



The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 11-129

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Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid for approval of a smart grid pilot program.

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I. INTRODUCTION AND PROCEDURAL HISTORY

Section 85 of the Green Communities Act requires each electric distribution company to file with the Department of Public Utilities (“Department”) a proposal for conducting a smart grid pilot program. St. 2008, c. 169, § 85 (“Section 85”). On December 23, 2011, Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid (“National Grid” or “Company”), filed with the Department its proposed smart grid pilot program.¹ This matter was docketed as D.P.U. 11-129.

The Attorney General of the Commonwealth (“Attorney General”) intervened pursuant to G.L. c. 12, § 11E. The Department granted the petitions to intervene of the Department of Energy Resources (“DOER”) and the Low-Income Weatherization and Fuel Assistance Program Network (“Network”). The Department granted the petitions for limited participant status of NSTAR Electric Company (“NSTAR Electric”) and Western Massachusetts Electric Company (“WMECo”).

Pursuant to notice duly issued, the Department conducted a public hearing on February 9, 2012. The Department held evidentiary hearings on April 30, May 2, May 3, and May 4, 2012. The Company sponsored the testimony of the following witnesses: Cheryl A. Warren, vice

¹ The Company filed its original smart grid pilot program proposal on April 1, 2009, which was docketed as D.P.U. 09-32. In that proceeding, the Department investigated the Company’s proposal and issued an Order. The Department conditionally approved elements of the pilot program but also directed the Company to make additional filings regarding: (1) information technology systems; (2) marketing, education, and outreach plan; and (3) evaluation. Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 09-32 (2010). On February 11, 2011, the Company filed a petition to withdraw its proposal in D.P.U. 09-32. On March 4, 2011, the Department approved the Company’s petition to withdraw its proposal in D.P.U. 09-32.

president of asset management for National Grid USA Service Company, Inc.; Edward H. White, vice president, customer and business strategy for National Grid USA; and Peter T. Zschokke, director of regulatory strategy for National Grid USA Service Company, Inc. The Attorney General sponsored the testimony of Barbara Alexander, consumer affairs consultant. The Network sponsored the testimony of Nancy Brockway, principal of NBrockway & Associates.

The Company, the Attorney General, and the Network filed initial briefs on May 30, 2012. The Company and the Network filed reply briefs on June 6, 2012. The evidentiary record includes 380 exhibits and 35 responses to record requests.

II. GREEN COMMUNITIES ACT

Section 85 provides that each smart grid pilot program shall include, but not be limited to, advanced smart meters that provide real-time measurement and communication of energy consumption, automated load management systems embedded with current demand-side management programs and remote status detection and operation of distribution equipment. Section 85 requires that any smart grid pilot program include time-of-use or hourly pricing for commodity service for a minimum of 0.25 percent of a company's customers. Further, Section 85 requires that a specific objective of any smart grid pilot program shall be to reduce by a minimum of five percent the peak and average loads of those customers who actively participate in the program. A company that designs a smart grid pilot program that includes a larger number of customers and demonstrates bill savings in excess of the minimum required is eligible to earn incentives.

Section 85 requires the Department to work with the electric distribution companies to identify specific areas of study, and the Department may incorporate and use information from

relevant past studies and pilot programs. Finally, Section 85 requires the electric distribution companies to include in their filings a proposed rate treatment for incremental smart grid pilot program costs for the Department's approval.

III. NATIONAL GRID'S PROPOSED SMART GRID PILOT PROGRAM

A. Description of Proposal

1. Overview

National Grid states that its proposed smart grid pilot program is similar in size, scope, and scale to the original proposal that the Company filed in D.P.U. 09-32 (Exh. CAW-1, at 4-7). The Company states that it sought to maintain the aspects of the pilot program that were endorsed by the Department in D.P.U. 09-32, while reducing the overall cost and including even more advanced smart grid technologies, and sought to enhance its outreach and education plan (Exh. CAW-1, at 4-9).

National Grid proposes to operate its smart grid pilot program for twelve or 24 months,² beginning in the summer of 2012, in the northwest area of Worcester, Massachusetts

² After a twelve-month preparatory period, the Company seeks to operate its pilot program for a period of either one year or two years, based upon direction from the Department (Exh. PTZ-1, at 12-13).

(Exhs. CAW-1, at 14; PTZ-1, at 12).³ Similar to the program proposed in D.P.U. 09-32, the Company proposes to enroll approximately 13,457 residential and 1,341 commercial and industrial (“C&I”) basic service customers as participants in the pilot program on an “opt-out” basis (i.e., customers will be enrolled in the pilot program unless and until they inform the Company that they wish to opt-out) (RR-AG-1(a); Tr. 2, at 379-380). The Company’s proposed program includes two components: (1) a “customer-facing” component, which includes a dynamic pricing program as well as the installation of advanced metering infrastructure (“AMI”) meters and in-home energy management technologies; and (2) a “grid-facing” component, which includes the deployment of advanced distribution automation and control, automated distribution system monitoring technologies, fault location devices, and advanced capacitors on the Company’s electric distribution system within the pilot program area (Exh. CAW-1, at 15-26).

The Company proposes to implement the two components of the pilot program together in order to conduct a limited simulation of the actual operating conditions of a full-scale deployment of smart grid tools and technologies (Exhs. DPU-NG-7-2, at 5-6; AG-1-23; National Grid Brief at 3). Accordingly, the Company proposes to: (1) install AMI meters at the homes and businesses of all customers within the pilot program area; (2) offer dynamic pricing

³ According to the Company, it selected Worcester for the pilot program area because: (1) the city’s large and diverse population will inform the Company as to the implications of smart grid technology and dynamic pricing for a wide variety of customers; (2) the Company’s distribution system assets in Worcester are representative of the mix of overhead and underground distribution system infrastructure throughout the Company’s service territory; (3) the city has a number of existing distributed generation project sites and electric vehicle charging stations, which will inform the Company as to how these resources affect grid operating conditions; and (4) the city contains colleges and universities, which will allow the Company to offer students experience in the smart grid and renewable energy industries (Exh. CAW-1, at 13-14).

programs to all customers within the pilot program area; and (3) install the distribution automation equipment on facilities within that same area (Exh. CAW-1, at 5, 15-16).⁴ The Company estimates the total cost of its proposed smart grid pilot program is approximately \$43.6 million (Exh. CAW-11, at 1).⁵

National Grid states that its proposed pilot program will allow the Company to test and quantify the extent to which a large-scale deployment of smart grid technology, coupled with extensive education and outreach, may provide significant benefits to its customers and to the grid (Exh. DPU-NG-7-2). National Grid anticipates that such benefits could include: (1) providing customers the information and incentives to reduce peak and average energy consumption; (2) reducing outage times and increasing reliability; (3) reducing grid operation and maintenance costs; (4) reducing system line losses; (5) improving grid thermal performance; and (6) allowing the Company to better plan capital investments and improve its management of the electric grid (Exhs. DPU-NG-7-2; CAW-1, at 11).

2. Customers' Ability to Opt Out of the Smart Grid Pilot Program

As noted above, National Grid proposes to enroll all basic service customers within the smart grid pilot program area on an "opt-out" basis (Exh. CAW-1, at 5). The Company proposes to notify customers in writing of the Company's intent to: (1) enroll them in the pilot program; and (2) install an AMI meter (Exhs. DPU-NG-1-9; DPU-NG-5-4 (Supp); DPU-NG-5-5; Tr. 1,

⁴ The distribution system facilities located in the proposed smart grid pilot program area include five substations and eleven feeders (Exh. CAW-1, at 15).

⁵ National Grid states that its budget estimate for its current proposal is approximately \$12 million less than the estimate for its original proposal in D.P.U. 09-32 (Exh. CAW-11, at 1).

at 45). The Company states it will allow any customer to opt out of the installation of an AMI meter, at any time before or during the pilot program, which would effectively exclude the customer from the pilot program altogether (Exhs. DPU-NG-1-9; DPU-NG-5-4 (Supp); Tr. 1, at 45, 61; Tr. 3, at 446-447, 451). National Grid will provide customers with a an opt-out form as well as a toll-free telephone number to call in order to opt-out of the installation or have the AMI meter removed (Exh. DPU-NG-5-4 (Supp); Tr. 1, at 45, 61).

3. Smart Grid Technology Platform

a. Introduction

National Grid's proposed smart grid technology solution includes: (1) a high-speed communications network connecting the Company, customers, and the distribution grid; (2) customer-facing technologies (i.e., AMI meters and in-home devices); (3) distribution grid-facing technologies (i.e., distribution system monitoring and control technologies); (4) "cloud" computing systems;⁶ (5) modifications to the Company's existing information technology ("IT") systems; and (6) consulting and professional services related to the pilot program's design, development, and implementation activities (Exh. DPU-NG-3-11, at 3).⁷

b. Communications Network

National Grid's smart grid pilot program will include a high-speed, two-way communications network to transfer data between the Company and the grid-facing and customer-facing portions of the pilot program in a secure and reliable manner

⁶ "Cloud" computing, also called "Software-as-a-Service," refers to the practice of leasing IT functions from external vendors that store and maintain the software, as opposed to purchasing or building such systems internally.

⁷ The Company selected vendors for consulting and smart grid technologies through a multistep procurement process (Exh. CAW-1, at 40-46).

(Exh. DPU-NG-3-11, at 7). The communications network consists of three main layers, each using a different communications protocol: (1) a home area network (“HAN”);⁸ (2) a local area network (“LAN”);⁹ and (3) a wide area network (“WAN”)¹⁰ (Exhs. DPU-NG-3-11, at 7; CAW-1, at 21-22). In addition, the Company also proposes to use an existing third-party cellular network as a backup system to the WAN, which will provide system redundancy and test the potential of cellular networks to serve as communications systems in any future smart grid deployment (Exh. DPU-NG-3-11, at 9). The Company estimates that the cost of the communications network is \$3,542,041 (Exh. DPU-NG-6-15-1, at 3).

c. Customer-Facing Technologies

i. Introduction

The customer-facing component of the proposed smart grid pilot program includes a dynamic pricing program for residential and C&I basic service customers within the pilot

⁸ The HAN will be a ZigBee SEP 1.0 network, which is a proprietary standard for wireless networking, that will allow in-home devices to communicate with the AMI meters (Exh. DPU-NG-3-11, at 7-8).

⁹ The LAN will be a two-way radio frequency mesh (“RF mesh”) wireless network that enables the AMI meters to communicate information between the customer’s home and the Company. The LAN will transmit data to be collected by 14 Connected Grid Routers (*i.e.*, “CGRs”), which will then transmit the data to the WAN (Exhs. DPU-NG-3-11, at 8; DPU-NG-6-15-1, at 3).

¹⁰ The WAN will be a dedicated system based on Worldwide Interoperability for Microwave Access (“WiMAX”) technology, which is a standard high-speed wireless protocol (Exh. DPU-NG-3-11, at 9). The WAN will consist of approximately nine base stations on existing cellular towers and National Grid infrastructure (Exh. DPU-NG-3-11, at 9). The WAN will transmit data and communications back and forth to customers through the CGRs, while also communicating with all grid-facing devices (Exh. DPU-NG-3-11, at 9). Data will be communicated from the WAN to the Company’s IT systems using a combination of existing fiber optic cables, public carrier networks, and microwave radio networks (Exh. DPU-NG-3-11, at 9).

program area. To support the dynamic pricing program, the Company proposes to provide participating customers with some combination of AMI meters, in-home devices, and energy management technologies (Exhs. CAW-1, at 15-21; DPU-NG-6-14, Att. at 4-5).

ii. Advanced Metering Infrastructure

National Grid proposes to install new AMI meters for up to 14,798 residential and C&I basic service customers located within the smart grid pilot program area (Exh. CAW-1, at 15-16; RR-AG-1(a), at 1). The AMI meters are capable of recording and providing interval electricity consumption data, which will enable various dynamic pricing experiments and serve as a two-way communications portal between the Company and customers: (1) inside the home or business, to support customer information and energy management technologies; and (2) outside the home or business, to communicate data back to the Company (Exhs. CAW-1, at 16; DPU-NG-3-11, at 5).

The Company has begun to install 5,000 meters within the proposed pilot program area in order to test the data collection and communications capabilities of the AMI meters, and to look for potential issues related to AMI meter deployment (Exh. CAW-1, at 36). At the conclusion of the pilot program, if there is no plan for a wider deployment of AMI meters within the Company's service territory, the AMI meters from the pilot program will be converted to automated meter reading ("AMR") meters and remain in service (Exh. AG-1-49).

iii. In-Home Devices and Energy Management Technologies

National Grid will provide residential and C&I basic service customers enrolled in the pilot program with various technologies to manage their energy consumption (Exh. CAW-1,

at 16; Tr. 2, at 387). The Company estimates that the cost of providing residential and C&I basic service customers with the customer-facing technology is \$1,434,822 (Exh. DPU-6-15-1, at 1).

Up to 13,457 residential customers will be divided among four levels of technology. At a minimum, all customers will have access to Level 1 technology, which includes: (1) access to their energy use information at 15-minute intervals through National Grid's website; and (2) access to educational tools and messages provided by the Company through phone, email, and/or text messaging (Exh. DPU-NG-3-11, at 5). In addition, the Company proposes to provide three additional levels of tools and technologies to residential participants who elect a higher level of participation in the pilot program, on a first-come, first-served basis (Exhs. CAW-1, at 16-17; DPU-NG-3-11, at 6).

For Level 2, the Company proposes to equip up to 1,600 customers with a home display unit ("HDU") on which they will receive: (1) energy consumption information; (2) messages from National Grid concerning demand response events; and (3) information about actions that customers can take to lower their energy costs (Exh. CAW-1, at 17-18; RR-AG-1(a), at 1).

For Level 3, the Company proposes to equip up to 1,600 customers with a programmable communicating thermostat ("PCT") for automatic heating, ventilation, and air conditioning ("HVAC") systems (Exh. CAW-1, at 19; RR-AG-1(a), at 1). If Level 3 customers have a broadband Internet connection, the Company will provide them with a PCT with advanced analytical capabilities and a simplified user interface (Exh. DPU-NG-5-10).¹¹ For Level 3

¹¹ These customers will be able to set their PCT based on their personal preferences, either through a web-based interface or manually on the thermostat itself (Tr. 2, at 411-412). These PCTs can analyze the customer's behavior and the thermal performance of their house, and then optimize settings remotely based on customer preferences, in-home temperature, and weather information (Exhs. CAW-1, at 19-20; DPU-NG-5-10).

customers without a broadband Internet connection, the Company will provide a PCT without advanced analytical features (Tr. 2, at 415-416). All customers in Level 3 also can choose to allow the Company to automatically control their PCTs during critical peak events (Tr. 2, at 381-382).

In Level 4, the Company will provide up to 1,600 customers with all of the technologies provided to Level 1, Level 2, and Level 3 customers, as well as one load control device that allows customers to monitor and remotely control any device connected to a 120-volt outlet¹² (Exhs. CAW-1, at 20; DPU-NG-3-11, at 6; RR-AG-1(a) at 1). Each load control device will include a web-based interface that will allow customers to establish time-of-day and weekly load control profiles to help them reduce energy use and remotely control any device or appliance that they choose (Exhs. CAW-1, at 19-20; DPU-NG-7-2, at 4). National Grid also will offer Level 4 customers the choice to manage their energy consumption themselves or to authorize the Company to remotely shift their energy consumption to lower-priced times during critical peak events (Exhs. CAW-1, at 20; DPU-NG-7-2, at 4).

Up to 1,341 C&I customers will be enrolled in Level 1 of the pilot. A subset of these C&I customers are eligible to receive one of two different technology packages, if they so choose, on a first-come, first-served basis (RR-AG-1(a) at 1; Tr. 2, at 388). Up to 160 C&I customers will receive the same HDU that residential customers in Level 2 will receive (RR-AG-1(a) at 1; Tr. 2, at 394-395). Another group of 160 C&I customers may choose circuit-level monitoring, which allows them to view real-time energy usage on each circuit

¹² A 120-volt outlet is an ordinary residential outlet used for devices such as window air conditioners, refrigerators, pool pumps, and home electronics.

within their place of business, alerting them to unusual usage or overloaded circuits, thereby providing an educational opportunity for customers to reduce their energy usage (Exhs. CAW-1, at 21; DPU-NG-3-11, at 6-7; RR-AG-1(a) at 1; Tr. 2, at 384-386).

d. Distribution Grid-Facing Technologies

At the five distribution substations and along the eleven distribution feeders within the smart grid pilot program area, National Grid proposes to install the following grid-facing technologies: (1) advanced distribution automation (“ADA”) devices; (2) advanced capacitor control technology; (3) advanced grid monitoring technology; and (4) remote fault indicators (Exhs. CAW-1, at 22; DPU-NG-6-15-1, Att. at 7-10). The Company estimates that the cost of the distribution grid-facing technologies is \$9,727,493 (Exh. DPU-6-15-1, at 10).

The Company states that these technologies are intended to: (1) improve reliability performance by reducing the duration of power interruptions; (2) improve thermal performance, which will allow operators to run the system closer to full capacity; and (3) improve operational efficiency, thereby reducing costs for grid operation and maintenance (Exhs. DPU-NG-8-11, at 1; CAW-1, at 22-24). The proposed grid-facing technologies will use the high-speed communications system to give grid operators new knowledge and control over grid conditions, in almost real time (Exh. CAW-1, at 23). In addition, the Company proposes to use the distribution monitoring equipment to study the effects of electric vehicles and distributed generation on the grid by leveraging existing resources that are funded and operated by others, such as a wind turbine at a local high school and an electric vehicle charging station at a university (Tr. 3, at 540-543).

On eleven feeders within the pilot program area, the Company proposes to install 64 ADA devices, which include: (1) 50 new overhead reclosers;¹³ (2) five retrofitted overhead reclosers with new communications and control technologies; and (3) nine underground switches (Exhs. CAW-1, at 24; DPU-NG-8-15(a), Att. 1; DPU-NG-6-15, Att. at 7). In addition, the Company proposes to automate five substations within the pilot program area, which will enable them to: (1) communicate with the ADA switches; (2) communicate with the Company; and (3) automate certain operations (Exhs. CAW-1, at 24; DPU-NG-8-4, at 1). The Company states that these ADA devices and automated substations will communicate with grid operators as well as with each other, which will allow the grid to “self-heal” (Exh. CAW-1, at 24-27). These technologies have the potential to decrease the length of outages, restoring power in an outage without a crew site visit, and improving the thermal performance of the grid (Exh. DPU-NG-7-2, at 1).

The Company also proposes to measure and test the potential system benefits of two additional advanced recloser technologies not currently in use by the Company (Exhs. AG-4-25; AG-4-27). First, the Company proposes to install seven advanced reclosers that can determine whether the line is clear of faults prior to closing, instead of opening and closing a number of times like a traditional recloser (Exh. CAW-1, at 27; Tr. 3, at 545-546). The Company states that such reclosers are designed to minimize fault current that damages equipment over time and, therefore, could increase the useful life of other electric grid equipment, such as transformers (Exhs. DPU-NG-8-8, at 1; DPU-NG-7-2, at 3; Tr. 3, at 545-546). Second, the Company plans to

¹³ A recloser is a switch on an electric distribution line that automatically opens and closes (i.e., to cut off and restore the flow of electricity) whenever it senses a fault on the line.

install two single-phase reclosers, which will trip only one phase on a three-phase distribution line whenever possible, thereby preventing an outage for customers who are served by the other two phases of the line (Exh. DPU-NG-7-2, at 3; Tr. 3, at 546-547).¹⁴

National Grid also proposes to install 47 overhead capacitor banks,¹⁵ of which: (1) 36 are new capacitors; and (2) eleven are existing capacitors retrofitted with new communications and control technology (Exhs. CAW-1, at 25; DPU-NG-6-15-1, at 9; DPU-NG-8-16, Att.). The Company states that this component of the pilot program is designed to test the technology's ability to improve power quality, reduce line losses, improve compliance with Independent System Operators-New England, Inc. ("ISO-NE") operating requirements, and also potentially reduce operations and maintenance costs for the Company (Exh. DPU-NG-7-2, at 1-2).

