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Date: September 16, 2019

To: Board of Public Utilities
State of New Jersey
Email: EMP.Comments@bpu.nj.gov

Subject: Siemens Comments, Draft Energy Master Plan

Siemens is pleased to provide comments on the Board of Public Utilities' ("Board") draft Energy Master Plan (EMP). Siemens appreciates the effort that has gone into developing the EMP and supports the adoption and implementation of the EMP. Siemens specifically supports all seven overarching strategies guiding the EMP, repeated here:

1. Reduce Energy Consumption and Emissions from the Transportation Sector
2. Accelerate Deployment of Renewable Energy and Distributed Energy Resources
3. Maximize Energy Efficiency and Conservation and Reduce Peak Demand
4. Reduce Energy Consumption and Emissions from the Buildings Sector
5. Modernize the Grid and Utility Infrastructure
6. Support Community Energy Planning and Action in Low- and Moderate-Income and Environmental Justice Communities
7. Expand the Clean Energy Innovation Economy

While Siemens has business interests and expertise in most of the above-listed areas, our focus in these comments is on transportation electrification, specifically EV charging infrastructure, including light-, medium-, and heavy-duty vehicles, as well as off-road sectors such as ports and airports.

About Siemens eMobility®

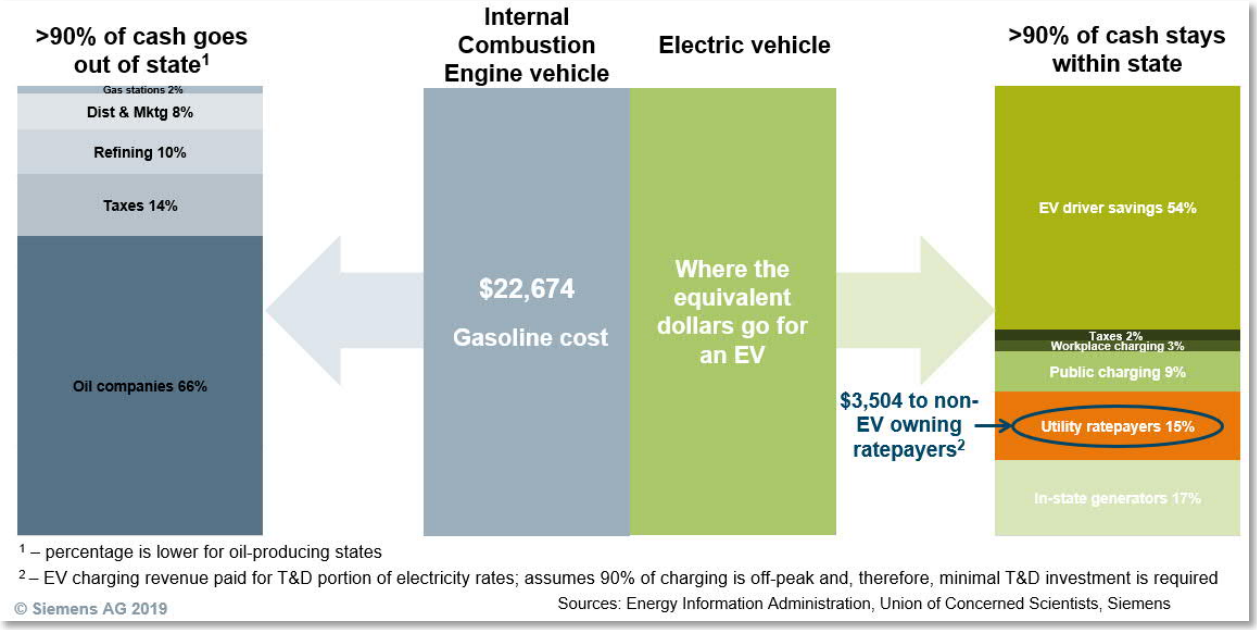
Siemens is the first corporation of its size to commit to being net-zero carbon by 2030 including a full transition to clean transportation. We are motivated by the goal of driving socio-economic benefits that stem from reducing GHG emissions and adoption of clean energy. Siemens employs over 2,500 workers in 21 locations in New Jersey, generating over $475 million dollars of in-state sales. With the intent of generating business efficiencies for our customers at workplaces, transit, government, utilities, fleet and other segments, Siemens manufactures/assembles its EV chargers and EVSE electrical components on both coasts of the U.S. Siemens PlugtoGrid™ eMobility product portfolio encompasses hardware, software and services that are currently deployed in 35

