The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 12-76-A December 23, 2013

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

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I. INTRODUCTION

On October 2, 2012, the Department of Public Utilities ("Department") issued a Notice of Investigation ("NOI") into the modernization of the electric grid.[1] Modernization of the Electric Grid, D.P.U. 12-76 (2012). The purpose of this investigation is to examine our policies and ensure that electric distribution companies adopt grid modernization technologies and practices to enhance the reliability of electricity service, reduce costs of operating the electric grid, mitigate price increases and volatility for customers, and empower customers to adopt new electricity technologies and better manage their use of electricity.[2]

The Department must ensure that electric distribution companies provide safe and reliable electric service to customers and enhance the deployment of clean energy technologies and processes. The modern grid will enhance reliability and resiliency in the face of increasingly extreme weather and allow for much more efficient utility operations. We also see grid modernization as an important means for advancing the statutory directives and policy goals of an electricity system that can support further development of energy efficiency, demand response, distributed generation, storage, electric vehicles ("EVs"), renewable energy resources,

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[1] The electric grid is an interconnected network for the production, transmission and distribution of electricity from suppliers to consumers. It consists of generating stations that produce electrical power, high-voltage transmission lines that carry power from distant sources to demand centers, and distribution lines that connect individual customers. We refer in this Order to "grid modernization" and a "modern grid." Many of the concepts and technologies that we discuss here are typically referred to as "smart grid." We use the alternative terminology because it is more descriptive of the range of issues that we intend to address.

[2] For more information and future updates, please refer to the Department's grid modernization webpage at: http://www.mass.gov/dpu/gridmodernization.

and innovations that we have yet to imagine.[3] The modern grid will empower customers with greater choices for using electricity and will provide opportunities for reducing costs.

Pursuant to this NOI, in November 2012, the Department hosted a workshop ("Workshop") attended by over 125 stakeholders, launching a collective effort to develop a vision of grid modernization. Following the Workshop, we created a stakeholder Working Group ("Working Group") to: (1) inform the Department's approach to grid modernization over the short, medium, and long terms; and (2) provide input on the sequence and pace of grid modernization infrastructure investments, including grid-facing and customer-facing technologies.[4] From November 2012 through June 2013, stakeholders discussed a full range of issues relating to modernization of the grid. On July 2, 2013, the Working Group submitted a report to the Department that contained information, principles, and recommendations on a wide array of grid modernization issues. "Report to the Department of Public Utilities from the Steering Committee," D.P.U. 12-76 ("Report").

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3 See, e.g., An Act Relative to Green Communities, St. 2008, c. 169; An Act Relative to Competitively Priced Electricity in the Commonwealth, St. 2012, c. 209; An Act Establishing the Global Warming Solutions Act ("GWSA"), St. 2008, c. 298, codified as G.L. c. 21N, § 3; Executive Office of Energy and Environmental Affairs, Massachusetts Clean Energy and Climate Plan for 2020 (December 29, 2010).

4 By "grid-facing," we mean technologies that automate grid operations and allow distribution companies to monitor and control grid conditions in near real time. "Customer-facing" technologies primarily include customer metering and related infrastructure and may include any of the following technologies: meters; two-way communications systems (fixed, wireless and home area networks); internet-based information portals; wireless applications; direct load control technologies (e.g., in-home energy devices and programmable communicating thermostats); and smart appliances and electronics. See, e.g., D.P.U. 12-76, at 8.

The Department is grateful for the dedication and insights of the Working Group members and other stakeholders. Here, we present a straw proposal for moving forward with modernizing the electric grid, based in large part on the deliberations of the Working Group.

In sum, the Department establishes four grid modernization objectives: (1) to reduce the effects of outages; (2) to optimize demand, which includes reducing system and customer costs; (3) to integrate distributed resources; and (4) to improve workforce and asset management.[5] The Department proposes to require each electric distribution company to develop and submit to the Department a ten-year strategic grid modernization plan ("GMP") within six months of a final Order in this proceeding. Each GMP must lay out plans to make measureable progress towards all of these grid modernization objectives. In its first GMP, an electric distribution company must include a comprehensive advanced metering plan ("CAMP"), as defined below. We are requiring the companies to achieve advanced metering functionality because it will serve as the basic platform for grid modernization and provide significant benefits, which are also described in detail below. Each company must achieve advanced metering functionality no later than three years from our approval of its GMP, assuming that the benefits of so doing justify the costs.

We recognize that our directive regarding advanced metering functionality is ambitious. Based on the Report, we have developed a targeted regulatory framework specifically for advanced metering functionality. As described below, the CAMP should consist of: (1) a technology proposal and implementation plan; (2) a business case with a benefit-cost analysis;

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[5] We adopt as our grid modernization objectives the Working Group's "outcomes," which define four different categories of grid modernization. Throughout, we will refer to the "objectives" of grid modernization, which are consistent with the Working Group's outcomes.

(3) a request for pre-authorization of investments; and (4) a request for a mechanism to allow for more timely cost recovery than is typically available. Finally, we propose to address in separate, upcoming proceedings: (1) time varying rates ("TVRs"); (2) cybersecurity, privacy, and access to meter data; and (3) EVs, a proceeding that we open in conjunction with this Order. More details on all of these topics are provided below.

II. BACKGROUND AND PROCEDURAL HISTORY

In the NOI, at 3-4, we sought: (1) an understanding of the current status of electric grid infrastructure; (2) an implementation strategy for grid-facing elements, including distribution automation; (3) an implementation strategy for customer-facing elements, including TVRs;[6] (4) an understanding of the costs and benefits of grid modernization; (5) input on cost recovery questions; (6) an approach to customer education and engagement; and (7) an approach to issues such as security, privacy, interoperability, and concerns about potential health effects.

On November 14, 2012, the Department hosted the Workshop. Following the Workshop, we established the structure, membership, timeline, and process for the Working Group. Led by a facilitator, the Working Group's steering committee included 25 member organizations from consumer and environmental groups, the electric distribution companies, ISO-New England Inc. ("ISO-NE"), the Department of Energy Resources, the Attorney General of the Commonwealth ("Attorney General"), competitive suppliers, and representatives from a wide range of clean energy companies and organizations, as well as ex officio members from the Department, the Massachusetts Executive Office of Energy and Environmental Affairs, and the Massachusetts Department of Telecommunications and Cable. The Working Group also included two

[6] Our NOI called such rates "dynamic pricing," but these terms are synonymous.

subcommittees, which were tasked with discussing the issues and developing and reporting recommendations to the steering committee.[7] Over eight months, the Working Group process consisted of 14 all-day meetings and several conference calls in which participants shared knowledge and opinions on grid modernization topics and developed the Report.[8]

On July 2, 2013, the Working Group filed its Report with the Department. The Department solicited comments on the Report, and received 29 sets of comments.[9]

III. SUMMARY OF THE WORKING GROUP REPORT

In establishing the Working Group, we encouraged its members to work towards agreement on as many of the key grid modernization issues as possible, and to identify those areas of agreement. Where agreement could not be reached, the Department asked the Working Group to report the different views and identify which members supported each one. The

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[7] For a complete description of the Workshop and Working Group process refer to the Report at 2-6. For a complete list of Working Group members, refer to the Report at Appendix II. The organizations represented on the Steering Committee also were represented on the subcommittees, and the subcommittees also included renewable energy and grid modernization advocates other than those who were formally a part of the process.

