Niagara Mohawk Power Corporation
d/b/a National Grid
Case 17-E-0238 & 17-G-0239
Attachment 5 to DPS-055 NM-442
Question 2 (a)
Page 1 of 1

Gas ERTs in Service by Vintage through December 31, 2016

Vintage Year	Gas ERTs
2002	105,831
2003	301,163
2004	32,169
2005	13,006
2006	11,652
2007	917
2008	13,407
2009	10,882
2010	16,475
2011	25,341
2012	22,943
2013	8,778
2014	29,926
2015	22,553
2016	12,973
	628,016

Niagara Mohawk Power Corporation
d/b/a National Grid
Case 17-E-0238 & 17-G-0239
Attachment 1 to DPS-055 NM-442
Question 1 (a)
Page 1 of 1

Electric Meters in Service by Vintage through December 31, 2016

Vintage Year	Electric Meters
2002	315,936
2003	855,548
2004	285,993
2005	20,325
2006	11,392
2007	7,327
2008	15,391
2009	3,235
2010	18,300
2011	33,983
2012	5,613
2013	35,041
2014	30,317
2015	32,781
2016	6,056
Unknown	27,227
	1,704,465

Date of Request: June 30, 2017
Due Date: July 10, 2017

Request No. DPS-450 CK-12
NMPC Req. No. NM-1026

NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID
Case No. 17-E-0238 and 17-G-0239 –
Niagara Mohawk Power Corporation d/b/a National Grid – Electric and Gas Rates

Request for Information

FROM: DPS Staff, Chelsea Kruger

TO: National Grid, Advanced Metering Infrastructure Panel

SUBJECT: **AMI PILOT PROJECTS – CUSTOMER ENGAGEMENT**

Request:

In these interrogatories, all requests for data, work papers or supporting calculations should be construed as requesting any Word, Excel, or other computer spreadsheet models in original electronic format with all formulae intact.

1. The following questions pertain to National Grid's Worcester, Massachusetts, SmartGrid Pilot Project:
a. Provide the Customer Engagement Plan developed and used for this pilot project.

b. Provide all customer surveys that the Company used before, during, and after AMF meter implementation. Include the results of each survey in your response.

c. For each month since meter deployment, provide the number of residential customers who are enrolled, by heating and non-heating. Include the following information in your response:
i. The number of customers who opted-out of the project before, during, and after deployment, separately for each category.
ii. A breakout of low-income customers who enrolled or opted-out of the project.

d. With regard to customer engagement, provide a detailed list of lessons learned from this project.

e. Provide monthly data for any customer engagement metrics measured during this project.

f. For each month of the pilot, provide customer retention rates for:
i. The AMF meter;
ii. The TOU rate; and
iii. Both the AMF meter and the TOU rate.

2. The following questions pertain to Niagara Mohawk's Clifton Park Demand Response demonstration project:

a. Provide the Customer Engagement Plan used by Niagara Mohawk for this demonstration project.

b. For each month since AMF meter deployment, provide the number of residential customers who are enrolled in Niagara Mohawk's Clifton Park demonstration project by heating and non-heating. Include the following information in your response:
i. The number of customers who opted-out of the project before, during, and after deployment, separately for each category.
ii. A breakout of low-income customers who enrolled or opted-out.

c. With regard to customer engagement, provide a list of lessons learned prior to AMF meter deployment.

d. Provide monthly data for any customer engagement metrics being measured during this project.

e. For each month of the pilot to date, provide customer retention rates for:
i. The AMF meter
ii. The TOU rate
iii. Both the AMF meter and the TOU rate.

Response:

1.

a. The Customer Engagement Plan developed and used for the Worcester Smart Energy Solutions Smart Grid Pilot (the "Pilot") is included as Attachment 1.

b. Customer surveys completed for the Pilot are included in Attachments 2 and 3. Because of size, the surveys are included in zip files. The specific surveys and document reference number for each are listed below:

i. Meter Decline Survey, November 2013 (Doc. # 0,1)
ii. Pre-Pilot Survey, February 2014 (Doc. # 2,3,4)
iii. Post Installation Survey, April 2014-March 2015 (Doc. # 5,6)
iv. Post Event Surveys; June-July 2015(Doc. # 7,8,9), July-August 2016 (Doc. # 12,13,14)
v. End of Summer Survey, September 2015 (Doc. # 10,11)

vi. End of Pilot Survey, October 2016 (Doc. # 15, 16)
vii. Opt Out & Drop Out Survey, November 2015 (Doc. # 17, 18)
viii. Opt Out & Drop Out Survey, October 2016 (Doc. # 19, 20)

Summary results for the above surveys can be found in Appendix C, pages 143 – 151 of 158, of the "Smart Energy Solutions Final Evaluation Report" that the Company previously submitted as Attachment 1 to Information Request No. UIU-2 (KOH-89). Attachments 2 and 3 also contain results for the surveys.

c. The Company cannot provide an enrollment break out between heating and non-heating customers because this break out was not tracked as part of the Pilot.