countries globally – our solutions are geared to maximize the abilities of electric vehicles as Distributed Energy Resources as well as their use in effective harnessing of renewable resources.

Economic Benefits of EVs

The health and environmental benefits provided by EVs through reductions in emissions and improving air quality is common knowledge. EVs provide direct economic benefits to their owners in the form of fuel and maintenance cost savings. More importantly, *every electric vehicle purchased in New Jersey will deliver, over its lifetime, an estimated $3,500 in savings to non-EV drivers* as a result of the added throughput through the electric grid.[1] And that $3,500 is for grid fees only. The additional money paid for power to charge EVs also benefits the state by flowing largely to in-state or in-region electricity generators rather than out-of-state oil producers (see figure).

Figure 1: Fuel Dollar Distribution during a Car's Lifetime, Gas vs. Electric



Beyond these economic benefits, EVs have important advantages for the electricity grid, power supply costs, integration of renewables, and resiliency. EVs and their "second-life" batteries can act as a non-wires alternative to sometimes expensive traditional grid reinforcement and provide back-up power during outages resulting from natural disasters. The EVs and their used batteries can provide peaking capacity and ancillary services to reduce wholesale electricity costs, with those benefits flowing to all ratepayers. Through what is known as "smart" EV charging, EVs become grid assets that can soak up excess wind and solar production while avoiding charging during times of peak demand.

[1] Siemens analysis based on national data from the Union of Concerned Scientists, Department of Energy, and Energy Information Administration.

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Need for Charging Infrastructure

There are a number of barriers to EV adoption, but one of the largest is availability of charging infrastructure. According to a survey conducted by Altman Vilandrie & Company, *85 percent of Americans believe EV charging infrastructure is inadequate*.[2] In New Jersey, there are only 332 public charging stations in the entire state.[3] This compares to over 3,000 gasoline stations.[4]

Given that this is a nascent market, EV charging infrastructure today has not attracted sufficient investment to establish sufficient public charging stations, including at workplaces and multi-family dwelling units. In turn, the lack of charging stations continues to stunt the adoption of EVs.

Morgan Stanley predicts that 2025 could be a turning point for EVs. In its base case, it predicts that EVs will constitute 10 percent of new car sales in 2025, grow to 30 percent in 2035, and reach 70 percent in 2049. It prepared a more aggressive scenario putting EVs at 90 percent of new car sales by 2045. However, it also presented a bearish model – one that could be the result of insufficient charging infrastructure – that saw EVs at or below 10 percent of new car sales for the foreseeable future.[5]

While the majority of all EV charging today is done at home, there are many critical infrastructure needs not met by single-family home charging. The following are critical EV charging infrastructure needs:

- Highway corridor DC fast-charging
- Workplace charging
- Multi-unit dwellings
- Public charging at key destinations such as parks and beaches
- Urban core DC fast-charging

Siemens encourages the Board to consider all these needs in developing New Jersey's strategic vision for supporting EV adoption through provision of sufficient charging infrastructure.

Comments in Response to Draft EMP Section VI, Request for Feedback

Siemens is pleased to provide these comments in response to some of the questions posed in Draft EMP Section VI, Request for Feedback. For the remaining questions, Siemens reserves the right to provide feedback at a later stage.