In addition, National Grid proposes to install 20 new overhead and underground faulted circuit indicators ("FCIs") that are designed, in concert with data from other grid-facing devices included in the pilot program and software (as described further below), to enable the Company to identify potential fault locations (Exhs. CAW-1, at 28-29; DPU-NG-8-18, Att.). The Company states that this component of the pilot program is designed to examine whether outage times can be reduced by allowing the Company to pinpoint the location of faults more quickly (Exh. DPU-NG-7-2, at 3).

Finally, the Company proposes to install 16 grid monitors and 16 feeder monitors (Exh. CAW-1, at 25). The grid monitors will be installed around electricity capacity

¹⁴ Currently, the Company uses only three-phase reclosers on its distribution system.

¹⁵ Capacitors store electricity and release it when needed to correct improper distribution system operating conditions.

“bottlenecks,” certain grid infrastructure, distributed generation facilities, and electric vehicle charging stations and will, along with data collected by other pilot program devices such as capacitors, provide the Company with real-time information about grid operating conditions (Exhs. CAW-1, at 25-26; DPU-NG-2-13). The Company states that the grid monitoring component of the pilot program is designed to test the usefulness of collecting granular grid data, and may allow the Company to operate its system closer to full capacity, which could defer the need for system upgrades and the associated costs (Exhs. CAW-1, at 26; DPU-NG-7-2, at 2). Feeder monitors will continuously collect a variety of data on grid operating conditions and thermal performance (Exh. CAW-1, at 26). The Company states that grid-facing monitoring and control technologies may enable more efficient operation of the electric grid, thereby better balancing supply and demand, reducing overheating and reduced capacity of feeders and transformers, and also helping the Company improve planning of system upgrades (Exh. DPU-NG-7-2, at 2).

e. Smart Grid Information Technology System

The Company’s proposed IT solution relies on leased “cloud” computing technology, supplemented by changes to National Grid’s legacy IT systems and the purchase of new software (Exhs. CAW-1, at 29; DPU-NG-3-11, at 10-11). The Company estimates that the cost of its proposed IT solution is \$13,443,647 (Exh. DPU-NG-6-15-1, at 6).

With cloud computing, the Company will outsource various IT functions to vendors that will manage, own, and maintain the software (Exhs. CAW-1, at 30-31; DPU-NG-3-11, at 10).

The Company proposes to lease: (1) a Meter Data Management System (“MDMS”);¹⁶ (2) a Meter Head End System (“HES”);¹⁷ (3) a Network Management System (“NMS”);¹⁸ and (4) software to support the in-home devices¹⁹ (Exh. DPU-NG-6-15-1, at 4-5; DPU-NG-6-14, Att. at 8). The Company proposes to modify two of National Grid’s existing IT systems to support the customer-facing component of the pilot program: (1) the Customer Service System (“CSS”), which is used to bill customers and organize their data to be viewed on the Internet, will be modified to collect interval data from AMI meters and support the pricing structures of the pilot program; and (2) the Meter Inventory Tracking System (“MITS”), which is used to track the location and age of all existing meters, will be modified to include the AMI meters (Exh. DPU-NG-3-11, at 12).

Taken together, these systems will support the customer-facing portion of the pilot by: (1) receiving customer consumption data remotely; (2) transferring interval-based consumption data that are stored in the meter data management system to the billing system in order to generate customer bills; (3) displaying consumption data on the customer web portal;

¹⁶ The MDMS will collect and store customer energy usage data from the AMI meters and transfer such data to the Company for use in customer billing and communications (Exh. DPU-NG-3-11, at 4).

¹⁷ The HES will manage the two-way communication between the Company and devices on customer premises and on the electric grid (Exh. DPU-NG-2-5, at 1-2).

¹⁸ The NMS software will allow the Company to constantly monitor the communications network, perform remote software upgrades, and change component settings, while helping to ensure that data are communicated securely (Exh. DPU-NG-3-11, at 9-10).

¹⁹ The software to support the in-home devices will allow customers to view energy usage data and control devices over the Internet and on their mobile phones (Exh. DPU-NG-2-5; Tr. 2, at 409).

(4) ensuring secure transfer of customer usage data and customer privacy; (5) scheduling meter installations; (6) tracking AMI meter inventory and locations; (7) enabling customers or National Grid to remotely control in-home devices during demand response events; and (8) sending meter outage information to the outage management system (Exh. DPU-NG-3-11, at 10-12; Tr. 2, at 371-372).

The Company's other proposed investments in software systems are associated with the distribution grid-facing component of the pilot program, which include: (1) modifications to the Company's existing Energy Management System ("EMS"); (2) modifications to the Company's existing data historian software, which collects, organizes, and archives real-time grid data; (3) the addition of fault locations software; and (4) the addition of a data warehouse (Tr. 2, at 405-408; Exhs. DPU-NG-3-11, at 13; DPU-NG-6-8). National Grid states that these systems are designed to enable the Company to: (1) automate control of the sensors and other equipment on the distribution system; (2) receive immediate notification of problems on the distribution system; (3) identify fault locations in almost real time; (4) allow grid operators to respond to changes in almost real time; and (5) provide historical data collected over the term of the pilot program for future analysis related to system operations, upgrades, and planning (Tr. 2, at 405-408; Exh. DPU-NG-3-11, at 13). The Company states that any changes to its legacy IT software to support both the customer-facing and grid-facing components could be permanent, depending on the results of the pilot program (Tr. 2, at 406).

f. Program/Execution Partner

The Company proposes to hire a consultant ("Program/Execution Partner") to support the design, development, and implementation of the Company's smart grid pilot program (Tr. 3,

at 562-568). A key role of the Program/Execution Partner would be to coordinate between the Company and technology vendors and ensure that the pilot program proceeds as scheduled and that all technology vendors fulfill their contractual obligations (Tr. 3, at 563-564; Exh. DPU-NG-9-4). The Program/Execution Partner would lead the architecture and engineering of the proposed technology solution, ensure that all technologies plus all leased and legacy IT systems work together as envisioned, and be responsible for developing and executing a plan to test the proposed technology solution prior to its deployment (Tr. 3, at 553, 566-567). The Program/Execution Partner also would work with the Company during the pilot program to ensure the ongoing functioning of the pilot program technologies (Tr. 3, at 566-567). The Program/Execution Partner also would help National Grid to: (1) train its personnel to successfully execute the pilot program and provide effective customer service; and (2) communicate with pilot program participants (Tr. 3, at 565-568; Exhs. DPU-NG-9-3; DPU-NG-6-12 (Confidential), at 4-5). The Company estimates that the cost of including the Program/Execution Partner is \$10,104,582 (Exh. DPU-6-15-1, at 11).

4. Cyber Security and Customer Privacy

National Grid's proposed pilot program requires a regular, bidirectional flow of price, consumption, and other types of information between the Company and customers (Exhs. CAW-1, at 6, 11, 23; DPU-NG-6-14, Att.). National Grid states that its proposed AMI meters will meet the latest industry standards as well as the latest interoperability, cyber security, and open architecture (i.e., software that allows for adding, upgrading, and exchanging components) protocols (Exh. CAW-1, at 10, 16, 36). In addition, National Grid proposes to allay any potential customer concerns about cyber security and customer privacy as part of its outreach and

education plan (“O&E”) plan, as described further below, using welcome kits with safety and security information, and by training customer representatives to respond to related customer questions (Exhs. EHW-1, at 9; DPU-NG-1-6; Tr. 1, at 141-142).

5. Dynamic Pricing Structures

a. Introduction

National Grid proposes to enroll up to 14,798 customers within the smart grid pilot program area who receive electric supply pursuant to the Company’s basic service tariffs in a dynamic pricing program (Exh. PTZ-2, at 1). National Grid proposes to maintain the same dynamic pricing program that was included in its 2009 proposal (Exh. PTZ-1, at 4). Residential customers, small C&I customers, and medium C&I customers taking retail delivery service on rate classes G-1 and G-2 will be enrolled in either: (1) time-of-use rates with critical peak pricing (“TOU/ CPP”); or (2) peak time rebate (“PTR”) rates (Exh. PTZ-2, at 2, 6). Large C&I customers taking service on rate class G-3 will be enrolled in either: (1) an hourly pricing program (“HPP”); or (2) PTR (Exh. PTZ-2, at 2, 5-6).

National Grid proposes to enroll all residential, G-1, and G-2 customers in the TOU/ CPP, and to enroll all G-3 customers in HPP, all on an “opt-out” basis (Exhs. PTZ-1, at 10-11; PTZ-2, at 1-2).²⁰ Any customers who opt-out of TOU/ CPP or HPP will be surveyed as to their reasons for declining these rates (Exhs. PTZ-1, at 10; PTZ-2, at 1). National Grid proposes to offer

²⁰ National Grid states that, no later than two months prior to the start of the pilot program, it will provide customers with an opt-out form, and they will have 30 days to return the completed form (Exh. PTZ-1, at 10). In addition, the Company plans to host a toll-free telephone line for customers to opt-out by telephone (Exh. DPU-NG-5-4 (Supp.) Att. at 2).

prevailing basic service rates with PTR to all residential and C&I customers who opt out of TOU/CPP or HPP (Exh. PTZ-2, at 5).

b. Time-of-Use Rates with Critical Peak Pricing

For TOU/CPP, National Grid proposes to offer three unique rates for consumption that occurs during periods that are identified as “on-peak,” “off-peak,” or “critical peak” (Exh. PTZ-2, at 3). The Company’s on-peak period will consist of non-holiday weekday hours from 8:00 a.m. to 8:00 p.m. (see Exh. PTZ-2, at 3). The Company’s off-peak period will consist of all hours not included in the on-peak period (Exh. PTZ-2, at 3). A subset of hours will be deemed critical peak hours based on critical events called by the Company that may occur at any time on weekdays (Exh. PTZ-2, at 3). The Company states that it plans to call critical peak events in conjunction with day-ahead forecasts by ISO-NE that indicate high load or peak conditions for the following day (Exh. PTZ-2, at 3). Critical peak events will be called a maximum of 30 separate times per year, and will not exceed 175 hours per year (Exh. PTZ-1, at 6). National Grid intends to notify customers of a critical peak event one day prior to the event (Exh. PTZ-2, at 3).

The Company’s rates for electricity will vary in the course of its pilot program, but its off-peak period will have the lowest price, its on-peak hours will have a slightly higher price, and its critical peak period will carry the highest price (Exh. PTZ-2, at 3). National Grid will use a four-step process to determine its TOU/CPP rates, which will be based on: (1) prices in the wholesale energy and capacity markets administered by ISO-NE; and (2) its current basic service

rate (Exhs. PTZ-2, at 4; PTZ-3, at 1).²¹ Table 1, below, provides an illustrative example of CPP rates, based on a residential (R-1), small commercial (G-1), and large commercial (G-2) basic service rates in effect on November 1, 2011.

Table 1: Example of Time-of-Use Rates with Critical Peak Pricing²²

Rate Class	Basic Service Rate	Off-Peak (\$/kWh)	On-Peak (\$/kWh)	Critical Peak (\$/kWh)
R-1	\$0.083	\$0.056	\$0.069	\$0.635
G-1	\$0.080	\$0.055	\$0.068	\$0.627
G-2	\$0.083	\$0.058	\$0.072	\$0.665

National Grid's proposed TOU/CPP offering includes a bill protection component such that customers who enroll in TOU/CPP will pay no more for their electricity supply over a twelve-month period than if they had remained on the prevailing fixed basic service rate (Exhs. PTZ-1, at 11; PTZ-2, at 1). After twelve months of the pilot program, the Company states that it will calculate the difference between what each customer was charged for electricity supply under the TOU/CPP rates and what that same customer would have otherwise been charged pursuant to the basic service flat rate in effect during the pilot program year

²¹ First, the Company will calculate load weighted average wholesale energy market prices for the off-peak, on-peak, and critical peak periods using wholesale energy prices from 2010 (Exhs. PTZ-1, at 4-5; PTZ-3, at 1). Second, the Company will determine the average energy price for each period by dividing the sum of the hourly cost by the sum of the hourly loads in each period (Exh. PTZ-2, at 4). Third, National Grid will allocate 100 percent of its estimated annual capacity costs to 173 critical peak period hours (Exhs. PTZ-2, at 4; PTZ-3, at 3). Fourth, the Company will adjust each of the three periodic rates proportionally so that the resulting revenues are equal to the flat basic service rate currently in effect (Exh. PTZ-2, at 5).

²² Source: Exh. PTZ-3, at 1.

(Exh. PTZ-2, at 1). The Company proposes to credit the difference to those participants who paid more for basic service pursuant to TOU/CPP (Exh. PTZ-2, at 1). National Grid states that TOU/CPP participants will be required to remain in the program for twelve consecutive months because, absent this requirement, if a customer enrolled in TOU/CPP only during non-summer months in order to avail itself of low seasonal prices, it would avoid its true cost of capacity, which is set during the summer months (Exh. PTZ-2, at 2).²³

c. Peak Time Rebate

National Grid proposes to offer a PTR pricing structure to all residential, small C&I, and medium C&I customers who opt out of TOU/CPP (Exh. PTZ-2, at 5). All PTR participants will remain on the Company's standard basic service rates (Exh. PTZ-2, at 5). During critical peak events, participants who reduce electricity consumption will receive a credit on their bill for the event (Exhs. PTZ-2, at 5; PTZ-3(a), at 3). National Grid proposes a credit at a rate equal to the capacity adder used to determine the critical peak rate in the TOU/CPP program, which would be

²³ The Company states that the rationale for requiring customers to remain in the pilot program for twelve consecutive months is driven by the ISO-NE's practice of charging wholesale electricity suppliers using capacity "tags" for the customers they serve, and such tags are determined at the time of the annual system peak (Exh. PTZ-2, at 2). The monthly cost of a capacity tag (*i.e.*, a monetary amount that is based upon the customer's demand during the system peak) remains with a customer even if the customer switches suppliers (Exh. PTZ-2, at 2). If a customer chooses a competitive supplier for the summer months, and returns to basic service during the lower cost months, the capacity tag remains with the customer and will be charged to the customer's supplier (Exh. PTZ-2, at 2). Because residential and small C&I basic service procurements occur every six months, a basic service supplier could have a significant under recovery of basic service costs associated with customers switching between competitive supply and basic service (Exh. PTZ-2, at 2).

approximately \$0.39 per kilowatt-hour (“kWh”) of reduced consumption.²⁴ National Grid will determine whether PTR program participants earned a credit by calculating the difference between a participant’s historic reference level of consumption²⁵ and the participant’s actual level of consumption during each critical peak event (Exh. EHW-3, at 45).

d. Hourly Pricing Program

National Grid proposes to offer HPP on an opt-out basis to all large basic service C&I customers taking service under the Company’s G-3 rate (Exh. PTZ-2, at 5). The HPP rates will be calculated as the sum of: (1) a day-ahead location-based hourly energy price from ISO-NE; (2) a capacity adder allocated during critical peak event hours, calculated in a manner consistent with the TOU/CPP program; and (3) a per kWh reconciliation factor applicable to every hour (i.e., that will account for other wholesale and retail costs not included in energy and capacity prices) (Exh. PTZ-2, at 6). Like TOU/CPP participants, the Company proposes that HPP participants be required to remain on this rate for a twelve-month period, and they will receive bill protection such that, at the end of a twelve-month period, they will pay no more than if they

²⁴ The credit rate is based on an estimated annual capacity cost of \$67.07 per kilowatt (“kW”), divided by 173 critical peak hours (Exhs. PTZ-3(a), at 3; c.f. PTZ-1, at 6 (similar to its actual peak of 173 hours, National Grid proposes to call critical peak events for a total of no more than 175 hours per year)).

²⁵ For each hour of the critical peak period, each participant’s historic level of consumption (i.e., “acceptable days” or baseline) will be determined by the measured kWh usage during each of the five business days immediately prior to the critical peak event (Exh. EHW-3, at 45). These values will be adjusted by the difference between actual kWh usage that occurs during the hour that is two hours prior to the start of the critical peak period and the consumption occurring during the same period during each of the five prior business days (Exh. EHW-3, at 45). National Grid proposes to use the same “day matching” method as used by ISO-NE in its settlement calculations for the Company’s evaluation of PTR customers’ load response (Exh. EHW-3, at 45).

had remained on prevailing fixed basic service rates (Exh. PTZ-2, at 2, 5). If a G-3 customer opts-out of HPP, it will receive PTR instead (RR-DPU-8, Att. at 1; RR-AG-1(b)).

6. Outreach and Education Plan

National Grid's proposal includes an O&E plan that it states has two fundamental goals: (1) to achieve effective and meaningful customer engagement in the pilot program; and (2) to eliminate potential barriers to customer adoption of the proposed smart grid technologies and rate structures (Exhs. EHW-1, at 3; EHW-2, at 15). The estimated cost of the O&E plan is \$2.4 million (Exh. EHW-2, at 29).

The Company states that its O&E plan is based on a similar plan that was considered in D.P.U. 09-32, with significant refinements (Exh. EHW-1, at 5). According to the Company, the focus of the updated O&E plan has shifted from an awareness-building campaign to customer and community engagement and education (Exh. EHW-1, at 5). The Company states that its O&E plan is a "listen, test, and learn" approach, which is designed to optimize customer engagement and communications through various means that include, but are not limited to: community forums, direct customer interaction, and social media outlets (Exh. EHW-1, at 5). Based on feedback from participants, the Company states that it will refine: (1) its communication channels; (2) the form and content of messages that are communicated to customers; and (3) the means of communicating information (Exh. EHW-2, at 8, 25).

National Grid's O&E plan involves a number of topics, communication channels, and means of achieving customer and community engagement (Exh. EHW-2, at 13, 15). For example, the Company states that it aims to educate customers on the following topics: (1) the different rate and technology options that are available to them; (2) the strategies that they can

use to take advantage of the rate structure they have chosen, such as load-shifting and the enabling technologies provided by the Company; and (3) how bill protection provides customers with a safeguard to their participation in TOU/CPP rates (Exh. EHW-2, at 13). National Grid's O&E plan will use five major communication channels: (1) home or work;²⁶ (2) local and social media;²⁷ (3) community partners and leaders;²⁸ (4) college co-op;²⁹ and (5) retailers and contractors³⁰ (Exhs. EHW-1, at 10; EHW-2, at 15). National Grid states that it will specifically tailor its approaches to the context, reach, and capabilities of each of these channels (Exh. EHW-2, at 15). In addition, the Company plans to use means such as print, broadcast, web, electronic, mobile, and social media, as well as in-person discussions (Exh. EHW-2, at 15-23).

²⁶ Through this channel, residential participants will receive educational messages in their homes, while C&I participants will receive messages at their place of business (Exh. EHW-2, at 17-20).

²⁷ National Grid will use local media outlets to spread educational messages to pilot program participants (Exh. EHW-2, at 23). The Company states that it also intends to hold regular media events and perform ongoing outreach efforts to local media outlets throughout the pilot program (Exh. EHW-2, at 23).

²⁸ This channel will involve partnerships between the Company and community organizations such as schools, city officials, non-profits, and advocates to spread the Company's educational messages (Exh. EHW-2, at 20-22).

²⁹ Through the college co-op channel, local college students will provide education and support to pilot program participants using demonstrations designed to illustrate the various rate and technology choices (Exh. EHW-1, at 10). In addition, college students will provide technical support and troubleshooting on the pilot program technology, plus answer participants' questions and gather their feedback (Exhs. EHW-1, at 10; EHW-2, at 35, 37).

³⁰ National Grid will conduct training and in-store demonstrations at local retailers (Exh. EHW-2, at 22).