The table below summarizes the total residential customer enrollment in the Pilot, broken out monthly by R1 (non-low-income) and R2 (low-income) residential customers. These monthly counts include residential customers enrolled in either of the Pilot's two pricing plans (Time of Use with Critical Peak Pricing or Peak Time Rebate). The Company began tracking this information in February 2015, the billing month following the launch of the Pilot's customer pricing plans.

Month	R1	R2
Feb-15	10625	1399
Mar-15	10462	1378
Apr-15	10279	1345
May-15	10304	1350
Jun-15	10316	1326
Jul-15	10257	1322
Aug-15	10310	1307
Sep-15	10422	1292
Oct-15	10416	1336
Nov-15	10415	1325
Dec-15	10363	1319
Jan-16	10324	1359
Feb-16	10303	1346
Mar-16	10307	1351
Apr-16	10298	1341
May-16	10269	1012
Jun-16	10266	1049
Jul-16	10269	1072
Aug-16	10276	1065
Sep-16	10271	1066
Oct-16	10297	1062
Nov-16	10316	1098
Dec-16	10312	1113

i. & ii.
The table below summarizes the total number of residential customers who declined an AMI meter during the 2012 to 2013 deployment phase of the Pilot broken out by R1 (non-low-income) and R2 (low-income) residential customers. The Company does not have this data broken out by month.

Residential Customer Rate Class	# of AMI Meter Declines
R1	991
R2	100

The table below summarizes the total number of customers who, after having an AMI meter installed, chose to opt out of the Pilot before it officially went live with new customer pricing plans on January 1, 2015. This table is broken out by R1 (non-low-income) and R2 (low-income) residential customers. The Company does not have this data broken out by month.

Residential Customer Rate Class	# of Pilot Customer Opt Outs After AMI Meter Install
R1	218
R2	42

The table below summarizes the total number of customers who chose to drop out of the Pilot after it went live (from January 1, 2015 through December 31, 2016). This table is broken out by R1 (non-low-income) and R2 (low-income) residential customers. The Company does not have this data broken out by month.

Residential Customer Rate Class	# of Pilot Customer Drop Outs (1/1/15 - 12/31/16)
R1	252
R2	40

d. The Company provided a list of lessons learned from the Pilot in its response to Information Request No. UIU-2 (KOH-89). In the response, the Company noted the importance of a staged approach to customer engagement, the necessity of tools to support customer engagement, the viability of an opt-out design, and the value of soliciting customer feedback on a recurring basis. Lessons learned are documented in the Pilot evaluation report (pgs. 114 – 117 of 158) that was included as Attachment 1 to Information Request No. UIU-2 (KOH-89). Key customer-focused learnings are also included on page 120 the same report.

e. The customer-engagement metrics that were measured are as follows:

   i. *Total customer traffic of visits to the Pilot's customer web portal* – this data, broken out bimonthly (2x per month), was provided in Attachment 1 to

Information Request No. UIU-2 (KOH-89) (please see Figure D-1 on pg. 152 of 158). Figure D-1 also shows the total count of unique logins for each record, as well as a cumulative count of unique logins.

ii. *Frequency of first time web portal log-ins* – this data, broken out monthly, was provided in Attachment 1 to Information Request No. UIU-2 (KOH-89) (please see Figure 2-8 on pg. 50 of 158).

iii. *Number of new in-home technology installs* – this data, broken out monthly, was provided in Attachment 1 to Information Request No. UIU-2 (KOH-89) (please see Figure 2-9 on pg. 51 of 158).

iv. *Number of Pilot customers with in-home technology* – this data, broken out monthly below, shows the total numbers of participating customers with any combination of the in-home technology options offered by the Pilot (*i.e.*, digital picture frame, programmable communicating thermostat, load control device, and smart plug).

Please note that these figures may not align perfectly with "*Number of new in-home technology installs"* noted above in Part e.iii. due to various customer changes throughout the Pilot (*e.g.* move in, move out, Pilot drop out).

Pilot Program Year	Pilot Program Month	Total Customers with Technology
2015	January	932
2015	February	1007
2015	March	1055
2015	April	1063
2015	May	1072
2015	June	1081
2015	July	1081
2015	August	1091
2015	September	1111
2015	October	1127
2015	November	1127
2015	December	1132
2016	January	1139
2016	February	1145
2016	March	1151
2016	April	1144
2016	May	1145
2016	June	1134
2016	July	1121
2016	August	1122
2016	September	1124
2016	October	1122
2016	November	1127
2016	December	1126

f. The Company did not track a specific monthly retention rate for the AMF meter and/or the TOU rate for the Pilot. Please refer to the Company's response in part c above for the corresponding counts regarding total customer enrollment and/or opt outs during the various phases of the Pilot.