[2] http://www.businesswire.com/news/home/20161208005809/en/High-Costs-Lack-Awareness-Threaten-Short-Electric
[3] https://www.afdc.energy.gov/fuels/stations_counts.html
[4] https://afdc.energy.gov/files/u/data/data_source/10333/10333_gasoline_stations_year.xlsx
[5] https://electrek.co/2017/05/05/electric-vehicle-sales-vs-gas-2040/#jp-carousel-43397

Strategy 1: Reduce Energy Consumption and Emissions from the Transportation Sector

1) *In considering the policy mechanisms suggested in Strategy 1, how should the state seek to implement the policies to reduce transportation-related emissions? What policy mechanisms have we missed?*

Siemens respectfully urges the state to consider and adopt the following additional policy mechanisms related to EV charging infrastructure:

- An active role for electric utilities;
- promoting open connector, technical and payment standards for charging infrastructure;
- incentivizing adoption of smart chargers to enable EVs to be grid assets; and
- providing dynamic tariffs for EV charging.

Active Role for Electric Utilities to Maximize EV Benefits and Minimize Costs

Regarding the utilities' role, New Jersey needs to fully leverage utility assets and capabilities to maximize the benefits associated with EV ownership and operation to animate the market. In our opinion, the charging market should be open to all relevant participants, including the utilities. Several states have reached the conclusion that utility participation in EV charging is not only beneficial but, in some cases, necessary, to achieve state policy goals for EV adoption. Public utility commissions in Minnesota, Maryland, Florida, Washington, Oregon, Massachusetts, Rhode Island, Nevada, Ohio, California, and others have approved utility investments in EV charging infrastructure. Contrary to arguments made by certain parties, we have not seen a single instance where utility participation has harmed competition in the EV charging infrastructure market (as per our testimony in Oregon).

Siemens recommends that the Board evaluate different business models to deploy EV infrastructure with utility roles ranging from turnkey ownership deployment and management (example in the residential segment) to make-ready ownership or provision (example in fast charging depots) to provision of platform energy services (example in the fleet segment) to name a few variants. There exist examples via pilots that are ongoing in several states focused on a rebates-only model – we have seen no factual evidence that dependence on this model animates the market.

An active utility role also allows for capturing the full stack of EV benefits. EVs offer the obvious benefit to their owners (or operators) of providing transportation at lower fuel costs and to society of reducing air emissions. However, EVs also offer important benefits (or can impose additional costs) to the electricity grid, wholesale electricity markets, and integration of both centralized and distributed renewable generation. For the grid, EVs can provide peaking capacity and, thus, act as a non-wires alternative to traditional grid reinforcement when there is a need for additional capacity. For wholesale markets, EVs can provide peaking capacity and ancillary services such as imbalance energy. For renewable generation, EVs can reduce curtailments by using wind and solar energy at times

of abundance (over generation). We refer to these as the full value stack of EV benefits. These benefits are well recognized, but there is less discussion of how to capture the benefits.

From a technology perspective, capturing the full value stack requires:

- an end-to-end integrated system approach that is only possible via the active involvement and participation by the utility;
- seamless, low-cost, reliable, and efficient integration of EV charging data and operations with utility planning, operational, business, and customer systems; and
- a robust connection with transmission operational and wholesale market systems.

Similarly, New Jersey needs to fully leverage utility assets and capabilities to minimize the costs associated with EV ownership and operation to animate the market.

Utilities have important assets and capabilities to reduce the total cost of ownership (TCO) – buying, owning and operating EVs. Utilities can greatly reduce costs in three key areas: asset ownership and maintenance, charger procurement, and the consumer experience. In many situations, such as home charging – where 70% of charging is expected to occur – utilities can have the greatest ability to reduce these costs when they own the Electric Vehicle Supply Equipment (EVSE).

We request that the Board take a long-term view in its deliberations especially with regard to the charging infrastructure that it authorizes through public funds. Open standards-based infrastructure, capable of smart charging (or managed charging) is critical to the health of the grid both in terms of its utilization as well as being able to provide benefits to the rate payers through lower rates. The infrastructure being deployed at present should be capable of responding to dynamic rates or demand response or other services that may be available in the future as the market grows. There are discussions about vehicle telematics that make smart charging redundant – vehicle manufacturers take a global viewpoint in their product development and grid support may or may not be a key priority in their product specifications. Also, the Board does not regulate the EV manufacturers but does regulate the electric utilities and, through them, the grid and charging infrastructure that is deployed using ratepayer funds.

