Mass Market Managed Charging

PROGRAM PROPOSAL

Submitted by: New York State Electric & Gas Corporation and Rochester Gas and Electric Corporation

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Table of Contents

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EXECUTIVE SUMMARY

NYSEG and RG&E Mass Market Managed Charging Program Proposal

1.1 EXECUTIVE SUMMARY

New York State Electric and Gas Corporation ("NYSEG") and Rochester Gas and Electric Corporation ("RG&E") (hereinafter "the Companies") hereby submit this Mass Market Managed Charging Program Proposal ("Proposal") for program years 2020 through 2025. The Companies are filing this Proposal in compliance with the New York State Public Service Commission's ("Commission") July 16, 2020 "*Order Establishing Electric Vehicle Infrastructure Make-Ready Program and Other Programs"* ("Order"[1]).

Increased use and smart integration of Electric Vehicles ("EVs") can improve asset utilization by increasing non-peak electricity use which has potential value to all ratepayers. While the impact of EVs is not yet significant, to provide value to grid operations and to minimize the impact to existing capacity, integration of high levels of Distributed Energy Resources ("DER"), including flexible loads like EVs, at large scale will require visibility and the ability to coordinate these DER assets connected to the distribution system through secure communications and flexible interconnections.

It is widely documented that 80% or more of residential EV charging occurs at home. However, less is known about the charging behavior of EV drivers when they do plug in at home. Many of the benefits afforded to the distribution system by EV charging are predicated on assumptions of off-peak charging. Conversely, at scale, simultaneous off-peak charging can have adverse effects on the distribution system. The Companies' Proposal addresses these concerns through behavioral (passive) and non-behavioral (active) approaches to encourage off-peak charging and optimize charging load to maximize benefits to the distribution system.

[1] Case 18-E-0138, *Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure.* Order Establishing Electric Vehicle Infrastructure Make-Ready Program and Other Programs, Jul. 16, 2020.

How much energy a customer receives at home is directly related to the charging equipment they use, daily driving needs (mileage) and access to available charging opportunities such as workplace charging. A Level 1 ("L1") charger is supplied with almost all new EVs sold in the U.S. These chargers connect to a typical residential 120V outlet and can deliver approximately 4 miles of charge per hour depending on the amperage rating of the charging plug. An L1 charger could meet the daily driving needs of an EV driver if they drive less than 30 miles per day but would require daily charging. Many EV drivers using L1 at home will supplement their charging at work, especially if it is offered free of charge.

EV drivers may forgo installing Level 2 ("L2") charging equipment at home due to the initial equipment cost, potential service upgrades and the costs to install a 240V outlet where they charge (i.e. garage). Costs for L2 equipment and installation can vary widely, but average approximately $600 for the L2 charger and $750 for installation of a 240V outlet. An L2 charger delivers more than 5 times the miles per hour charge of an L1 charger, averaging approximately 25 miles per hour depending on the amperage rating of the charger.

Conversely, at scale, L2 residential chargers can create unfavorable conditions for the local distribution system due to their greater power requirements. Typical residential L2 chargers have power ratings of approximately 7 kW, while a typical residential transformer is rated for approximately 25 kW and can serve 5 to 10 households[2]. Wide scale deployment of unmanaged residential L2 charging would generate the need for the upgrade of, or installation of additional, transformers and potentially feeder upgrades depending on loading conditions. Therefore, the Companies propose a Passive and Active Managed Charging Program to encourage and support off-peak charging by residential EV owners/operators.

The Mass Market Managed Charging Program proposed recommends an approach based on a variety factors which the Companies believe will result in the greatest opportunity for program participation and success. The Companies look forward to incorporating stakeholder feedback and adjusting the approach, as appropriate.

[2] In the Companies' more rural districts transformers may be rated at 10 kW and serve as few as 1 to 3 customers.

PROPOSAL DESCRIPTION

2.1 PROPOSAL DESCRIPTION

The Proposal is a comprehensive managed charging program for residential EV owners/operators that incorporates both passive and active features designed to encourage and optimize off-peak charging of light-duty EVs. The Proposal is voluntary for participants and provides incentives that scale in relation to participation as users choose to opt-in to Proposal features that require increasing levels of participant commitment. Proposal participation levels vary from basic to advanced and allow participants to commit themselves to managed charging activities they are comfortable with.