National Grid also proposes to open a facility near Clark University designed to provide interactive exhibits, education, and hands-on access to the smart grid technology offered in the pilot program (“Sustainability Hub”) (Exh. EHW-2, at 35). The Sustainability Hub also will host computer terminals with Internet access for any participants who do not have Internet access in their homes (Exh. EHW-2, at 35). National Grid expects that space, equipment, most services, and overhead for the Sustainability Hub will be donated in part by community, stakeholder, and vendor partners (Exh. EHW-2, at 37).³¹ National Grid estimates that its costs for the Sustainability Hub will be \$50,000 (Exh. EHW-2, at 28, 37).

The Company states that it intends to begin the O&E plan messaging approximately nine months before the pilot program begins to operate (Exh. EHW-2, at 14-15, 23). Prior to the start of the O&E plan messaging, in accordance with the Common Evaluation Framework,³² the Company will conduct a pre-pilot program survey and research to evaluate the use of various topics, communication channels, and means of engaging and educating customers (Exh. EHW-1, at 8). In addition, the Company proposes to sponsor a behavioral study by the Massachusetts Institute of Technology (“MIT Behavioral Study”), designed to study pilot program participants’

³¹ For example, National Grid states that the Sustainability Hub will be staffed by National Grid employees, college co-op students, pilot program vendors, and community partners (Exh. DPU-NG-4-6).

³² The Department established a Smart Grid Working Group Collaborative to facilitate coordination and maximize comparability among the Section 85 smart grid pilot programs. This group developed a Common Evaluation Framework, designed to encourage uniform statewide smart grid evaluation approaches and standards to the extent reasonable. See, e.g., D.P.U. 09-33, at 39-40; Massachusetts Smart Grid Collaborative, “Common Evaluation Framework,” D.P.U. 10-82.

behaviors more deeply (Exh. EHW-3, at 58; Tr. 3, at 473-476). The estimated cost of the MIT Behavioral Study is \$50,000 (Exh. EHW-3, at 58; Tr. 3, at 473-476).

7. Evaluation Plan

National Grid has developed an evaluation plan designed to assess the effects of the grid-facing and customer-facing pilot program components, as well as how the O&E plan affects participants' energy consumption (Exh. EHW-1, at 13). The estimated budget for evaluation plan is between \$1.05 million and \$1.15 million (Exh. EHW-3, at 58).³³

National Grid's evaluation plan for the customer-facing component corresponds to its pilot program design. The Company proposes to evaluate residential customers within each of the four technology groups (i.e., Levels 1 through 4), further segmented by whether they are enrolled in TOU-CPP or PTR (Exh. EHW-2, at 12-13). The Company proposes to evaluate C&I customers within each of the two technology groups,³⁴ further segmented by whether they are enrolled in HPP or PTR (RR-DPU-8, Att. at 1). In total, National Grid proposes to evaluate eight residential participant groups and four C&I participant groups (Exh. EHW-3, at 23).

Because National Grid proposes to enroll customers on an opt-out basis, and further enroll them

³³ The Company states that this budget is dependent upon the survey response rate and level of effort required to achieve an adequate number of returned surveys (Exh. EHW-3, at 57). The budget does not include any costs related to the evaluation of grid-facing activities. The Company states that this evaluation will be conducted by National Grid employees as part of their normal work responsibilities and, therefore, the Company does not propose to seek recovery of such costs in the pilot program context (Exh. EHW-3, at 57).

³⁴ As described earlier, the Company proposes to provide two subsets of C&I customers with either HDUs or circuit-level monitoring devices, whereas all other C&I customers will have the same technology package as Level 1 among the residential customers (RR-DPU-8, Att. at 1).

in TOU/ CPP or HPP as the default pricing option with PTR as the back-up choice, the Company states that it cannot project in advance the size of these twelve participant groups (National Grid Reply Brief at 19, citing Tr. 3, at 445-448).

The Company states that its evaluation plan is consistent with the Common Evaluation Framework (Exh. EHW-3, at 19). Specifically, the Company proposes to segment participants by the following demographic categories: (1) all participants; (2) low-income; (3) high income; (4) low use; (5) high use; (6) low-income and low use; (7) low-income and high use; (8) premises with senior residents; (9) small home; and (10) large home (Exh. EHW-3, at 19). National Grid intends to further subdivide these customer segments into test groups based upon the customers' technology levels and rate structures, for a total of 80 test groups (Exh. EHW-3, at 19).³⁵ The Company states that the pilot program also will include a control group made up of 360 existing load research customers³⁶ outside of the pilot program area (Exh. EHW-3, at 24).

The Company proposes to administer customer surveys to residential and C&I customers to determine the effectiveness of the various technology, pricing structures, and educational approaches in eliciting changes in electricity consumption behavior (Exh. EHW-3, at 32). The Company states that its surveys will conform to the parameters established by the Smart Grid Working Group Collaborative and will be conducted before, during, and at the end of the pilot

³⁵ While C&I customers are included in the pilot program, they will not be segmented into the demographic categories from the Common Evaluation Framework (Exh. EHW-3, at 21). Accordingly, the eight residential participant groups will be segmented into ten demographic categories for a total of 80 test groups (Exh. EHW-3, at 23).

³⁶ The Company states that its load research customers have been randomly selected, equipped with hourly interval load research meters, and are studied for the purpose of forecasting load and determining the potential capital needed to serve that load (Tr. 1, at 87-89; Tr. 3, at 438-439, 444-446).

program (Exh. EHW-3, at 32). The Company primarily intends to use web- and telephone-based surveys, although it also will gather in-person feedback at the Sustainability Hub (Exhs. EHW-3, at 59; EHW-1, at 15).

To evaluate the grid-facing component, National Grid will study the effects of the devices on: (1) service reliability; (2) operational efficiency; and (3) thermal performance (Exhs. EHW-3, at 47; DPU-NG-8-11). The results of these studies will be compared to baseline data from the pilot program area over the last three years (Exh. EHW-3, at 52). To determine the effects on service reliability, the Company will evaluate the grid-facing devices using the System Average Interruption Frequency Index (“SAIFI”) and System Average Interruption Duration Index (“SAIDI”) metrics (Exh. EHW-3, at 50). To determine the effects on operational efficiency, the Company will evaluate whether the grid-facing devices improve system operator and crew use (Exhs. EHW-3, at 53; DPU-NG-8-11; Tr. 3 at 467-473). To determine whether there are thermal performance benefits, the Company will evaluate whether the grid-facing devices minimize system losses and improve reactive demand compensation (Exhs. EHW-3, at 54; DPU-NG-8-11; DPU-NG-8-20).

8. Pilot Program Duration

Although its estimated budget of \$43.6 million is based on an 18-month smart grid pilot program, the Company proposes to operate the pilot program for a period of one or two years, based upon direction from the Department (Exh. PTZ-1, at 12-13; Tr. 1, at 163). National Grid estimates that the incremental cost to operate the pilot program for an additional six months (i.e., for a total of two years) is \$2,271,543 (Exhs. PTZ-1, at 13; PTZ-5, at 1; Tr. 1, at 159-160).

Conversely, the overall pilot program budget estimate is reduced by \$2,271,543 for a one-year pilot program (Exh. PTZ-1, at 13; Tr. 1, at 163-165).

Based on these cost estimates, National Grid calculates the total resulting revenue requirement for a one- or two-year pilot program to be \$50,197,082, and \$54,156,666, respectively (RR-DPU-4, Att. at 1; RR-DPU-5, Att. at 1). These revenue requirements calculations include taxes, a return on investment, operating expenses, book depreciation, and property taxes (RR-DPU-4, Att. at 1; RR-DPU-5, Att. at 1).

9. Performance Incentive

National Grid proposes to collect a performance incentive at the conclusion of the smart grid pilot program if: (1) more than 0.25 percent³⁷ of its customers participate in the program; and (2) participants reduce both their average and peak consumption by greater than five percent (Exh. PTZ-1, at 8).³⁸ The Company's proposed incentive is equal to 50 percent of basic service bill savings that result from any reductions in average and peak usage in excess of five percent, not to exceed (on a pre-tax basis) three percent of the Company's spending on the customer-facing component of the pilot program (Exh. PTZ-1, at 8).³⁹

³⁷ As stated above, pursuant Section 85, a minimum of 0.25 percent of a company's customers must participate in a dynamic pricing program. For National Grid, 0.25 percent of its customers would equal approximately 3,200 participants.

³⁸ Section 85 states that, "[a] specific objective of the pilot shall be to reduce, for those customers who actively participate in the pilot, peak and average loads by a minimum of five percent"

³⁹ The Company's sample tariffs, further describe how the performance incentive will be calculated (Exh. PTZ-4(c) at 2-4).

10. Early Procurement and Installation of Smart Grid Technology

In anticipation of the start of its smart grid pilot program, National Grid states that it has begun designing, procuring, installing, and testing certain components of smart grid technology prior to receiving Department approval in order to shorten the “ramp-up” period leading to the start of the pilot program (Exh. CAW-1, at 4). National Grid affirms that it has already begun to: (1) install and test some customer-facing equipment; and (2) begun to design and procure some grid-facing equipment (RR-DPU-1; RR-AG-13; Tr. 1, at 126-127). National Grid avers that its ability to recover approximately \$1,687,598 for early equipment expenditures will depend upon whether the Department approves the Company’s pilot program as proposed (Exh. DPU-NG-1-4).

With specific regard to the customer-facing component, National Grid states that it has installed 5,000 AMI meters in the pilot program area as an “early field trial,” which will allow it to: (1) establish baseline information; (2) test the communications capabilities of the meters; and (3) address any interoperability and capability issues (Exhs. CAW-1, at 10, 12, 32, 33, 34-35, 36; CAW-3, at 1). According to National Grid, the early field trial reduces costs of the pilot program because the AMI meter vendor provided these 5,000 meters at no cost in exchange for allowing it to conduct various tests (Exh. CAW-1, at 37; Tr. 1, at 124, Tr. 2, at 327-328). The Company estimates that it will incur approximately \$400,000 of costs for the early field trial of the meters but, in National Grid’s view, only \$65,000 of labor costs for installing the meters is an incremental cost of the smart grid pilot program (Exh. DPU-NG-1-3, at 1; Tr. 1, at 132-135). Accordingly, the Company does not plan to seek cost recovery for the remainder as part of the cost recovery sought for the pilot program (Exh. DPU-NG-1-3, at 1; Tr. 1, at 132-135).

In addition, National Grid states that it has begun to design and procure grid-facing technology, which it contends will allow the Company to more rapidly deploy this aspect of the pilot program if it is approved (Exhs. CAW-1, at 38; DPU-NG-1-1). National Grid claims that it needed to procure certain long lead-time materials (i.e., requiring up to five months to obtain) in order: (1) to ensure that the equipment can be installed in time for the start of the pilot program; and (2) to begin testing the equipment, because engineering design must be completed prior to scheduling construction (Exhs. CAW-1, at 12, 38; DPU-NG-1-1; DPU-NG-1-2; DPU-NG-1-4; Tr. 1 at 126-127). The Company states that its early expenditures on grid-facing technologies will total approximately \$1,622,598 (Exhs. DPU-NG-1-3, at 1; DPU-NG-5-1; Tr. 1, at 126-127; RR-DPU-1).⁴⁰ Of this total: (1) \$1,473,200 is capital costs for grid-facing plant investments; (2) \$2,078 is for the cost of removal of previously installed equipment; and (3) \$147,320 is operating costs (Exhs. PTZ-6 (Confidential), at 8, 14; DPU-NG-1-3, at 2; Tr. 1, at 126-127). However, National Grid affirms that no grid-facing technology will be physically installed on its electric distribution system until the Department renders a final decision on its pilot (Exhs. DPU-NG-1-1; DPU-NG-1-2).

B. Positions of the Parties

1. National Grid

a. Customers' Ability to Opt-Out of the Smart Grid Pilot Program

National Grid states that it will provide customers with sufficient information and a clear opportunity to opt-out of the pilot program (National Grid Reply Brief at 7). National Grid

⁴⁰ As of April 30, 2012, the Company states that it had spent \$62,765 on grid-facing technology (RR-DPU-1).

disputes the Attorney General's allegation that it has not demonstrated that customers will be adequately informed about their ability to opt-out of the pilot program (National Grid Reply Brief at 7). With respect to the early installation of meters, National Grid states that in response to a written notice sent to 5,000 customers, 132 customers opted-out of the pilot program (National Grid Reply Brief at 7, citing RR-AG-13 (Supp)). The Company argues that this response demonstrates that customers were adequately informed of their ability to opt-out of the pilot program (National Grid Reply Brief at 7, citing RR-AG-13 (Supp)). National Grid asserts that all customers to be included in the broader pilot program will likewise be notified in writing, in advance of the AMI meter installation, that they may opt-out and how to do so (National Grid Reply Brief at 7). The Company further states that it will allow any customer within the pilot program area to opt-out of the installation of AMI meters at any time, even if it requires the Company to return and install the customer's former AMR meter (National Grid Reply Brief at 7, citing Exh. DPU-NG-1-9; Tr. 2, at 232).

b. Size, Scope, and Scale

The Company asserts that its proposed smart grid pilot program is similar to the pilot program conditionally approved by the Department in D.P.U. 09-32 (National Grid Brief at 8-9; National Grid Reply Brief at 3). The Company argues that the Department should approve the size, scope, and scale of its proposed smart grid pilot program because it will: (1) provide a statistically valid sampling of a range of customer segments, customer types, demographics, and load profiles; (2) test the ability of a large-scale pilot program to achieve the targets set by Section 85; and (3) allow the Company to include a sufficient number of distribution substations and feeders to test a broad variety of distribution grid innovations, including system

configurations (e.g., loop and radial feeders), distribution system control devices and configurations, and infrastructure to support distributed generation (National Grid Reply Brief at 4). For these reasons, the Company argues that its pilot program will allow it to collect granular data across many customer categories and extrapolate the grid-facing results throughout its entire service territory (Tr. 3, at 573).

In addition, the Company argues that its proposed smart grid pilot program is fully consistent with Section 85 (National Grid Reply Brief at 3-4). The Company maintains that, while Section 85 establishes minimum requirements for a smart grid pilot program design, it also encourages pilot programs of greater size, scope, and scale by authorizing the Department to award incentives if a greater number of customers participate in the program (National Grid Reply Brief at 3-4).

c. Smart Grid Technology Platform

The Company contends that it has selected the appropriate technology platform to properly assess the benefits of smart grid technology within its service territory (Exh. NG-Rebuttal at 29; National Grid Reply Brief at 14-15). National Grid asserts that it has chosen the most advanced smart grid technologies, which will: (1) provide customers with near real-time information regarding electricity consumption and costs, as well as greater control of their energy use; (2) provide its distribution grid operators and planners a powerful new set of tools to improve the efficiency, reliability, and security of the grid; and (3) serve as a foundation for a transition to a “smarter grid” in which distributed generation, electric vehicles, and demand response providers are all connected to the grid and operating simultaneously (Exhs. DPU-NG-6-10, at 1; DPU-NG-3-11, at 3).

In response to the Attorney General's assertions that adequate testing has already been done on in-home devices, National Grid argues that while other pilot programs have influenced its design, its pilot program will not be duplicative because aspects of its service territory are unique (e.g., load curves, customer usage patterns, weather, and manufacturing base) (National Grid Reply Brief at 13). In addition, National Grid contends that it is essential to test the devices in its service territory in order to fully assess their value (National Grid Reply Brief at 12). In response to the Attorney General's argument that in-home devices should not be provided to customers at no charge, the Company asserts that it must give customers these technologies at no cost in order to ensure adequate participation in the pilot program (Exh. NG-Rebuttal at 24). As part of the pilot program surveying, the Company states that it intends to investigate how much customers would be willing to pay for in-home devices, which it argues will further inform a determination of the value of these technologies (Exh. NG-Rebuttal at 25).

On several grounds, the Company refutes the Attorney General's recommendation that the pilot program should be scaled down, especially with regard to the distribution grid-facing component (Exh. NG-Rebuttal at 27-30). First, the Company states that the eleven feeders included in the pilot program are representative of National Grid's territory (Exh. NG-Rebuttal at 27-28). In addition, the Company asserts that all of the proposed distribution experiments should be conducted on multiple feeders to allow any assessment of the benefits of the technology to be extrapolated across its service territory (Exh. NG-Rebuttal at 27-28). Further, the Company argues that it is inappropriate to rely on results from other pilot programs because of the unique characteristics, geography, design, and operation of its system (Exh. NG-Rebuttal at 29). Finally, the Company claims that the pilot program is unique because many of the

proposed technologies have not been tested elsewhere in the same configuration (Exh. NG-Rebuttal at 29-30).

d. Shutoff, Cyber Security, and Customer Privacy

National Grid affirms that it will not terminate service of pilot program customers, remotely or otherwise, in a manner that is inconsistent with the Department's billing and termination of service regulations, 220 C.M.R. § 25.00 et seq. (National Grid Reply Brief at 25). Further, even if a pilot program customer is otherwise subject to termination of service pursuant to the Department's regulations, the Company states that it will not use the remote shutoff feature of the AMI meters for this purpose (National Grid Reply Brief at 25).

In addition, the Company argues that its proposed pilot program fully addresses cyber security and data privacy (National Grid Reply Brief at 22-23, 25). Prior to the start of the pilot program, National Grid states that it will conduct a thorough risk assessment: (1) to ensure that the probability and potential impact of a cyber attack is fully addressed; (2) to identify vulnerabilities that could be exploited; and (3) to implement controls to mitigate the potential of a successful attack (National Grid Reply Brief at 24-25, citing Exh. AG-5-4).

National Grid asserts that it has selected its proposed AMI meters and designed its security solutions based on recognized industry standards, and that its internal standards go well beyond basic security principles (National Grid Reply Brief at 24, citing Exh. AG-5-4).⁴¹ In addition, the Company avers that it has an internal team consisting of Company personnel that

⁴¹ Specifically, National Grid argues that its proposed AMI meters meet the latest standards from the National Institute of Standards and Technology ("NIST"), Institute of Electrical and Electronics Engineers ("IEEE"), and Federal Information Processing Standards ("FIPS"), Federal Communication Commission ("FCC"), and Internet Protocol Version 6 ("IPv6") (Exh. LIN-1-13; Tr. 1, at 121-123, 145).

are focused on security architecture, security policy, security project management, data privacy, compliance, threat management, incident management, risk management, and security consultancy (National Grid Reply Brief at 23, citing Exh. AG-5-4).

National Grid contends that it has selected vendors with strong records of cyber security (National Grid Reply Brief at 24).⁴² The Company asserts that the controls and security architecture it is designing with its vendors diminish the risk and probability of a successful cyber attack, and mitigate the potential damage of an attack if one occurs (National Grid Reply Brief at 24, citing Exh. AG-5-4).

In response to the Attorney General's claims to the contrary, National Grid argues that it has provided ample information on how it will protect customer data privacy (National Grid Reply Brief at 25). According to National Grid, the AMI meters will be owned by the Company, and consumption data will not be made available to anyone but the customer, unless the customer authorizes the information to be made available to third parties (National Grid Brief at 17, citing Exh. DPU-NG-3-11). In the event of a breach of data privacy, National Grid claims that it will perform an initial investigation to determine the nature of the breach (National Grid Reply Brief at 25-26, citing RR-LIN-3). If a breach is confirmed, National Grid states that it will inform the customer immediately, issue the required reports and notices to appropriate state and federal agencies, and determine an appropriate remedy (National Grid Reply Brief at 26).

