STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1275

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application by Duke Energy Carolinas, LLC for Approval of Electric Vehicle-to-Grid Pilot Program Pursuant to N.C. Gen. Stat. § 62-133.9 and Commission Rule R8-68	))))	ORDER APPROVING PILOT PROGRAM SUBJECT TO CONDITIONS

BY THE COMMISSION: On August 16, 2022, Duke Energy Carolinas, LLC (DEC or Company), filed an Application in the above-captioned docket for approval of its proposed Electric Vehicle Load Control Service Pilot (V2G) program as a new demand-side management (DSM) program.

On November 14, 2022, the Public Staff and Vote Solar filed initial comments on the V2G pilot program.

On November 15, 2022, the Commission issued an Order granting Vote Solar's request to intervene.

On December 12, 2022, DEC filed reply comments.

Description of the V2G Pilot Program

Program Guidelines

DEC stated that it would work with the Ford Motor Company (Ford) to pilot a program that will allow DEC to use certain electric vehicle (EV) batteries in leased trucks as a dispatchable distributed energy resource (DER) to help manage peak load conditions. According to DEC, the V2G pilot would allow DEC to evaluate the bi-directional vehicle-to-grid technology, the availability and performance of EV batteries, and how the load management activities impact the battery life and functionality, as well as gain insight into customers' behaviors and willingness to allow DEC to control EV batteries. The Application, in section (c)(2)(ii)(b), states that:

> This Pilot's duration will be the term of the vehicle lease; but the Company anticipates having verified results from the first two years of the Pilot to demonstrate and inform the launching of a commercial version of the program prior to the end of the Pilot period.

DEC stated that pilot participants would be individually metered residential customers who have leased a qualifying EV and installed the necessary EV supply equipment at their residences. DEC explained that pilot participants will be customers who lease EVs for several reasons. First, working with customer leases allows for an easier implementation because the Company pays an incentive directly to Ford to reduce the customer's monthly EV lease payments. Second, based on conversations with Ford, a high number of EVs capable of participating in the pilot are anticipated to be leased to customers, and historically in North Carolina, less than 10% of lease customers relocate during the term of the lease. According to DEC, this data indicates a likely reduced risk of a leased EV owner relocating during the pilot and removing the source of the utility system benefit from DEC's system. Finally, the Company is able to limit the duration of the pilot to align with the duration of the EV lease.

DEC stated that initially the Ford F150 Lightning will serve as the only EV for the pilot, but that it expects to expand the program to include other models and manufacturers in the future. Participants would allow DEC to dispatch the EV battery's electricity for up to 24 control/discharge events per year. DEC proposed to call three events during each of the winter months (December through February), three during each of the summer months (June through August), and one event in each of the remaining months. Participants would be notified at least 18 hours in advance of events, and discharge events would last no longer than four hours. The Company would reserve the right for interruption outside of these parameters in the event continuity of service is threatened and would reserve the right to test the connectivity and discharge capability of the participant's EV battery at any time, without notice, with such test periods being counted toward the maximum number of events. Other guidelines for participation would include:

- Participants would receive an incentive of $6.50 per kilowatt (kW) demand per month in the form of a payment by DEC to Ford to reduce the customer's monthly EV lease payment. The amount of kW demand and the corresponding incentive amount would be based on the battery discharge capability. If the actual annual battery capability exceeds the assumed capability, participants will also receive a $25 gift card.

- Participants would be allowed to opt out of control events, but those who opt out from part or the whole of a control event in a single winter or summer could be subject to removal from the pilot and loss of participant incentives.

- Participants may transfer service to a different location within DEC's service territory on the condition that they also transfer their participation in the V2G pilot.

- Participants who terminate participation within 12 months would be subject to a termination payment equal to the sum of all financial incentives that the participant has received.

- Participants would be required to install and maintain the EV supply equipment consistent with the Company's interconnection procedures.

- DEC expects to enroll at least 35 participants and no more than 100 participants.

- DEC expects to enroll approximately 385 kW of dispatchable DER. If the pilot is fully commercialized, DEC expects approximately 7.8 MWs of dispatchable DER from participating EVs.