[8] The process was supported by a public website to share ground rules, agendas, meeting summaries, presentations, working documents, and background/research materials at: http://magrid.raabassociates.org/index.asp.

[9] Comments were filed by: 24M Technologies, Inc.; Advanced Energy Economy; Andrew A. Bochman; Attorney General; Beacon Power, LLC; BRIDGE Energy Group; Cape Light Compact; ChargePoint; ClearEdge Power; Conservation Law Foundation; eCurv. Inc.; The Electricity Storage Association; Environment Northeast; The EMR Policy Institute; Intelligent Illuminations, Inc.; Interstate Renewable Energy Council, Inc.; ISO-NE; Low-Income Network; Massachusetts Department of Energy Resources; Muninsight; My Generation Energy; National Grid; New England Clean Energy Council; NSTAR Electric Company and Western Massachusetts Electric Company; Perfect Power Institute; Retail Energy Supply Association; TechNet; Utilidata, Inc.; and Veolia Energy North America, Inc.

purpose of these instructions was to determine the commonalities and differences among the stakeholders, in order to help the Department identify and consider their perspectives in designing policies in support of a more modern electric grid.

The Report is the product of many hours of education, discussion, and debate. Chapter One provides an introduction and overview of the Working Group process. Chapter Two outlines the Department's goals for grid modernization and also provides the Working Group members' enumeration of potential barriers under the current regulatory regime. Chapter Three includes the Working Group's taxonomy for grid modernization in Massachusetts, which includes: (1) objectives; (2) the activities, capabilities, and system enablers associated with those objectives; and (3) definitions of each term.[10] Chapter Four is a summary of the background information assembled largely by the subcommittees and the electric distribution companies regarding the current status of: (1) grid-facing system enabling technologies; (2) TVR pilot programs; (3) metering technologies; (4) capabilities of different kinds of metering technologies; and (5) estimated cost ranges associated with metering technologies and related system enablers. Chapter Five contains the Working Group's recommended principles for over-arching, grid-facing and customer-facing issues. Chapter Six contains recommended policies for regulatory oversight, ratemaking, and cost recovery for grid modernization investments.

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[10] When we opened this investigation, we asked the Working Group for its recommendations on customer-facing and grid-facing technologies and practices. In response, the Working Group produced a taxonomy that recognizes that some types of technologies offer benefits for both customers and for the system as a whole.

Chapter Seven provides various cost-effectiveness frameworks offered by Working Group members. The Report concludes with recommendations about next steps for the Department.[11]

IV. DEPARTMENT GOALS AND OBJECTIVES

In the NOI at 3-4, the Department identified the opportunities provided by a modern electric grid, which are: (1) to reduce the frequency and duration of customer electricity outages through automated, remote-controlled grid devices and real-time communication to the electric distribution companies; (2) to provide information, price structures, technologies, incentives, and other tools to customers to empower them to use electricity more efficiently and thereby save money; (3) to improve the operational efficiency of the grid, particularly during peak times when it is most stressed and when electricity is most expensive; (4) to reduce operation, maintenance, and construction costs of the transmission and distribution systems by reducing electricity demand during system peaks; (5) to reduce wholesale and retail electricity prices by reducing electricity demand during system peaks; (6) to encourage the adoption of distributed resources and new technologies such as renewable energy technologies, combined heat and power, energy storage, and EVs; (7) to enhance the success of energy efficiency initiatives through marketing campaigns and advanced technologies that reduce peak demand and save energy; and (8) to reduce greenhouse gas emissions by reducing line losses, reducing the demand for conventional fossil fuel generation, empowering customers to use energy more efficiently, and encouraging the adoption of clean distributed resources.

We also identified several factors to keep in mind in realizing these opportunities. These include: (1) consumer protection, in order to ensure that all electricity customers, including

[11] The Report's three appendices provide additional details.

low-income customers, renters, and small business customers, are able to benefit from grid modernization developments; (2) cost-effectiveness, in order to limit the cost burden of electricity for customers; (3) customer engagement, which is necessary to take full advantage of grid modernization opportunities; and (4) timing, in light of cost issues and the rapid pace of technology evolution. The Department reviewed the Report and comments with these factors in mind. Below, we present our plan for moving Massachusetts towards a modern electric grid and the opportunities it will provide.

V. STRAW PROPOSAL

A. Overview of Straw Proposal

Our straw proposal for achieving grid modernization has two main components. The first component is our directive to each electric distribution company to submit a GMP, and the first GMP must include a CAMP. The filing of a GMP is a new and recurring requirement for each electric distribution company, which must occur no less often than every five years. The second component is our plan to address a number of grid modernization topics in separate proceedings. These topics include: (1) TVR; (2) cybersecurity, privacy, and access to meter data; and (3) EVs. Commenters may address any aspect of this straw proposal.

B. Grid Modernization Plans

1. Reasons to Require Grid Modernization Plans

The Report at 44 states that the Department's role in advancing grid modernization is: (1) to identify goals and objectives for electric distribution companies; (2) to establish the policy and regulatory framework; and (3) to provide appropriate cost recovery for electric distribution company investments. The Report at 44-45 states that the electric distribution companies' role is

to develop and implement investment and operational plans that will meet the Department's grid modernization objectives as well as the companies' obligation to provide safe and reliable service at just and reasonable rates.

We find that evaluating and investing in technologies that further grid modernization should be an integral component of electric distribution companies' on-going and routine investment and operational plans. While we expect grid modernization to be part of the normal course of business for electric distribution companies, we recognize that, initially, it will involve some changes to their traditional planning and practices. In addition, to advance grid modernization we must address certain existing barriers, consider potential benefits and costs to customers and the distribution companies, and balance the interests of competitive suppliers, clean energy companies, and technology innovators. For these reasons, and based on numerous other considerations raised in the Report, we conclude that we must take a comprehensive approach to addressing the various, interrelated aspects of modernizing the electric grid.

Therefore, we direct electric distribution companies to prepare and file with the Department ten-year GMPs that describe the companies' investment and operational strategies for achieving grid modernization. In the sections that follow, we outline: (1) the goals, objectives, and functions of GMPs; and (2) the required elements of a GMP, including the CAMP.

2. Goals, Objectives, and Functions of Grid Modernization Plans

a. Introduction

To specify the purpose of GMPs, we begin with a fundamental question examined by the Working Group: what are the desired objectives and functions of a modern grid? According to

the Report at 44, it is appropriate for the Department to identify goals and objectives, but not specific technologies. We agree that the Department should identify the goals and objectives of a modern grid and leave specific decisions about system planning and technologies to the electric distribution companies.

As we have said, to define grid modernization, the Working Group produced a taxonomy with four broad objectives: (1) to reduce the effect of outages; (2) to optimize demand, which includes reducing system and customer costs; (3) to integrate distributed resources; and (4) to improve workforce and asset management. The taxonomy also identifies the capabilities, functions, and "network system enablers"[12] that are associated with each objective, and distinguishes them from other activities that do not meet the definition of grid modernization.[13]

We accept the taxonomy's objectives and definitions of grid modernization. We also accept the Working Group's view that it is important to distinguish between activities that constitute grid modernization and those that do not, and the taxonomy draws an appropriate

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12 According to the Working Group, network system enablers are the core systems (e.g., metering) and enterprise software applications (e.g., outage management systems) that underpin electric distribution company operations and support implementation of the various grid modernization capabilities (Report at 13).