At the basic level participants have a low level of commitment and provide the Companies with basic demographic and charging behavior information. They also agree to enroll in the Companies' EV time-of-use ("TOU") rate and receive behavior prompts to charge during off peak periods. At the intermediate level, participants commit to allow the Companies to receive charging data via a telematics device they install in their EV and/or through telematics data delivered through existing on-board EV telematic systems. At the intermediate level, participants are challenged to maximize off peak charging and may also participate in demand response. The advanced level will recruit participants to enroll in active managed charging. Participants who enroll in active managed charging will determine the level or state of charge required (charging power requirements) and the times their vehicle is available for charging (charging session duration). By defining these variables, the managed charging algorithm determines how much power to deliver each participant and during what periods. All interaction between participants and the Proposal will be automated through a web-based portal and/or mobile app. The portal/app allows participants to enroll in the Proposal, manage their participation, monitor their performance and receive feedback on their participation.

2.2 PROPOSAL ELIGIBILITY REQUIREMENTS AND INCENTIVES

The proposed incentive values are estimates based on review of similar "Smart Charging" programs at other utilities, similar incentives offered by the Companies' in its demand response programs and the active managed charging pilot operated by NYSEG in Ithaca, NY. Ultimately, the Companies selected incentive levels that are designed to entice participation at a reasonable level of financial gain. Proposed incentive levels will be reviewed in the evaluation of the Proposal. Proposal incentives are not designed to monetize distribution system, or rate payer benefits. However, one of the underlying metrics for the Proposal is to refine incentive levels based on several variables which may include a monetization of benefits.

In addition to financial incentives, each participant at the intermediate level and above will receive a telematic device at no cost and/or provide access to their EV on-board telematics. The Companies prefer the telematics approach to data collection over networked L2 because it provides several program benefits that are not achievable through a networked charger. Some of the benefits of telematics include:

- An economical alternative to networked L2 chargers
- A reliable cellular data transfer platform
- The ability to collect charging session data at any location at home or away
- The ability to initiate demand response events at any location within the Companies' service area

Proposal incentive levels and the associated program eligibility requirements are described below:

Basic Level Participation: At the basic level participants receive a $25.00 annual incentive for completing an online survey instrument designed to capture EV driving and charging behaviors and other demographic information. This survey will be used to develop a database of EV driving and charging use cases in the Companies' service area. In addition to the survey, participants agree to enroll in the Companies' EV TOU rate for one year. Each year that the participant completes the survey and remains on the EV TOU rate, they are eligible to continue receiving the

incentive. Participants in the basic level receive regular communications regarding the proposed program, their participation and encouragement to charge off-peak. They will also be asked to consider higher levels of participation.

Intermediate Level Participation: In addition to the incentives and requirements of the basic level, participants in the intermediate level agree to share charging session data with the Company through a telematics device provided by the Companies and installed by the customer, and or provide the Companies access to the on-board telematics data. When the Companies begin successfully receiving data the participant is eligible for a $50.00 annual incentive and continues to be eligible for the term of the Proposal. Participants in the intermediate level are also eligible to receive an additional annual incentive of $50.00 if at least 90% of their charging occurs during off-peak hours over the course of a calendar year.

Participants at the intermediate level also agree to enroll in demand response but are not obligated to respond to any event called by the Companies. Participants always have the option to "opt-out" when an event is initiated. Demand response events would coincide with the Companies' annual Distribution Level Demand Response events. If the participant opts-in to the event and does not charge their EV during the event they would be eligible for a $20 incentive for each event they successfully opt-in to. Participants in the intermediate level receive regular communications regarding the proposed program, their participation and encouragement to charge off-peak. They are also able to track their participation through a web portal designed to facilitate program participation.

Advanced Level Participation: In addition to the incentives and requirements of the basic and intermediate levels, participants in the advanced level take an active role in managing their charging in collaboration with the Companies to optimize charging for maximum benefit to rate payers and the distribution system. The primary objective of load optimization is to achieve a balance between individual EV charging needs and available system capacity at the local and substation level by targeting areas of high EV penetration for active managed charging.