Projected Costs

Attachment C to the Application states the total projected costs of the V2G pilot over the first five years as follows:

Type of Costs	Costs
Implementation Costs	$874,014
Administrative (EM&V) Costs	$335,102
Participant Incentives	$3,529,550[1]
Other Utility Costs	$703,603
Total Costs	$5,442,270

Cost-Effectiveness

According to Attachment B to the Application, DEC projects the total net present value of benefits of the pilot to be $17,483,851. Approximately 40% of the system-level avoided cost benefits are derived from capacity savings and 60% from transmission and distribution (T&D) savings. The cost-effectiveness results for the pilot and commercialization of the program[2] are summarized below:

[1] This number reflects the total cost of participant incentives as listed in lines 21-25 of Attachment C. Although Line 22 of Attachment C states "$831" as the value for Year 2 incentives, the supporting workpapers demonstrate that the correct value for Line 22 is $831,000, resulting in the total amount of participant incentives listed above.

[2] Attachment B states that the "[d]ata represents present value of costs and benefits over the life of the program," which DEC has clarified includes the duration of the Pilot and the first three years of commercialization.

Utility Cost Test	1.24
Total Resource Cost Test	2.56
Ratepayer Impact Measure Test	1.24
Participant Test	Not applicable

In conclusion, DEC stated that if the V2G pilot program is approved by the Commission the Company will complete its implementation plans and make the pilot available to customers on or about March 31, 2023.

Comments

Public Staff

The Public Staff stated that as is typical of pilot programs, the two-year V2G pilot is not expected to be cost-effective, but that if the pilot proves successful in providing meaningful capacity reductions, the five-year perspective of the pilot and commercialization are expected to produce cost-effective capacity savings and serve as the basis for a longer term DSM program. The Public Staff opined that the level of capacity reductions per EV that can be achieved, the impacts on the system when the dispatch/control event is concluded, how the leasing arrangement with EV manufacturers impacts participation, and how the telematics data of the battery and availability can inform long term commercialization of the pilot and other future DSM programs are all critical to developing EVs as a DER. Further, the Public Staff confirmed through discovery that DEC's avoided energy and capacity benefits were valued using the avoided cost rates derived from Docket No. E-100, Sub 167 and that the avoided T&D benefits were valued using the updated rates associated with DEC's 2022 DSM/EE rider filing in Docket No. E-7, Sub 1265, which were agreed upon between DEC and the Public Staff for use in the Vintage 2023 forecast.

The Public Staff stated that Paragraph 59 of DEC's DSM/EE cost recovery Mechanism allows the recovery of net lost revenues if, at the time of an application, the Company intends to develop a pilot into a full-scale approved program and subject the program to appropriate evaluation, measurement and verification (EM&V). Paragraph 59 also requires that a pilot program's cost-effectiveness be proven for it to receive net lost revenues upon true-up. In addition, the Public Staff stated that Paragraph 67 of the Mechanism allows the recovery of a program performance incentive (PPI) for a pilot if the Commission specifically approves a request at the time of the application, and if the pilot is ultimately commercialized as a full scale program. According to the Public Staff, DEC indicated in discovery that the Company had not identified any potential for a commercialized version of the pilot to produce net lost revenues, and that this is typical of DSM programs, which are intended to provide capacity or demand savings and not energy savings. Moreover, the Public Staff stated that DEC indicated that if the V2G pilot is approved as a fully commercialized DSM program, the Company will seek approval of a

PPI for the program. Finally, the Public Staff stated that it would appreciate the opportunity to work with DEC to develop a reporting template that will provide useful information on commercialization of the pilot and the potential for other managed charging programs and DSM programs. The Public Staff provided some examples of the information that could be included in the reporting template.

In conclusion, the Public Staff recommended that the Commission approve the V2G pilot for a period of two years, with the question of whether to extend or end it to be addressed three months prior to the expiration of the pilot upon a motion filed by DEC to extend or cancel the pilot, or a request to transition the pilot into a fully commercialized DSM program. In the event that DEC files a motion to extend the pilot program, the Public Staff listed several items of information that should be provided by DEC in support of its motion. Further, the Public Staff recommended that DEC file an EM&V evaluation plan as soon as it becomes available but no later than 90 days after the implementation of the pilot. The Public Staff also recommended that DEC and the Public Staff jointly develop a template for a report on the commercialization of the pilot program into a DSM program, and that DEC should file the first report within nine months of the approval of the program and thereafter on a quarterly basis.