2.

a. Attachment 4 is a copy of the Company's Clifton Park Demand Reduction REV Demonstration Project Implementation Plan. The customer engagement plan is addressed on pages 5 – 8 of the attachment. Customer engagement activities that have occurred to date include:

- Direct mail to 14,464 customers to introduce Smart Energy Solutions and provide an opt-out period;
- Video to educate customers on how Smart Energy Solutions can help Clifton Park residents better manage their energy use;
- Mailed weekly Meter Installation Notifications postcards;
- Presentation focused on the benefits of Smart Energy Solutions for the community outreach meetings;
- Hosted three customer outreach meetings to discuss Smart Energy Solutions and demonstrate the portal:
    - Approximately 170 total attendees;
    - Meeting dates were March 29, April 27, and June 12.
- Continual update of ngrid.com/cliftonpark and the FAQs based on customer feedback into the call centers and as new features were rolled out;
- Mailed welcome letters to those customers whose meters were installed;
- Mailed letter to invite those customers who initially opted out to come and learn more about the program to see if we could get them to opt back in to the program (five people opted back in);
- Social media to begin in July; and
- National Grid Conservation day emails to begin July 3.

b. The Clifton Park Demand Reduction REV Demonstration Project is an opt-out design. Eligible customers are enrolled in the project until they request to opt out. There are 14,456 residential electric premises eligible for the project. Of these, 13,358 have residential natural gas service. Of the eligible population, the distribution of heat/no-heat based on the tariff description in the billing system is as follows:

- 12,328 electric no heat; 2,128 electric heat
- 12,577 natural gas heat; 781 natural gas no heat

In January 2017, letters were sent to the eligible population describing the project along with instructions to opt out. The Company tracks opt outs by calls received in the Contact Center or in the field at the time of meter installation; opt outs are not tracked by heating and non-heating. The table below represents the monthly tracking of opt outs by month.

	Total	Feb 2017	Mar 2017	Apr 2017	May 2017	June 2017
Contact Center	347	202	47	77	17	4
Field	472			12	282	178*
	819					

* 28 of the 178 June filed opt outs were determined after three attempts to install the meters

Of the project eligible premises, 243 are considered low income. Of these, 14 accounts have opted out of the project.

c. National Grid's experience with the Worcester Smart Energy Solutions Smart Grid Pilot project provided insight to the development of the customer engagement tools for the Clifton Park Demand Reduction REV Demonstration Project. Although the project designs have significant differences, the experience of the Worcester project informed the REV demonstration with respect to meter deployment communications.

d. The table below includes the customer engagement metrics that will be tracked throughout the project, including targets.

		Baseline	Goals			
Web Portal Metrics	**Metric Definition**	**Jan - Apr**	**May**	**June**	**July**	**August**
Login Rate	Out of all customers with active utility accounts in that month, what percentage of them have ever logged in	14.75%	16.15%	16.84%	17.53%	18.22%
# Customer has ever logged in	Number of customers who have ever logged in	2,132	2,332	2,432	2,532	2,632
# of new customers logged in	# of new customers logged in	77	200	100	100	100
# of unique customers logged in per month	Number of customers who logged in during a given month	290	315	340	365	390
% of active customers logged in per month	Out of all customers with active utility accounts in a given month, what percentage of them logged during that month	2.00%	2.00%	2.34%	2.52%	2.69%
# login events per month	Total number of login events per month (e.g. a customer logging twice in during one month counts as two logins for that month)	339	339	397	427	456
Top 5 site selections	Ranked by the number of sessions that visited that section	1. My Energy Use - 65%, 2. Ways to Save - 27%, 3. Dashboard - 15%, 4. Home Energy Audit - 15%, 5. Compare My Bills - 12%				
Points & Rewards Metrics	**Metric Definition**	**Jan - Apr**	**May**	**June**	**July**	**August**
Customer Expereince Metrics						
Customers who have enrolled in Points & Rewards	Number of customers who have enrolled in Points & Rewards	404	604	704	804	904
Customers who have earned points	Number of customers who have earned points in Points & Rewards	400	423	493	724	814
Customers who have redeemed points they earned	Number of customers who have redeemed points in Points & Rewards	24	30	35	51	57
Budget Metrics						
Rewards account: Points awarded	As of the end of the month, the total number of points awarded (cumulative)	314,254	434,854	555,454	691,054	841,654
Rewards account: Points & Rewards redemption	As of the end of the month, the total number of points redeemed (cumulative)	29,820	31,425	34,788	38,882	41,463
Rewards account: Points awarded, but not redeemed	As of the end of the month, the total number of awarded points that have not been redeemed (cumulative)	284,434	403,429	520,666	652,172	800,191
Opt-Out Metrics	**Metric Definition**	**Jan - Apr**	**May**	**June**	**July**	**August**
Customers unsubscribed from email channel	Total number of customers who have unsubscribed from specific email types	218	238	258	278	298
Customer Unsubscribe by Email Type -- DRR	Total number of customers who have unsubscribed from DRR emails specifically	0	35	70	105	140
Customer Unsubscribe by Email Type -- WAMI	Total number of customers who have unsubscribed from WAMI emails specifically	0	35	70	105	140
Customer Unsubscribe by Email Type -- HBA	Total number of customers who have unsubscribed from HBA emails specifically	0	35	70	105	140

e.

i. To date, 13,006 electric meters and 11,675 gas ERTs have been installed for the project. Meters will continue to be installed through July. There have been a total of 819 opt outs, as described above.

ii. By design, the Voluntary Time of Use rate ("VTOU") will not be promoted for the project until the fall of 2017. The VTOU rate was approved for Niagara Mohawk customers in November 2016. Modifications to omit the metering charge for Clifton Park customers were approved in the spring of 2017. There are currently no Clifton Park customers on the VTOU rate. There are 45 Clifton Park customers on the SC1C TOU rate. Promotion of the VTOU rate will be coordinated with the Smart Home Rate promotion.

iii. The VTOU rate will not be promoted for the project until the fall of 2017.

