# The Commonwealth of Massachusetts

## DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 20-69 July 2, 2020

Investigation by the Department of Public Utilities on its own Motion into the Modernization of the Electric Grid – Phase Two.

---

VOTE AND ORDER OPENING INVESTIGATION

## I. INTRODUCTION

On May 10, 2018, the Department of Public Utilities ("Department") issued an Order approving the first Grid Modernization Plans for Massachusetts Electric Company and Nantucket Electric Company, d/b/a National Grid ("National Grid"), Fitchburg Gas and Electric Light Company d/b/a Unitil ("Unitil"), and NSTAR Electric Company d/b/a Eversource Energy ("Eversource")[1] (collectively, "Companies"). Grid Modernization, D.P.U. 15-120/D.P.U. 15-121/D.P.U. 15-122 (2018) ("Grid Modernization Order"). The Department preauthorized several grid-facing investment categories, subject to a company-specific budget cap, for a three-year investment term from 2018 through 2020.[2] D.P.U. 15-120/D.P.U. 15-121/D.P.U. 15-122, at 107-108, 113-114. The Department declined, however, to preauthorize the Companies' proposed customer-facing grid modernization investments because our review of the business cases for full deployment of advanced metering functionality showed that the anticipated benefits of these investments did not justify the substantial costs. Grid Modernization Order at 117-135.

---

[1] A Grid Modernization Plan was filed in D.P.U. 15-122 by NSTAR Electric Company and Western Massachusetts Electric Company. Subsequently, in NSTAR Electric Company and Western Massachusetts Electric Company, D.P.U. 17-05, at 36-55 (2017), the Department approved the corporate consolidation of Western Massachusetts Electric Company with and into NSTAR Electric Company pursuant to G.L. c. 164, § 96.

[2] On May 12, 2020, the Department extended the current three-year Grid Modernization Plan investment term through 2021 and established a revised filing date for the subsequent grid modernization plans of July 1, 2021. Grid Modernization, D.P.U. 15-120-D/D.P.U. 15-121-D/D.P.U. 15-122-D at 7 (2020).

In particular, the Department found that the substantial operational savings previously achieved by the Companies through the automated meter reading ("AMR") meters already in use in the Commonwealth, combined with the significant stranded costs that would be incurred to replace these AMR meters prematurely, made full deployment of advanced metering infrastructure difficult to achieve in a cost-effective manner. Grid Modernization Order at 121-124. Also, the Department determined that the costs to upgrade a company's billing and meter data management systems to accommodate deployment of advanced metering functionality further complicated the cost equation. Grid Modernization Order at 121-124.

In addition, the Department determined that customer participation in time-varying rates ("TVR") or other dynamic pricing programs was needed to maximize the benefits of advanced metering functionality. Grid Modernization Order at 133, 136. The Department questioned the reliability of the Companies' customer participation rate assumptions, which added to the uncertainty of the likely benefits from proposed customer-facing grid modernization investments. Grid Modernization Order at 129. The Department found that the increasing number of customers on competitive supply, especially as a result of the recent growth of municipal aggregation in the Commonwealth, further reduced the anticipated benefits of a full deployment of advanced metering functionality as it could significantly curtail the number of customers that can participate in TVR. Grid Modernization Order at 125.

Finally, the Department determined that price fluctuations in the forward capacity market added further uncertainty in achieving anticipated benefits from peak demand reduction. We determined that the forecast of forward capacity market prices used by the Companies to monetize the benefits of peak demand reduction achieved through TVR was not reflective of actual forward capacity market conditions. Grid Modernization Order at 131-132.

In sum, the Department concluded that the anticipated benefits of the Companies' proposed customer-facing investments in advanced metering functionality did not justify the substantial costs. Grid Modernization Order at 134. Our inquiry into advanced metering functionality, however, does not end there. In the Grid Modernization Order, at 135-137, we identified several issues concerning deployment of advanced metering functionality appropriate for further investigation. The Department now opens this second phase of our grid modernization investigation to consider the next appropriate steps for deployment of advanced metering functionality in the Commonwealth.

## II. SCOPE OF INVESTIGATION

In the Grid Modernization Order, at 3, 124-135, the Department found significant barriers to a full deployment of advanced metering functionality and indicated that we would consider whether a targeted deployment of advanced metering functionality to certain customer groups would yield benefits that justify the costs. In this proceeding, the Department will explore whether a targeted deployment of customer-facing technologies to

electric vehicle ("EV") customers, including residential customers, low-income customers, commercial and industrial ("C&I") customers, and EV charging site hosts, is appropriate.