Vote Solar

Vote Solar stated that it supports DEC's proposed V2G pilot program because the proposal is projected to achieve cost-effective DSM. However, Vote Solar recommended two supplemental elements to the DEC proposal that it contended would enable evaluation of the V2G pilot performance at the distribution feeder level as a hosting capacity constraint mitigation tool:

(1) DEC should report on V2G pilot participation kW reduction performance at the feeder and substation level, using anonymized customer data; and

(2) DEC should use one test event in summer and one test event in winter to test the ability for V2G discharging to mitigate distribution constraints. If any participants are on a feeder experiencing reverse power flow issues or other capacity constraints, these participants should be used. If no participants are on a constrained feeder, DEC should perform modeling to analyze how the actual participant performance would have affected a feeder with reverse power flow and other capacity constraints.

According to Vote Solar, these two modifications of the pilot would assist DEC in managing feeder and substation level peak demands that impose costs on ratepayers. Vote Solar discussed a 2019 study by the Electric Power Research Institute that modeled the interactions between V2G services and a constrained distribution feeder and found that V2G can provide savings to ratepayers and serve as a tool to mitigate hosting capacity constraints. Vote Solar also cited a recent California study using hosting capacity data available to stakeholders to analyze the impact that building and vehicle electrification will have on the demand for distribution upgrades. Vote Solar stated that the California study found that electrification may require between $1 to $10 billion dollars in additional rate

base for distribution infrastructure alone, and that key factors as to the size of the increase will be how well loads are managed and if non-wires alternatives are deployed effectively. Vote Solar contended that the V2G pilot could serve as a critical learning experience to keep distribution infrastructure upgrades to a minimum.

Finally, Vote Solar recommended that if adopted at a full scale the V2G program should be offered to all DEC customers who lease and own EVs, not just to those who lease.

Reply Comments

DEC stated that the Public Staff and DEC had met and agreed on a reporting template. DEC included the details of the reporting template and stated that the Company will file the first report no later than nine months from the date of a Commission Order approving the V2G pilot, and every six months thereafter. The first report will include information for the first six months of the V2G pilot.

DEC further stated that it met with Vote Solar to discuss Vote Solar's proposed additions to the scope of the V2G pilot. DEC stated that the Company and Vote Solar were unable to reach agreement on the necessity or advantage of adding the two elements proposed by Vote Solar. According to DEC, it tailored the V2G pilot specifically to allow the Company to assess the potential system benefits, technical capability, and customer willingness to allow a utility to leverage EV batteries in the framework of demand response, but the V2G pilot was not designed to, nor does it have the necessary scope to provide learnings specific to locational values and impact on DER integration capabilities. DEC acknowledged that it may be able to collect some locational information regarding participants in the V2G pilot, based on the small scale of the pilot, but stated that the broader applicability of any data will likely be limited. Moreover, DEC maintained that it designed the V2G to be consistent with the Commission's Order Approving Electric Transportation Pilot, In Part, issued on November 24, 2020 in Docket Nos. E-2, Sub 1197 and E-7, Sub 1195 (ET Pilot Order), in which the Commission directed the Company to be mindful of the proper scale and scope of EV pilots so that it may "test a concept at a smaller scale." (ET Pilot Order, at 20.) In addition, DEC opined that with the small number of intended participants, no more than 100, reporting about locational data publicly could potentially compromise the ability to ensure the privacy of participants and possibly implicate the Company's Code of Conduct, which limits the Company's ability to share potentially competitively sensitive nonpublic customer usage data, even when anonymous and aggregated. Finally, DEC stated that it would commit to use any lessons learned and applicable data collected regarding location of participants to inform its work with stakeholders to develop any future V2G programs that could inform the calculation of location values and DER integration capabilities.