Siemens urges the Board to enable a competitive EV market in New Jersey that allows a multi-business model market with customer choice – and not rely on any one model especially the rebate model. All eMobility stakeholders should be allowed to operate on a level playing field including the electric utilities, across the infrastructure value chain. We have witnessed the positive impact of utility leadership on the energy efficiency market as a parallel framework that has worked. Above all, having a diverse business model environment will empower the customer's right to choose. The utilities in California have found in their first round of EV programs that many customers, such as multi-unit dwellings and government agencies, prefer utility ownership of EV chargers. The Board should protect this customer choice.

Promoting Open Connector, Technical and Payment Standards

A comprehensive vision for EV charging infrastructure in New Jersey is needed to promote EV adoption. New Jersey should ensure that the resulting EV charging infrastructure is as convenient for consumers as possible.

Proprietary technologies with closed networks have been a barrier to more widespread use of EVs generally and as DERs. Proprietary technologies have also resulted in stranded assets in some cases. On the payment side, proprietary, closed payment systems at public charging stations have retarded growth of the EV market. The exception that "proves the rule" is Tesla, which has used proprietary charging and payment approaches for its customers – but has deployed a universal, nationwide network as a key part of its business strategy to promote EV sales. Given the multi-hundred million dollar investment made by Tesla in its network, Tesla clearly believes this has been essential for successfully selling its vehicles. Tesla's strong sales figures support this conclusion.

Open Technical Standards
We highlight **four** technical standards. The **first** standard is for communications from the cloud to the charger to manage the charger and charging activity; most of the industry – and some state public utility commissions – have gone with Open Charge Point Protocol (OCCP) for this. The **second** is for communications from wholesale market operators or utilities for demand response events. The industry is converging on OpenADR for this. The **third** is for communications between the charger and the EV itself. One standard used for this is one Siemens helped develop and has been adopted globally. It is called ISO 15118. The **fourth** technical standard is the cable connecting EVs with chargers. Here different standards apply, depending on the type of charging. They include SAE J1772 for AC charging, CHADEMO and CCS for DC charging, and SAE J3105 for electric bus charging.

Our advice to policymakers is not to mandate specific technology standards. Instead, we advocate for regulators to require that any publicly-funded charging infrastructure comply with open standards, but that the specific equipment standards be specified by the relevant organization at the time of procuring equipment. This could be utilities, including those offering rebates for chargers, or public agencies giving out grants. For example, Maryland, Minnesota, and Arizona are requiring open standards such as OCPP.

Universal, Open Payment Access
We also highlight the importance of open payment standards. EV owners face huge barriers in utilizing public charging networks. To use these sites, an EV driver must have a smart phone, download an app, sign up with the network provider, have a banking relationship, and have working cellular coverage at the site – unlike a simple card swipe at a gas station. The lack of charging infrastructure, including easily accessible public charging, was cited by 85% of consumers in a survey as a reason they did not purchase an EV.[6] This was even higher than the 83% who said a main barrier was the cost of the vehicle itself. Some states have recognized the payment problem and are requiring open payment standards. Nevada,

[6] - Altman Vilandrie & Co., December 2016.

Vermont, Massachusetts, Arizona, and California have proposed or adopted regulations that require that public charging stations accept physical credit/debit/pre-paid cards to make the charging experience as simple as buying gasoline. Let me stress that this is for public locations only.

Incentivizing Adoption of Smart Chargers to Enable EVs to be Grid Assets

We believe the most important factor in adoption is lowering the Total Cost of Ownership, in terms of both economics and consumer convenience. One means of reducing costs is having access to low-cost, off-peak electricity – which includes times when renewable resources are abundant. Another is leveraging EVs as grid assets, as DERs.