Name of Respondent:
John Leana
Nick Corsetti
Melissa Piper

Date of Reply:
July 10, 2017

Form 103

nationalgrid

Worcester Smart Grid Pilot

Customer Outreach and Education Plan

December 22, 2011

Contents

Introduction

National Grid's comprehensive Smart Grid modernization and customer interface pilot in Worcester can only succeed if it's rooted in deep customer engagement and starts and ends with the customer. When customers are engaged, they can better understand the benefits of their involvement and ultimately help manage their energy utilization and save costs. The company has reviewed other Smart Grid deployments around the country and has learned how critical effective engagement with customers is to overall success. Utility customers have long been passive buyers of electricity; it is a commodity that is an afterthought amongst larger financial obligations such as a mortgage or rising consumer costs. Historically the sale of electricity has been a one way transaction that has not required our customers to play material role, and customers have not seen a role for themselves. Smart Grid dramatically changes that dynamic with the onset of real time usage data, alternative pricing schemes and the fact that plug in electric vehicles and distributed generation are much more viable. To effectively modify a long established culture, the Company has adapted a thorough and creative approach in the Outreach and Education Plan (O & E). The O & E is a fundamental tool in bridging community, stakeholder and customer experience and their inputs with the Smart Grid technology and grid modernization to achieve, and possibly exceed, the 5% savings target as stated in Section 85 of the Massachusetts Green Communities Act (Chapter 169 of the Acts of 2008). Moreover, engaging customers in a fundamentally new way will enhance both National Grid's and our customer's abilities to impact how and when we use energy, control and reduce costs associated with energy use, as well as convey inherent grid modernization benefits such as increased service reliability, improved outage and emergency restoration response.

Community Customer Worcester

The City of Worcester, centrally located in Massachusetts, is home to a diverse population that represents a microcosm of the Commonwealth, and the 15,000 households and businesses within the Pilot footprint are reflective of that diversity. This varied mix of customers provides the opportunity to test the value proposition of the newly available interactive rates, technology and informed customer actions sought after in deploying the Smart Grid Pilot and will aid in understanding the implications and benefits of Smart Grid technology. In addition, Worcester has a diverse distribution system with both underground and overhead networks within close proximity of a number of existing and potential distribution generation project sites. Worcester's multiple institutions of higher learning are also committed to energy education and technology, renewables, and energy efficiency, and will serve as a critical partner in the Pilot's success.

Listening to Community, Customer, Worcester

Customer engagement will need to be driven and supported by a fluid and ongoing O & E plan that reaches customers effectively and enlists them in a two-way partnership to help them realize their ambitions in managing energy use and achieving savings. Effective customer engagement will maximize the value of the investments being made through the Pilot and can, over time, enhance customer experience and customer satisfaction. The pages ahead will demonstrate that National Grid's O & E strategy was informed by:

- Appreciative Inquiry Community Summit in Worcester (Green2Growth)
- Green Communities Act and Mass Smart Grid Collaborative "Common Evaluation Framework"
- Lessons learned observing other Smart Grid pilots

Community Summit

National Grid has taken major strides in ensuring that our O & E plan is built on the foundations established by the community summit held in September of 2011, which encouraged leveraging customer-centric initiatives and a robust two-way communications approach to enable customers to choose how and when they use energy. This pivotal customer engagement event included approximately 300 stakeholders and is locally known as the **Green Today, Growth Tomorrow Community Summit** (Green2Growth).

Green2Growth Summit Participation

Green2Growth introduced a new 'listen, test and learn[1]' approach to optimize engagement and it opened the door to two-way communications that can enable the Company to better understand what motivates customers to act. The partnership between National Grid and the City of Worcester was an essential factor in the success of the event and provided the Company with its first steps on a journey that will be taken with customers. Additionally, as the Pilot unfolds, the Green2Growth approach and the continuing dialogue it has generated will provide the ability to amplify, modify, or refine tactics based on their effectiveness, building a more interactive and meaningful customer experience. National Grid views Green2Growth and our partnership with the community as a means to be much more of a collaborative partner than an imposer of new technology on an unprepared customer base. When you look at the Smart Grid deployments that have met with consumer backlash, it has been the case that the customers felt as though something dramatically different and unexpected had been foisted upon them. National Grid's partnership with the community of Worcester is designed to avoid those problems and rely on a continuous learning experience and exchange of ideas.