Incentives at the advanced level are calculated based on the energy and time requirements of each individual participant. Through the proposed program mobile app, participants select the

state of charge they require (energy) and the delay they are willing to accept to receive that state of charge (time). The lower the state of charge required, combined with the longest delay tolerance provides the highest level of flexibility and subsequent incentive. For planning purposes, the Companies have categorized incentives in three scenarios for an individual participant, maximum charging flexibility, moderate charging flexibility, and minimum charging flexibility. Table 2.2 illustrates the maximum incentives under each scenario. Actual incentives will vary according to the specific state of charge relative to the charging period delay of each individual participant. Where the incentive is highest when there is more opportunity for charging flexibility (a combination of a small energy requirement and maximum delay) and is lowest when the customer provides the Companies with less flexibility (a combination of a large energy requirement and minimum delay).

	Monthly Incentive	Annual Incentive
Minimum Charge Flexibility	$1.98	$24.00
Moderate Charge Flexibility	$3.85	$46.00
Maximum Charge Flexibility	$5.83	$70.00

Table 2.2: Illustrative Managed Charging Incentive

2.2.1 Active Managed Charging and NYSEG's OptimizEV Pilot

Active Managed Charging: As technology related to EV onboard charging systems and networked EV residential charging has increased, a new phenomenon known as "timer peak" has emerged. Timer peak is a potentially significant issue related to passive managed charging and experienced by utilities today. Figure 2.2.1a shows the effects of timer peak at San Diego Gas & Electric related to the use of time varying rates without active managed charging.

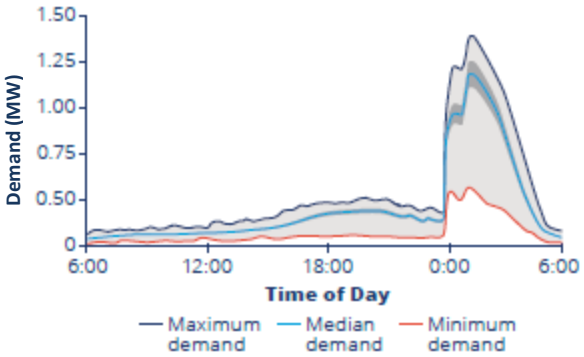

Figure 2.2.1a: Timer Peak at San Diego Gas & Electric[3]

NYSEG OptimizEV Active Managed Charging Pilot: Launched in March 2020 for 35 participants (or 10% of the EV owners in the smart meter footprint in 2017), the NYSEG OptimizEV smart charging pilot explores the use of deadline-differentiated pricing for Service Class 1 customers with plug-in electric vehicles. It gathers insight into the degree to which customer behaviors can be influenced through indirect (e.g. price) and direct control signals.

OptimizEV is designed to minimize the impact of EV charging on the grid. As illustrated in Figure 2.2.1b, the orange curve represents the baseline electricity demand without EV charging over one day and the green curves represent new electricity load due to EV adoption and subsequent at-home charging. The data for the figures was developed with models powered by actual customer data in Lansing, NY. The figure on the left shows uncoordinated EV charging in green, resulting in a peak demand that is much higher than the usual baseline evening demand. OptimizEV coordinates EV charging as shown in the figure on the right, which fills in the valley of the overnight baseline load. (Image credit: Alexeenko & Bitar, 2019, Cornell University)

[3] Residential Electric Vehicle Rates that Work, Smart Electric Power Alliance, November 2019