13 For example, vegetation management and "system hardening" will make an electric distribution company's system better able to withstand a major storm or other catastrophic event. For example, tree trimming and "undergrounding" of power lines will reduce the number of wires and poles downed by storms, and elevating substations will protect them from floods. Such measures have been practiced for over a century, and have not been characterized by significant advances in technology. Accordingly, while they may improve reliability and prevent outages, they are not grid modernization functionalities (Report at 12-13, 18).

boundary.[14] As discussed further below, an electric distribution company's GMP must lay out a strategy for measureable progress in all four of the objectives identified by the Working Group.[15]

b. Need for Advanced Metering Functionality

According to the Report at 40-43, advanced metering functionality can provide: (1) the collection of customers' interval data, in near real-time, usable for settlement in the ISO-NE energy and ancillary services markets;[16] (2) automated outage and restoration notification; (3) two-way communication between customers and the electric distribution company; (4) with a customer's permission, communication with and control of appliances; (5) large-scale conservation voltage reduction ("CVR") programs; (6) remote connection and disconnection of a customer's electric service (while maintaining the Department's consumer protections); and (7) measurement of customers' power quality and voltage. We recognize that this list of

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14 For example, while we agree that outage prevention is an important function for electric distribution companies, it does not require advanced technologies or new practices. Conversely, reducing the effects of outages is an aspect of grid modernization, because it is being transformed by advances in technology. One electric distribution company is in the process of implementing, in its smart grid pilot program, technology that will automatically: (1) notify the company of outages; (2) identify the location of faults; and (3) re-route power. Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 11-129, at 12-13, 16 (2012). Because this technology may perform these functions without the involvement of company personnel and site visits, it could be transformative for reducing the effects of power outages.

15 The Report also identifies "next generation systems" and "advanced applications" in the taxonomy. We expect electric distribution companies to continue examining technology and system enablers that will further grid modernization objectives, including next generation systems and advanced applications.

16 Settlement is the process by which ISO-NE determines the financial obligations of the market participants. Energy market settlements are performed by calculating the charges and credits for all of the market activity that occurs at every pricing location on an hourly basis throughout New England.

functions from the Working Group is consistent with the capabilities of technology referred to in the industry as "advanced metering infrastructure" or "AMI." However, we agree with the Working Group's position that we should determine an appropriate level of functionality, and prefer the use of the term "advanced metering functionality."

Putting aside this discussion of terms, we note that the Working Group's taxonomy classifies a metering system as a core system that furthers a single objective, i.e., optimizing electric demand (Report at 12). Although we agree that advanced metering functionality is essential to optimizing demand, we conclude that advanced metering functionality will further all four of our grid modernization objectives. Advanced metering functionality is a basic technology platform for grid modernization that must be in place before all of the benefits of grid modernization can be fully realized. Accordingly, advanced metering functionality must become a priority for electric distribution companies.

We direct electric distribution companies to file GMPs that include a proposal for implementing advanced metering functionality that will achieve the seven functions listed above. Electric distribution companies must achieve advanced metering functionality while maintaining existing customer protections.[17] Each electric distribution company will make individual choices about technology and systems, but must meet our objectives and requirements, all of which are described in more detail, below.

An electric distribution company's GMP should contain a plan to achieve advanced metering functionality within three years of the plan's approval, assuming that the benefits

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[17] As described in more detail below, we plan to investigate topics such as data management, data sharing, data storage, and security standards separately in a proceeding on cybersecurity, privacy, and meter data access.

justify the costs. We recognize that a number of factors could influence the optimal timing for each company to achieve advanced metering functionality, including but not limited to how much time the company requires to upgrade its meters and systems, its other capital expenditure plans, and the remaining useful lives of current meters, billing systems, and customer information systems. Accordingly, we will consider a company's proposal to implement an advanced metering functionality plan over a longer term if the proposal includes: (1) a statement of the reasons with a supporting analysis; and (2) an alternative timeline for achieving advanced metering functionality

c. Objective 1: Reduce Effects of Outages

Electrical outages cause significant costs and other burdens for business and residential customers, a matter that has been of growing concern in recent years, partly due to the increasing strength and frequency of storms.[18] In addition, consumers and businesses are increasingly dependent on electronics, which can be sensitive to even momentary outages. The outage and restoration notification of advanced metering functionality should provide significant benefits for customers, particularly in the context of storms.

It is essential that electric distribution companies maximize their use of technologies to reduce outages, and a GMP must address how the company will achieve measureable progress in

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[18] A recent federal study estimated that the average annual cost of weather-related outages nationally between 2003 and 2012 was between $18 billion and $33 billion. Executive Office of the President, Economic Benefits of Increasing Electric Grid Resilience to Weather Outages (August 2013), available at: http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf. See also: Executive Office of Energy and Environmental Affairs and the Climate Adaptation Advisory Committee, Massachusetts Climate Change Adaptation Report (September 2011), available at: http://www.mass.gov/eea/docs/eea/energy/cca/eea-climate-adaptation-report.pdf.

reducing the frequency and duration of outages, explain why the approach is appropriate, and include a proposed timeline for deployment of new technologies. In addition, the companies' methods of reducing the effects of outages is under review in the Department's service quality ("SQ") proceeding, and we expect companies' grid modernization efforts to help achieve any new reliability metrics or standards that we establish for SQ.[19]

d. Objective 2: Optimize Demand, Including Reducing System and Customer Costs

Rising energy costs are a continuing source of concern for customers in the Commonwealth, and electric distribution companies must provide reliable service at as low a cost as possible consistent with all of their obligations. While the cost of electricity fluctuates throughout the day and year, most customers have electric rates that are flat and fixed. If customers could shift demand to off-peak periods, when electricity prices are lower, and even eliminate some demand, they could decrease their bills both by avoiding the use of electricity when it is most expensive and by reducing costs for new generation, transmission, and distribution resources. In addition, CVR and advanced volt/VAR management[20] have been shown to reduce line losses and improve the timing and reduce the amount of customers' energy

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19 The Department is reviewing the SQ metrics in Service Quality Standards, D.P.U. 12-120.

20 According to the Report, at 15, "volt/VAR management" is the term for technology that measures voltage and power factor on the electric distribution system and corrects imbalances in order to minimize power quality disturbances and limit line losses. "Next generation systems" for volt/VAR management may include centralized processing with the ability to optimize feeders, substations, and areas or regions. They may also incorporate distributed solar photovoltaic cells and other resources by using controllable inverters for VAR support.

consumption,[21] which will reduce customers' costs and help the Commonwealth meet its commitments to reduce greenhouse gas emissions and achieve all cost-effective energy efficiency. All of these energy- and cost-saving possibilities are encompassed in the concept of optimizing demand.

Advanced metering functionality will allow electric distribution companies to make measureable progress in optimizing demand. Electric distribution companies must also evaluate grid-facing technologies that can offer similar progress in optimizing demand, such as a comprehensive CVR program.[22] In a GMP, an electric distribution company must explain its strategy for making measureable progress in optimizing demand.

e. Objective 3: Integrate Distributed Resources

To meet its mandates to increase the use of renewable energy and reduce greenhouse gas emissions, the Commonwealth must continue integrating distributed resources into the electric grid. Also, some distributed resources, such as microgrids and energy storage, can reduce the effect of outages, and improve the stability and reliability of the grid. Advanced metering functionality and grid-facing devices should allow electric distribution companies to better manage power flow and demand, allowing them to integrate more distributed resources on their systems. In a GMP, an electric distribution company must explain its strategy for making measureable progress in the integration of distributed resources.