EV customers currently are a small, but rapidly growing, subset of electric customers in the Commonwealth.[3] And, importantly, EV-charging load has the potential to be significant.[4] Continued growth in the EV sector will be critical to the achievement of the

---

[3] For example, the Department of Energy Resources recently expanded the MOR-EV rebate program for the purchase of electric vehicles to include commercial and nonprofit fleets as well as passenger vehicles. See Baker-Polito Administration Expands Electric Vehicle Program to Include Commercial and Nonprofit Fleets, available at: https://www.mass.gov/news/baker-polito-administration-expands-electric-vehicle-rebate-program-to-include-commercial-and (June 25, 2020). Since the program first launched in June 2014, over 16,000 EVs were purchased in Massachusetts with rebates through the MOR-EV program. See Massachusetts Offers Rebates for Electric Vehicles, MOR-EV Program Statistics, available at: https://mor-ev.org/program-statistics (last updated June 23, 2020).

[4] The Smart Electric Power Alliance reports that, in addition to increases in volumetric electric loads, a typical EV charger consumes approximately 3.3 to 10.0 kilowatts ("kW") of demand, which can exceed the total peak demand of a home. In addition, charging loads for vehicles with larger batteries can be up to 20 kW. Smart Electric Power Alliance, A Comprehensive Guide to Electric Vehicle Managed Charging, at Table 1 (2019).

Additionally, the U.S. Department of Energy estimates that a typical EV can require approximately 24 to 50 kW-hours of electricity to drive 100 miles. See U.S. Department of Energy, Power Search, available at: https://www.fueleconomy.gov/feg/powerSearch.jsp (sorted by "Model Year 2020-2021" and "Vehicle Type All Electric") (last visited July 1, 2020). Based on the average annual vehicle miles driven per capita in Massachusetts (i.e., 9,100 miles), a typical EV may consume between 2,184 and 4,550 kW-hours of electricity annually in the Commonwealth. See Office of Energy Efficiency & Renewable Energy, FOTW #113, December 23, 2019: Average Annual Highway Vehicle Miles Traveled Per Capita Varies by State, available at: https://www.energy.gov/eere/vehicles/articles/fotw-1113-december-23-2019-average-annual-highway-vehicle-miles-traveled (2019).

Commonwealth's statewide goal of lowering carbon emissions 80 percent by 2050.[5, 6] In addition, EV-charging load is both discrete and controllable, and EV customers are likely to be motivated to manage their charging behavior if they are given appropriate price signals or

---

[5] The Global Warming Solutions Act ("GWSA") requires the Commonwealth to reduce its greenhouse gas emissions by at least 80 percent below 1990 levels by 2050. St. 2008, c. 298, § 3. Further, pursuant to the GWSA, on April 22, 2020, the Baker-Polito Administration established a statewide net zero emissions limit for 2050 as "necessary to adequately protect the health, economy, people and natural resources of the Commonwealth...." Executive Office of Energy and Environmental Affairs, Determination of Statewide Emissions Limits for 2050, available at: https://www.mass.gov/doc/final-signed-letter-of-determination-for-2050-emissions-limit/download (2020).

[6] The Executive Office of Energy and Environmental Affairs ("EEA") has estimated that the transportation sector will account for more than 40 percent of all greenhouse gas emissions in 2020. Executive Office of Energy and Environmental Affairs, Massachusetts Clean Energy and Climate Plan for 2020, at 86, available at: https://www.mass.gov/files/documents/2017/12/06/Clean%20Energy%20and%20Climate%20Plan%20for%202020.pdf (December 31, 2015). To address these emissions levels, in December 2018, the Commission on the Future of Transportation in the Commonwealth recommended that Massachusetts (1) develop standards for EVs to charge during off-peak hours and be available to deliver energy to the grid during peak hours, and (2) establish a goal that all new cars, light duty trucks, and buses sold in Massachusetts be electric by 2040. Commission on the Future of Transportation in the Commonwealth, Choices for Stewardship: Recommendations to Meet the Transportation Future (Executive Summary), at 8, available at: https://www.mass.gov/doc/choices-for-stewardship-recommendations-to-meet-the-transportation-future-executive-summary/download (last visited July 1, 2020). In addition, EEA has stated that it intends to release its 2050 Decarbonization Roadmap Report and 2030 Clean Energy and Climate Plan before the end of 2020. Executive Office of Energy and Environmental Affairs, MA Decarbonization Roadmap, available at: https://www.mass.gov/info-details/ma-decarbonization-roadmap (last visited July 1, 2020).

incentives.[7] For these reasons, the Department will investigate the targeted deployment of advanced metering functionality to EV customers.