Discussion and Conclusion

In the ET Pilot Order the Commission established several minimum criteria for approval of ET pilot programs. Two of those criteria are:

- Proper Scale and Scope: The scale and scope of a pilot program should be set in a manner that allows the utility to test a concept at a smaller scale without incurring substantial capital costs, such that if the pilot program is successful it can then be readily deployed system-wide with more assurance that it will be economically viable.

- Leverage Other Funding: Pilot programs should encourage or require the use of third-party funding (private, federal, state, municipal, grants) wherever it is available. Programs should also encourage ownership and operation partnerships that provide the greatest benefit to customers.

ET Pilot Order, at 20-21.

The design of the V2G pilot is consistent with these two goals. It is apparent that DEC has given much thought to the size and scope of the V2G pilot in order to produce a meaningful test of EV battery management capability that could lead to a much broader application. In addition, DEC's partnership with Ford is an innovative way to bring together commercial interests and the public interest to serve the customers of both Ford and DEC. Moreover, it could serve as a model for developing similar partnerships in pursuit of the benefits of EVs.

Based on the foregoing and the record, the Commission concludes that the proposed V2G pilot meets the requirements of a new DSM program as set forth in N.C. Gen. Stat. §§ 62-133.8 and 62-133.9 and Commission Rules R8-67 and R8-68 and is in the public interest. Further, the Commission concludes that all reasonable and prudent costs incurred by DEC for implementation of the pilot should be eligible for cost recovery through the Company's annual DSM/EE rider in accordance with Rule R8-69(b), with the question of a PPI for the program to be decided if the program is ultimately offered by DEC as a commercialized tariff.

The Commission further concludes, consistent with the recommendation of the Public Staff, that the V2G pilot program should be approved for a duration of two years, subject to DEC's right to petition the Commission to extend the pilot program, transition the pilot into a fully commercialized program, or end the program. Such petition by DEC shall be filed at least three months prior to the expiration of the V2G pilot, and shall include the information that was recommended by the Public Staff for inclusion in any such petition. Moreover, such petition shall include a discussion and recommendation as to whether the program, if to be continued, should be opened to owners of EVs, as recommended by Vote Solar.

In addition, the Commission finds good cause to approve the reporting template agreed upon by DEC and the Public Staff, as detailed in DEC's Reply Comments. DEC shall file the first report nine months from the date of this Order and every six months thereafter. The first report shall include information for the first six months of the V2G pilot.

Finally, the Commission finds good cause to require DEC to work with Vote Solar and the Electric Transportation Stakeholder Group, to discuss and evaluate the potential for collecting data to enable the calculation of location values and DER integration capabilities in future iterations of the V2G program, if there are any such future iterations. DEC shall include its findings on these points in the report filed with the Commission at the end of the first two years of the pilot program.

IT IS, THEREFORE, ORDERED as follows:

1. That DEC's Application for approval of the Electric Vehicle Load Control Service Pilot for a period of two years as a new DSM pilot program shall be, and is hereby, approved, subject to the conditions stated in the body of this Order;

2. That DEC shall file an EM&V evaluation plan no later than 90 days after the implementation of the pilot program;

3. That DEC shall file a report on the commercialization of the pilot program into a commercialized DSM program within nine months of the date of this Order and every six months thereafter;

4. That, to the extent DEC desires to extend the program beyond the initial two year term or to transition the pilot into a commercialized DSM program, DEC shall make such request by motion filed no later than three months prior to the expiration of the initial two year term, and shall include in any such motion the information that was recommended by the Public Staff for inclusion;

5. That the Commission shall determine the appropriate ratemaking treatment for the pilot program, including program costs and incentives, in DEC's annual DSM/EE cost recovery rider, in accordance with N.C. Gen. Stat. § 62-133.9 and Commission Rule R8- 69; and

6. That DEC shall file tariffs for the pilot program within ten days of the date of this Order that include the effective date of the program.

ISSUED BY ORDER OF THE COMMISSION.

This the 11th day of April, 2023.

NORTH CAROLINA UTILITIES COMMISSION

Erica N Green

Erica N. Green, Deputy Clerk