Further, National Grid states that vendors that handle customer information must agree to protect customers' personal information and, if a vendor is responsible for the breach, that

⁴² National Grid notes that its AMI meter vendor has deployed approximately nine million AMI meters without a single reported data breach to date (Exh. AG-5-4, at 2).

vendor must provide a remedy (National Grid Reply Brief at 26). The Company states that vendors handling sensitive information must carry cyber security insurance, be subject to credit monitoring, certify data destruction, comply with 201 C.M.R. § 17.00 et seq. (regulations on the protection of personal information), and supply proof of the controlled environment from a certified independent auditor (National Grid Reply Brief at 26-27).

e. Dynamic Pricing Structures

National Grid argues that its proposed pricing structures (i.e., TOU/CPP, PTR, and HPP) provide an appropriate test of dynamic pricing options within the context of the smart grid pilot program, as required by Section 85 (National Grid Brief at 9).

National Grid contends that it is appropriate to set TOU/CPP as the default pricing option because it will allow the Company to study customers' willingness to accept this rate instead of PTR, and that such insights will help design future customer education programs and energy savings opportunities (National Grid Reply Brief at 8).⁴³ In response to the Attorney General's recommendation to instead make PTR the default price option, the Company claims that TOU/CPP is superior to PTR because TOU/CPP offers customers an opportunity to save money without requiring the Company to perform a baseline estimate of a customer's potential load reduction (National Grid Reply Brief at 9). In addition, the Company argues that offering TOU/CPP on an opt-out basis is critical to studying how customers respond to this rate, with the ultimate goal of shifting electricity consumption away from peak (Exh. PTZ-2, at 3; National Grid Reply Brief at 10).

⁴³ The Company predicts that a majority of customers will opt-out of TOU/CPP and it seeks to understand their reasons for doing so (Exh. EHW-3, at 22).

In response to the Attorney General's argument that bill protection for TOU/CPP customers will skew pilot program results, the Company argues that bill protection provides an appropriate balance between: (1) giving customers a better understanding of the cost of energy in order to potentially modify consumption patterns; and (2) the risk of potential bill increases (National Grid Brief at 10; National Grid Reply Brief at 16). Further, the Company argues that bill protection is consistent with D.P.U. 09-32, at 64, where the Department found that while bill protection would not likely be included in a full deployment of dynamic pricing, it is nonetheless integral to the Company's proposed opt-out approach and that its effects should be evaluated (National Grid Reply Brief at 16; National Grid Brief at 10, citing Exh. PTZ-1, at 11).

National Grid opposes the Attorney General's recommendation to use an alternative method to calculate baseline load for PTR customers (National Grid Reply Brief at 10). The Company claims that the appropriate method to estimate baseline load will be studied as an element of the pilot program (National Grid Reply Brief at 10). The Company asserts that it is inappropriate to adopt the Attorney General's proposed approach as part of the pilot program, as the Company cannot yet ensure that this method will provide valid usage estimates (National Grid Reply Brief at 10). National Grid asserts that it will be able to determine whether the Attorney General's method is appropriate only after the Company has evaluated customer loads and response during the pilot program (National Grid Reply Brief at 10).

f. Outreach and Education Plan

National Grid argues that its comprehensive O&E plan, with its community-based customer engagement approach, is essential to the success of its smart grid pilot program and necessary to achieve the five percent energy savings targets required by Section 85 (National

Grid Brief at 35; Exhs. EHW-2, at 14; EHW-1, at 3). National Grid asserts that customer engagement will maximize the value of its pilot program investments and may serve to enhance customer satisfaction as customers learn about the pilot program technology, rate offerings, and how their individual actions can bring about energy savings and reduce costs (National Grid Brief at 31, citing Exh. EHW-1, at 3, 5). According to the Company, its review of other smart grid projects in the country shows that early customer and community engagement is vital to the success of a smart grid project (National Grid Brief at 30, citing Exh. CAW-1, at 7). For this reason, the Company has used a collaborative approach to design its O&E plan (National Grid Brief at 30).

In addition, National Grid argues that the Sustainability Hub is an important element of its proposed O&E plan. The Company contends that the concept was developed based on input received at a stakeholder summit⁴⁴ and, therefore, it is an element requested by the community (National Grid Brief at 33). Further, the Company contends that the hands-on education and interactive technology elements of the Sustainability Hub will create a valuable experience for the community and foster general interest in smart grid (National Grid Brief at 34, citing Exh. EHW-1, at 11-12). The Company also claims that the Sustainability Hub will promote customer awareness and increase pilot program participation levels (National Grid Brief at 34, citing Exh. EHW-1, at 12).

According to National Grid, the Attorney General has offered no evidence to support her argument that the Company's O&E plan is comparable to other plans that failed to reduce

⁴⁴ On September 19 and 20, 2011, National Grid hosted a two-day stakeholder session in Worcester to gather customer and community input with a goal of transforming Worcester into an innovative energy leader (Exh. EHW-2, at 31-34).

average load (National Grid Reply Brief at 14). Further, the Company argues that its O&E plan will be tested as part of the pilot program to determine which elements are successful and, therefore, that it cannot draw reliable conclusions about what may work in the future until such study is complete (National Grid Reply Brief at 14).

g. Evaluation Plan

The Company argues that its evaluation plan should be approved by the Department, as designed (National Grid Brief at 36). National Grid contends that the evaluation plan is reasonably designed to assess changes in energy use and to identify the most significant factors prompting such changes among a broad, diverse group of customers (National Grid Brief at 35). The Company contends that the study of the customer-facing component of the pilot program is consistent with the Common Evaluation Framework (National Grid Brief at 35, citing EHW-1, at 13-14). The Company argues that it expects to achieve statistically valid insights, using surveys and observation methods, about the effectiveness of different messaging approaches in achieving customer response and adoption of the pilot program's technology and rate structure offerings (National Grid Brief at 35-36, citing EHW-1, at 15).

The Company disputes the Attorney General's contention that the evaluation plan is deficient in several aspects (National Grid Reply Brief at 15-20). Specifically, the Company argues that it is appropriate to use the load research group as the pilot program control group, because it represents general customer electric usage characteristics within National Grid's Massachusetts service territory (National Grid Reply Brief at 16-17). The Company also argues that it has adequately explained how it will evaluate the combination of customer-facing and grid-facing technologies (National Grid Reply Brief at 17, citing Tr. 3, at 536).

In addition, National Grid contends that, contrary to the view of the Attorney General, the pilot program design is likely to result in statistically significant results (National Grid Reply Brief at 18). The Company argues that its proposal to enroll approximately 15,000 customers in the pilot program is likely to yield results of greater statistical significance than the other smart grid pilot programs approved by the Department to date (National Grid Reply Brief at 18). National Grid contends, however, that the likelihood of achieving statistical significance through the Company's pilot program evaluation data will not be known with greater specificity until initial enrollment is complete (*i.e.*, when participants are segmented into groups) (National Grid Reply Brief at 18). Therefore, the Company maintains that it would be premature for the Department to make findings now regarding the statistical significance of the various evaluation categories (National Grid Reply Brief at 18, 20).

While National Grid did not address on brief the Network's concerns that the pilot program will not obtain enough information from low-income customers, the Company has acknowledged that focus groups could provide supplemental qualitative information that traditional surveys do not capture (Tr. 2, at 355-356). In addition, National Grid has expressed a willingness to conduct focus groups in order to better reach customers that are difficult to survey⁴⁵ (Tr. 2, at 356-359).

h. Pilot Program Duration

National Grid takes no formal position on whether to operate the pilot program for one or two years. The Company acknowledges that operating the pilot program for a two-year period

⁴⁵ According to the Company, such customers may include elderly customers, medically vulnerable customers, or individuals with disabilities or special needs (Tr. 2, at 356-359).

will increase overall costs, but it will also allow for a more robust analysis of customer benefits (Exh. PTZ-1, at 13). The Company asserts that a two-year pilot program will have significant value because two years of data will allow for better analysis regarding customer usage and participation over time, as well as account for differences in weather (Tr. 1, at 151-152).

National Grid also maintains that two years of data could potentially yield results with a higher degree of statistical significance (Tr. 3, at 457).

i. Performance Incentive

The Company argues that its proposed performance incentive is consistent with D.P.U. 09-32, at 77-78, where the Department found that an identical performance incentive was consistent with Section 85 (National Grid Reply Brief at 20). Consequently, National Grid opposes the Attorney General's recommendations to either reject or substantially modify the performance incentive (National Grid Reply Brief at 20).

2. Attorney General

a. Customers' Ability to Opt-Out of the Smart Grid Pilot Program

The Attorney General argues that the Company must give its customers a clear opportunity to opt-out of the installation of smart meters (Attorney General Brief at 11). She claims that the Company has failed to produce any customer opt-out notification materials and, therefore, she questions whether customers will be provided with sufficient opt-out information (Attorney General Brief at 11, citing Exh. DPU-NG-5-4 (Supp); Tr. 1, at 27-28). The Attorney General requests that the Department direct the Company to: (1) fully disclose to customers that they may opt-out of AMI meter installation; and (2) submit its proposed written customer

communications about opting-out of AMI meters for review by the Department as a compliance filing (Attorney General Brief at 11).

b. Size, Scope, and Scale

The Attorney General states that the size, scope, and scale of the Company's smart grid pilot program exceed the minimum requirements of Section 85 without adequate justification and, therefore, that it should not be approved (Attorney General Brief at 9, 19). The Attorney General argues that, with a pilot program of this size and expense, the Company bears a heavy burden to justify the significant costs and that the Company has failed to do so (Attorney General Brief at 9-10, 16-17). The Attorney General asserts that the Company's proposal far exceeds the number of participants required by Section 85 (Attorney General Brief at 9).

The Attorney General contends that the primary purpose of Section 85 is to test customer response to and results of dynamic pricing programs and a more modest pilot program would better meet this purpose (Attorney General Brief at 9). She further claims that National Grid's pilot program is unlikely to yield results different from those of other dynamic pricing pilot programs conducted around the country (Attorney General Brief at 9). The Attorney General urges the Department, at a minimum, to reduce the size of the pilot program so that each of the four levels of residential subgroups contains no more customers than is required to produce a statistically valid sample (Attorney General Brief at 11).

With regard to the distribution grid-facing component, the Attorney General argues that it is larger than necessary and appears to be a first phase of the Company's implementation of smart grid technology rather than a pilot program (Attorney General Brief at 19). The Attorney General contends that this aspect of the proposal also goes well beyond what Section 85

contemplates (Attorney General Brief at 19). She claims that the Company has conceded that many of its proposed grid-facing experiments have been, or will be, duplicative of other smart grid pilot programs (Attorney General Brief at 11, 19-20). The Attorney General urges the Department, at a minimum, to reduce the technology experiments to include only those pertaining to the communication system and those that have not been conducted elsewhere (Attorney General Brief at 11, 19-20).

c. Smart Grid Technology Platform

The Attorney General recommends that the Department reduce the Company's use of in-home devices in the pilot program because she contends that such a test will be duplicative of other recent pilot programs around the country (Attorney General Brief at 17). The Attorney General further argues that, based on the Company's O&E plan, it is unlikely that customers will use in-home devices to their fullest potential (Attorney General Brief at 18). In addition, the Attorney General opposes the Company's plan to provide in-home devices to pilot program customers at no cost because they are too expensive to provide at no cost in a full deployment of smart grid (i.e., the Company should require customers to pay for such technology instead) (Attorney General Brief at 17-19, citing Exh. BA at 36-37). Also, the Attorney General asserts that the information the Company proposes to provide to customers through the HDUs will be available to all pilot program customers through the Company's website, making these devices unnecessary (Attorney General Brief at 19).

The Attorney General also argues that the Company has failed to demonstrate that it can effectively evaluate the operations and maintenance savings from the AMI meters and the grid-facing investments (Attorney General Brief at 21-22). Therefore, she argues that, at a

minimum, the Department should not approve the experiments related to the capacitor banks and reclosers and, as noted above, should reduce the grid-facing experiments to include only those pertaining to grid communications (Attorney General Brief at 20).

d. Shutoff, Cyber Security, and Customer Privacy

According to the Attorney General, National Grid's proposed pilot program does not adequately address her concerns about remote shutoff of electric service, cyber security, or customer privacy (Attorney General Brief at 34). First, the Attorney General doubts National Grid's claims that it will not use the remote shutoff feature of the AMI meter (Attorney General Brief at 35, 38-39).⁴⁶ Accordingly, if the Department approves the pilot program, the Attorney General requests that the Department specifically prohibit the Company from using any remote shutoff features to terminate service to customers (Attorney General Brief at 39).

In addition, the Attorney General argues that because regulated utilities provide an essential public service, the Department cannot allow National Grid to install any meter that could jeopardize the electric grid or expose its customers to the potential risk of service loss (Attorney General Brief at 34). Because AMI meters can be shut off remotely by stopping the flow of electricity, the Attorney General argues that the entire service area could be instantly shut down by a cyber attack (Attorney General Brief at 35). The Attorney General further claims that the remote shutoff function on the AMI meters introduces thousands of points of entry for hackers to attack (Attorney General Brief at 36). According to the Attorney General, it is

⁴⁶ While National Grid states that it will fully comply with 220 C.M.R. § 25.00 et seq. regarding termination of service, the Attorney General claims that the regulations address billing and termination procedures, but do not expressly prohibit remote shutoff (Attorney General Brief at 38-39).

reasonable to assume that any of National Grid's cyber security measures will eventually be breached, and a serious attack could require the replacement of all meters before electricity could be restored, which might take days or weeks (Attorney General Brief at 36, 37-38, citing Tr. 2, at 287-288, 330). Accordingly, the Attorney General asserts that the Department should not approve the pilot program unless the remote shutoff mechanism in the AMI meters is physically disconnected from the internal software and controls (Attorney General Brief at 38).

Also, the Attorney General alleges that National Grid is unaware of its legal obligations regarding customer privacy because the Company could not: (1) confirm whether its privacy policy included customer notification of security breaches and "hold harmless" provisions; and (2) cite to any specific policy regarding customer notification in the event of a breach (Attorney General Brief at 40, citing Tr. 2, at 370). According to the Attorney General, 201 C.M.R. § 17.00 et seq., "Standards for the Protection of Personal Information of Residents of the Commonwealth," often referred to as the "Data Privacy" regulations, obligate the Company to protect customers' personal information and to develop standards for this purpose (Attorney General Brief at 40-41). The Attorney General recommends that the Department require National Grid to demonstrate that it and its vendors will comply with these regulations for the smart grid pilot program (Attorney General Brief at 41).

e. Dynamic Pricing Structures

The Attorney General recommends that the Department reject the Company's proposal to enroll pilot program customers, on an opt-out basis, in TOU/ CPP (Attorney General Brief at 14). The Attorney General recommends, instead, that the Department direct National Grid to:

(1) allow customers to choose whether to enroll in TOU/ CPP or PTR (i.e., no default price

offering); or (2) provide customers with PTR as the default price offering, with the ability to opt-in to TOU/CPP (Attorney General Brief at 13, 15).

According to the Attorney General, the Company's opt-out model for TOU/CPP is fraught with risk of failure, given that a Commonwealth Edison smart grid pilot program used the same approach and did not yield statistically valid reductions in either overall usage or peak load (Attorney General Brief at 12, citing Exh. BA at 27). Instead of an opt-out approach, the Attorney General argues that an opt-in approach for TOU/CPP would provide customers with a more meaningful choice and would more closely resemble a reasonable method of offering TOU/CPP to customers in the future (Attorney General Brief at 12).

In response to the Company's claims that TOU/CPP is superior to PTR, the Attorney General contends that PTR could create load reductions to TOU/CPP; however, fewer pilot program customers will choose PTR because they must opt-in to this group (Attorney General Brief at 12-13). In addition, the Attorney General argues that PTR is preferred over TOU/CPP by customers because it offers customers the chance to save money by changing usage patterns without the punitive nature of TOU/CPP (Attorney General Brief at 13-14).

According to the Attorney General, the Company's PTR program has serious flaws that should be amended (Attorney General Brief at 14). Because the Company will not inform customers of their baseline electricity consumption prior to a critical peak event, the Attorney General avers that a customer will not know how much to reduce his or her usage in order to earn a credit for an event (Attorney General Brief at 14). Accordingly, the Attorney General recommends that the Department order National Grid to inform customers of their baseline usage

every month, and the usage reductions that are required to earn the PTR credit for critical peak events (Attorney General Brief at 15).

f. Outreach and Education Plan

The Attorney General argues that National Grid's O&E plan is unlikely to result in average use reduction (Attorney General Brief at 16). The Attorney General contends that other pilot programs also have attempted to use aggressive education and communication strategies but none has showed reductions in average usage (Attorney General Brief at 16, citing Tr. 4, at 721). In addition, the Attorney General argues that, because of its significant cost, it is not reasonable to expect that the Company's proposed O&E plan will be replicated in any full rollout of smart grid (Attorney General Brief at 17, citing Exh. BA at 29).

The Attorney General argues that the Company's emphasis on expensive in-home technologies, some of which are integral to its outreach and marketing plan, is misplaced (Attorney General Brief at 17). As such, she contends that even if the pilot program is successful, the results will be questionable because the reasons for the success (i.e., the no-cost provision of expensive in-home technologies) are unlikely to be replicated in a full deployment (Attorney General Brief at 18).

In addition, the Attorney General calls the Sustainability Hub one of the only definitive results from the stakeholder summit (Attorney General Brief at 8-9, citing Exhs. CAW-1 at 8; AG-1-1). However, she claims that the Sustainability Hub is still an exploratory project between local community and vendor partners, as evidenced by the absence of costs in the pilot program budget (Attorney General Brief at 8-9, citing EHW-2, Appendix 3).

g. Evaluation Plan

The Attorney General argues that National Grid's evaluation plan is deficient because: (1) the Company plans to notify participants about bill protection, which will skew the results; (2) the Company has not ensured comparability between the pilot program group and the control group; (3) the Company has not demonstrated that the pilot program will yield statistically significant results; and (4) the Company has not demonstrated how it will measure and evaluate the combination of customer-facing and grid-facing components (Attorney General Brief at 20-21). In addition, the Attorney General asserts that the Company has not documented the assumptions underlying the evaluation plan and, consequently, has not proven that those assumptions are justified (Attorney General Brief at 22-23).

The Attorney General recommends that the Company seek 100 participants in each evaluation treatment cell as opposed to its proposed sample size of 80 participants (Attorney General Brief at 21, 23). According to the Attorney General, a sample size of 100 is advisable to obtain a 95 percent confidence level (and a corresponding five percent margin of error), whereas a sample size of 80 would have only a 90 percent confidence level, with a ten percent margin of error (Attorney General Brief at 23). While the Company provided cost estimates for increasing the sample sizes, the Attorney General opposes allowing the Company to incur any additional costs in order to improve the statistical validity of the proposed evaluation plan (Attorney General Brief at 24).

h. Pilot Program Duration

The Attorney General argues that the Company's pilot program, as proposed, is too large and expensive to operate for two years (Attorney General Brief at 19). She contends that the

additional cost for a two-year pilot program is unnecessary and that a two-year pilot program goes well beyond what Section 85 contemplates (Attorney General Brief at 19).

i. Performance Incentive

The Attorney General argues that the proposed performance incentive rewards National Grid for expanding the scope of its pilot program beyond what is required by Section 85 because the incentive is tied, in part, to the number of customers that are included in the pilot program (Attorney General Brief at 24). In addition, the Attorney General opposes the Company's proposal to calculate the savings target on an aggregate basis, rather than separately by rate class, because she postulates that C&I participants could significantly exceed the savings target of five percent, while residential customers may not (Attorney General Brief at 24). As a consequence, she claims that the Company could achieve a performance incentive for bill savings from the pilot program even though most of the participants (i.e., the residential customers) may not reach or exceed the savings targets (Attorney General Brief at 24). As an alternative, the Attorney General recommends that the Company's performance incentive be calculated separately for each customer class, equal to 50 percent of any bill savings resulting from that customer class (Attorney General Brief at 24-25). In addition, the Attorney General claims that the Department should minimize the effect of the Company's performance incentive on ratepayers by lowering the maximum cap (Attorney General Brief at 25).