Advanced metering functionality includes a broader range of technology than just advanced metering infrastructure ("AMI") or "smart meters." Accordingly, the Department's investigation will include a full range of cost-effective options in addition to standard AMI technology. The Department expects that, at a minimum, a targeted deployment of advanced metering functionality to basic service EV customers will help establish the groundwork for future deployment of advanced metering functionality to other customer segments.

An investigation into a targeted deployment of advanced metering functionality to EV customers necessarily involves the exploration of TVR designs and other dynamic pricing options[8] that would enable these customers to take advantage of the benefits of advanced metering functionality. TVR should provide effective price signals to customers so that they can take actions that will contribute to reducing system peak demand. In this proceeding, the Department will investigate potential TVR designs for EV customers receiving basic service. Further, the Department will consider whether TVR options for these customers should

---

7 For example, research has found that, for utilities that adopted off-peak EV charging rates, 90 percent of customers responded to the price signals. Smart Electric Power Alliance, Residential Electric Vehicle Rates That Work, at 11 (2019).

8 The Department's use of the term "TVR" in this Order includes the full range of dynamic pricing options for EV customers. As part of this investigation, the Department will consider any implementable TVR design or other dynamic pricing options that are expected to deliver benefits to customers.

include both supply and distribution rates. Although the Department's primary focus will be on basic service EV customers, the Department will also consider what requirements must be met to allow EV customers on competitive supply (and, in particular, EV customers that are in a municipal aggregation program) to participate in TVR to achieve the benefits of advanced metering functionality.

In the Grid Modernization Order, at 121-124, 133-134, the Department determined that the costs associated with necessary upgrades to the Companies' various systems to support advanced metering functionality was a factor that weighed against full deployment. Accordingly, the Department will also investigate the current capabilities of each company's systems to support advanced metering functionality for EV customers. Specifically, the Department will investigate the current status, constraints, and flexibility of each company's metering, data management, communications, and billing systems as they relate to incorporating advanced metering functionality.

Additionally, in the Grid Modernization Order, at 136, the Department noted that alternative metering solutions may exist to enable a cost-effective deployment of advanced metering functionality without resorting to a costly early replacement of AMR meters. In the context of examining a targeted deployment of advanced metering functionality to EV customers, the Department will explore whether any alternative solutions may be compatible with the Companies' current communications, data management, and billing systems to allow each company to collect and communicate interval data without prematurely retiring existing AMR meters.

Last, as we noted in the Grid Modernization Order, at 121-122, 133-134, the potential for stranded costs is a significant impediment to a full deployment of advanced metering functionality. Accordingly, the Department will examine end-of-life meter replacement strategies[9] that will support our grid modernization objectives[10] and limit or avoid stranded costs.

The Department expects that this proceeding will inform the customer-facing investments that the Companies will incorporate into their future grid modernization investment plans. In order to facilitate the conduct of the investigation in an efficient manner, the scope of the proceeding will be limited to the issues identified above.

## III. REQUEST FOR COMMENTS

To begin phase two of our investigation, the Department seeks written comments from the Companies and other interested stakeholders on the questions below. Comments should be filed no later than 5:00 p.m. on August 13, 2020.[11] Reply comments should be filed no later than 5:00 p.m. on September 4, 2020.

---

9 The investigation will also consider cost recovery associated with end-of-life meter replacement strategies.

10 The Department has established the following grid modernization objectives: (1) optimize system performance (by attaining optimal levels of grid visibility, command and control, and self-healing); (2) optimize system demand (by facilitating consumer price-responsiveness); and (3) interconnect and integrate distributed energy resources. Grid Modernization Order at 99-106.

11 On March 10, 2020, Governor Baker issued a State of Emergency related to COVID-19. Ordinarily, commenters would follow Sections B.1 and B.4 of the Department's Standard Ground Rules regarding the filing of documents. See Electronic Filing Guidelines, D.P.U. 15-184-A, App. 1 (March 4, 2020). However,

1. Please discuss all factors the Department should consider when determining whether a targeted deployment of advanced metering functionality to EV customers is appropriate. As part of your response, identify any unique factors that should be considered for particular EV customer segments (e.g., residential customers, low-income customers, C&I customers, EV charging site hosts).

