VIA ELECTRONIC MAIL

August 13, 2018

Hon. Kathleen H. Burgess
Secretary to the Commission
New York State Public Service Commission
Empire State Plaza, Agency Building 3
Albany, New York 12223-1350
secretary@dps.ny.gov

Re: 18-E-0138 – Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure

Post-Technical Conference Comment

Dear Secretary Burgess,

University of Delaware’s EV R&D Group is pleased to comment on the above-referenced proceeding. In particular, we address questions 7 and 8 raised in the August 16, 2018 Notice of Working Group Meeting and Request for Post-Conference Comments, regarding EVs as distributed energy resources (DERs).

The EV R&D Group, under Principal Investigator Willett Kempton, researches and develops technology and policy related to electric vehicle deployment, in particular, vehicle-to-grid (V2G) systems. Vehicle-to-grid systems (V2G) allow electric vehicles (EVs) to export power to the electric grid at the distribution level. UD has been the leader in V2G development since 1997, when Dr. Kempton laid out the first conceptual design and economic analysis of a V2G system.

Since then, the Group has developed an aggregation platform and associated hardware, which is now licensed world-wide to Nuvve Corp., and is in use in the US and Europe. V2G projects have been earning revenue through frequency regulation in wholesale markets since 2013.1 With third-party

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1 From 2013–2016, EVs managed by NRG and University of Delaware earned compensation in PJM Interconnection’s frequency regulation market. Nuvve Corp. has recently filed an interconnection request for commercial operation in PJM. Nuvve Corp. also manages a fleet of 40 vehicles in Denmark receiving compensation for frequency regulation.
aggregation, large numbers of vehicles could be managed to provide all the services that stationary storage is capable of, in both wholesale markets and through retail programs.

As a follow-up to our participation in the Technical Conference, we expand upon the policy issues in Imelda Foley’s presentation. We respectfully request that the Public Service Commission (“the Commission”) act on the following points necessary to allow V2G resources to interconnect and provide grid services in New York State:

1. **Regulatory classification**
   New York State does not currently have a regulatory classification for V2G systems. A V2G system is defined here as a charging station and its associated equipment that have the ability to allow two-way power flow between an EV and the electric grid, as well as the communications hardware and software that allow for the external control of the vehicle’s battery charging and discharging.

   A V2G system interacts with the grid much the same as stationary storage resources, and very differently than standard EVs (even those using “smart” charging). In fact, V2G systems fall within New York’s definition of an energy storage system (ESS) in the *Standardized Interconnection Requirements (SIR)*. Accordingly, V2G systems should be included in the regulatory framework for behind-the-meter storage, with the modifications detailed below.

2. **Market participation**
   a. **Market switching**
      Like other distributed storage, V2G systems can provide benefits to the grid through participation in both wholesale markets and retail programs; relative price signals in each of these will indicate where resources are needed most at any point in time. DER should be allowed to participate in, and switch between, both markets, subject to legitimate limitations such as avoiding double compensation.

   b. **VDER**
      We include in this section comments filed previously in proceeding 15-E-0751 *In the Matter of the Value of Distributed Energy Resources*.

      i. The May 22, 2018 *Staff Proposal on Value Stack Eligibility Expansion* recommends that “stand-alone storage, including storage paired with consumption load,” be made eligible for VDER tariffs. “Stand-alone storage” (as well as the already-included category of “storage paired with another eligible technology”) should be explicitly defined to include V2G systems.

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ii. The Staff proposal recognizes the importance of prohibiting “uneconomic arbitrage” resulting from price signals that encourage activity that increases costs to the retail utility without providing corresponding value. The proposal points out that this could occur if storage resources imported at the average retail price, and exported at the more granular VDER rate. To address this issue, the Staff proposes that storage resources participating in VDER tariffs purchase charging energy at Mandatory Hourly Pricing rates.

We would add that the inverse holds as well: an import/export rate scheme that places costs on a resource that do not reflect actual costs to the system discourages that resource from time-of-use arbitrage even when arbitrage would provide net benefits to the system (e.g., by increasing energy supply at peak demand times).