3. Low-Income Weatherization and Fuel Assistance Network

a. Cyber Security and Customer Privacy

The Network argues that because National Grid did not provide a specific policy for protecting customers' personal information, the Department should require it to do so (Network

Brief (Supp) at 2). In addition, the Network recommends that National Grid be required to include customer energy consumption information in the definition of “personal information” used in its non-disclosure agreements with the pilot program vendors (Network Brief (Supp) at 2). The Network also argues that National Grid should develop a comprehensive policy, specific to its Massachusetts service territory, that holds the Company to the same standards and procedures for handling customer information as third-party recipients (Network Brief (Supp) at 2).

b. Evaluation Plan

The Network questions whether the Common Evaluation Framework and National Grid’s evaluation plan will provide enough detailed information about low-income customers’ usage, usage patterns, and responses to peak pricing structures and strategies (Network Brief at 2). The Network argues that the Company’s evaluation plan will not provide statistically significant results for most of the low-income populations it plans to evaluate (Network Brief at 2). Further, the Network contends that the Company’s evaluation plan overlooks several categories of vulnerable low-income customers, such as the physically handicapped and those with electricity-dependent medical needs (Network Brief at 2). Accordingly, the Network recommends that the Company include the use of focus groups as part of its evaluation plan in order to gain information about these relatively small groups of vulnerable customers (Network Brief at 3).

c. Pilot Program Duration

The Network supports the operation of the pilot program for two years instead of one because it will increase the volume of information gathered (Network Brief (Supp) at 1). The

Network contends that the additional information comes “at almost no additional cost” (Network Brief (Supp.) at 1).

C. Analysis and Finding

1. Customers’ Ability to Opt Out of the Smart Grid Pilot Program

All parties agree that customers should be given a clear opportunity to opt out of the installation of AMI meters. The Attorney General questions whether the Company will provide customers with sufficient information regarding their ability to opt out of the pilot program and, in particular, the installation of AMI meters (Attorney General Brief at 11). The Company states that the notification materials it will use for the wider pilot program will be the same as or substantially similar to the materials it sent to customers before its early field trial of AMI meters (Exhs. DPU-NG-1-9; DPU-NG-5-4 (Supp.); Tr. 1, at 61).⁴⁷ These materials were provided to customers as a bill insert (Exh. DPU-NG-5-4 (Supp.)).

The content of customer notification materials and the manner of notice delivery are of critical importance to the success of the Company’s pilot program. We are not persuaded that use of a bill insert alone is a sufficient method to notify customers about the opt-out provisions of the pilot program. Consistent with Department practice, the Company shall make a copy of all customer notification materials available to the Director of the Department’s Consumer Division at least 30 days before it intends to send these materials to customers. As part of this filing, the Company shall propose an alternate or additional method of notifying customers about

⁴⁷ The Company also has affirmed that it will allow a customer who receives an AMI meter to opt-out at any time, and it will return the customer’s AMR meter (Exh. DPU-NG-5-5; Tr. 1, at 61, 80; Tr. 2, at 232).

the opt-out provisions of the pilot program designed to ensure that customers appreciate the non-routine nature of the information contained therein.

2. Size, Scope, and Scale

Each electric distribution company is required to conduct a smart grid pilot program that uses advanced technologies, including but not limited to: (1) advanced (i.e., “smart”) meters that provide real-time measurement and communication of energy consumption; (2) automated load management systems; and (3) remote status detection and operation of distribution system equipment. St. 2008, c. 169, § 85. In order to enable both dynamic pricing and distribution grid-facing projects, distribution companies are required to implement technologies from all three of these categories. St. 2008, c. 169, § 85.

Although Section 85 anticipates that any smart grid pilot program must include a minimum of 0.25 percent of a distribution company’s customers, the statute anticipates that a company may propose dynamic pricing programs covering more than 0.25 percent of its customers, stating that “plans that provide for larger number of customers . . . shall be eligible to earn incentives as outlined in an approved plan.” St. 2008, c. 169, § 85. Thus, Section 85 does not preclude smart grid pilot program proposals that exceed the statutory minimum participation levels. D.P.U. 09-32, at 51. However, because National Grid’s proposed pilot program far exceeds the statutory minimum, the Company must demonstrate that its proposal will provide sufficient benefits and overall value to customers to warrant approval of a pilot program of this size, scope and scale. D.P.U. 09-32, at 51.

The Attorney General argues that the primary purpose of Section 85 is to test customer response to dynamic pricing programs, whereas the scope of National Grid’s smart grid pilot

program amounts to an actual phased deployment of smart grid technologies (Attorney General Brief at 9, 19). According to the Attorney General, it is unlikely that the Company's pilot program will not achieve results sufficient to justify anything beyond the minimum threshold of Section 85 (Attorney General Brief at 9). She contends that the Department should either reduce both the customer-facing and distribution grid-facing components of the pilot program or direct the Company to resubmit its proposal at a significantly smaller size, scope, and scale (Attorney General Brief at 9-11, citing Exh. BA at 21-22).

While the Company acknowledges that its smart grid pilot program exceeds the minimum number of customers established by Section 85, it argues that the Department conditionally approved a pilot program with a similar size, scope, and scale in D.P.U. 09-32, finding that the size established in Section 85 is a minimum size that can be exceeded (National Grid Reply Brief at 3-6, citing D.P.U. 09-32, at 53-54). The Company argues that the size, scope, and scale of its proposed pilot program provides for a valid sampling of customer types, demographics, and load usage profiles (National Grid Reply Brief at 4, citing Exh. NG-Rebuttal at 5). The Company also contends that the proposed scale of its pilot program will allow the Company to test enough distribution substations and circuit configurations to extrapolate pilot program results throughout the Company's service territory (National Grid Reply Brief at 4, citing Exh. NG-Rebuttal at 5).

As we found in D.P.U. 09-32, at 51, the deployment of smart grid technologies may offer significant benefits to Massachusetts electricity customers in terms of: (1) empowering customers to decrease electricity consumption, thereby reducing costs and environmental impacts; (2) increasing the operational efficiency of the distribution network, thereby decreasing operating costs and improving service quality; (3) potentially avoid the cost of adding new

generating facilities designed to meet peak load; and (4) enabling the integration of new distributed generation technologies and electric vehicles on the electric grid, thereby further reducing the environmental impact of electricity consumption. See D.P.U. 09-32, at 51. The deployment of smart grid technologies also has the potential to reduce customer outage time. In combination with the aggressive energy efficiency, distributed generation, and renewable resource initiatives included in the Green Communities Act, a successful deployment of smart grid technologies will greatly assist the Department in meeting its energy goals, and enable the electric distribution companies to improve their distribution networks to meet the evolving needs of customers and increasing requirements to address climate change. D.P.U. 09-32, at 51-52.

There are, however, many critical unanswered questions regarding the extent to which these benefits will be realized through the deployment of smart grid technologies. D.P.U. 09-32, at 52. Prior to investing in a full-scale deployment, the Department must identify the types and configurations of technologies that can maximize the benefits for customers, and the Section 85 smart grid pilot programs will assist in this effort. D.P.U. 09-32, at 52.

Like the pilot program we considered in D.P.U. 09-32, National Grid's proposal has four characteristics that are unique among the Section 85 pilot programs. First, the Company proposes to implement the two components of its pilot program within one city in order to test whether a comprehensive deployment of smart grid technologies produces significant customer benefits (Exh. CAW-1, at 13-15, 22-24; AG-1-22). Second, the Company proposes to distribute AMI meters and communications infrastructure to all pilot program participants on an opt-out basis (Exhs. CAW-1, at 13, 21-22; DPU-NG-7-4; Tr. 2, at 379-380). Third, the Company proposes to conduct its opt-out dynamic pricing pilot program with a significant number of

customers, and provide a number of in-home devices to the subsets of customers (Exhs. CAW-1, at 13-17; EHW-3, at 10-13). Fourth, the Company proposes to implement a comprehensive O&E plan that includes traditional elements and community-based elements and that is designed to encourage customers to permanently change their energy consumption behavior in response to the price signals and other messaging through smart grid technologies (Exhs. EHW-1, at 3-5; EHW-2, at 14-23). Accordingly, the main characteristics of the Company's proposal are substantially similar to the proposal that the Department conditionally approved in D.P.U. 09-32.

Because of the size of the pilot program, the Company will be able to evaluate the customer-facing component using its: (1) different segments of program participants; (2) different combinations of smart grid tools and technologies; and (3) education and outreach channels. This analysis should allow the Company to gain a rich understanding of the behavioral changes of groups of customers that are: (1) empowered with smart grid tools and technologies; and (2) provided information and education through different channels. See, e.g., D.P.U. 09-32, at 53. Because of the comprehensive scope and scale of the pilot program, the Company will be able to test and evaluate: (1) the effect that distributed resources (such as energy storage units, plug-in hybrid electric vehicles, solar photovoltaics and wind turbines) and demand response resources (i.e., customers' price responsive consumption) have on the operational status of its distribution network; (2) whether advanced technology allows the Company to operate the grid closer to its full capacity; (3) whether collecting continuous data on grid operating characteristics allows the Company to better plan capital expenditures; and (4) the benefits available to customers of combining customer-facing technologies, grid-facing technologies, and a high-speed communications system. Such testing and evaluation should improve the Company's

understanding of the benefits to be obtained using smart grid technologies. See, e.g., D.P.U. 09-32, at 53-54.

Finally, by using cloud-based IT systems and services, National Grid will be able to test whether this IT solution would provide significant cost savings to ratepayers in any full-scale deployment of smart grid technologies. In addition, National Grid will be gaining valuable insight into best practices for potential future use of smart grid technologies. See, e.g., D.P.U. 09-32, at 54.

For all of these reasons, we find that the Company has demonstrated that its proposed smart grid pilot program is likely to provide valuable insights into the benefits and costs of a larger deployment of smart grid technologies and that the realization of these benefits and overall value to customers supports a pilot program of this size, scope, and scale. See, e.g., D.P.U. 09-32, at 52-54. Not only is the size, scope, and scale of the Company's proposal consistent with Section 85, the results of the smart grid pilot program will yield information relevant to the fundamental inquiry contemplated by the statute, which is to assess the value of the program to participants and non-participants and whether there should be further implementation of smart grid technology. St. 2008, c. 169, § 85.

3. Smart Grid Technology Platform

a. Introduction

In this section, we address the issues raised by the Company's smart grid technology platform for its proposed pilot program. In short, we will determine whether the Company's proposal meets the requirements of Section 85, and involves the appropriate provision and testing of various devices and technologies on customers and on the distribution grid.

b. Requirements of Section 85

As noted above, Section 85 requires that each smart grid pilot program shall include, but not be limited to, advanced smart meters that provide real-time measurement and communication of energy consumption, automated load management systems embedded with current demand-side management programs and remote status detection and operation of distribution equipment. National Grid proposes to deploy AMI meters for 14,798 residential and C&I customers (RR-AG-1(a) Att., at 1). The Company also proposes to deploy ADA technology, fault location analytics, capacitors, and monitors on the Company's distribution grid that will enable the Company to view grid conditions in near real time, increase automated procedures, identify and avoid problems to minimize outages, and improve voltage regulation and power quality (Exh. DPU-NG-7-2). Accordingly, the Department finds that the Company's proposed use of advanced technologies has met the requirements of Section 85.

c. Inclusion of In-Home Devices

In addition to Level 1 technology,⁴⁸ the Company proposes to provide residential customers who choose to participate in Levels 2, 3, or 4 of the dynamic pricing program with a range of in-home devices, at no cost, including HDUs, PCTs, load control devices, circuit-level monitoring, and online energy management tools (Exhs. CAW-1, at 18-20; DPU-NG-3-11, at 5-6). These devices will allow customers to: (1) view their energy consumption and costs in near real time; (2) learn about and evaluate ways to reduce energy consumption and

⁴⁸ Level 1 includes: (1) access to energy use information at 15-minute intervals through National Grid's website; and (2) access to educational tools and messages provided by the Company through phone, email, and/or text messaging (Exh. DPU-NG-3-11, at 5).

expenditures; and (3) automatically control electric loads in their homes (Exh. CAW-1, at 16-20).

The Attorney General generally argues that the Company should significantly scale back its proposed deployment of in-home devices, and eliminate the HDUs, because many such devices have failed to produce significant average load reductions in other pilot program tests (see e.g., Attorney General Brief at 16, 17-19). In addition, the Attorney General opines that it is inappropriate to provide in-home devices to participants at no cost because, in a full deployment, customers will be expected to pay for such devices (Attorney General Brief at 18-19, citing Exh. BA at 36-37, 43). The Company counters that it is appropriate to test these smart grid technologies in its own service territory and not rely on the results of other pilot programs (National Grid Reply Brief at 11-13). Further, the Company contends that it is necessary to provide the devices to pilot program participants at no charge because, if participants were required to bear some or all of these costs, fewer would participate and the maximum possible benefits would remain unknown (National Grid Reply Brief at 14, citing Exh. NG-Rebuttal at 24-25).

One important aspect of the Company's pilot program is the testing of how different demographic and load profile groups within the Commonwealth will use in-home devices to respond to price signals. Section 85 requires the Company to pursue and study both peak and average load reductions, and the purpose of the in-home devices is to: (1) provide an additional tool to customers that may motivate them to reduce peak and average load; and (2) deliver additional messaging pursuant to the O&E plan (Exh. NG-Rebuttal at 20, 22-23). While the Attorney General questions whether the in-home devices will achieve the goals of Section 85,

testing such devices is a fundamental purpose of the pilot program. In addition, the Company states that, as part of the evaluation plan, it will survey customers regarding how much they would be willing to pay for such devices (Exh. NG-Rebuttal at 25). NSTAR Electric Company and Fitchburg Gas and Electric Light Company d/b/a Unitil both conducted Section 85 smart grid pilot programs in which they provided and installed in-home devices to program participants at no cost to the customer . See, e.g., NSTAR Electric Company, D.P.U. 09-33, at 37 (2010); Fitchburg Gas and Electric Light Company d/b/a Unitil, D.P.U. 09-31, at 9-10 (2010). We find that, in the context of a pilot program, the Company's provision and installation of such devices at no cost to participants is a reasonable means to test peak and average load reductions and to remove barriers to participation (Exh. NG-Rebuttal at 24). Accordingly, we approve the Company's inclusion of in-home devices to be provided at no cost to residential customers.

d. Devices for Commercial and Industrial Customers

The Company proposes to offer two technology levels to a limited number of basic service C&I customers: (1) the same HDUs that are available to residential customers; or (2) circuit-level monitoring technology (Exhs. CAW-1, at 21; DPU-NG-3-11, at 6-7). The Company proposes to provide the circuit-level monitoring devices to G-1 basic service customers (i.e., small businesses that use up to 10,000 kWh of electricity per month) in order to examine if such technology can be used to change how they set up appliances and equipment, move equipment from one circuit to another, and change energy usage patterns (Tr. 2, at 385-396). The Company proposes to purchase the circuit-level monitoring devices and also pay an ongoing fee during the pilot program for cloud-based software that will support these devices (see, e.g., Exh. DPU-NG-6-15-1 (Att.), at 1, 4)

As an initial matter, we support the Company's inclusion of 1,341 C&I basic service customers because they are frequently overlooked in smart grid pilot programs (Tr. 2, at 397-398). Further, consistent with our approval of HDUs for a subset of residential customers, we approve the Company's inclusion of HDUs for a subset of C&I customers. However, we decline to approve the Company's proposal to include circuit-level monitoring technology for C&I customers. The Company has proposed to provide circuit-level monitoring devices to G-1 customers (Tr. 2, at 389) (i.e., small businesses that are using up to 10,000 kilowatt-hours), stating that these customers may use such technology to change how they set up appliances and equipment within their businesses, move equipment from one circuit to another, and change energy usage patterns (Tr. 2, at 385-396). This technology, however, appears to have "one-time" benefits that are achieved upon installation, which makes it difficult to justify both the purchase price and the monthly fees for the duration of the smart grid pilot program. Accordingly, we deny the Company's request to include circuit-level monitoring technology in the pilot program.

e. Distribution Grid-Facing Technologies

The Company proposes to install a range of distribution grid-facing technologies in order to assess the benefits of overlaying these technologies with customer-facing technologies (Exh. AG-1-23). The Company states that the feeders selected for the pilot program are representative of the 1,100 feeders in its service territory, and that this comprehensive test of advanced distribution technologies will allow the Company to extrapolate the findings to its entire distribution system (Exh. NG-Rebuttal at 27-28; Tr 3., at 436-437).

The Attorney General argues that the distribution grid-facing portion of the pilot program is larger than necessary and appears more like a phased implementation of smart grid technology

than a pilot program (Attorney General Brief at 19, citing Exh. BA at 40; Tr. 4, at 750-751). She contends that similar technologies are being tested by other utilities around the country and, therefore, that it is not necessary for the Company to test them here (Attorney General Brief at 19-20, citing Exh. AG-1-21; AG-1-24; AG-3-19; Tr. 1, at 114-119). The Attorney General recommends that the Company reduce the distribution grid-facing experiments to focus on communications and technologies that are not being tested elsewhere (Attorney General Brief at 20).

We find that the Company's proposed pilot program is unique among the Massachusetts distribution companies in that it proposes to overlay grid-facing technologies with customer-facing technologies. By integrating these two elements, the Company should gain valuable insight into the full benefits of smart grid technologies for Massachusetts ratepayers. Further, we find that the Company has demonstrated that testing grid-facing devices is an important step prior to implementing these technologies. We conclude that the Company's proposal is a comprehensive test of the range of available technologies and an important step in the modernization of our electric grid. Accordingly, we approve the grid-facing portion of the Company's pilot program as proposed.

f. Conclusion

In order to implement a pilot program of this size, scope, and scale, the Company's proposed smart grid technology solution includes: (1) a high-speed communications network connecting the Company, customers, and the distribution grid; (2) customer-facing technologies; (3) distribution grid-facing technologies; (4) cloud-based computing systems; (5) modifications to the Company's existing IT systems; and (6) consulting and professional services related to the

pilot program's design, development, and implementation activities (Exh. DPU-NG-3-11, at 3 & Att.). We agree that all of these technologies are required for the successful implementation of the pilot programs and, with the exception of the circuit-level monitoring technology, the Company has demonstrated that its smart grid technology platform is reasonable. Accordingly, with the exception of the circuit-level monitoring technology, we approve the Company's proposed smart grid technology platform.

4. Shutoff, Cyber Security, and Customer Privacy

The Attorney General has raised concerns about the potential use of the AMI meters for remote service terminations as well as cyber security and customer privacy concerns (Attorney General Brief at 35-38, citing Tr. 2, at 282-283). Accordingly, the Department must determine whether National Grid has appropriately addressed remote shutoff, cyber security, and customer privacy in its pilot program proposal.

National Grid has affirmed that it will observe the Department's billing and termination regulations, 220 C.M.R. § 25.00 et seq. and it will not use the remote disconnect feature of any AMI meter within the pilot program, even if a customer is otherwise eligible for termination of service (Exhs. AG-4-4; AG-4-5). The Attorney General is dubious of the Company's claims and recommends that the remote shutoff feature of the AMI meters be disabled (Attorney General Brief at 38).

In D.P.U. 09-32, at 59-60, the Department found that the Company was not authorized to remotely terminate service as part of its smart grid pilot program. We affirm that finding here. It is not possible for National Grid to permanently or physically remove the remote shutoff features of its AMI meters (Exhs. AG-4-4; AG-4-5). The Company can, however, configure the software

used by the meters so that the remote disconnect feature is disabled, which would prevent any remote termination of electric service (Exhs. AG-4-4; AG-4-5; AG-4-6). To ensure that the AMI meters are not used for remote service terminations within the pilot program, we direct the Company to configure the meters so that the remote disconnect feature is disabled.