Green Today, Growth Tomorrow Community Summit

Those who participated in Green2Growth in Worcester on September 19 and 20, 2011 had the opportunity to experience something truly groundbreaking. Rather than prescribing Smart Grid as a utility-centric project, the pilot was introduced in the context of broader sustainability initiatives that will serve the passion, vision, and needs of the local community. Civic and business leaders, educators and community groups, university professors, facilities personnel, and students, young people and seniors, low-income and affluent citizens, home owners and renters, enthusiastically embraced the notion that by working together they could each make a difference in their community's environmental and economic future. Understanding Smart Grid and the connection to

[1] "Listen, test and learn" approach refers to testing and measuring pilot tactics and using the resulting information to improve approaches at several points along the Pilot.

associated impacts on economic vitality, among other benefits, will increase the effectiveness of the pilot investment and bridge community goals to those of the Pilot.

National Grid employees—union members, senior executives, technical and program managers—had an opportunity to listen to their customers first hand. Collaborating with city and state elected officials, regulators, consumer advocates, community-based organizations, thought leaders, and other stakeholders, National Grid learned how their ideas for the Pilot could enable the community's goals. Smart Grid, for its own sake, was not the agenda. Sustainability and technology were discussed as a means to provide feedback from customers on how they could make intelligent choices about reducing and deferring energy usage, how to better manage the distribution system so outage detection and emergency response could be improved and how to enable the integration of more renewable generation, for example.

What a difference TWO days can make...

Green2Growth Summit Customer Participation

What became clear to everyone present—even the skeptics—was the groundswell of support that arose when people were brought together to share ideas and apply their creative energies. Participants recognized that sustainability is a pathway to economic vitality for the community. The fundamental structure of National Grid's Outreach and Education Plan is a direct result of this deep collaboration by National Grid, the Worcester community and engaged stakeholders.

Green2Growth Outreach to recruit and retain participants

Numerous assessments of consumer attitudes have been quantified by leading research organizations[2] and have found certain dominant themes that resonate with people sharing similar perspectives. At the same time, research studies have shown that one person's compelling reason is another person's deterrent and that people tend to project their own perspective onto the broader community. This phenomenon explains why a single tagline or campaign will not successfully reach all audiences.

Green2Growth participants saw these variances in action during the Innovation Panel. The panelists, selected from different professional perspectives, offered a range of value propositions they found to be compelling. One panelist set the stage by describing the importance of forming

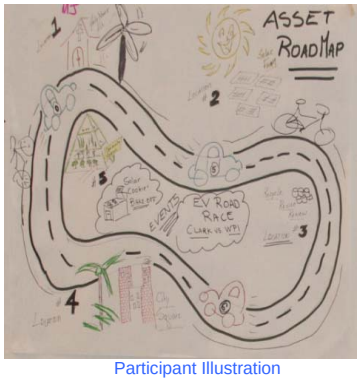
[2] 2011 State of the Consumer Report, Smart Grid Consumer Collaborative, pages 19-25

emotional connections to rational reasons for behavioral changes regarding energy usage. Other panelists spoke about the need for transformative goals to achieve environmental progress, support for providing affordable energy, creating the right educational programs that can help customers cut their bills and teaching children about sustainability. National Grid listened to all of these stakeholders within the community and has incorporated their input into the Outreach and Education approach.

Today, the Company continues to listen and participate in the Green2Growth steering committee supporting the further evolution of the 15 opportunity areas that were identified at the Summit.

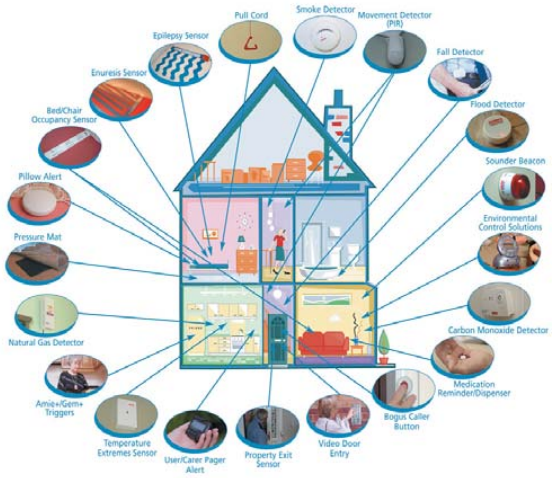
Green2Growth initiatives aligning the community and with the Smart Grid Pilot:

- Asset map showcasing sustainable resources, technologies, opportunities, and leaders
- Viral video project by schools and university students on "Ways our family saves energy"
- "Kids' eye views of sustainability" video
- Empower low-income consumers as energy leaders
- Advance energy literacy education within the community
- Advance the Sustainability Hub as a World-class smart energy demonstration destination



Participant Illustration

Screen shot from Asset Map Draft 1



Sustainability Hub Concept Model

The Sustainability Hub concept is a direct initiative resulting from the Green2Growth Summit. National Grid is leading the development of the Sustainability Hub by partnering with vendors, local institutions and interested stakeholders to create a destination for the community to experience interactive exhibits and have hands-on access to Smart Grid technology & education.