To avoid both scenarios (uneconomic costs to either the utility or the resource provider), storage resources, including V2G systems, should be billed for charging energy, and paid for exported energy, at the identical rate scheme. If Mandatory Hourly Pricing does in fact work out to be identical to the sum of the VDER credit elements for storage, then we agree with Staff’s proposal. Otherwise, we suggest charging be purchased, and export be compensated, at the VDER rate.

c. **FERC 841 accounting**

The Federal Energy Regulatory Commission (FERC) recently addressed the topic of rates for ESS’ charging energy. Order 841 requires that ESSs, including those behind the meter, be charged wholesale rates for the portion of their charging energy (and the associated efficiency losses) that is later to be resold in wholesale markets. But this model can’t be employed unless utilities differentiate wholesale charging energy from end-use energy on the retail customer’s bill. (FERC refers to this accounting process as “netting out”.)

We recommend that the Commission direct New York State utilities to evaluate the feasibility of accounting for the netting out of wholesale charging energy.

d. **Aggregation**

3 “Each RTO/ISO must specify that the sale of electric energy from the RTO/ISO markets to an electric storage resource that the resource then resells back to those markets must be at the wholesale locational marginal price...To the extent that the host distribution utility is unable...or unwilling to net out any energy purchases associated with a resource using the participation model for electric storage resources' wholesale charging activities from the host customer’s retail bill, the RTO/ISO would be prevented from charging that resource using the participation model for electric storage resources electric wholesale rates for the charging energy for which it is already paying retail rates....We find that efficiency losses are charging energy and therefore not a component of station power load. Accordingly, the charging energy lost to conversion inefficiencies should also be settled at the wholesale LMP as long as those efficiency losses are an unavoidable component of the conversion, storage, and discharge process that is used to resell energy back to the RTO/ISO markets.” FERC Order 841 (2018).
Individually interconnected resources should be allowed to aggregate for the purpose of meeting the minimum capacity requirement of retail programs such as ConEd’s Service Class 11 Buyback, which currently has a 1 MW minimum.

3. Interconnection
The Commission modified New York’s the SIR in April 2018 to cover ESSs of 5 MW or less, yet several of the requirements of the SIR present barriers to V2G resources interconnecting within this framework.

a. V2G-specific procedures
Experience interconnecting V2G in other regions has shown that lack of a clear resource definition and standard processes and requirements creates confusion. A utility may take months or even years to decide on the best course of action, or reject the application entirely. The application form, criteria for equipment certification, and metering and testing requirements should be reviewed and adapted for V2G systems. For example, the information on battery type and operating characteristics required to complete Appendix J in the SIR should be modified to account for the fact that a V2G system may allow, in practice, a number of approved car models, and thus several approved battery and inverter types, to export from the same location.

b. Standards for AC charging systems
While the SIR require distributed resources to comply only with IEEE 1547, in order to qualify for the expedited application process they must meet standard UL 1741 as well. Bi-directional DC (direct current) charging stations can meet this standard. However, UL 1741 does not apply to the most commonly used type of bi-directional EV supply equipment, the AC (alternating current) charging station. In such systems, the inverter is on board the EV instead of permanently installed on site, as is assumed by the UL standard. Since a variety of cars may connect to a single charging station, the system must be able to identify which car model is connected, and whether it has an inverter that meets safety and reliability standards for export.

In order to resolve this issue, the Society of Automotive Engineers has developed standard SAE J3072. Notably, the SAE standard adds a unique safety feature: the stationary components act as a protective gatekeeper, allowing only approved car models to export power. This standard requires that the grid-integrated vehicle and charging station be in compliance with both the National Electrical Code (NEC) and IEEE 1547, and adds other safety features.

We recommend that the Commission allow AC V2G systems certified to standard SAE J3072 to qualify for the SIR’s expedited application process.

c. Certifying entity for AC charging systems
The SIR also require that testing of interconnection equipment be done by a Nationally Recognized Testing Laboratory. These labs, known as NRTLs, are defined by federal
OSHA regulations to specifically exclude “automotive vehicles.”\textsuperscript{4} We recommend that the Commission allow electric vehicle compliance with SAE J3072 to be determined (and attested to) by the vehicle manufacturer or the supplier of the on-board inverter and other charging equipment.

If NRTL testing is needed, the relevant standard is UL 2594, which applies to the stationary components of the V2G system.

We appreciate the opportunity to contribute our comments on this matter.

Sincerely,

\textit{/s/ Imelda Foley}
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