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21 See, e.g., U.S. Department of Energy, Application of Automated Controls for Voltage and Reactive Power Management – Initial Results (December 2012), available at: http://www.smartgrid.gov/sites/default/files/doc/files/VVO%20Report%20-%20Final.pdf.

22 See, e.g., Lisa Schwartz, Is It Smart If It's Not Clean? Strategies for Utility Distribution Systems, Part 1, Regulatory Assistance Project (May 2010), available at: http://www.raponline.org/document/download/id/656.

f. Objective 4: Workforce and Asset Management

The efficient management of an electric distribution company's workforce and assets is another important objective of grid modernization. Grid modernization can provide substantial benefits in this area, such as reduced costs of operations and maintenance and a more effective deployment of resources for storm response and other outage events. We anticipate that companies will continually improve their operational efficiency, and use all available resources, data, and technologies to that end. We recognize that most progress related to this objective is likely to result from efforts towards the first three objectives described above. However, in a GMP, an electric distribution company must explain its strategy for making measureable progress in improving workforce and asset management.

3. Elements of a Grid Modernization Plan

a. Overview of a Grid Modernization Plan

Each electric distribution company must submit a GMP with a ten-year strategic plan outlining how it proposes to make measureable progress towards the four grid modernization objectives identified above, with proposed timing and prioritization of activities.[23] The GMP should include a strategy and a general investment plan, but not a detailed budget. The Department will review each electric distribution company's GMP in a separate proceeding to ensure that it comports with our objectives for grid modernization. If it does not, we will direct the electric distribution company to revise it accordingly.

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[23] The Department recognizes that the electric distribution companies are at different stages of grid modernization, and each GMP should be tailored to a company's situation.

When we issue a final Order in this investigation, we will direct each electric distribution company to file a GMP within six months, or in its next base distribution rate case, whichever occurs first.[24] Also, we will direct electric distribution companies to update their GMPs in subsequent base distribution rate cases, which by statute must occur no less often than every five years.[25] The electric distribution company's updates shall describe the implementation of the GMP to date, report on its metrics, identify any changes to the GMP, and include a new ten-year GMP.

Each electric distribution company will have to weigh the costs, benefits, and maturity of various kinds of technologies in order to prioritize its investment decisions, and a GMP must include the rationale for the prioritization. Also, a company's GMP should factor in and discuss any characteristics that are unique or specific to the system and service territory.

A question that we raised in the NOI and that was addressed in the Report is whether the risks and challenges of grid modernization are so great that they require a new regulatory framework. As discussed in the Report at 58-73, a different framework could include: (1) preauthorization[26] by the Department of investment plans and budgets prior to their

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[24] To respect the time, efforts, and input of stakeholders in this policy proceeding, we would prefer not to consider any GMP filings by companies until we have issued a final Order here. However, if a company decides to file a GMP in the interim, whether in conjunction with a rate case or independently, the GMP should conform to the Department's straw proposal, and the company should be prepared to adapt its GMP to conform to a final Order in this proceeding.

[25] General Laws c. 164, § 94, as amended by the Electricity Act, requires that "electric companies shall file with the [D]epartment schedules not less frequently than every five years . . . under a filing schedule as prescribed by the [D]epartment and in such form as the [D]epartment shall prescribe." St. 2012, c. 209, § 51.

[26] The Working Group Report referred to this approach as "preapproval."

implementation; (2) a benefit-cost analysis, within a business case; and (3) a targeted cost recovery mechanism. After consideration, we have determined that grid modernization should become a new part of normal business practices for electric distribution companies, and the Department expects to evaluate many grid modernization investments in base distribution rate proceedings pursuant to the same standards as other capital additions. However, as discussed further below, companies will be permitted to include a CAMP in their GMP for investments that are necessary to achieve advanced metering functionality.

b. Comprehensive Advanced Metering Plan

In our view, achieving advanced metering functionality warrants special regulatory treatment, for several reasons. As described above, advanced metering functionality will further all four grid modernization objectives. Also, under the current regulatory regime, we are concerned that an electric distribution company will limit large investments in advanced metering functionality, concluding that the benefits will accrue in large part to customers and not the company. Accordingly, we will examine advanced metering functionality investments under a targeted regulatory framework, which includes: (1) review and preauthorization by the Department; (2) a benefit-cost analysis, within a business case; and (3) if justified, a targeted cost recovery mechanism.

Accordingly, as described in more detail below, a company's CAMP must contain a number of elements. If the Department approves the CAMP, our preauthorization endorses the electric distribution company's decision to proceed with the investment plan. If CAMP investments are preauthorized, there is no need for further review of the company's decision or timeline for making the CAMP investments in a subsequent cost recovery proceeding, but we

will review whether the implementation of the investment was prudent and whether it is "used and useful."[27]

4. Elements of a Comprehensive Advanced Metering Proposal

a. Marketing, Education, and Outreach Plan

Educating customers about changes to their meters, electric bills, and price offerings is a core component of any CAMP. In considering the Working Group's suggestions concerning customer education, the Department provides the following guidance.

Successful implementation of grid modernization will require fundamental changes in the relationship between the companies and their customers, because customer participation is necessary to realize many of the benefits of grid modernization. Marketing, education, and outreach can help ensure that customers are well informed about and engaged in: (1) their options for managing their energy consumption; (2) the tools and technologies that will assist them; and (3) the benefits associated with reductions in consumption.[28]

Accordingly, we direct each electric distribution company to include a proposed marketing, education, and outreach plan in the company's CAMP, with its timeline, strategies, and budget for educating customers and motivating them to become full participants in grid modernization. Based on the effectiveness of cooperative statewide marketing campaigns among Massachusetts electric distribution companies in implementing energy efficiency programs, we

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27 See, e.g., Massachusetts Electric Company, Nantucket Electric Company, Boston Gas Company, and Colonial Gas Company, each d/b/a National Grid, D.P.U. 09-38, at 24-26 (2009).

28 See, e.g., Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 11-129, at 73-74 (2012).

encourage each electric distribution company to develop a marketing, education, and outreach plan that employs innovative technologies as well as community-based marketing strategies.

b. Benefit-Cost Analysis

i. Introduction

A stakeholder group formed within the Working Group and known as the Clean Energy Caucus suggests that an electric distribution company that seeks a targeted ratemaking treatment (i.e., preauthorization) of investments should

> present a "business case" supporting the investment that would include a description of each quantifiable cost and benefit, the associated net present value and the key assumptions that went into each value, along with a sensitivity analysis. Any costs and benefits of the proposed investment that the proponent believed should be considered but which could not be reasonably quantified would also be presented and explained (Report at 82).

We agree and we direct electric distribution companies to include a benefit-cost analysis in their CAMPs using a "business case" approach, which assesses all costs and benefits, including those that are difficult to quantify, and provides its underlying assumptions.

ii. Overview of Benefit-Cost Analysis

In a CAMP, the company must submit a benefit-cost analysis to support its request for preauthorization of advanced metering investments. The Department and others will have an opportunity to evaluate whether the company's "business case" justifies the investments before the company makes its expenditures. Before preauthorizing investments, the Department must find that the benefits, quantified and unquantified, exceed the costs.[29] Later, in a subsequent cost

[29] We aim to evaluate the costs and benefits of grid modernization , and we expect to include and fairly weigh unquantified benefits as well. As we previously have stated, "it is not necessary for all costs and benefits to be quantifiable or quantified in order for us to

recovery proceeding, the Department will evaluate the prudency of implementation, whether the investments are used and useful, and will evaluate them in light of the projections in the company's benefit-cost analysis.