Through this partnership, the Company will continue to further explore, review and communicate Smart Grid initiatives and efforts undertaken in the Pilot. In addition, communication outreach channels incorporated in the O&E Plan such as the Sustainability Hub, online and mobile channels, customer usage benchmarking and data visualization, among others, represent how customer preferences and needs expressed during the Summit are now linked with the Company's approach to the Pilot. National Grid took what we heard in Green2Growth and not only applied it directly to the approach of the Outreach & Education Plan, but is partnering with Green2Growth as a local stakeholder to ensure that we continue to have an open dialogue with stakeholders, continuously advancing the "listen, test & learn" model.

Lessons Learned In Smart Grid

In addition to the Grren2Growth summit, and to gain a better understanding of best practices and build a more meaningful approach, National Grid also collected information, observations and key learnings by:

- Participating in the Statewide Evaluation Collaborative Common Evaluation Framework
- Understanding key insights that can be achieved through the Green Communities Act
- Assessing similar utility pilot efforts across the nation: San Diego Gas & Electric, NSTAR, Unitel, Commonwealth Edison, Duke Energy, Westar Energy, and Oklahoma Gas & Electric
- Obtaining feedback from industry experts: GreenOrder, The Structure Group, To-The-Point
- Consulting with educational institutions and organizations with experience in the Smart Grid arena: Clark University, Worcester Polytechnic Institute, Institute for Energy & Sustainability

Several lessons and best practices can be learned from Smart Grid projects that are already underway. Although Smart Grid remains a relatively new phenomenon in the utility sector, these case studies provide early lessons learned and have helped inform the development of the Company's Outreach and Education strategy. The Company identified a wide range of case studies for in-depth analysis. Two select case studies are attached in the Appendix 4.

Outreach & Education Strategy

The customer voice heard at Green2Growth, along with lessons learned from other Smart Grid pilots helped the Company to craft a highly customer-centric approach that starts long before the Pilot is launched. Engaging customers and stakeholders prior to the launch has proven to be a general best practice in outreach, engagement and communications methodologies. National Grid has developed a strategy that will use current customer touch-points and community-based communication vehicles as an opportunity to deploy the "listen, test & learn" approach and will continuously refine channels of communications, messages developed for education and outreach, and methods of deploying information based on what we hear from our customers. (*Details on Channel and Message delivery are found later in Plan)*.

PRE-LAUNCH Strategy

Gain customer trust first: Customers must clearly understand the "what, when, & why" and see benefits[3]. Installing technology prior to gaining trust and customer buy-in has led to confusion and backlash as evidenced in lessons learned from other Smart Grid deployments. When customers clearly understand how smart energy technology will provide them with more control, choice and understand the benefits of Smart Grid reliability enhancements, it enables them to save energy and costs. All messaging should be informative and in the voice of the customer and should focus on enabling the consumer to make the best choices among the available options. That choice includes the ability to choose the right technology/rate package or the opportunity for the customer to opt-out of the program.

Example:

The Green2Growth website, brand, and activities will continue to develop under the direction of the steering committee, the City of Worcester, and National Grid. The Green2Growth website will be a community-based vehicle for customer outreach, education and communication.

Local community partners can act as ambassadors. Community Based Organizations (CBO), such as school PTO's, conservation groups, faith-based groups, neighborhood associations,

[3] Note: Timing is critical. To ensure pilot success, consideration of external factors may contribute to customer perception about technology and utility approach: weather, season, trends in price of energy, rate tiers, policy changes, economic conditions, etc.

thought leaders, etc. can help convey information/messages to large audience groups. As customers see peers and neighbors participating, it is likely they will be better equipped to participation and engagement.

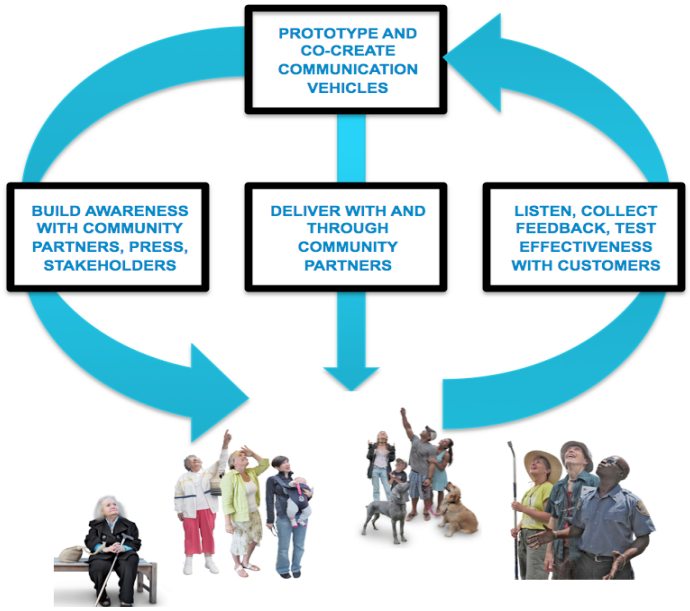
Develop, deliver & repeat important message(s). Message content and channel deployment will be developed based on community "listen, test & learn" engagement on lessons learned and best practices from other. It is commonly understood that messages need to be repeated multiple times to be internalized, therefore, use of multiple channels to deliver repeated messages will be necessary. Messaging should be informative on the benefits of both grid modernization and customer devices, as well as introduce the technology deployed.