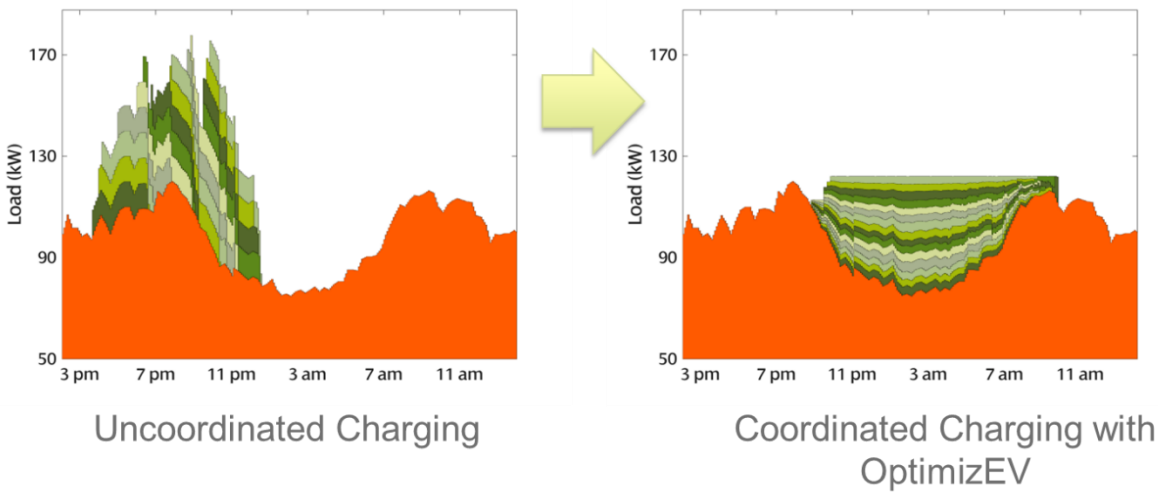

Figure 2.2.1b: Intended Effect of Optimized EV Charging Load

In exchange for a discount, residential EV owners provide flexibility as to when their cars will be charged during overnight hours. In partnership with Cornell University researchers, OptimizEV ensures that EVs are charged within the timeframes specified by the EV owners. The flexibility of allowing NYSEG to coordinate charging is incentivized by discounts on their electricity delivery cost, which is based on how long their cars are plugged in. The discounts are reflected on their monthly bills. Participants can choose to skip coordinated charging if they wish, allowing the ability to charge immediately when needed. OptimizEV participants manage their charging schedule with their smartphone, tablet, or computer by selecting the time that they want their EVs to be charged. For this pilot, participants received a free Level 2 charger with installation at their homes.

Since its launch, the algorithm developed by Cornell University researchers and the Kitu EV Convoy platform successfully work together to accept customer input and control the amount of electricity flowing from the chargers. It should be noted that the COVID-19 pandemic has affected the volume of sessions but overall, the pilot has seen high instances of optimized customer charging. Initial results of the OptimizEV pilot indicate that timer peak occurring from TOU rates, as described previously in this section, can be avoided through managed charging. Complete pilot results will be available in 2021.

Preliminary lessons learned:

- The charging data collected by the program is key. Identify technical specifications and data requirements early in the project and automate data management for all parties.
- Customers expect a well-developed smartphone app to control their charging, as most use their smartphones to log in.
- Data communications must work. There has been little downtime in communications for participants because customers were provided with a cellular gateway connection instead of using customers' WiFi.
- Participants fall into a spectrum of technical ability and understanding of the software's user interface.
- Customers need reminders to start sessions as sometimes participants plug in but forget to start a session through the website.
- Participants desire an indicator to guarantee that their car will start charging during an optimized (coordinated) session.
- Participants indicated that a high level of accessibility to customer support would be a good feature if the program becomes widely available to all NYSEG customers.
- Certain vehicle make/models go into a sleep state if left parked, plugged-in, and idle, resulting in the EV not accepting electricity from the charger and the EV not reaching the desired charge. From our efforts to understand the underlying causes of this issue, it appears that this is not caused by the OptimizEV platform but instead due to individual EV software. Lack of smart charging standards contributes to this issue.

PROPOSAL METRICS

3.1 PROPOSAL METRICS

The Companies have extensive experience in Evaluation, Measurement, and Verification ("EM&V") across a broad range of energy related programs, pilots and measures. The Companies have developed the capabilities to design and implement EM&V studies that are structured, include well-defined methodologies and relevant data sets. In addition, the Companies have long standing and established relationships with a diverse mix of EM&V providers that have the expertise required to execute EM&V studies across subject areas. While the Companies have limited experience with EV Managed charging programs, we have translated our extensive experience with customer programs to recommend preliminary pilot metrics.