With regard to cyber security, the Attorney General claims that Company's cyber security plans are inadequate and, because, she asserts, cyber attacks are inevitable, unless the Company can physically disconnect the shutoff mechanism in the AMI meters, the Department should not approve the pilot program (Attorney General Brief at 34, 36-38). National Grid counters that it has implemented a robust cyber security policy and dedicated Company personnel to maintaining cyber security for the smart grid pilot program (Exhs. AG-4-7; AG-5-4, at 1; LIN-1-11; Tr. 1, at 122-123).

The Department recognizes that the risk of a cyber security breach can never be eliminated in full; however, the risk of a breach is not grounds to reject the pilot program if the Company can show it has taken all reasonable and appropriate steps to adequately minimize this risk. Here, National Grid has demonstrated that it has a well conceived, comprehensive cyber security plan for its pilot program that includes both proactive and reactive measures (Exhs. AG-4-7; AG-5-4; LIN-1-11; Tr. 1, at 141-142; Tr. 2, at 274-283; Tr. 2, at 368; RR-LIN-3). For example, National Grid will complete a thorough risk assessment prior to the start of the pilot program (Exh. AG-5-4, at 2). In addition, National Grid's plans to ensure cyber security are based on NIST, IEEE, and other recognized industry standards (Exh. AG-5-4, at 1-2). Finally, the Company has: (1) identified likely points of entry to be monitored for attempted security breaches; and (2) developed technical controls for preventing, detecting, and

detering potential breaches (Exh. AG-5-4, at 2). Accordingly, we find that National Grid has taken reasonable and appropriate measures to ensure the cyber security of its smart grid pilot program and minimize the risk of a breach.

With regard to customer privacy, the Attorney General argues that the Company should be required to demonstrate that both it and its pilot program vendors have standards that comply with the Commonwealth's data privacy regulations, 201 C.M.R. § 17.00 et seq. (Attorney General Brief at 41). Likewise, Network recommends that National Grid be required to develop a comprehensive privacy policy for its Massachusetts service territory that holds itself to the same standards and procedures as pilot program vendors that handle customer information (Network Brief (Supp) at 2). National Grid argues that the Company has provided sufficient detailed information on how it will ensure the privacy of customer information in the context of its smart grid pilot program (National Grid Reply Brief at 25).

National Grid states that it will encrypt and secure customer data and that such data will not be released without a customer's knowledge and express consent (Exh. AG-4-5; Tr. 2, at 363, 368). Also, the Company's service contracts and non-disclosure agreements with pilot program vendors contain additional measures aimed at preserving customer privacy, such as certification of data destruction (RR-LIN-2; RR-LIN-3). Further, the Company's non-disclosure agreements require pilot program vendors to comply with the data privacy regulations, 201 C.M.R. § 17.00 et seq. (RR-LIN-2, Att. at 6). Accordingly, we find that National Grid has demonstrated that its pilot program proposal adequately addresses customer privacy concerns. Although we will not require any further demonstrations as requested by the Attorney General

and Network, we fully expect that both the Company and its pilot program vendors will strictly comply with the Commonwealth's data privacy regulations, 201 C.M.R. § 17.00 et seq.

Finally, Network recommends that National Grid expand the definition of "personal information" in its privacy policy, pilot program service contracts, and non-disclosure agreements to include energy consumption information (Network Brief (Supp) at 2). While the definition of "personal information" contained in the non-disclosure agreements refers to "financial, technical and other non-public or proprietary information," it is not clear that energy consumption data fits into one of these categories (RR-LIN-2, Att. at 1). Accordingly, we direct the Company to amend its pilot program non-disclosure agreements to specifically include customers' energy consumption data in any definition of "personal information."

5. Dynamic Pricing Structures

a. Compliance with Section 85

Section 85 requires that each electric distribution company include "time of use or hourly pricing for commodity service" as part of its smart grid pilot program. St. 2008, c. 169, § 85. As described above, National Grid's proposed dynamic pricing program involves: (1) TOU/ CPP for residential, and small and medium C&I customers; (2) HPP for large C&I customers; and (3) PTR for all customers who opt-out of TOU/ CPP or HPP (Exh. PTZ-4(b), at 9-12).

National Grid proposed design for TOU/ CPP uses wholesale market prices to establish differentials between off-peak, on-peak, and critical peak periods. On-peak prices for residential customers will be approximately 23 percent higher than off-peak prices and critical peak prices will be approximately eleven times greater than off-peak prices (see Table 1, above).

Participants on TOU/ CPP rates will realize immediate savings from reducing electricity

consumption during on-peak and critical peak hours,⁴⁹ but also will be exposed to critical peak rates for any electricity consumed during those hours. The TOU/CPP peak hour rates will be approximately seven times greater than the prevailing basic service rate (see Table 1, above) (Exh. PTZ-3(a), at 1).

In contrast, under the Company's proposed PTR pricing structure, participants continue to pay the basic service rate in effect for all kWhs consumed (i.e., off-peak, on-peak, and critical peak), but also are paid 39 cents per kWh for reducing electricity consumption during critical peak hours. Customers on PTR will never be exposed to critical peak rates for any kWhs consumed during critical peak hours.

Finally, the Company's proposed HPP structure establishes prices for G-3 customers based on the day-ahead wholesale energy market, with a capacity adder during critical peak hours (Exh. PTZ-2, at 5-6).

Based on the above, we find that the Company's proposed dynamic pricing structures satisfy the requirement in Section 85 that smart grid pilot programs include time-of-use or hourly pricing for commodity service.

b. Time-of-Use Rates with Critical Peak Pricing

As described above, the Company proposes to offer its dynamic pricing programs to basic service customers in the smart grid pilot program area on an opt-out basis. Specifically, National Grid proposes to enroll its residential, and small and medium C&I basic service customers in the TOU/CPP offering as the default option, and its G-3 customers in HPP

⁴⁹ The savings realized by participants would depend on the extent to which they reduced overall consumption or shifted consumption from on-peak to off-peak hours.

(Exh. PTZ-2, at 1-2). The Company also proposes to adopt a bill protection mechanism in which TOU/CPP and HPP participants would be made whole, on an annual basis, for any increases in the basic service portion of their bills resulting from these pricing structures (Exh. PTZ-1, at 11).

The Attorney General argues that the Company should allow participants to affirmatively choose whether they will be enrolled in PTR or TOU/CPP, or offer PTR as the default pricing option (Attorney General Brief at 13, citing Exhs. BA at 29; BA Surrebuttal at 8). The Company counters that it is necessary to offer TOU/CPP on an opt-out basis in order to study how customers respond to this rate (National Grid Reply Brief at 10).

Two key areas the Company proposes to study in its smart grid pilot are: (1) what motivates customers to opt-out of TOU/CPP; and (2) whether customers enrolled in TOU/CPP will respond favorably if they are provided with aggressive education and outreach. If the Company were to revise its pilot program design to make PTR the default pricing option as requested by the Attorney General, the Company would not be able to study the reasons why customers opt-out of TOU/CPP.

Even though the Company anticipates that many participants will opt-out of TOU/CPP and HPP, its proposed opt-out approach aims to ensure that enough customers participate in this component of the dynamic pricing program to maximize the statistical significance of the information that the Company gathers about this pricing option. See, e.g., D.P.U. 09-32, at 64. We find this approach to be reasonable and, accordingly, we will permit the Company to offer its pilot dynamic pricing programs on an opt-out basis, with TOU/CPP and HPP as the default option.

We note, however, that the Company's proposed opt-out approach, given a pilot program of this size, could result in a large number of customers who are subject to TOU/CPP and HPP rates but are passive participants because they have minimal knowledge of its advantages and disadvantages. To avoid this outcome, the Company must ensure that, to the maximum extent possible, participants enrolled in TOU/CPP and HPP have a full understanding of these rates.⁵⁰ See, e.g., D.P.U. 09-32, at 64.

The Attorney General argues that expressly informing TOU/CPP and HPP customers of bill protection will skew the pilot program results, making them unreliable (Attorney General Brief at 20-21, citing Exh. BA at 43). The Company argues that its proposal to provide bill protection is entirely consistent with D.P.U. 09-32 (National Grid Brief at 10; National Grid Reply Brief at 16). In D.P.U. 09-32, at 62-64, we acknowledged the issues raised by the Attorney General regarding bill protection, and we nonetheless allowed it to be included in a smart grid pilot program as long as: (1) customers were informed about the feature during the opt-out process; and (2) the Company evaluated the effects of bill protection in its evaluation plan. The Company intends to meet these same requirements here.

The Company may not achieve high levels of participation in TOU/CPP or HPP in a pilot program without bill protection. In addition, the inclusion or exclusion of bill protection will

⁵⁰ In D.P.U. 09-32, at 63-64, the Department directed the Company to include in its marketing, education, and outreach plan, information that would ensure that customers fully understand all aspects of their participation in any of the dynamic pricing programs. National Grid has proposed an aggressive outreach and education plan based on its "listen, test & learn" approach, which involves: engaging customers prior to the launch of the pilot program; repeating important messages; using multiple communications channels to convey and reinforce messages; and making sure all employees, interns and vendors affiliated with the pilot program can effectively communicate important messages to the participants (Exh. EHW-2, at 8-9).

result in self-selection bias among participants either way. There is no question that if the Company includes bill protection in its pilot program, it must analyze any bias that bill protection may have introduced into the results. See, e.g., D.P.U. 09-32, at 64. Accordingly, the Department will allow the Company to include bill protection, and we further direct the Company to study, in its program evaluation efforts, the effect that bill protection has on customers' willingness to participate in the dynamic pricing program and their price responsive behavior.⁵¹ D.P.U. 09-32, at 64. As we noted in D.P.U. 09-32, at 64, understanding this effect is critical to determining how to design dynamic pricing programs if the Company is to pursue a larger deployment of smart grid.

Finally, because the goal of TOU/CPP rates is to motivate customers to respond to a critical peak event, rather than to modify their consumption patterns on a day-to-day basis, and because critical peak hours are the true driver of distribution system costs, we find that National Grid's proposal to include all capacity costs in the critical peak portion of its TOU/CPP rate is reasonable. Similarly, we find that National Grid's proposal to provide G-3 customers with HPP is reasonable, given that these prices reflect day-ahead location-based hourly energy price plus an allocated capacity charge.

c. Peak Time Rebate

National Grid proposes to offer a PTR pricing structure as part of its pilot program (Exh. PTZ-2, at 5). During critical peak events, participants who reduce electricity consumption will receive a credit on their bill for the event (Exhs. PTZ-2, at 5; PTZ-3(a), at 3). In order to

⁵¹ The Company states that in its evaluation plan it intends to evaluate the impacts of bill protection on the pilot program study (Exh. EHW-3, at 14).

determine whether PTR program participants are eligible for a credit, the Company will look at the difference between a participant's historic reference level of consumption and the participant's actual level of consumption during each critical peak event (Exh. EHW-3, at 45).

The Attorney General recommends that the Department direct National Grid to modify its PTR program to provide participants with their monthly baseline electricity usage so that they know what level of reduction is required to earn the credit for a critical peak event (Attorney General Brief at 15). The Company responds that the appropriate method to calculate a participant's baseline usage is an area of study in the pilot program (National Grid Reply Brief at 10). Accordingly, the Company argues that it not appropriate to adopt the Attorney General's proposed approach as part of the pilot but accepts that the Attorney General's approach may prove to be reasonable after study (National Grid Reply Brief at 10).

We agree with the Attorney General that providing PTR customers with their baseline electricity usage is an important element in successful PTR pricing. The Company does not, however, currently have the necessary data to calculate baseline electricity usage accurately for individual customers (see e.g., Exh. EHW-3, at 45). In the absence of such data, we find that the Company's proposed method is acceptable. Nevertheless, we recognize that there may be value in providing PTR customers with a baseline of electricity usage so that they can determine what level of reduction is required to earn a credit for a critical peak event. Accordingly, we direct the Company to provide a report to the Smart Grid Collaborative Working Group nine months after the start of the pilot program on whether the Company should begin using customer-specific usage data and outlining what steps would be required to distribute this information to participants in the PTR program.

In addition, we find that National Grid's proposal to convert all capacity costs into a credit for the PTR rate as it has for the TOU/CPP rates is reasonable. Thus, we approve the Company's proposed PTR pricing structure.

6. Outreach and Education Plan

At the time the Department considered the Company's initial pilot program proposal in D.P.U. 09-32, the Company had not yet developed a detailed O&E plan. D.P.U. 09-32, at 65. In D.P.U. 09-32, at 66, the Department found that:

The successful implementation of a larger deployment of smart grid tools and technologies would require a fundamental change in customer behavior which, in turn, will require significant education to ensure that customers are well-informed regarding: (1) the steps they can take to manage their energy consumption; (2) the tools and technologies available that can assist them; and (3) the benefits associated with reductions in consumption.

The Department supported, in principle, National Grid's proposal to use innovative, community-based marketing initiatives to meet these educational challenges. D.P.U. 09-32, at 66. The Department found that National Grid's proposal to evaluate the effectiveness of different outreach and education channels (i.e., both traditional and community-based) to elicit changes in customer behavior would provide valuable insights regarding options for larger deployment of smart grid tools and technologies. D.P.U. 09-32, at 66. Finally, we directed the Company, in developing its detailed O&E plan, to consider all options that would reduce costs without diminishing the benefits of its proposed comprehensive marketing approaches, such as the inclusion of social media technologies. D.P.U. 09-32, at 67-68.

National Grid's current pilot program proposal contains a detailed O&E plan designed with two fundamental goals: (1) to achieve effective and meaningful customer engagement in the pilot program; and (2) to eliminate potential barriers to customer adoption of the proposed smart

grid technologies and rate structures (Exhs. EHW-1, at 3; EHW-2, at 15). Essentially, the Attorney General doubts the value of the Company's current comprehensive, community-based approach and its ability to achieve both peak and average load reductions because, "while admirable, [it] is not unique and has not worked out elsewhere" (Attorney General Brief at 8-9, 14-18, citing Tr. 4, at 721). National Grid counters that the Attorney General has offered no evidence to support her contention that the Company's proposed O&E approach has proven unsuccessful in other smart grid pilots (National Grid Reply Brief at 14).

The Attorney General has not provided sufficient detail to support her argument that the Company's proposal is deficient because similar outreach and education approaches have been tested in other pilots and were found to be ineffective (see, e.g., Attorney General Brief at 16-17). Based on the record before us, we are unable to determine whether the program she cites is sufficiently similar in design and execution to be comparable to Company's proposal here (see, e.g., Attorney General Brief at 16-17; Exh. AG-BA-1, at 21, 28; Tr. 4. at 720-721).

As the Department noted in D.P.U. 09-32, at 66, if all potential benefits of smart grid technologies and grid modernization are to be realized, it will require serious efforts, significant participation, and fundamental change in customer behavior. As a result, considerable customer education and engagement will be necessary. Here, the Company proposes to test a comprehensive, community-based engagement approach (Exhs. EHW-1, at 3; EHW-2, at 20-22). The Company's O&E plan contains many of the same elements that the Department supported in D.P.U. 09-32, including: (1) the significant focus on education and awareness of customers; (2) innovative community-based marketing initiatives; and (3) the evaluation of the effectiveness of different marketing challenges. D.P.U. 09-32, at 65-66. Further, consistent with the Department's

directives in D.P.U. 09-32, at 68, the proposed O&E plan leverages cost-effective education and outreach strategies, such as the college co-op program, social media, and partnerships with vendors and community stakeholders (Exhs. EHW-1, at 10; EHW-2, at 35-37). The Company's "listen, test, and learn" approach and the use of a variety of different communication channels, both traditional and community-based, to attempt to elicit customer behavior changes, is likely to provide valuable insights regarding options for larger deployment of smart grid tools and technologies.

Further, we find that the Company's proposed Sustainability Hub is a reasonable channel to directly educate and engage customers. The Sustainability Hub will provide hands-on access to the smart grid technology and information regarding pricing structures offered in the pilot (Exhs. EHW-2, at 35; DPU-NG 4-7). The proposed location of the Sustainability Hub near Clark University and the availability of computers with Internet access should provide participants with additional opportunities to seek assistance regarding participation in the pilot program. The Sustainability Hub also leverages college student interns through the college co-op and partnerships with vendors and community stakeholders to minimize cost (Exh. EHW-2, at 35, 37). While we recognize the value of the Sustainability Hub as a key element at the start of the pilot program, we question whether the functions provided by this channel (i.e., demonstrations and technical support) will be needed for the full duration of the pilot program. Accordingly, we direct the Company to provide a report to the Smart Grid Collaborative Working Group nine months after the start of the pilot program about the use of the Sustainability Hub, including an assessment of whether to maintain it for the remainder of the pilot program.

Overall, we find that the Company's proposed O&E plan is an innovative way to educate customers on the rate structures and enabling technology in the pilot program. We find that the Company's proposed O&E plan is critical to National Grid's pilot program as designed and should maximize the value of its investments. Therefore, with our directive to evaluate the Sustainability Hub, we approve the Company's O&E plan.

7. Evaluation Plan

Because National Grid's proposed smart grid pilot program will include both customer-facing and grid-facing elements, its evaluation plan is designed to study both of these components (Exh. EHW-3, at 15). The evaluation plan also considers the effects of all customer-facing technologies and their impacts on overall and peak demand as well as the effectiveness of the Company's O&E strategies, and customer satisfaction (Exh. EHW-3, at 15-16). In addition, the evaluation plan is designed to study the grid-facing components and the effects of grid devices on service reliability, operational efficiency, and thermal performance (Exh. EHW-3, at 46-47).

In assessing the customer-facing components of the evaluation plan, we consider several issues raised by the parties. First, the Attorney General claims that the estimated number of customers in each of the various test cells is not sufficient to ensure the likelihood of statistically significant results (Attorney General Brief at 21, 22-23). Specifically, the Attorney General argues that the sample size of each test cell should be a minimum of 100 customers (Attorney General Brief at 21, citing Exh. BA at 20-21; Tr. 1, at 106-109). National Grid counters that a sample size of 80 customers is reasonable and that even smaller sample sizes could be corrected and used to provide statistically significant results (Tr. 2, at 393).

According to National Grid, in designing its pilot program, it attempted to balance its desire to attain significant numbers of customers for robust results with its goal of containing pilot program costs (Tr. 2, at 393). While the Company recognizes that larger sample sizes could improve the likelihood of achieving statistically significant results at the 95 percent confidence level, doing so would increase the cost of the pilot program (RR-DPU-9; RR-DPU-10; RR-DPU-12; Tr. 2, at 393).⁵²

We find that a projected sample size of 80 customers in each treatment cell is adequate to ensure a reasonable likelihood of statistically significant results (RR-DPU-6; RR-DPU-9; Tr. 2, at 392-393). Further, we find that the benefit of an increased likelihood of statistical significance is outweighed by the significant cost of expanding the projected sample sizes beyond the Company's current proposal. Accordingly, we will not require the Company to increase the size of the pilot program.

We agree with the Company that it is impossible to know for certain whether a study will actually show statistically significant results until after the study ends (Tr. 2, at 404).⁵³ We note, however, that the Smart Grid Working Group Collaborative was established in order to optimize the results of the Section 85 smart grid pilot programs. Therefore, we fully expect the Company to raise any issues with the Smart Grid Working Group Collaborative that relate to the statistical

⁵² National Grid has estimated the cost of recruiting more participants in each of the customer segments (i.e., installing more meters, purchasing and providing more in-home devices, and increasing the number of low-income customers in the control group) (see e.g., RR-DPU-9; RR-DPU-10; RR-DPU-12). In total, the Company's estimate of the cost ranges between \$1.12 million and \$1.25 million (Exh. EHW-3, at 58).

⁵³ For example, the Company cannot know information such as the distribution of the sample and the variance until the conclusion of the pilot program study (Tr. 2, at 393, 404).

validity of the pilot program. At a minimum, the Company must provide such updates: (1) after it has completed its initial enrollment efforts; (2) 60 days before the start of the pilot program; and (3) ten months after the start of the pilot program. To the extent that our review of such reports raises any concerns, we will seek input from the Smart Grid Working Group Collaborative on any measures that the Company should take to further increase the likelihood of statistically significant results.