2. Please:

   a. describe generally what basic service supply TVR design options each company should make available to the following EV customer segments: (1) residential EV customers; (2) C&I EV customers; and (3) EV charging site hosts. Identify and discuss the basis for any differences between TVR design options for each EV customer segment;

   b. with respect to the C&I EV customer segment, discuss whether a separate TVR design option should apply to EV fleets;

---

at this time, all filings will be submitted only in electronic format in recognition of the difficulty that commenters and the Department may have filing and receiving original copies. Until further notice, commenters must retain the original paper version of all comments and the Department will later determine when the paper version must be filed with the Department Secretary.

All written comments must be submitted to the Department in .pdf format by email attachment to Peter.Ray@mass.gov, and Hearing Officers Tina.Chin@mass.gov and Sarah.Spruce@mass.gov. The text of the email must specify: (1) the docket number of the proceeding (D.P.U. 20-69); (2) the name of the person or company submitting the filing; (3) a brief descriptive title of the document; and (4) the name, title, email address, and telephone number of a person to contact in the event of questions about the filing. Importantly, all large files submitted must be broken down into electronic files that **do not exceed 20 MB**.

All documents submitted to the Department will be available on the Department's website as soon as is practicable at https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber (enter "20-69"). Paper copies of documents will not be available for public viewing at the Department due to the State of Emergency. To request materials in accessible formats (Braille, large print, electronic files, audio format) for people with disabilities, contact the Department's ADA coordinator at DPUADACoordinator@mass.gov.

c. for each identified basic service supply TVR design option, discuss whether there should be an accompanying distribution TVR design option;

d. for each identified TVR design option in (a) through (c), discuss whether the TVR should apply only to the EV-charging portion of the customer's load or to the customer's entire load;

e. for each identified TVR design option in (a) through (c), discuss how it is designed to provide effective price signals to EV customers so that they can take actions that will contribute to reducing system peak demand; and

f. where applicable, provide citations to jurisdictions where the identified TVR design options have been applied.

3. Please discuss how municipal aggregators can facilitate the participation of their EV customers in TVR to achieve the benefits of advanced metering functionality.

4. (Companies only) Please:

a. describe the current status of your company's metering, data management, communications, and billing systems as they relate to incorporating advanced metering functionality for EV customers;

b. identify any limitations or constraints in your company's existing metering, data management, communications, and billing systems that would serve as barriers to implementing the specific TVR designs for EV customers identified by commenters in response to question 2; and

c. discuss all solutions and the associated costs that would allow your company to accommodate the TVR designs for EV customers identified in response to question 2 using its existing metering, data management, communications, and billing systems.

5. (Companies only) Please identify:

a. the maximum number of TVR customers that your company's existing billing system can accommodate; and

b. the TVR designs that your company's existing billing system can accommodate.

6. Please describe any alternative solutions that may be compatible with the Companies' current communications, data management, and billing systems to allow each company to collect and communicate interval data without prematurely retiring existing AMR meters.

7. (Companies only) Please describe your company's current strategy for meter replacements when an existing meter reaches the end of its useful life or otherwise needs to be replaced. As part of this response, identify any situation where a new service meter would not be capable of advanced metering functionality when installed.

8. Please discuss whether the Department should require all new service meters to be capable of providing advanced metering functionality when installed to replace an existing meter that reaches the end of its useful life or otherwise needs to be replaced.

To provide further opportunity for discussion, the Department anticipates holding a remote technical conference after reply comments are filed. The Department will provide an agenda in advance of the technical conference.

## IV. ORDER

Accordingly, the Department

VOTES: To open phase two of its inquiry into the modernization of the electric grid, consistent with the scope of investigation described herein; and it is

ORDERED: That the Secretary of the Department shall send a copy of this Order to each electric distribution company subject to the jurisdiction of the Department under G.L. c. 164, the Attorney General for the Commonwealth of Massachusetts, and to the service lists in D.P.U. 15-120, D.P.U. 15-121, and D.P.U. 15-122.

By Order of the Department,

Matthew H. Nelson, Chair

Robert E. Hayden, Commissioner

Cecile M. Fraser, Commissioner