SIEMENS
Ingenuity for life

Filed in ePUC

May 13, 2019

Ms. Judith C. Whitney, Clerk
Vermont Public Utility Commission
112 State Street
Montpellier, VT 05620-2701

Re: Case No. 18-2660-INV; Investigation into promoting the ownership and use of electric vehicles in the State of Vermont

Dear Ms. Whitney,

The Public Utility Commission ("Commission") issued an order in this case on March 22, 2019, seeking input from participants on incentives, education, and safety standards for Vermont's transportation infrastructure as electric vehicle ("EV") usage continues to rise in Vermont. The Commission invited comments by May 13, 2019, and in this letter, Siemens is pleased to provide its thoughts. We also refer you to our comments on interoperability filed in this docket on December 20, 2018.

Siemens is a global leader in eMobility® and considers eMobility to be a critical element in driving economic benefits from new investments and job opportunities, at the same time achieving the societal benefit of a cleaner environment. We sell the EV chargers, EVSE electrical components, and make-ready equipment that we assemble/manufacture in the US directly to consumers, workplaces, cities, government, utilities and other segments. Siemens Plug to Grid™ eMobility product portfolio encompasses hardware, software and services which are currently deployed in 35 countries globally. The goal of our policy efforts is to promote public policies and global best practices that animates the EV market through lowering the Total Cost of Ownership (TCO). We believe an open standards-based EV charging infrastructure promotes a competitive EV charging market that drives adoption among the public

In our comments, we respond to those questions specifically related to EV charging infrastructure.

The Role of State Government

3. *What educational programs should the State of Vermont engage in to convey the benefits of transportation electrification to Vermonters, including environmental benefits, lower maintenance and fuel costs, and lower costs for ratepayers generally?*

In addition to providing educational programs about the general and environmental benefits of transportation electrification (TE), the State should provide information about the benefits of "smart" EV charging, whereby charging is performed off-peak and controlled remotely. Smart charging requires chargers that are networked (communicate) and sub-metered. Smart charging benefits EV drivers through lower fuel costs and benefits non-participating ratepayer through minimizing the need to reinforce the grid to support charging loads.

To quantify the benefits of smart charging, Siemens has developed an economic model to calculate an estimate of the gross financial benefit of an electric vehicle to a utility's non-participating ratepayers. The model calculates the incremental transmission and distribution revenue from recharging the batteries of an EV over a 10-year life. The value of this calculation is estimated to be similar to the direct financial benefit to non-participating ratepayers. This calculation excludes all other benefits, most importantly fuel savings to EV owners, the health benefits of reduced air pollution and emissions, and the stimulus to economic development. Using average electricity rates across the U.S., the model calculates EV-related T&D revenues of $3,071 per EV for 10 years. Since EVs are entirely new loads, these revenues are all incremental. How these amounts flow to ratepayers, shareholders, tax collectors, or others is a matter for regulators and policymakers to determine.

5. *What other suggestions or ideas do you have for the role of state government?*

States and utilities are now beginning to invest in public charging for EVs, particularly in highway corridors. These investments are meeting a strong need for charging infrastructure, the lack of which is the second largest barrier to EV adoption (after the cost

of the vehicle).[1] However, for these investments to meet their goals, the chargers need to be easily accessible by the public and be serviceable for the long term – both of which require the adoption of open technical and payment standards. We respectfully suggest that **Vermont should require that any publicly-funded, public charging stations comply with open technical and payment standards.**

Technical standards

One technical standard for chargers is the physical cord connecting the vehicle. This is not an issue for the light-duty vehicles that public EV charging investments are looking to service. The issue is the communications protocol between the charger and the back-end system. Without a standard, states and utilities are often locked into proprietary protocols. In fact, the vast majority of existing public chargers use proprietary protocols – even though many have been paid for with taxpayer or ratepayer funds[2].