As discussed above, the Company proposes to use its existing load research customers as a pilot program control group because: (1) they are already equipped with hourly interval recording load research meters; and (2) doing so would allow a comparison of pilot program participants to the Company's typical, non-pilot program customers (Exh. EHW-3, at 24). The Attorney General argues, however, that unless the control group is equipped with AMI meters, it will not allow an "apples to apples" comparison of customer usage data (Attorney General Brief at 21). The Company counters that load research meters capture hourly usage data and, because it intends to evaluate changes in consumption based on hourly data, interval meters will be comparable to AMI meters (Tr. 1, at 86-88).

We are persuaded that the use of the Company's existing load research customers for the pilot control group, even with somewhat different meters, will provide sufficiently similar energy consumption information for the Company to perform a useful comparison of these two groups (i.e., the Company will be able to evaluate and compare the electricity usage of pilot program participants and the control group in any given hour). Accordingly, we will not require the Company to install AMI meters for its control group customers.

In addition, at present, the Company is aware of the rate classes and usage levels of its load research customers, but is not aware of any of the other demographic information that will be collected from pilot participants (e.g., income, age, and size of home) (Tr. 2, at 349-350). National Grid states that it is willing to survey the customer load research group to try to obtain the necessary information to compare the demographics of these two groups (Tr. 2, at 350-351). Such information could be beneficial in comparing the pilot program customers to the control group, and we direct the Company to survey its customer load research group in an effort to obtain the same demographic information as it will seek from pilot program participants.

Network questions whether the Company will gather enough detailed information about low-income customers in its pilot program (Network Brief at 2). Accordingly, Network recommends that National Grid be required to conduct three focus groups as part of its evaluation plan in order to reach low-income customers and others who are difficult to survey (e.g., elderly customers, medically vulnerable customers, individuals with disabilities or special needs) (Network Brief at 2-3; Tr. 4, at 803). National Grid has expressed a willingness to conduct such focus groups (Tr. 2 at 355-356).

We direct the Company to collaborate with Network and conduct up to three focus groups for the purpose of surveying low-income customers and/or customers that are difficult to survey. In determining the logistics of these focus groups, National Grid and Network must seek to minimize the associated costs. A summary of the results of these focus groups shall be included in the Company's final evaluation report to the Department.

As discussed above, National Grid is also testing its proposed O&E plan as part of its evaluation plan. The Company will evaluate the effectiveness of the multiple facets of the pilot

program O&E campaign, consistent with the Common Evaluation Framework developed by the Smart Grid Working Group Collaborative (Exh. EHW-3 at 32). Specifically, National Grid intends to evaluate: (1) the effects of each media channel, such as print, web, mobile, electronic, social, and broadcast media; (2) the number of attempts to reach each customer; (3) the timing of messaging; (4) the effects of targeted messaging (e.g., environmental, cost consciousness); (5) the effect of messaging through in-home devices; (6) customer satisfaction, interest, and behavior; and (7) the effectiveness of the critical peak event notices (Exh. EHW-3, at 32-39). The Company states that variation in outreach approaches for recruiting and retaining customers will allow it to assess the relative strength of various channels, techniques, and messaging approaches (Exh. EHW-3, at 31). Given that other smart grid pilot programs have not tested such comprehensive customer engagement strategies, we find that including the Company's O&E plan as part of the evaluation plan should provide useful insight and help inform any future smart grid development.

Finally, as an additional means of studying the customer-facing component of the pilot program, the Company proposes to spend approximately \$50,000 to sponsor the MIT Behavioral Study (Exh. EHW-3 at 58; Tr. 3, at 473-476). The Company acknowledged that it has not yet fully formulated the objective(s) of the study and, while the Company has identified some potential benefits, it is unclear whether or how those benefits would flow to its ratepayers, who would bear the costs (Tr. 3, at 473-476).

We recognize that such a study could be beneficial if it bolstered public understanding of customer behavior and motivations. However, we find that the proposed MIT Behavioral Study is not an essential component of the pilot program and, further, that the Company has provided

insufficient detail to support the study. As such, we decline to approve the inclusion of the MIT Behavioral Study as part of the Company's evaluation plan.

In assessing the grid-facing elements of the evaluation plan, we find that National Grid had developed a detailed and comprehensive plan for evaluating the results of these experiments. Such comprehensive tests of the range of available grid-facing technologies should provide many useful lessons about grid modernization (Exh. EHW-3, at 47, 50-56). In addition, the Company's plan to have its own personnel evaluate the grid-facing elements and experiments has several benefits, which include: (1) the Company's personnel has ample experience with the proposed evaluation methods and metrics, such as SAIDI, SAIFI; (2) there will be no incremental pilot program evaluation costs to be borne by customers; and (3) the Company's personnel will gain knowledge and experience by evaluating the new grid-facing equipment internally.

With regard to the Attorney General's contention that the Company has not explained how it will evaluate the combination of customer-facing and grid-facing technology, National Grid argues that it will test the benefits to be derived from both advanced meters and advanced grid technology (National Grid Reply Brief at 17, citing Tr. 3, at 536; Exh. EHW-3 at 46). In particular, the Company will evaluate whether and to what extent AMI meters provide incremental operational efficiencies as compared to existing AMR meters (Tr. 3, at 469-471; Exh. DPU-NG-7-2, at 5).⁵⁴ Accordingly, we find that National Grid has demonstrated that it will

⁵⁴ In particular, the Company will evaluate whether and to what extent AMI meters provide incremental operational efficiencies as compared to existing AMR meters (Tr. 3, at 469-471; Exh. DPU-NG-7-2, at 5).

test and evaluate the combination of technologies and that the results will provide valuable information regarding potential incremental benefits of a comprehensive approach to smart grid.

In conclusion, we find that National Grid's proposed evaluation plan is comprehensive, detailed, and consistent with the Common Evaluation Framework. Accordingly, with the exception of the proposed MIT Behavioral Study, we approve the Company's evaluation plan.

8. Pilot Program Duration

While Section 85 establishes some criteria for the smart grid pilot programs, it does not specify the amount of time a pilot program must operate. National Grid presented the costs of operating a pilot program over 18 months, but seeks the Department's direction as whether it should operate its program for one or two years. Both the Attorney General and the Network observed that, in principle, operating a pilot program for two years would likely provide the Company with more valuable information; they disagree, however, on whether this pilot program should operate for two years (Tr. 4, at 749-750; Network Brief (Supp.) at 1). Because the Attorney General is opposed to the size, scope, and scale of the proposed pilot program, she is opposed to operating it for two years, whereas the Network believes that the additional year of data is worth the additional cost (Tr. 4, at 749-750; Network Brief (Supp.) at 1).

It is undisputed that a two-year pilot program would result in more data than a one-year program, and that the longer pilot would allow for more robust results and analysis.

Nevertheless, there is no consensus among the parties as to whether a larger quantity of data is worth the additional cost.⁵⁵

⁵⁵ The Company's estimated budget for a one-year pilot program is approximately \$41.4 million, and for a two-year pilot program it is approximately \$45.8 million (i.e., while the Company estimates that it would cost \$43.6 million for 18 months, it also

One identifiable advantage of a two-year pilot program is that it would allow the Company and others to study customer participation, customer usage, and “customer fatigue”⁵⁶ over a longer term (Tr. 1, at 151-153). Also, conducting a two-year pilot program would mean collecting data over two summers, which would facilitate the analysis of differences in weather patterns and any effects on customer usage (Tr. 1, at 151-152). In addition, a pilot program that operates over a longer period is likely to provide results that are more robust, which could improve the overall quality of data that is collected (Tr. 3, at 457). Thus, we find that the incremental cost of increasing the duration of the pilot program from one year to two is reasonable. Accordingly, the Department directs National Grid to operate its smart grid pilot program for a two-year period.

9. Performance Incentive

Section 85 requires each distribution company to develop a smart grid pilot program:

for a minimum of 0.25 percent of the company’s customers. A specific objective of the pilot shall be to reduce, for those customers who actively participate in the pilot, peak and average loads by a minimum of five percent. . . . Plans which

estimates that it would cost \$2.2 million less to operate the pilot program for twelve months or, alternatively, it would cost \$2.2 million more to operate the pilot program for 24 months) (see e.g., Exh. PTZ-5). In addition, the estimated revenue requirements for a one- and two-year pilot program are approximately \$50.2 million and \$54.1 million, respectively (RR-DPU-4; RR-DPU-5). These estimates include a return on customer-facing and grid-facing investments, operating expenses, taxes, and depreciation (RR-DPU-4; RR-DPU-5). The capital investments associated with the smart grid pilot program are the same regardless of whether the pilot program is operating for one year or two years, which means that the difference in costs is primarily due to operation and maintenance expenses (RR-DPU-4; RR-DPU-5).

⁵⁶ The term “customer fatigue” refers to customers’ decreased willingness over time to participate in an activity. In the context of this smart grid pilot program, we expect that customers’ willingness to actively monitor their energy usage could decrease over two years.

provide for larger numbers of customers and can show higher bill savings than outlined above shall be eligible to earn incentives as outlined in an approved plan.

While Section 85 provides that companies may earn an incentive for exceeding each of the established minimums, it does not specify how an incentive mechanism must be designed. Therefore, the Department must review National Grid's proposed incentive mechanism to determine whether it is consistent with Section 85 and is reasonable and appropriate in the context of the Company's proposed pilot program design. D.P.U. 09-32, at 75.

As described above, National Grid proposes to collect a performance incentive at the conclusion of the pilot program if more than 0.25 percent of its customers participate in the pilot program and participants reduce both their average and peak consumption by greater than five percent (Exh. PTZ-1, at 8). If both of these criteria are met, National Grid proposes to collect an incentive equal to 50 percent of the basic service bill savings that result from any reductions in average and peak usage in excess of five percent, not to exceed (on a pre-tax basis) three percent of the Company's spending on the customer facing component of the pilot program (Exh. PTZ-1, at 8).

The Attorney General raises three objections to the Company's proposed performance incentive design. First, the Attorney General argues that the incentive should not be tied, even in part, to the number of customers included in the pilot because it rewards National Grid for expanding the pilot program scope (Attorney General Brief at 24). Second, the Attorney General argues that the Company's proposal to calculate the savings target on an aggregate basis, rather than separately for each customer class, could enable the Company to achieve a performance incentive for bill savings driven primarily by C&I customers even though the large majority of pilot program participants (i.e., residential customers) did not reach or exceed the savings targets

(Attorney General Brief at 24-25). Finally, the Attorney General argues that the Company should be required to lower the maximum incentive cap (Attorney General Brief at 25).

We agree with the Attorney General that an incentive mechanism designed to pay a company solely for exceeding the statutory minimum number of customers in its pilot program inappropriately rewards the company merely for expanding a pilot program's size. Such a design would be inconsistent with Section 85, which provides that incentives are available to companies whose pilot programs provide for larger number of customers *and* who can show higher bill savings than the statutory minimums. See D.P.U. 09-32, at 75-76 (rejecting the Company's proposal to earn an incentive payment solely for exceeding the statutory minimum number of customers participating in the dynamic pricing program).

However, in this case, the Company's incentive mechanism design does not reward the Company solely for exceeding the statutory minimum number of customers in the pilot program. Instead, consistent with Section 85 and D.P.U. 09-32, at 76, National Grid's proposed incentive mechanism also includes the statutory minimum for peak and average usage reductions as threshold performance levels (Exh. PTZ-1, at 8). For National Grid to receive an incentive payment, both the customer participation and average usage reduction threshold performance levels must be met (Exh. PTZ-1, at 8). Only then will National Grid will receive an incentive payment based on the portion of bill savings that result from reductions in average and peak usage that exceed the threshold levels of five percent (Exh. PTZ-1, at 8).

The Attorney General argues that the Company's proposal to calculate savings achieved by pilot program participants on an aggregate basis, rather than by rate class, could result in the Company earning a performance incentive even though most of the pilot program participants

have not exceeded the savings targets (Attorney General Brief at 24). However, we note that the Company's proposal also could result in the Company not earning a performance incentive even though most of the pilot program participants have exceeded the savings targets. On balance, we find that the Company's proposal to calculate savings achieved on an aggregate basis is reasonably designed to encourage good pilot performance.

National Grid's proposed incentive cap of three percent (on a pre-tax basis) of the Company's spending on the customer-facing components of the pilot program is consistent with D.P.U. 09-32, at 77, where the Department found that a three percent cap strikes the appropriate balance between: (1) providing an incentive for the Company to achieve good performance with respect to its smart grid pilot program; and (2) minimizing costs to customers. However, in order to further minimize costs to customers, the Attorney General recommends that the Department require the Company to lower the incentive cap (Attorney General Brief at 25).

The Attorney General has not offered a persuasive argument to cause us to reconsider our earlier findings here. Based on our review of the design of the Company's pilot program, we find that establishing a performance incentive cap of three percent of the Company's spending on the customer-facing component of its smart grid pilot program strikes the appropriate balance between providing an incentive for good performance and minimizing costs to customers. D.P.U. 09-32, at 77.

Because the cap is tied to a component of pilot program spending, we are concerned that any additional spending by the Company on the customer-facing component, even if reasonable and prudent, would allow the Company to collect a larger performance incentive payment than contemplated here. Accordingly, in the event that the Company's spending on the

customer-facing component exceeds the budget for that component, the Company's incentive payment shall not exceed (on a pre-tax basis) three percent of the Company's spending on the customer facing component of the pilot program, as budgeted (see, e.g., Exh. PTZ-4(d) (Confidential)).⁵⁷

With the changes described above, we find that National Grid's proposed performance incentive mechanism is consistent with Section 85 and is reasonable and appropriate in the context of the Company's pilot program design. D.P.U. 09-32, at 75.

IV. COST RECOVERY

A. Company Proposal

National Grid proposes to recover the following categories of smart grid pilot program-related costs from its customers: (1) capital costs for the installation of metering and communication technologies, software, and hardware; (2) capital costs associated with the installation of distribution grid technologies; and (3) incremental costs for expenses related to the operations, maintenance, customer education and evaluation of the smart grid pilot program (Exh. PTZ-1, at 13). The Company is seeking a return on capital costs at its weighted average cost of capital, as determined by the Department in National Grid's most recent electric base rate proceeding (Exh. PTZ-1, at 13-14). National Grid proposes to recover incremental pilot program-related costs over five years (Exh. PTZ-1, at 13-14).

⁵⁷ To the extent that spending on the customer-facing component does not exceed the budget, the Company's incentive payment shall not exceed (on a pre-tax basis) three percent of the Company's actual spending on the customer facing component of the pilot program (Exh. PTZ-1, at 8).

National Grid proposes to recover grid-facing costs from all distribution customers, and it proposes to recover customer-facing costs from basic service customers (Exh. PTZ-1, at 14). For investments that are shared between the grid-facing and customer-facing elements of the pilot program (e.g., communications equipment that support both the customer-facing and grid-facing components of the pilot program), the Company proposes to allocate the costs based upon the relative proportion of direct costs for the grid-facing and customer-facing elements (Exhs. PTZ-1, at 21; PTZ-4(d)).⁵⁸

The Company states that it will file its request for cost recovery in the year after the costs have been incurred, and it states that actual costs and revenue will be reconciled each year until the pilot program costs have been fully recovered (Exh. PTZ-1, at 14). Under the Company's proposal, if there is any difference between the revenues recovered in rates and the actual costs of the pilot program in a given year, the Company will adjust the level of costs in rates accordingly to recover or credit the balance over the remaining useful life of the pilot program assets (Exh. PTZ-1, at 23). The Company does not propose any carrying charge on these year-to-year balances (i.e., over- and under-recoveries) (Exh. PTZ-1, at 23).

Since National Grid first filed a smart grid cost recovery proposal in D.P.U. 09-32, the Department approved revenue decoupling and a capital tracker for the Company in Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 09-39 (2009), the Company's most recent electric distribution rate case (Exhs. PTZ-1, at 18-19; PTZ-4(a) at 12-13;

⁵⁸ For example, if the direct costs of the grid-facing component are \$16 million and the direct costs of the customer-facing component are \$24 million, then National Grid proposes to allocate 60 percent ($\$24 \text{ million} / \$40 \text{ million} = 60 \text{ percent}$) of any shared costs to the customer-facing component.

PTZ-4(c) at 1). Because the capital tracker provides National Grid with a mechanism to recover capital expenses on an accelerated basis relative to a traditional regulatory regime of rate cases, the Company has now excluded any grid-facing investments from its cost recovery proposal that it deems necessary to maintain safe, reliable electric service (Exh. PTZ-1, at 19). Conversely, with the advent of revenue decoupling, the Company states that it is not able to retain revenues from increases in sales (which, in 2009, the Company had assumed would provide for pilot program expenses related to capital and labor overhead) (Exh. PTZ-1, at 19-20). Therefore, the Company now proposes to recover both capital and labor overhead costs it expects to incur through its investments in smart grid capital projects, when the cost of such projects are incremental to those already recovered in base rates or other rate adjustment mechanisms (Exh. PTZ-1, at 19).

The Company presents illustrative revenue requirement calculations for the grid-facing investments and for the customer-facing investments (Exhs. PTZ-1, at 14-17; PTZ-6).⁵⁹ Both revenue requirement calculations include: (1) operating expenses; (2) book depreciation; (3) property taxes; (4) return on investment; and (5) federal and state income taxes (Exhs. PTZ-1, at 15-17; PTZ-6). The Company proposes to depreciate all pilot program-related capital investments over a five-year depreciable life (Exh. PTZ-1, at 16, 21-22). In addition, National Grid states that it will recognize bonus depreciation⁶⁰ of pilot program assets placed in service

⁵⁹ The Company presents two revenue requirement calculations because it expects to recover costs related to the grid-facing component from all distribution customers, while it expects to recover costs related to the customer-facing component only from basic service customers (Exh. PTZ-1, at 8).

⁶⁰ Bonus depreciation increases the amount of tax depreciation in the year that depreciable qualifying capital investments are placed in service (RR-DPU-13). Any remaining tax

where federal law allows it and any savings realized from bonus depreciation will be incorporated into its subsequent smart grid cost recovery filings (Exh. PTZ-1, at 22).

B. Positions of the Parties

1. National Grid

National Grid argues that its cost recovery proposal and proposed tariffs are consistent with the Department's directives on cost recovery in D.P.U. 09-32 (Exh. PTZ-1, at 13-14; National Grid Brief at 14, 37; National Grid Reply Brief at 22).

In response to the Attorney General's recommendation that the Company reduce the carrying charges on the costs and expenses associated with the pilot program by borrowing funds from its money pool, National Grid avers that its money pool is used primarily to finance its needs for short term funding and working capital (National Grid Reply Brief at 21). National Grid argues that, in this context, "short-term" refers to a maturity of less than one year, at which time the full amount must be repaid (National Grid Reply Brief at 21). Given that the Company's smart grid pilot program is more akin to a long-term expense, and based on its proposed depreciable life of five years, the Company argues that it is more appropriate to finance

basis of those investments after bonus depreciation is applied will be subject to the application of the modified accelerated cost recovery system in order to calculate total depreciation for tax purposes in the year the investments are placed into service (RR-DPU-13). Current income taxes will be reduced by the total amount of accelerated depreciation multiplied by the effective tax rate coupled with an offsetting increase in the deferred tax reserve (RR-DPU-13). The Company calculates its deferred tax reserve as the difference between depreciation for tax purposes and that for book purposes multiplied by the effective tax rate (RR-DPU-13). The deferred tax reserve is applied as a reduction to rate base, thereby reducing the revenue requirement charged to customers related to its investments (RR-DPU-13). See e.g., Western Massachusetts Electric Company, D.P.U. 08-89, at 12, n.9 (2010).

the pilot program investments with debt instruments that have a maturity of at least five years (National Grid Reply Brief at 22).

