can be incentivized to off peak times, along with monitored and controllable charging cycles, it will curb and delay the need for costly capital upgrades.

JCPL estimates the demand impact for individual residential customers as follows: Level 1 individual charging at approximately 1.2 kW and for Level 2 individual vehicle charging between 3.8 kW and 9.6 kW. In JCP&L's opinion, these loads are typically in the range of normal 120 volt residential appliances and 240 volt, residential water heaters and electric ranges. JCP&L estimates, based on this information, that many homes will not need to be upgraded to support the additional electric vehicle load. Rather, there might be some older homes that will require some upgrades to the service entrance or internal wiring. However, upgraded electrical supply is well within the normal load addition / upgrade service process within JCPL procedures. As for distribution and transmission impacts, JCP&L estimates that each new PEV will add approximately 1.05 kW to the system peak between 4 pm and 8 pm. System load impact will be based on the PEV adoption numbers as discussed previously.

Questions posed by Staff in section 4.0 concern the status and suitability of using EVs as demand response resources. The questions for which we are offering input are the following:

> *4.1 What is the state of the technology that could allow the EV to be utilized as a demand response technology? What is the availability of the technology now and how/when will that availability evolve? What actions should NJBPU take to take advantage of the use of EVs as demand response technology? If not why not?*

An electric vehicle is an electric load similar to a water heater, pool pump, air conditioner or other load. It can be easily controlled by removing power from the charging equipment. Typically, these forms of load control are communication enabled and signaled by the utility or set by a time of use device similar to a time clock. Some EVSE manufacturers offer networked capable (communication enabled) EVSEs that incorporate the ability to stop charging, or throttle down the amount of energy through the device. Since the EVSEs are fixed premises devices that receive electric supply from the utility, communication from the utility to the EVSE either directly or through a third party is essential for demand response. In the future, the EVSE could communicate with the vehicle to understand the state of charge of the vehicle battery and further help to determine the best charging schedule to meet both the demand response requirements and the need to fully charge the vehicle in the allotted time.

> *4.2 V2X: Is the two way communication of the EV to the grid a commercially available technology or not? If so why? If not why not? What is the availability of the technology now and how/when will that availability evolve? What actions should NJBPU take and when to take advantage of the use of EVs in V2X technology?*

There is no two-way communication of the EV to the grid that is commercially available. There are vendors of communication systems designed for the utility to communicate and control the EVSE either through a utility communication network or through the EVSE manufacturer's network like ChargePoint or the GreenLots system. It is uncertain how the ability to communicate from the utility to the vehicle will evolve. This is future technology and the NJBPU should revisit this technology in 3 to 5 years.

> *4.3 Could the EV electric customer access the energy markets directly, through an aggregator or Network Operations Center (NOC), through the electric utility or blockchain?*

This capability does not currently exist.

> *4.4 If the EV could be utilized as a demand response technology in a two way communication with the grid, distribution and/or transmission, would the EV meet the definition of demand side management in N.J.S.A. 48:3-51? If so why? If not why not?*

JCP&L believes that EVs squarely fall within the definition of demand side management as set forth at N.J.S.A. 48:3-5, particularly with the use of a two-way communication capability. This position was detailed in our comments submitted October 16, 2017 in response to the Staff's Task 1 questions.

4.7 Should the BPU consider the use of telematics (such as Con Edison's SmartCharge New York program) in any demand response program and to address changes to demand charges. If so why? If not why not?

FirstEnergy has experience with telematics devices from a research and development standpoint. The communication with such devices in those studies was found to be unpredictable and unreliable. Data streams were found to have had several holes leading to instances when data was uncollected. Further, the device is a portable device that can be simply installed, removed, or relocated by the vehicle owner. Based upon this experience, in our opinion, the BPU should not consider the use of telematics as a component of a demand response program.

While electric vehicles have the capability to be managed as demand side resources, we believe the more pressing issue to be the initial task of increasing the acceptance of electric vehicles and working towards efforts to establish the required EVSE infrastructure. The public interest would be best served by a well thought out, planned expansion of the availability of public EV charging infrastructure, including the charger. The regulated EDCs are best positioned to offer public charging services. Utilities can plan and manage regular maintenance and upkeep to avoid long EVSE downtime, customize the EV charging retail rates to account for peak/off-peak use and plan for long-term infrastructure rollouts that are not subject to short-term profitability goals. EDCs can also identify EV charging stations sites in optimal locations across the service territory, taking into account low income/disadvantaged neighborhoods, travel corridors and proper placement for grid interconnections. This suggestion would also support our response to the series of questions posed in sections 5.0 and 6.0 relative to the state of the EVSE market and the utility role in a rate-based "Charge-Ready" program.

In early market transformation programs, a catalyst is needed to jumpstart necessary investment, particularly when the value proposition is uncertain for market participants. Because the electric vehicle market is a nascent industry, participation by the regulated EDC may be the catalyst needed to spur EVSE investment in support of growing numbers of EVs. With the possible exception of the actual charger portion of EVSE, we don't view the various market sectors as being competitive. This particularly applies to the installation of electrical infrastructure required to serve the end use charging equipment. Irrespective of whether the various market sectors are competitive, the EDCs should be allowed to make regulated investments in and support the EVSE market.

In closing, the regulated EDCs are well positioned to develop public electric infrastructure particularly in early market transformation development phases. In order to promote this development, the BPU should consider the advantages and societal benefits for EDCs to identify locations and install the infrastructure required to support EV operation, including ownership of EV charging stations, while allowing for cost recovery through a non-bypassable rate mechanism on a full and current basis. When the EDCs have the opportunity to receive adequate and timely cost recovery, planning for and installation of public infrastructure is more likely to be where most suitable to enable greater EV adoption and thus, maximize attainment of the associated energy efficiency and environmental benefits cited above.

The Company appreciates the opportunity to provide these comments, and hopes to continue to work with and be helpful to Staff as it works toward further development of electric vehicle infrastructure in New Jersey. If there are any questions, please contact me.

Very Truly Yours,

Thomas R. Donadio