The Companies continue to assess a set of metrics that would be most effective at evaluating program performance, therefore, specific program metrics will be developed prior to launch. Preliminary metrics of the Pilot may include:

- Evaluation of various levels of participation relative to other levels (i.e. Basic, Intermediate or Advanced).
- Evaluation of participation relative to EV market share.
- Evaluation of increased levels of participation by existing participants.
- Measurement of off-peak charging relative to on-peak charging.
- Evaluation of charging data in developing use case charging profiles.
- Measurement of Pilot performance in minimizing the effect of Timer Peak
- Measurement of Pilot performance in smoothing overall off-peak charging load.
- Evaluation of grid benefits because of minimized effect of Timer Peak / smoothing of off-peak load.
- Evaluation of the economic incentive tipping point for a customer to choose to go through the process required to engage in Advanced Level charging
- Evaluation of the minimum participation required to achieve desired peak load reduction
- Compare the costs-benefits of providing such a program to the resulting avoided infrastructure costs

EDUCATION AND OUTREACH

4.1 OVERVIEW

The Companies will conduct education and outreach to promote the Mass Market Managed Charging program to existing and potential EV owners/ operators throughout their service areas. The Companies marketing and communications plan will focus on community engagement and traditional and non-traditional (digital) forms of marketing to promote the proposed program. An important component of the Proposal is continued outreach and education to enrolled EV drivers at each level of participation (basic, intermediate and advances) to provide support, encouragement, and continued participation.

BUDGET AND RECOVERY

5.1 PROPOSAL BUDGET

The Proposal is budgeted for five years and is based on projected participation in each year. Participation in each year is estimated as a percent of EV market share or registrations in the Companies' service area with the assumption that new EV registrations occur at a rate required to achieve NY's stated goal by 2025. Therefore, if future EV market penetration does not meet the required sales curve, participation will decrease. The Proposal would be capped at the estimated level of participation and/or budget levels. Table 5.1 shows the proposed annual budget by Proposal year and total Proposal budget.

2021 - 2025 Five Year Program Budget		NYSEG		RG&E		Total	
	Incentive	Participants	Budget	Participants	Budget	Participants	Budget
Basic: Behavioral	$25	16,148	$ 742,876	9,689	$ 445,726	25,837	$ 1,188,601
Intermediate: Data Share	$50	12,918	$ 1,188,601	7,751	$ 713,161	20,669	$ 1,901,762
Intermediate: Off-Peak Charge	$50	10,335	$ 950,881	6,201	$ 570,529	16,535	$ 1,521,410
Intermediate: Demand Response	$100	6,459	$ 1,188,601	3,875	$ 713,161	10,335	$ 1,901,762
Sub-Total Intermediate			$ 3,328,084		$ 1,996,850		$ 5,324,935
Advanced: 75% Charge/ Min. Delay	$24	3,875	$ 171,159	2,325	$ 102,695	6,201	$ 273,854
Advanced: 50% Charge/ Mod. Delay	$46	1,938	$ 164,027	1,163	$ 98,416	3,100	$ 262,443
Advanced: 25% Charge/ Max. Delay	$70	646	$ 83,202	388	$ 49,921	1,033	$ 133,123
Sub-Total Advanced			$ 418,388		$ 251,033		$ 669,420
Total Incentive Budget			$ 4,489,348		$ 2,693,609		$ 7,182,956
Avg. Annual Incentive						$278	25,837
Estimated Annual kWh							3,530
Incentive per kWh							$0.08
Total Hardware/ Software			$ 1,937,748		$ 1,162,649		$ 3,100,396
Program Admin (15%)			$ 964,064		$ 578,439		$ 1,542,503
Total			**$ 7,391,160**		**$ 4,434,696**		**$ 11,825,855**

Table 5.1: Proposed Managed Charging Budget

5.2 PROPOSAL RECOVERY

Consistent with the Commission's Order regarding cost recovery of the Make-Ready Program, Environmental Justice Community Clean Vehicles Transformation Prize, Clean Personal Mobility Prize, Clean Medium- and Heavy- Duty Innovation Prize, Fleet Assessment Service, Medium- and Heavy-Duty Make-Ready Pilot Program, and Transit Authority Make-Ready Program, the Companies propose that costs related to its Mass Market Managed Charing proposal be deferred as a regulatory asset. At the end of each program year, these costs would be recovered through existing surcharges over a period of 10 years, with the net-of-tax balances accruing carrying charges at each utility's pretax overall cost of capital.