With respect to the other arguments raised by the Attorney General on cost recovery, the Company argues that the Department need not address these issues at this time (National Grid Reply Brief at 22). According to the Company, the Department's ultimate decision regarding which costs associated with the pilot program are recoverable will be addressed in future annual smart grid cost recovery proceedings (National Grid Reply Brief at 22). In such proceedings, the Company recognizes that it must demonstrate that all costs are incremental and comply with Department precedent (National Grid Reply Brief at 22). National Grid argues that its cost recovery proposal, its revenue requirement, and its proposed tariffs are all consistent with Section 85 and the Department's directives on cost recovery in D.P.U. 09-32 (Exh. PTZ-1, at 13-14; National Grid Brief at 14, 37; National Grid Reply Brief at 22).

2. Attorney General

The Attorney General argues that the Company's cost recovery proposal is flawed and must be fixed before the Department can approve the smart grid pilot program (Attorney General Brief at 25). First, with regard to the scope of costs, the Attorney General contends that the Company should only be allowed to recover incremental costs of the pilot program, given that the cost of providing electric distribution service is already recovered by the Company through base rates (Attorney General Brief at 25-26). Otherwise, the Attorney General argues, there is a clear risk that costs will be double recovered (Attorney General Brief at 25-26, 31). Specifically, the Attorney General recommends the inclusion of language in the smart grid tariffs to ensure that corporate overhead costs are not double recovered by the Company (). Also, the Attorney

General argues that the Department should direct National Grid to include language in its tariffs regarding incremental costs similar to the Department's statements in D.P.U. 09-33, at 66-68 regarding the tracking of labor costs (Attorney General Brief at 26).⁶¹ In addition, the Attorney General recommends that the Department require the Company to adopt a cost-tracking and reporting system to properly document the incremental costs of the pilot program (Attorney General Brief at 26).

In terms of which costs are incremental to the pilot program, the Attorney General claims that in calculating the incremental cost of new equipment the Company should take into account the fact that the equipment that is removed and replaced within the pilot program area will have a service life remaining (Attorney General Brief at 27-28). For example, the Attorney General argues that the AMR meters removed from the pilot program area could be returned to the Company's warehouse and used in other parts of its service territory, thereby reducing the Company's overall costs of inventory, meter replacement, and new meter installation (Attorney General Brief at 27). The Attorney General asserts that because the AMI meters to be used for the pilot program will have a similar service life as the AMR meters (i.e., 29 years), these meters will have significant salvage value if they are not kept in service after the conclusion of the pilot program (Attorney General Brief at 27). The Attorney General avers that, based on the Company's own estimates, the installed cost of AMI meters is \$97.62, whereas the installed cost of AMR meters is \$90.63 (Attorney General Brief at 27, citing Tr. at 303). Accordingly, the Attorney General argues that because all of the AMR meters to be replaced will likely be

⁶¹ In D.P.U. 09-33, at 66-68, the Department clarified that NSTAR Electric Company must maintain a cost-tracking system and track its labor costs, including any backfill of employees who are reassigned to work on its smart grid pilot program.

reusable and the AMI meters can remain in service for 29 years, the Department should only allow the Company to recover \$6.99 per meter as the incremental meter cost (Attorney General Brief at 27-28). The Attorney General makes a similar argument regarding the replacement of capacitor banks and reclosers that the Company will be installing for the pilot program (Attorney General Brief at 28).

With regard to the Company's recovery of capital costs, the Attorney General claims that the Company's cost recovery proposal should reflect the longer useful lives of these assets, particularly because the Company has stated that it will make use of these assets even if the pilot program is unsuccessful and full deployment of smart grid technology does not occur (Attorney General Brief at 29). The Attorney General asserts that the Company's cost recovery proposal unfairly burdens current customers with the costs of equipment that will provide service to customers many decades after the pilot program has been completed (Attorney General Brief at 26). The Attorney General recommends that the Company treat these capital assets in a manner similar to other rate base investments, which is to treat the incremental costs as incremental additions to the Company's rate base (Attorney General Brief at 29). According to the Attorney General, the Company should be allowed to earn a return on the incremental investment, after accumulated depreciation and deferred income taxes have been netted out (Attorney General Brief at 29). The Attorney General argues that the Company should use the same depreciation accrual rate that is used for the other property in the same plant account (Attorney General Brief at 29-30).

With regard to the proposed software investments for the pilot program, the Attorney General argues that the Company should amortize these costs over a ten-year term, which she

claims is common practice for other large IT investments (Attorney General Brief at 30, citing Boston Gas Company, D.T.E. 03-40, at 88 (2003)). The Attorney General notes, however, that amortization of software costs should be contingent upon whether the software systems are still useful after the completion of the pilot program (Attorney General Brief at 30). The Attorney General states that if any software systems are deemed no longer useful, such stranded costs could be recovered over a shorter period of time (Attorney General Brief at 30).

In terms of the proposed outside consulting fees and evaluation costs, the Attorney General recommends that the Company amortize such costs over a five-year period, rather than recovering these costs as an expense in the year that they are incurred by the Company (Attorney General Brief at 33). The Attorney General states these are extraordinary, non-recurring costs and should not be included in full in the year that they are incurred, consistent with Department precedent (Attorney General Brief at 33, citing Fitchburg Gas and Electric Light Company, D.P.U. 1270/1414, at 33 (1983)).

The Attorney General also recommends that the Department direct National Grid to maximize the economic benefits for customers to be gained from the use of accelerated depreciation of smart grid capital assets associated with federal and state income tax deductions (Attorney General Brief at 30). According to the Attorney General, the Company was not certain whether it could take advantage of accelerated tax deductions related to the pilot program and any failure to maximize such benefits will only serve to increase costs to customers (Attorney General Brief at 30-31, citing Tr. 2, at 267-270).

Finally, the Attorney General argues that allowing the Company to recover all of the capital costs and expenses of the pilot program over five years (i.e., with carrying charges at the

Company's weighted average cost of capital) would unjustly enrich the Company's shareholders at the expense of its customers (Attorney General Brief at 26). The Attorney General contends that even if the Department allows the Company to recover pilot program costs over five years, the Company's weighted average cost of capital is an inappropriate carrying charge and, instead, the Company should finance the pilot program through its source of short-term borrowing: the National Grid money pool (Attorney General Brief at 32). The Attorney General argues that borrowing from the National Grid money pool would result in a significantly lower carrying charge, which would considerably reduce the Company's revenue requirement for the pilot program (Attorney General Brief at 32-33).

C. Analysis and Findings

1. Introduction

The Department must address the following issues associated with the Company's cost recovery proposal: (1) the criteria by which we will evaluate incremental pilot program costs; (2) the number of years over which the Company may depreciate its capital assets; and (3) the manner in which the Company will recover its costs.

2. Pilot Program Costs

a. Incremental Costs

Section 85 provides that electric distribution companies must propose a method of rate treatment of "*incremental* program costs" (emphasis added). In order for National Grid to recover costs related to its smart grid pilot program outside of base rates, the Company must make two showings regarding the incremental nature of those costs. First, the Company must demonstrate that the costs are directly related to the pilot program and that the Company would

not incur those costs but for its implementation. Second, the Company must demonstrate that program-related costs are incremental to costs that the Company recovers through its base rates and other rate adjustments, in order to prevent any double recovery of those costs.⁶²

D.P.U. 09-32, at 85-86; D.P.U. 09-33, at 65-68. A simple demonstration by the Company that it will be undertaking new activities associated with its smart grid pilot program will not be sufficient to disprove the double recovery of costs. Instead, to identify costs that are truly incremental to those included in rates, the Company must track and clearly identify the labor costs associated with: (1) new employees hired specifically for smart grid pilot program implementation; and (2) new employees hired to perform non-smart grid work that was previously performed by employees who have been assigned to the smart grid pilot program on a full- or part-time basis. D.P.U. 09-32, at 86; D.P.U. 09-33, at 67-68.⁶³

As part of its filing, the Company included pro forma tariffs designed to implement its smart grid cost recovery proposal. These tariffs include language that defines incremental costs (Exhs. PTZ 4 (a) at 12-14; PTZ-4 (c) at 1-2).⁶⁴ The Attorney General argues that this definition

⁶² In addition, to ensure appropriate ratemaking treatment of smart grid pilot program costs, the Department stated that in a company's next base rate proceeding, it must identify and factor in all costs (e.g., capital, labor, and support costs) that it has recovered outside of base rates during prior years. D.P.U. 09-32, at 86, n.55; D.P.U. 09-33, at 68.

⁶³ Also, the Company included a line item for cost recovery of property taxes (Exh. PTZ-6, at 1). When the Company files for recovery of incremental property taxes related to its smart grid pilot program, it must view these property taxes in light of the equipment that is being displaced. In other words, if a portion of these property taxes are related to meters, National Grid must account for the property taxes associated with the replacement meters to ensure that there is no double recovery of property taxes. D.P.U. 09-32, at 87, n.56.

⁶⁴ Incremental costs are defined in the Company's tariffs as costs that are: (1) directly related to the implementation and operation of the customer-facing component or the

is inadequate. Specifically, she recommends that the tariffs be amended to include certain elements of the standard of review to be applied to cost recovery, including an assurance from the Company that it will not double recover any costs (Attorney General Brief at 26).

The Department addressed the issue of incremental costs in the context of NSTAR Electric's proposed smart grid tariffs. In D.P.U. 10-163-B/11-92-A, at 10-12, we considered whether the tariffs should include a broader definition of incremental costs. The Department found that, to fully explain the basis of all charges, tariffs need not contain a full recital of all applicable Department ratemaking precedent. D.P.U. 10-163-B/11-92-A, at 12. Similarly here, we find that the Company's proposed tariff language with respect to incremental costs is clear and contains sufficient detail to explain the basis for recovery of charges related to the smart grid pilot program (Exhs. PTZ-4 (a) at 12-14; PTZ-4 (c) at 1-2).

The Attorney General argues that, when determining the incremental costs of the pilot program, the Company should account for salvage value of the equipment that is being installed and the equipment that is being replaced. The Attorney General contends that, because the AMI meters will have significant salvage value if they are not kept in service after the conclusion of the pilot program, the appropriate amount of AMI meter costs to be recovered by the Company should be only the difference between the installed costs of AMI meters and those of the existing AMR meters. Because we do not yet have actual information about whether the meters remain in service, the costs of installation, and the salvage value, we cannot resolve here the appropriate amount of costs to be recovered by the Company related to the AMI meters. Such a

distribution grid-facing component of the smart grid pilot program; and (2) demonstrated to be incremental to those costs that the Company currently recovers through its base rates (Exhs. PTZ-4 (a) at 13; PTZ-4(c) at 1).

determination will be made when the Company seeks cost recovery. At that time, the Attorney General may present her arguments regarding the appropriate scope of incremental costs of meters.⁶⁵

b. Cost Tracking System

As noted above, in D.P.U. 09-32, at 86, the Department directed the Company to implement a system to track and clearly identify pilot program labor costs. We reaffirm that finding here. The Company must ensure that its cost-tracking system can demonstrate that the pilot program-related costs for which it seeks recovery are: (1) directly related to the program and that it would not incur the costs but for its implementation; and (2) not currently recovered through base rates or through other rate adjustment mechanisms.

The Attorney General contends that corporate overhead costs also must be appropriately tracked to avoid double recovery of such costs (Attorney General Brief at 31). We agree and direct the Company to include overhead costs related to the smart grid pilot program in its cost-tracking system. Consistent with our findings above, only those overhead costs that are shown to be directly related to the smart grid pilot program and not currently recovered through base rates will be eligible for recovery.

In addition, we direct the Company to physically and financially track and account for all equipment that is removed to make way for installation of smart grid pilot program equipment in

⁶⁵ The Attorney General raises similar issues with respect to capacitor banks and reclosers (Attorney General Brief at 28). Like the AMI meters, the Department will determine the appropriate amount of costs to be recovered by the Company related to capacitor banks and reclosers at the time the Company seeks recovery of these costs.

order to ensure that there is no double recovery for equipment already included in National Grid's rate base.⁶⁶

c. Ratemaking Treatment

i. Depreciation of Capital Assets

Under the Department's ratemaking precedent, a distribution company may recover costs related to capital assets through base rates in the form of depreciation over the life of an asset, as long as the company has demonstrated that the asset is used and useful. D.P.U. 09-39, at 177. In D.P.U. 09-32, at 89-90, the Department found that a five-year depreciation life (i.e., the number of years over which the Company proposes to depreciate its IT assets) is a good proxy for the used and useful lives of all the smart grid technology in the pilot program. Consistent with this finding, National Grid proposes to use a depreciation life of five years for the capital assets associated with all customer-facing and distribution grid-facing components of the smart grid pilot program (Exh. PTZ-1, at 14).

The Attorney General objects to the five-year cost recovery period for capital assets proposed by the Company. Instead, she argues that smart grid pilot program investments should be treated like standard utility expenditures, where the costs of the capital asset are recovered over the useful life of that asset (Attorney General Brief at 28-30). The Company states that its proposal is consistent with the Department's decision in D.P.U. 09-32 (Exh. PTZ-1, at 14).

⁶⁶ For example, when the Company removes an existing recloser (for which all associated costs are already included in the Company's rate base) to install an advanced recloser as part of the pilot program, the Company must track the recloser that was removed. If the recloser that was removed is reinstalled in another area of the Company's service territory, the Company must track the costs associated with that recloser to ensure that they are not included in rate base again.

The purpose of a Section 85 smart grid pilot program is, among other things, to test whether a broader deployment of equipment and/or dynamic pricing structures is warranted. Whether equipment remains on a utility's system after the pilot program has concluded will be based, in part, on the results of such a test. Even if the results of a pilot program indicate that a piece of equipment did not yield benefits, the installation of the equipment nonetheless provided useful information to the utility. Here, National Grid is testing a variety of types of equipment and it is not known how much of this equipment will remain on the Company's system at the conclusion of the pilot program (Exhs. AG-1-49; AG-5-8; Tr. 2, at 220-228).

In D.P.U. 09-32, at 89, the Department noted that smart grid technology is evolving much more rapidly than traditional utility equipment. This rapid evolution is evidenced by the fact that the AMI meters National Grid proposes to use for this pilot program are an updated version of the AMI meters the Company had specified in its 2009 proposal (see, e.g., Tr. 3, at 591). As we found in D.P.U. 09-32, at 89-90, the Department is persuaded that a five-year depreciation life remains a good proxy for the used and useful lives of all the smart grid technology in the pilot program. Consistent with this finding, we approve National Grid's proposal to use a depreciation life of five years for the capital assets associated with all customer-facing and distribution grid-facing components of the smart grid pilot program.

Finally, the Attorney General argues that, in order to reduce costs for ratepayers, the Company should be required to maximize benefits from accelerated (or bonus) depreciation as it relates to federal and state taxes (Attorney General Brief at 30-31). We agree. Where the law allows, we fully expect that National Grid will recognize bonus depreciation of pilot program

assets placed in service and incorporate all savings realized for the benefit of ratepayers (Exh. PTZ-1, at 22).

ii. Amortization of Pilot Program Expenses

The Attorney General recommends that the Company amortize the costs of software, software development, and program development expenses over a ten-year period, which she argues is how other large IT investments are treated (Attorney General Brief at 30, citing Boston Gas Company, D.T.E. 03-40, at 88 (2003)). The Attorney General also recommends that costs for outside consultants and pilot program evaluation be amortized over a five-year period because they are extraordinary and non-recurring (Attorney General Brief at 33, citing Fitchburg Gas and Electric Light Company, D.P.U. 1270/1414, at 33 (1983)).

When the Department has applied its extraordinary, non-recurring standard to expenses, those expenses were known and measurable and could clearly be characterized as a one-time expense during the test year. Fitchburg Gas and Electric Light Company, D.P.U. 1270/1414, at 32-34 (1983). Here, the costs at issue have not yet been incurred by the Company.

While it may be appropriate to amortize smart grid pilot program costs that are shown to be extraordinary and non-recurring, it is not possible for us to make such a determination without more information. During the subsequent investigation of the recovery of smart grid pilot program costs, the Attorney General may raise this issue again.

iii. Carrying Charge for Pilot Program Investments

The Attorney General opposes the Company's proposed use of its weighted average cost of capital as the carrying charge for smart grid pilot program investments, stating that the more appropriate interest rate would be the Company's short-term cost of borrowing from the National

Grid money pool (Attorney General Brief at 32-33). In response, the Company argues its money pool is not an appropriate means to finance pilot program investments because it is designed to finance short-term funding needs and working capital (National Grid Reply Brief at 21-22).

Short-term financing refers to debt issued that has a maturity of less than one year. See G.L. c. 164, § 14. Because the Company's smart grid pilot program will require investments to be recovered over many years, it would be inappropriate for the Department to require National Grid to finance this project using a short-term debt instrument such as its money pool.

In D.P.U. 10-163-B/11-92-A at 17, the Department allowed NSTAR Electric to apply its tax adjusted weighted average cost of capital to all smart grid pilot program related investments because we found that these investments (i.e., capital assets and expenses) are part of NSTAR Electric's broader investment in its smart grid pilot program. The same considerations apply here. Accordingly, the Department will allow National Grid to apply its tax-adjusted weighted average cost of capital to all smart grid pilot program investments.

iv. Basic Service Rates and Distribution Rates

In D.P.U. 09-32, at 92-93, the Department found that it was appropriate for the Company to recover customer-facing costs through its basic service rates and distribution grid facing costs from all distribution customers. We find that the Company's pro forma smart grid tariffs are consistent with this directive (Exh. PTZ-4).

Some of the Company's expenses will be incurred to support both the customer-facing and distribution grid-facing components of the smart grid pilot program (Exhs. PTZ-1, at 21; PTZ-4(d)). In order to allow for recovery of costs through both basic service and distribution rates, the Company must appropriately allocate these shared capital expenses between the two

components. In D.P.U. 09-32, at 93, the Department directed the Company to submit a proposed allocation method with supporting documentation. We have reviewed the Company's proposal and find that it is an appropriate method to allocate shared capital expenses.

d. Conclusion

In conclusion, with the exceptions noted above, the Department finds that the Company's cost recovery proposal is reasonable and consistent with Section 85 and Department precedent. D.P.U. 09-32, at 85-94. We remind National Grid that, at the time it seeks to recover its smart grid pilot program costs, the Company must demonstrate that its proposal fully complies with all applicable Department precedent. Here, in particular, the Company must demonstrate that all smart grid pilot program costs proposed for recovery: (1) are directly related to the pilot program and that the Company would not incur those costs but for its implementation; and (2) are incremental to costs that the Company recovers through its base rates and other rate adjustments. D.P.U. 09-32, at 86; D.P.U. 09-33, at 65-68. Further, as with all costs it seeks to recover from ratepayers, the Company must demonstrate that the smart grid costs are reasonable and prudently incurred. If the Company fails to meet its burden, it will result in the disallowance of such costs.

V. ORDER

Accordingly, after due notice, hearing, and consideration, it is hereby

ORDERED: That Massachusetts Electric Company and Nantucket Electric Company, d/b/a National Grid, shall comply with all of the directives contained in this Order.

By Order of the Department,

/s/

Ann G. Berwick, Chair

/s/

Jolette A. Westbrook, Commissioner

/s/

David W. Cash, Commissioner

An appeal as to matters of law from any final decision, order or ruling of the Commission may be taken to the Supreme Judicial Court by an aggrieved party in interest by the filing of a written petition praying that the Order of the Commission be modified or set aside in whole or in part. Such petition for appeal shall be filed with the Secretary of the Commission within twenty days after the date of service of the decision, order or ruling of the Commission, or within such further time as the Commission may allow upon request filed prior to the expiration of the twenty days after the date of service of said decision, order or ruling. Within ten days after such petition has been filed, the appealing party shall enter the appeal in the Supreme Judicial Court sitting in Suffolk County by filing a copy thereof with the Clerk of said Court. G.L. c. 25, § 5.