The company's business case must specify a deployment timeline and determine the total net present value ("NPV") of the associated benefits and costs. To calculate the NPV, a company should apply a discount rate to its projected costs and benefits and provide the rationale for the discount rate. A company must list all of the benefits and costs, and quantify as many as possible. Each company also should explain its view of any benefits that are unquantifiable. In addition, each company must produce a sensitivity analysis that includes at least three separate case scenarios (i.e., a "best case," "base case," and "worst case") that will show how the benefit-cost analysis will change when the company alters key assumptions.

In order to calculate benefits and costs, companies must use both baseline and projected data. Baseline data will establish the status of the company's distribution system during the project period, assuming no grid modernization investments.[30] The projected data will forecast expectations about the distribution system with the implementation of the proposed grid modernization investments. The value of a benefit and cost assessment will be the difference between the company's baseline and its projected data for a given point in time.

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give them weight." Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 10-54, at 68-69 (2010).

30 In its CAMP, an electric distribution company may employ a "business as usual" baseline in discussing the costs and benefits of its plans.

We expect all electric distribution companies to use the same or substantially similar benefit-cost analyses in their CAMPs. Below, we present our benefit-cost analysis model for comment.

iii. Cost Estimates

In the Department's view, the estimated costs of achieving advanced metering functionality will include the following major categories: (1) technologies deployed to achieve advanced metering functionality and associated communications systems; (2) information technology, systems integration, and network security; (3) marketing, education, and outreach; (4) project planning; (5) program management; and (6) initial and ongoing operations.

According to the Report at 38-39, electric distribution companies may not have fully recovered all of the "sunk costs" of existing meters and associated systems when they file their GMPs.[31] While we expect a company to provide information about its unrecovered costs for existing meters and systems in its "business case," a company should not include such costs in its benefit-cost analysis.

Companies should base their cost estimates on various sources, including company-specific plant and operational considerations and estimates, publicly available data, vendor quotes and other data. In a request for preauthorization of investments, we expect companies to complete and provide a table similar to Table 1, below.

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[31] Table 4-11 in the Report shows the age, book life and operating life of each company's metering infrastructure. However, the fact that an electric distribution company has not yet fully recovered all costs of existing meters does not preclude meter replacements. As we have previously found, even when existing meters are neither defective nor at the end of their useful lives, a company "has an ongoing need to replace infrastructure to meet reliability standards, as well as to manage its labor-related expenses (citation omitted)." Fitchburg Gas and Electric Light Company, D.P.U. 07-71, at 31 (2008).

Table 1: Costs to Achieve Advanced Metering Functionality[32]

Cost Categories	**Cost Estimates (NPV $)**
Technologies to achieve advanced metering functionality and communications systems	
Information technology, services, and network security	
Marketing, education, and outreach	
Project planning	
Program management	
Initial and ongoing operations	
Total Costs	

iv. Estimated Benefits

At a minimum, a company's total benefits must include its "best effort" estimates of the following quantifiable benefits: (1) reduced meter-related operations and maintenance ("O&M") expenses; (2) reduced capital expenditures; (3) theft prevention and revenue protection; (4) reduced unaccounted-for electricity; (5) reduced billing inquiries and customer service; (6) better outage management; (7) reduced energy consumption from inactive meters; (8) reduced bad debt expenses; (9) increased demand response; (10) increased energy efficiency; (11) increased use of EVs; (12) reduced carbon costs; and (13) the prevention or limitation of outages. In a request for preauthorization of investments, we expect companies to complete and provide a table similar to Table 2.

32 The Department will provide more details on these proposed cost categories and sample calculations in a future memorandum.

Table 2: Benefits of Achieving Advanced Metering Functionality[33]

Benefits	**Subcategories**	**Estimated Value ($NPV)**
O&M savings from advanced metering	Meter reading expenses Information technology expenses Vehicle expenses for meter reads On-cycle manual meter read expenses Disconnection and reconnection Off-cycle/special meter read expenses Vehicle expenses for field services Trip expense for "ok on arrival" meters Expenses of customer equipment failures Expenses from malfunctioning meters	
Capital expenditure savings	Distribution system management Asset management planning Avoided purchases of existing meters	
Theft prevention and revenue protection	Theft and tamper detection Faster identification of dead meters	
Unaccounted-for energy savings	Voltage optimization at customer sites Voltage optimization on system	
Billing and customer service savings	Reduced estimated bills Reduced call center volume Reduced lag from meter read to billing Reduced back office costs	
Outage management savings	Reduced truck rolls	
Energy savings from inactive meters		
Reduced bad debt expenses		
Demand response revenue	Savings on capacity costs	
Energy efficiency savings	Reduced energy consumption	
Reduced line losses		
Net EV savings	Reduced transportation fuel expense	
Avoided CO_2 compliance costs		

33 The Department will provide more details on these proposed benefits, subcategories, and sample calculations in a future memorandum.

Customer outage prevention	Reduced customer outages Reduced outage restoration expenses	
Reduced storm expenses	Lost output/wages Spoiled inventory Cost to restart industrial operations	
Total		

c. Cost Recovery

Many Working Group members asserted that current regulatory policies on cost recovery may pose a barrier to grid modernization investments (Report at 9). The Report includes a variety of regulatory framework proposals for grid modernization, some of which are designed to overcome such barriers, and different methods to recover the costs of investments (Report at 57-73, 103-136). The Working Group members recommended various options for how companies could recover the costs of grid modernization, which included those that: (1) apply to customer-facing investments, grid-facing investments, or both; (2) incorporate either a historic or a future test year; and (3) recover costs through base distribution rates, riders, reconciliation mechanisms, or other means (Report at 57-73, 103-136).

We find that some type of targeted cost recovery framework for grid modernization investments is necessary. We are concerned that, under our traditional ratemaking precedent, electric distribution companies may hesitate before making investments beyond what they deem necessary to ensure safe and reliable service. This reluctance may exist, for example, even when the investments are cost-beneficial for a company but involve high capital costs, combined with regulatory lag and the potential for disallowed costs. We are persuaded that targeted cost recovery treatment may be required to remove impediments to some grid modernization investment.

We have reviewed the options offered by the Working Group (Report at 57-73, 103-136). First, we decline to adopt a cost recovery model that incorporates a future test year because it would be based on projections, which involve speculation and uncertainty, and in our view expose ratepayers to unwarranted risk.[34] Also, grid modernization, and modernization in general, is a core component of an electric distribution company's obligation to provide safe and reliable service, which should require targeted cost recovery mechanisms only in limited circumstances.[35] We decline to make a targeted cost recovery mechanism available for all grid modernization investments because we are not persuaded that it is appropriate or necessary. Instead, we find that it may be appropriate to make a targeted approach to cost recovery available for investments associated with advanced metering functionality, but only until such time as the costs are incorporated into companies' base distribution rates.