One way to do this is what we call "V1G". This means managing charging so it happens off peak, and, by that, we mean both the overall system peak as well as the local distribution peak. In addition to this regular off-peak charging, V1G includes the ability to turn off chargers for demand response events that typically occur 50 to 100 hours per year when the system or local grid experience especially high peak loads. At the system level, V1G can lower capacity costs and wholesale energy costs at peak. For the grid, V1G can reduce or avoid the need to reinforce the grid to support EV charging.

Another DER approach is V2G, which means using the EV's battery to send power back onto the grid for demand response or to provide ancillary services to the wholesale market.

To make V1G and V2G work, we need both the right financial incentives and smart charging technology. Time-varying prices and demand response payments are obvious, with time-of-use rates being a good start but day-ahead hourly prices being even better. The problem with time varying rates is that EV drivers are usually happy with those rates for their vehicles but often don't want those for their home or business. EV-only rates are a good solution and offered by a number of utilities. This brings us to smart chargers.

Smart chargers are defined by three key features that empower EVs to be DERs. First, they have sub-meters built into them. EV-only rates can be done by adding a second utility meter, which can be expensive as we heard yesterday, or using a billing-accurate sub-meter. This is being done in SDG&E's Power Your Drive program, which has an EV-only, day ahead hourly price option.

The second defining feature of smart chargers is that they are networked. This means they have communications capability to receive price signals and control commands, as well as to send consumption data back to consumers. EV owners can program their chargers to turn on only when prices are low or to turn off when demand response events are called.

The third feature is IT, the integration of EVSE with back-end systems. For EVs to be effective as grid assets, as DERs, they need to interconnect with various parties. They need to connect to some combination of utilities for billing and other uses, EVSPs for charging management, utilities and aggregators for DR programs, customers for accessing data and controlling their own chargers, and, in the case of V2G, to EVs themselves.

Providing Dynamic Tariffs for EV Drivers
An additional strategy is to ensure the availability of dynamic electricity tariffs so that residents and businesses can take advantage of low-cost off-peak prices to charge their electric vehicles. Part of this strategy is to allow the use of sub-meters in chargers for billing so that the dynamic tariffs apply only to EV consumption and not to the rest of the facility, which may cause operational issues. Many states have authorized time-varying rates for use in EV charging. Maryland and California have authorized pilots of sub-metering.

4) How can the state work with the private sector to increase publicly-accessible EV charging infrastructure?

Many states have involved the private sector to increase publicly-accessible EV charging infrastructure. Utilities have been involved through the development and approval of implementation plans by state regulators, with the costs borne by and benefits shared by ratepayers or, in some cases, with the costs paid for by program participants only.[7] Third parties have been involved through the receipt of rebate funds from utilities or grant funds from states. Site owners are usually called upon to provide a portion of the funding for installation on private property, though exceptions have been made for situations such as multi-family dwellings in Disadvantaged Communities.

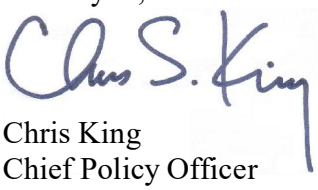
For the reasons described above in our response to Question 1, Siemens believes that good public policy calls for any chargers funded via public dollars – ratepayer or taxpayer – should meet open connector, technical, and payment standards and should be smart chargers.

5) How can the state work with the private sector to advance the technology for medium- and heavy-duty vehicles and incentivize private sector adoption of alternative fuel vehicles?

The same strategies mentioned in our answer to Questions 3 and 4 apply to medium- and heavy-duty vehicles.

Siemens appreciates the opportunity to comment and would be pleased to provide additional information on any of these points or other topics in our scope of expertise.

Thank you,



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[7] Xcel MN has a turn-key program to provide home EV chargers, including installation and maintenance for a fixed monthly fee of about $17, which fully covers the cost of providing the equipment and services, amortized over the life of the charger.