The issue is whether (or not) EV chargers are inherently dependent on a proprietary communications protocol (i.e., whether the chargers are "interoperable"). If Charger A works only with Network Service A, the risk of stranded assets is increased. Moreover, this situation locks in the site owner to a single provider of both the charger and the software/network service – with the inherent risk that the provider could exit the market and potentially strand the assets, not continue to provide the level of service or functionality desired by the site owner, or significantly raise the fees for service. If the communications protocol is open, then any charger is compatible with any network service, virtually eliminating the stranded asset risk. This openness also provides the site owner flexibility to move between different chargers and different network service providers for cost-related or any other reasons (similar to switching between telecom operators). For example, virtually all charger manufacturers make products that utilize the Open Charge Point Protocol (OCPP), an open standard, between the charger and the cloud. It is also possible

[1] Altman Vilandrie & Co., Private Study. 2017. The findings are summarized at https://ngtnews.com/survey-lack-of-awareness-high-costs-hamper-ev-adoption. See also, American Automobile Association, Fact Sheet: Consumer Attitudes – Electric Vehicles, April 2019. Available at: file:///C:/Users/king000c/Downloads/EV-Consumer-Survey-Fact-Sheet-FINAL-4-23-19.pdf

[2] Internal Siemens analysis

to implement OCPP between one vendor's cloud and another cloud, but this does not create interoperability, because the charger itself does not "speak" OCPP. Such a charger is still accessible only using the communication protocol of a single, proprietary vendor. The adoption of open communications protocols in chargers directly enables competition and, therefore, greater customer choice, while directly avoiding stranded costs.

The prevalent existing site-host driven marketplace typically is not based on open technical standards, which prevents the site host from being able to switch between EV service providers, whether that be for cost or any other reason. This prevents the marketplace from being able to continuously compete for a given operator or site host's business, instead confining competition to just the upfront purchase decision. To drive down cost and best serve the marketplace, competition and innovation for hardware, software and services must be based on product features, price, service, etc., and not just at the initial purchase decision, but also the ongoing costs. The Commission should ensure that the charging market that their funding supports is protected by mandates for open technical standards to prevent **vendor lock-in**.

Universal, Open Payment Standards

Payment at public charging stations to date has also suffered from proprietary approaches. At the vast majority of public stations, EV drivers must use a smart phone to pay for charging. This requires having a fob or RFID card and enrolling with the charging network operator to make the payment – as well as having cellular connectivity at the charger location. Some states have required that payment be allowed for EV drivers without becoming a "member" of a charging network or subscribing to it. These laws have failed to solve the problem, because EV drivers still need the fob or RFID card and still have to log on to the charging network's system to be able to use the charger and to make payment. This is a distinction, not a difference.

The solution is to ensure that all stations at public locations support payment with a credit card reader, in addition to other payment options that may be offered. Drivers expect to be

able to pay at these public charging stations just as they would at parking meters or gas stations. While roaming agreements, proprietary payment cards, or fobs provided by private companies can be alternate payment options that are provided, credit cards provide the most familiar and commonsensical approach for maximizing customer access and the perception of easily available/accessible public charging. This approach would ensure that the greatest number of customers have access to these public stations and would enable greater customer choice and access – therefore promoting customer satisfaction and EV adoption.

Some charger manufacturers and charging network operators object to putting credit card readers on chargers. Here are the primary objections and our view:

- **"Adding card readers is expensive":** As a manufacturer of chargers, Siemens estimate is that adding a card reader adds between 4% to less than 1% of the total installed cost for a public Level 2 and DCFC charger, respectively.

- **"Card readers are easily susceptible to fraud":** Since the introduction of EMV chip credit cards in the US in 2015, fraud has reduced by 75% (according to Mastercard) and 80% (according to Visa). In fact, fraud as moved online by 40% (Mastercard). According to Mastercard, EMV chip cards are the most secure form of payment.

  Regarding data privacy, the EMV smart payment technology is far more secure than the current payment methods for charging, where customers are required to provide their confidential information to charging companies. With chip cards, the credit card information is encrypted and not available to the charging companies, thereby protecting customer data.

- **"Credit cards are becoming obsolete":** In fact, only 16% of Americans have used a digital wallet, according to JP MorganChase[3]. Even in the European Union, which is a decade or more ahead of the U.S., the adoption rate is only 45%. Also, on March 25th

[3] https://www.creditkarma.com/credit-cards/i/contactless-payment-fad-or-future/

of this year, Apple announced its own physical credit card; why would the world's most innovative company launch a product that is supposedly obsolete and old technology?