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34 See, e.g., Rate Structures that will Promote Efficient Deployment of Demand Resources, D.P.U. 07-50-A at 52 (2008); Boston Gas Company, D.P.U. 18264, at 2 (1975); New England Telephone & Telegraph Company, D.P.U. 18210, at 2-3 (1975). Moreover, relying on companies' models to evaluate projected spending can cause an information imbalance and impose a burden on other parties. Specifically, other parties would be at a disadvantage in reviewing and debating the prudence of a company's projections of revenue requirements under a future test year approach, as opposed to reviewing and making arguments based on actual expenditures. See, e.g., D.P.U. 07-50-A, at 52; Eastern Edison Company, D.P.U. 1580, at 19 (1984).

35 In the Third Annual Report of the Board of Gas Commissioners, at 71 (1888), we addressed a gas company's duty to improve its provision of electric lighting, stating that,

> [i]ncidentally, the question has arisen how far a gas company ought to limit itself by contract to the use of any one system of electric lighting. The Board regards such restrictions as impolitic and unwise, and has advised against them. A company proposing to supply a community with the light it may need ought to be free to adopt any and all improvements which the future may develop, and however meritorious or wonderful the inventions and devices of to-day, it can scarcely be doubted that others still better will be discovered hereafter.

Specifically, we seek to: (1) align an electric distribution company's investment priorities with the interests and needs of its customers; and (2) allow an electric distribution company the opportunity to earn a fair return on its investments. While we seek to adapt our long-standing ratemaking policies and practices as required to advance our grid modernization objectives, a targeted cost recovery mechanism must:

- adhere to Department precedent that costs must be prudently incurred and investments must be used and useful before recovery in rates is allowed;
- be aligned with the Department's rate design goals of continuity, simplicity, efficiency, earnings stability, and fairness;
- be consistent with the Department's precedent on the transparency and propriety of electric rates;
- further the Commonwealth's and the electric distribution companies' obligations, as described above;
- adhere to cost causation principles by allocating costs to rate classes based on the factors that cause them, and avoid undue intergenerational or rate class price discrimination or cross-subsidization;
- enhance consumer protection standards; and
- balance risks and rewards for customers and shareholders, as appropriate.

Previously, we have allowed some companies to recover costs of capital projects through capital tracker mechanisms, such as the Targeted Infrastructure Reinvestment Factor ("TIRF") or the Capital Expenditure ("CapEx") mechanism.[36] Such capital trackers have been used to recover the revenue requirement (i.e., depreciation, return on investment, and taxes) associated with a company's capital projects through rates. The fundamental purpose of capital trackers is

[36] See, e.g., Boston Gas Company, Essex Gas Company, Colonial Gas Company, each d/b/a National Grid, D.P.U. 10-55, at 119-120 (2010); Bay State Gas Company, D.P.U. 09-30, at 133 (2009).

to provide a company with more timely recovery of costs associated with capital investments upon a demonstration that a targeted cost recovery mechanism is warranted. We find that a capital expenditure tracking mechanism is the appropriate means for the companies to recover investments related to achieving advanced metering functionality.

Accordingly, each electric distribution company may seek, within its CAMP, a capital expenditure tracking mechanism for advanced metering investments. Before seeing the scope of the investments, we anticipate that caps, offsets to O&M expenses, and annual filings may be appropriate for such mechanisms. Even with a capital expenditure tracking mechanism, an electric distribution company may only recover costs associated with the CAMP after they have been incurred and been demonstrated to be prudent, incremental to costs recovered in base rates, and "used and useful." See, e.g., D.P.U. 09-39, at 84; NSTAR Electric Company, D.P.U. 09-33, at 66-68 (2010); NSTAR Electric Company, D.P.U. 10-163-B/11-92-A at 9-10 (2012).

If the Department allows a capital expenditure tracking mechanism, the company must support its future cost recovery requests with: (1) documentation, per specific filing requirements;[37] and (2) a cost tracking accounting system.[38] The company will bear the burden

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[37] See, e.g., Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 10-79, Interlocutory Order on Filing Requirements at 6-8 (2011). Companies must submit: (1) prefiled narrative testimony; (2) details of capital projects that have been placed in service; (3) details of any cancelled projects and the disposition of costs; (4) details of any significant policy changes in accounting, allocation, and operations; and (5) details on any cost variances between budgets and actual expenditures.

[38] A reasonable system to track costs must prevent any "double recovery" of costs through base distribution rates and allow the Department and stakeholders to review expenditures easily. See, e.g., Boston Gas Company, Essex Gas Company, and Colonial Gas Company, each d/b/a National Grid, D.P.U. 10-55, at 74-76 (2010); NSTAR Electric Company, D.P.U. 09-33, at 66 (2010).

of demonstrating that all of the costs it seeks to recover through its tracker are prudent, used and useful, and incremental to base rates.

5. Grid Modernization Metrics

Members of the Working Group highlighted the importance of grid modernization performance metrics as a means of establishing principles, monitoring investments, and making measureable progress (Report at 46, 58-69). They suggested that performance metrics are a core component of their cost recovery proposals, which should be included in an expanded service quality program or in a separate program (Report at 58-69).

Targeted, well-designed metrics will allow the Department and other stakeholders to evaluate an electric distribution company's: (1) implementation of its GMP and CAMP; and (2) progress towards the grid modernization objectives. Metrics will allow the Department and others to assess where modifications to the GMP, if any, are necessary. In addition, metrics will quantify the operational effects and benefits of the GMP.

We aim to develop: (1) implementation metrics that are unique for each company; and (2) a standard set of targeted, statewide performance metrics for GMPs. For now, the purpose of the metrics will be to record and report relevant information, without a decision as to whether in the future it is appropriate to connect such metrics to financial penalties and rewards. To develop grid modernization metrics, we plan to review initial proposals from each electric distribution company within the context of its GMP. If necessary, we will convene a working group to further develop these metrics. Accordingly, in its GMP, an electric distribution company must propose: (1) infrastructure metrics that track its implementation of grid

modernization technologies or systems; and (2) performance metrics that measure progress towards the objectives of grid modernization.

For optimizing demand, an electric distribution company must propose a way to measure system performance and customer participation, as well as the success of the company's marketing, education and outreach strategies. With respect to reducing the effects of outages, we recognize that the Department is examining outage metrics in other proceedings, such as SQ and, therefore, a company need not develop metrics for this objective in its GMP. Electric distribution companies should propose metrics to report on the integration of distributed resources. Finally, companies should propose metrics for reporting on workforce and asset management to help measure O&M benefits. For example, in designing its metrics, a company could begin to report on:

- the number and percentage of customers who have accessed energy usage information using an internet portal or enrolled in energy information programs;
- peak load reduction from Volt/VAR control and CVR;
- total load reduction from Volt/VAR control and CVR;
- system load factor improvements, by rate class;
- reduced system line losses;
- peak load reduction from company-administered TVR programs, if applicable;
- number of customers subject to company-administered TVRs, if applicable.
- amount, type, and nameplate capacity of connected distributed generation facilities;
- amount, type, and nameplate capacity of connected energy storage facilities;
- amount of electricity exported to the grid from distributed generation facilities;

- number of EVs registered to customers, as well as amount and type of EV charging equipment within the company's service territory; and
- number of customers reached through various marketing, education, and outreach programs.

6. Cybersecurity, Privacy, and Meter Data Access

As we pursue modernization of the electric grid, we must ensure that issues related to cybersecurity, privacy, and the sharing of interval meter data remain a priority and are given sufficient attention and investment. As discussed further below, the Department plans to address these topics, as they relate to grid modernization, in a separate proceeding. However, in the interim, all GMPs must describe companies' strategies for ensuring cybersecurity, privacy, and safeguards in the sharing of meter data in conjunction with their grid modernization activities.