Use multiple channels strategically using segmentation as a guide. Multiple channels should be used to convey and reinforce messages. Channels should be tailored to fit the needs, preferences, and desires of different customer segments as identified in the Statewide Collaborative and results of what the Company learns in the "listen, test, learn" approach.

Equip customer-facing employees, interns, and vendors with knowledge. Customer-facing employees such as those in call centers, customer & business service teams, or field operations, along with employees who reside in the City of Worcester, act as ambassadors of the utility to their family, friends, and neighbors and should be provided with comprehensive training and a robust internal communication plan to deliver to customers to ensure consistency. A process should be established to update messages on a regular and emergency basis. Messaging should include, but not be limited to, information on available resources/expertise, community events and forums, technical information, tips on how to save energy, related utility programs such as rate programs, the benefits of Smart Grid on both sides of the meter, and so on. This internal communications plan should also extend to customer engaging vendors, College Co-op's or other partners working on the Company's behalf.

Instill a sense of positivity and excitement. The Green2Growth Summit echoes a trend that has been repeatedly demonstrated in successful pilots, efficiency programs, and AMI deployments across the country: involving the community and established local organizations to co-create solutions for better pilot success. Residents are more satisfied and Co-operative, local non-profits and advocates feel ownership in the outcome, and employees feel a sense of pride of how their organization is supporting their communities. Green2Growth unveiled many benefits associated with smart meter and Smart Grid technology, including, but not limited to, the potential for greater economic development, integration of renewables and electric vehicles, and more customer choice and control. Taking a positive, proactive approach can engage customers and encourage participation. Building on the momentum generated by Green2Growth, the Company intends to pursue the smart grid related initiatives that came out of the community summit, working collaboratively with community stakeholders to maintain a collective commitment to the success of Smart Grid.

Build on Green2Growth model of collaboration to deliver meaningful & adaptable O & E



LAUNCH & POST LAUNCH

Engage customers as partners in change. When utilities view customers as partners, there is a deeper level of engagement and a sense of an ongoing relationship. For example, championing customers who are successful in developing energy-saving behaviors should be reflected in communications during implementation as a showcase of progress within the community and help motivate customers' interest in smart technologies and drive increased customer engagement.

Continued communications should provide specific value (how-to's, practical tips). During launch, messaging resources should shift toward providing practical tips and additional opportunities that can contribute to greater energy savings, comfort, convenience or other benefits for customers. In addition, broader-based outreach will be deployed to expand awareness on the customer benefits and serve as a touchpoint to those throughout the community who have an interest in the Pilot, but may not be within the Pilot boundaries.

Proactively extend technical support (field demonstrations, in-home visits, local business/technology expos, etc.). Face-to-face interaction with the customer can help create momentum around customer engagement. Customers who have Smart Grid technology installed in their homes should be invited to multiple demonstrations and how-to events to provide an opportunity for them to learn about the broader Pilot goals, understand the basic operation of devices and how they can interact with the energy information newly available to them and become aware of their increased ability to control energy use and potential savings associated with the technology.

Plan, pace and cadence of regular communications events for continuity and momentum. Continued communication creates and maintains trust with the customer which enables deeper customer engagement. The "Listen, test and learn" approach will help customize outreach

messages, channel mechanisms, and identify other tactics and timing for disseminating information.

Measure key indicators. Measuring key indicators such as opt-in rates, attendance at events and calls to customer help lines provides valuable information on potential areas of concern as the project progresses. Critical indicators should be reviewed every 2 weeks, especially prior to and during deployment. Measuring indicators also provides the Company with the opportunity to learn what tactics are successful and provides reporting, transparency, sharing best practices, and communicating successes.

Share success stories. Sharing success stories, particularly with Pilot participants, is a way of demonstrating peer engagement, ease of use (for technology, etc.), and tangible results (e.g. cost savings). This can help to increase meaningful participation in the Pilot.

Customer Segmentation

The Company has fully aligned and updated its customer segmentation approach with the Statewide Collaborative Common Evaluation Framework. As such, the segments are incorporated into how the Company communicates with customers and how it evaluates the program in the Company's Evaluation Plan. The Company aims to conduct the Pilot in a manner which allows for the greatest insights into its overall customer base, and in a manner that the learnings can be transferrable across the state to the extent possible.