6. *What other incentives can the State provide — for example, providing EVSE in state employee parking lots?*

   Siemens believes providing chargers at state employee parking lots would be an important step in promoting EV adoption. Such chargers would generally raise awareness of EVs, help solve the range anxiety problem by enabling employees to recharge before driving home, and provide a charging solution to employees that may not have off-street parking at home or are renters and unable to install a charger at their residence.

   For employee parking lots, the chargers should comply with open technical standards, but credit card readers are not essential, because the employees come to the same place every day and cardless payments provide less of a barrier to using the chargers.

Questions for EV and EVSE Manufacturers and Organizations

1. *What incentives does your company or organization provide or promote to encourage the deployment of EV charging stations and the purchase and lease of EVs?*

   Siemens has deployed EV chargers for use by employees at many of its locations and continues to expand these deployments to additional sites. Siemens is also evaluating alternatives for electrifying its fleet of service vehicles.

2. *What actions can the State of Vermont take to help increase the rate of deployment of EV charging stations throughout the state? Please give examples from other states.*

   Vermont could adopt three strategies to increase the rate of deployment of EV chargers. The first is to provide direct funding via grants. Examples include VW Settlement Appendix D funds (most of the 50 states), state funds authorized in special legislation (e.g., California's Greenhouse Gas Reduction Funds), and utility deployment plans authorized or encouraged by state legislation and reviewed by public utility commissions (e.g., Washington, Oregon, California). In many states, the public utility commission has

authorized utility funding without legislation (e.g., Michigan, Minnesota, Massachusetts, Nevada, and Maryland).

The second action Vermont could take is to adopt the open payment and technical standards described above in our comments. Adoption of these standards reduces uncertainty in the market, promotes utilization of public chargers and purchasing of EVs, and increases the level of competition between charger providers and charging service providers. Such increased competition lowers costs to consumers.

The third action Vermont could take to adopt building codes that require that parking spaces in newly constructed or remodeled buildings be EV ready. This can be as simple as requiring a 220-volt outlet be conveniently located near the parking space; then a Level 2 charger can simply be plugged in. Some cities require that there also be a Level 2 charger to qualify as "EV-ready". Seattle and San Francisco have such building codes, and California has a Green Building Standards Code. These codes typically require only a portion of the parking spaces in a development to be EV-ready, such as 20 percent.

3. *Please provide examples from other states where electric distribution utilities work with EVSE providers to support the deployment of EV charging stations. Include an explanation of any public interest or similar test that must be met before such a utility may include the costs of EVSE deployment in its rate base.*

States/jurisdictions where electric distribution utilities have approved programs to construct or support construction of EV charging infrastructure – in all cases EVSE providers are involved – include Maryland, District of Columbia, Massachusetts, Michigan, Minnesota, Florida, North Carolina, Washington, Oregon, California, Texas, and Nevada.

The infrastructure includes three basic elements: 1) the make-ready electrical equipment connecting chargers to the grid, 2) the chargers, and, for "smart" chargers, 3) a network services provider. The programs vary with respect to which party owns and operates each

of these three elements as between the utility, the "EV Services Provider", and the customer/site owner.

Siemens strongly advocates that all these business models be considered and available for customers to choose, including full utility ownership. EV charging is a nascent market, and the shortage of public charging infrastructure is a major barrier to EV adoption (see above) – therefore, Vermont would benefit from the greatest possible participation and innovation in this market. Utilities have the advantage of scale economies, patient capital, and deep expertise. They are also best positioned to integrate EV charging into the grid and make EVs true grid assets. Competitive EVSPs have their own advantages, and customers/site owners should be able to exercise their own preferences – and this sometimes includes the desire for the utility to provide a turn-key charging service. An example is Xcel Minnesota's smart charging pilot in which the utility provides, installs, owns, operates, and maintains the charger for a fixed monthly fee calculated to recover the full cost from the individual homeowner.[4]

Most of the utility programs have been adopted without an explicit cost benefit or other economic test based on the extensive economic and health benefits provided by EVs. Several studies have been conducted at the state level for various states, finding cumulative net benefits to non-participating ratepayers usually in the billions of dollars over 15 to 30 years.[5] The studies include the northeastern states of Connecticut, Massachusetts, and New York.