7. Concerns about Potential Health Effects and "Opt-Out" Provisions

Most grid modernization technologies involve the wireless transmission of data using radio frequencies ("RF"). Judging from other proceedings, it is possible that some electricity customers will question the effects of RF on their health. A number of published reports on potential health effects of AMI suggest that RF from this technology is unlikely to harm health.[39] Nonetheless, some jurisdictions have explored different approaches to this issue. On the one hand, the Idaho Public Utilities Commission has held that installation of advanced metering is

[39] World Health Organization, Systematic Review on the Health Effects of Exposure to Radiofrequency Electromagnetic Fields from Mobile Phone Base Stations (2010); Vermont Department of Public Service, An Evaluation of Radio Frequency Fields Produced by Smart Meters Deployed in Vermont (2013) (RF emissions from AMI fall well below the limits set by the Federal Communications Commission); Texas Public Utilities Commission, Health and RF EMF from Advanced Meters (2012) ("the large body of scientific research reveals no definite or proven biological effects from exposure to low-level RF signals").

mandatory for all customers.[40] On the other hand, some states have allowed customers to "opt out" of AMI without a charge, and others have imposed a fee.[41]

We direct electric distribution companies to develop and include within their GMPs a model tariff for customers who would like to opt out of advanced metering functionality. The Department requests that each company provide an explanation detailing the reasons for its approach, accompanied by cost assumptions if it proposes to charge an opt-out fee.

8. Process for Adoption of New Technologies

According to the Electricity Storage Association, the Department ought to encourage new technology development without requiring burdensome regulatory processes, which it states can be detrimental to start-up companies (Report at 132). In the Department's view, a modernized grid depends upon continuous, measureable progress in processes and technologies. To assess the opportunities, options, and issues related to new technologies, we seek to better understand: (1) the electric distribution companies' research and development ("R&D") activities; and (2) the Department's role in facilitating the adoption of new technologies.

As an initial step, we seek to gather information in this proceeding about the companies' R&D activities, following which we can determine what role, if any, we have in this area. In particular, the Department requests that electric distribution companies explain in their comments how they currently: (1) determine budgets for R&D activities; (2) select R&D

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40 Bonnie Menth & Vicky Davis v. Idaho Power Company, IPC-E-12-04, 2012.

41 See, e.g., Idaho Power Company, Idaho Public Utilities Commission, IPC-E-12-04, Order No. 32500 (2012); Elisa Boxer-Cook, et al., Maine Public Utilities Commission, 2010-345, et al., Order I (2011); Potomac Electric Power Company, et al., Public Service Commission of Maryland, Order No. 85294 (2013).

projects; and (3) conduct R&D activities. Second, we propose that the Department more actively encourage R&D investments from the electric distribution companies through a structured investment, R&D, and piloting strategy. This strategy could explore ways to provide additional funding and require set annual investments (e.g., a certain small percentage of revenues) from each electric distribution company. We invite commenters to address this proposal and to provide alternative proposals on how the Department could better encourage investment in electric distribution companies' R&D.

C. Other Grid Modernization Topics

1. Introduction

Below, we briefly discuss the grid modernization topics that we plan to investigate in separate proceedings. We welcome comment on our decision to investigate these topics separately.

2. Time Varying Rates

While electricity costs vary dramatically over time for a variety of reasons, current rates send very limited price signals to customers to use electricity efficiently. For example, basic service rates for electricity are based mainly on prices for generation that are procured and fixed and flat for at least one month and as long as six months.[42] If the price of electricity tracked its

[42] Today, basic service customers have two pricing options: (1) a variable pricing option, in which basic service rates change every month; and (2) a fixed pricing option, where the basic service rate remains constant. Pricing and Procurement of Default Service, D.T.E. 02-40-B at 33-34 (2003). Electric distribution companies automatically place residential and small commercial customers on the fixed pricing option, and place medium and large commercial customers on the variable price option. D.T.E. 02-40-B at 34. The fixed price period is six months for residential and small commercial customers and three months for medium and large commercial customers. D.T.E. 02-40-B at 34; D.T.E. 02-40-C at 21-22 (2003).

costs, customers would get a signal to shift the timing of their electricity consumption to less expensive hours or to reduce their overall consumption. D.P.U. 12-76, at 9. Consumers have become accustomed in recent years to responding to price signals for everything from sporting events to airplane tickets.

Reducing electricity usage during peak hours can result in significant savings for all customers, and not just for those who respond to a price signal, because it can reduce the peak load on the system and, in turn, defer or reduce investments in electricity generation, transmission, and distribution. Technologies deployed to achieve advanced metering functionality and its associated infrastructure, as well as direct load control devices, will allow customers to receive price signals and enable them to take action to reduce their electric bills.

TVRs can include time-of-use rates, critical peak pricing, peak-time rebates, and real-time pricing. While the Working Group did not reach consensus regarding the best form of TVR, there was general agreement that the Department should examine TVRs and implement them when and where appropriate (Report at 53-56). Several members of the Working Group urged the Department to investigate TVRs in a separate proceeding (Report at 93-94).

A company should include projections about electricity and peak load savings from the implementation of TVR, along with underlying assumptions, in the benefit-cost analysis within its advanced metering functionality proposal. Because of the complexities involved, the Department will open a separate investigation into TVRs in the near future to examine the optimal approaches to rate design. In addition, we are opening a related proceeding today in which we will investigate metering policies and rate structures that incentivize off-peak charging

for residential customers with an EV. See, e.g., Electric Vehicles and Electric Vehicle Charging, D.P.U. 13-182, at 6 (2013).

A number of principles and questions will guide our investigation into TVRs. Specifically, we will examine broad questions such as: (1) whether electric distribution companies and/or competitive suppliers should offer TVRs to some or all of their customers; (2) whether TVRs should be implemented for the supply and/or delivery portion of the electric bill; and (3) whether TVRs should be the sole offering for basic service customers, or just one of the offerings. In addition, we will also examine more targeted questions such as: (1) how to design TVRs to recover costs while minimizing undue bill increases for customers, including customers who are least able to modify their electricity consumption patterns (e.g., low-income customers, renters, and small businesses); (2) how to design TVRs that encourage the development of distributed energy resources and demand response technologies and programs; and (3) whether electric distribution companies should implement some type of "shadow billing" or "bill protection" in order to phase in TVRs.

3. Cybersecurity, Privacy, and Meter Data Access

Cybersecurity is critical to the operation of an electric distribution company and a company must continually assess and upgrade its defenses. Moreover, we recognize the possibility that grid modernization initiatives could increase the vulnerability of the electric grid. This possible increased risk to system security arises largely because such initiatives will involve: (1) increasing the number of digital access points within the electric distribution system; (2) increasing the number of and level of control by networked devices; and (3) increasing the granularity of customer usage data. Currently, the only mandatory standard for

electric distribution companies' cybersecurity is the North American Electric Reliability Corporation Critical Infrastructure Protection ("NERC-CIP"), which applies only to bulk power systems and not to the electric distribution systems and metering infrastructure subject to the Department's jurisdiction.