In Michigan, the Public Service Commission approved a program by Consumers Energy that estimated "a net benefit to the grid of approximately $1,900 - $2,300 per electric vehicle."[6] The $7.5 million pilot "could bring a gross system benefit of $15 to $18 million," according to the PSC.

Consumers Energy summarizes the benefits as follows:

[4] Minnesota Public Utilities Commission, Order Approving Pilot Program, Granting Variance, and Requiring Annual Reports, Docket No. E-002/M-17-817, May 9, 2018.
[5] https://www.mjbradley.com/content/electric-vehicle-cost-benefit-framework
[6] Michigan Public Service Commission, Order

> "EV benefits to customers will come in three categories: Consumers Energy customer benefits, social benefits, and individual benefits. A central hypothesis of this Program is that Consumers Energy customers will see lower rates due to the lifetime value of each EV and improved grid utilization. To realize and maximize benefits to the grid and all system users, it is important to properly manage the incremental load resulting from EV adoption to ensure increased grid utilization and avoid increasing system peak loads. The Company is uniquely positioned to provide the basis for the realization of the "lifetime value" of grid benefits for system users by investing in EV programs and facilitating benefits to all customers. The financial benefit that each incremental EV adds to the system is a resource that could benefit all Consumers Energy customers. This occurs through a combination of reinvesting benefits towards further EV infrastructure, rebates, pilots, and reducing rates across all customers, including non-EV drivers."[7]

4. *How can EV and EVSE companies assist in facilitating the achievement of the goals of the State's Comprehensive Energy Plan and its greenhouse gas reduction goals?*

   EVSE companies can support growth in the EV market and promote EV adoption through the use of open payment standards (for public sites) and open technical standards to ensure universal access to public chargers, prevent vendor lock-in, and enhance competition for chargers and charging services.

   Another benefit EVSE companies can provide is to include **billing-quality sub-meters** in their chargers. This has three benefits:

   - Customers can charge EVs on time-varying rates without exposing the home or business to price volatility
   - EV drivers know exactly how much they are paying to charge their vehicles, because the bill is separate from the premise bill
   - EV owners can earn and help the grid by participating in demand response programs

<u>Safety standards that should apply to the charging of EVs.</u>

[7] In the matter of the application of Consumers Energy Company for authority to increase its rates for the generation and distribution of electricity and for other relief, Case No. U-20134. Direct Testimony of Michael J. Delaney on Behalf of Consumers Energy Company, May 1, 2018.

SIEMENS
Ingenuity for life

1. *What safety standards should apply to EV charging stations?*

   We recommend that Underwriter's Laboratory (UL) listing **be mandatory** for the procurement of any charging equipment. There should not be an option for by-passing UL by using a "Nationally Recognized Testing Lab" since their requirements can be less stringent than a UL listing and therefore, may impact total lifecycle safety elements.
   Outdoor mounted EVSE should specify a NEMA rating and we recommend that specification to be NEMA 4 owing to the level of enclosure protection it provides.

   In addition, we note that direct utility participation including ownership and operation of charging infrastructure and related back-end software comes with the distinct benefit of extending the same safety, reliability and cyber-security standards to these assets as is the case with all other utility assets. Indeed, an underappreciated aspect of the EV charging and services market is the complexity and cost associated with keeping equipment up and running safely and repairing or replacing it quickly if and when it encounters an issue. Utilities are uniquely situated to address this need and guard against related stranded asset risks.

3. *Please provide citations to any uniform safety standards or regulations that have been adopted in other states for EV charging.*

   UL 2594, Standard for Electric Vehicle Supply Equipment, available at https://standardscatalog.ul.com/standards/en/standard_2594

We thank the Commission for the opportunity to submit these comments and for its kind consideration of the same.

Thank you.

Chris King
Chief Policy Officer
Siemens Digital Grid