There are, however, other non-mandatory frameworks related to cybersecurity for electric distribution companies. For example, voluntary cybersecurity recommendations and guidelines for electric distribution companies include: (1) the National Institute of Standards and Technology ("NIST") Interagency Report ("NISTIR") 7628, entitled, "Guidelines for Smart Grid Cyber Security;"[43] (2) the United States Department of Energy's "Risk Management Process;"[44] and (3) the Electricity Subsector Cyber Security Capability Maturity Model ("ES-C2M2").[45] Additionally, NIST is developing a critical infrastructure security framework in response to the President's executive order on cybersecurity.[46]

We intend to explore whether to use one or more of the above standards or frameworks in order to assess electric distribution companies' cybersecurity practices. If warranted, such an investigation need not be limited to issues related to grid modernization, but could address broader cybersecurity planning and risk management.

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43 Available at: http://www.nist.gov/smartgrid/upload/nistir-7628_total.pdf

44 Available at: http://energy.gov/sites/prod/files/Cybersecurity%20Risk%20Management%20Process%20Guideline%20-%20Final%20-%20May%202012.pdf

45 Available at: http://energy.gov/sites/prod/files/Electricity%20Subsector%20Cybersecurity%20Capabilities%20Maturity%20Model%20%28ES-C2M2%29%20-%20May%202012.pdf.

46 Exec. Order 13636, 78 Fed. Reg. Issue at 11739 (February 19, 2013).

The Department established its current practices concerning the protection and release of electricity usage data to promote the competitive electricity market and to ensure customers' privacy and allow customers to request the collection of their interval data. Competitive Market Initiatives, D.T.E. 01-54 A, at 9-12 (2001); Installation of Advanced Metering Equipment for Residential Customers, D.T.E. 01-28, at 8 (2001). However, the future collection of interval data from all customers through advanced metering functionality raises additional potential privacy concerns. While protecting customer data must be a high priority for electric distribution companies, electricity usage and consumption data must be available to customers, as well as to competitive suppliers and other service providers if authorized by customers, in order to fully realize the benefits of a modern grid.

The Department must investigate these issues and strike an appropriate balance between ensuring safeguards and enabling customers to realize the full potential of interval data and data management. Thus, in a separate proceeding we will explore how the Department should ensure: (1) protection of customer data privacy; (2) access to data by customers and authorized third parties; (3) timing and availability of data; and (4) uses of aggregated interval data.

4. Electric Vehicles

In the NOI, at 7-8, the Department inquired about opportunities to maximize efficient operation of the grid and to facilitate the integration of distributed generation resources and EVs. In the Report at 47, the Working Group recommended that each electric distribution company file a GMP that would specify modernizing activities and describe how and whether these activities will further the integration of distributed resources, including EVs.

The Department considers the widespread adoption of EVs to be an integral component of Massachusetts' grid modernization efforts. We find that an investigation into policies regarding EV adoption and EV-related infrastructure is warranted. Accordingly, today, the Department also has opened a separate proceeding into issues concerning EVs and EV charging, which has been docketed as D.P.U. 13-182.

D. Request for Comments

The Department welcomes comment on any aspect of the straw proposal, as well as on the following specific questions:

- Have we provided the correct directives to electric distribution companies on grid modernization?
- Have we established appropriate priorities and timelines for grid modernization?
- Is our requirement to achieve advanced metering functionality appropriate?
- Which aspects of the benefit-cost analysis should include industry-wide figures?
- Which aspects of the benefit-cost analysis should be company-specific?
- Are there standard "useful lives" for different kinds of grid modernization technologies (e.g., advanced meters, communications networks, meter data management systems, etc.)?
- Have we established the correct categories of benefits associated with achieving advanced metering functionality?
- Should we consider a targeted cost recovery mechanism for CAMP investments?
- Should we review and approve a cost tracking accounting system in advance of allowing a targeted cost recovery mechanism?
- What cost recovery filing requirements should we impose upon companies?
- What aspects of a cost recovery mechanism should we establish?
- Should we establish an offset to O&M expenses to recognize cost savings from grid modernization technologies?

- Should we adopt metrics in this proceeding? If so, which ones?
- What information or standards on cybersecurity, if any, should apply to GMPs?

VI. PUBLIC PARTICIPATION

The Department invites all interested persons to file comments on the issues and questions discussed above. The Department anticipates that a number of persons will be interested in this proceeding. Therefore, we encourage interested persons to present consensus positions and submit comments jointly, when possible.

Initial comments may be submitted in writing, may not exceed 25 pages in length, and must be accompanied by an executive summary. Initial written comments must be filed no later than the close of business (5:00 p.m.) on **Friday, January 17, 2014.** Please submit: (1) one copy of written comments, printed on both sides of each page where possible, to Mark D. Marini, Secretary, Department of Public Utilities, One South Station, 5th Floor, Boston, Massachusetts 02110); and (2) one electronic copy of comments as an email attachment to: dpu.efiling@state.ma.us and mark.marini@state.ma.us.[47] Please specify: (1) the docket number of the proceeding (D.P.U. 12-76); (2) the name of the individual/organization submitting the comments; and (3) a brief descriptive title of the document. All documents submitted in electronic format should be compatible with Microsoft Office or Adobe Acrobat, and they will be posted on the Department's website: http://www.mass.gov/dpu.

[47] If commenters cannot submit comments as an e-mail attachment, they may send them on a CD-ROM. The CD-ROM label must specify: (1) the docket number of the proceeding (D.P.U. 12-76); (2) the name of the individual/organization submitting the filing; and (3) a brief descriptive title of the document.

At this time, the Department anticipates holding hearings during the week of **Monday, February 24, 2014 to Friday, February 28, 2014,** and organizing panels to provide comments at these hearings. Persons who wish to participate on a panel must express their interest to the Department, in writing, no later than **Friday, January 17, 2014.**[48] Following the submission of initial comments, the Department will issue a procedural notice that identifies the composition of the panels and the topics to be covered. While the Department will endeavor to honor requests to participate on a panel, in the interests of administrative efficiency the subject matter and composition of the panels will be subject to the Department's discretion. Following these hearings, interested persons will be given an opportunity to file written reply comments.

Reply comments may be submitted in writing, and may not exceed 15 pages in length. Reply comments are due no later than the close of business (5:00 p.m.) on **Friday, March 21, 2014.** After reviewing the reply comments, the Department will determine the appropriate next steps in this proceeding.

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[48] Individuals who wish to participate on a panel must: (1) provide their name, complete contact information (i.e., address, telephone number, and email address) and affiliation, if any; (2) summarize their qualifications; (3) identify the subject matter on which they wish to comment; and (4) briefly summarize the conclusions, opinions, and basis for the subject matter on which they wish to comment.

VII. ORDER

Accordingly, after notice, technical conferences, final reporting by the Massachusetts electric grid modernization stakeholder working group, comment, and due consideration, it is

ORDERED: That the Secretary of the Department shall distribute electronically and, where requested, serve by mailing this Order on the Department's official distribution list for this proceeding; and it is

FURTHER ORDERED: That the period for comment on the Department's proposals, as set forth herein, shall be:

Initial written comments:	January 17, 2014.
Notice of Interest to Testify on a Panel:	January 17, 2014.
Panel hearings:	February 24 to February 28, 2014.
Written reply comments:	March 21, 2014.

By Order of the Department,

/s/
Ann G. Berwick, Chair

/s/
Jolette A. Westbrook, Commissioner

/s/
David W. Cash, Commissioner