Pilot participants will be classified across a total of ten participant classifications or segments (described below). In addition to the overarching "All Participants" segment, the Company will define customers at a "sub-segment" level based on characteristics such as income and use levels, age and size of home and a combination of those factors. We will look at participant classifications at the high and low end of the income and use spectrum with all other groups (e.g. participants between low income and $100k per year and homes between 1,000 and 2,500 square feet) captured within in the context of the "All Participants" segment.

1) Low Income – low income participants as defined by rate classification and by the correlation between number of people in the household and annual household income

2) Low Use – participants with average annual energy consumption less than or equal to 50% of the residential class average

3) High Income – participants that answered the pre-pilot survey question on income as more than $100,000 for their household.

4) High Use – participants with average annual energy consumption greater than 150% of the residential class average

5) Participants with Presence of Senior – participants who responded to the pre-pilot survey question indicating presence of an occupant over the age of 65

6) Low Use and Low Income – participants who are both low use (as described above) and low income (as described above)

7) High Use and Low Income – participants who are both high use (as described above) and low income (as described above)

8) Small Homes – homes that are less than 1,000 square feet

9) Large Homes – homes that are greater than 2,500 square feet

10) All Participants

There will also be a control group which will not receive any of the communication, education and outreach of the Pilot participants. The comparison between the control and customer segments will help the Company to determine the impact of the Outreach & Education Plan. See the Evaluation Plan section for more detail.

In addition to the 10 residential segments described above, the Company's Pilot will include commercial participants from a cross section of industries. We will use rate classes to classify them by size of business, including Small C&I (G1) and Medium C&I (G2). Small C&I will include businesses with average usage of less than 10,000 kWh per month or 200 kW of demand while Medium C&I will include businesses with an average use exceeding 10,000 kWh per month and demand not exceeding 200 kW. Commercial customers will not be subdivided into demographic segments.

Though the Company will segment its customers consistent with the Common Evaluation Framework, the Company will engage its customers based on the benefits of Smart Grid. Additionally, the look and feel of the educational materials will be developed in a manner that resonates with the customer. Specifically, the Company can leverage, at least but not limited to information such as demographic and ethnic data that will help to inform the development of more relevant materials. This will enable the Company to undertake a multi-cultural outreach and education approach to target and reach members of the community with in-language communication.

Given the different energy use of the various segments and what will likely be a varying degree of new technology adoption, the Company will enable its customers to determine what Technology Package and Rate Plan (discussed below) they prefer based on their needs and desire to reduce energy consumption.

Technology Packages and Rate Plans

As indicated within the Smart Grid filing, the Company will offer two different rates in the pilot, critical peak pricing (CPP) and peak time rebate (PTR). CPP will have off peak (cheaper) and on peak (more expensive) times to reflect the higher costs of electricity for a portion of the year and PTR offers customers a rebate when they shift their load away from critical time periods. Both of these rates seek to provide a benefit to customers for shifting their load around times of stress on the grid. In addition to choosing a rate, every residential participant will be offered[4] the opportunity to receive one of four technology packages for their home. They are:

[4] Participants must have broadband internet in their home for technology levels 3 & 4. While every participant will have the opportunity to participate in technology levels 2, 3, & 4, the goal for total numbers at each level are limited and will be filled on a first come basis according to customer segment (discussed above).

- **Level 1 (or the Platform)** – The base technology level. Participants will have access to a personal web site which will provide them advanced energy information customized to their energy consumption. Participants will also receive enhanced consumption information on their monthly utility bills[5]. Features are made available by the installation of the new smart meter, which will contain one of two new rates.
- **Level 2 (or Energy Window)** – Participants will receive the same technology as Level 1 participants as well as a home display unit (HDU). Using customer input in conjunction with internal testing, the Company will select a more engaging/enhanced home display unit.
- **Level 3 (or Automated HVAC Control)** – Participants will receive the same technology as the Level 1 participants, as well as the opportunity to receive a thermostat or Automated HVAC Control capable of receiving load control signals through the Smart Grid and automate load reductions during critical events. The system can analyze the customer's usage patterns and/or the thermal performance of a residential unit and enable optimization opportunities.
- **Level 4 (or Advanced Controls)** – Participants will receive the same technology as the Level 1 participants, plus:

    - Home Display Unit (HDU)
    - HVAC controls
    - Load control devices which are enabled by the use of a home gateway device which facilitates advanced web and/or mobile control.

Small commercial and industrial customers will be offered technology consisting of everything included in Level 2 along with circuit-level monitoring technology, details of which are discussed within the Smart Grid filing.

Customer Technology & Rate Selection Process

Customers will be supplied with education material about the different rates and technology options available. They will learn about the different rates available and strategies to take advantage of the rates, such as load shifting, and the enabling technologies National Grid will offer to customers. Additionally, customers will also learn about the bill protection safeguards the Company has put in place. National Grid intends to utilize the Customer selection process illustrated below in Figure 1 during the Pre-pilot phase. Customers will then be contacted to provide them with the opportunity to choose the available package that best meets their needs.

[5] This group will include some customers that do not have internet access in their home. However, they may still be able to access information about their energy usage on the internet potentially from work, the public library or web enabled mobile device.

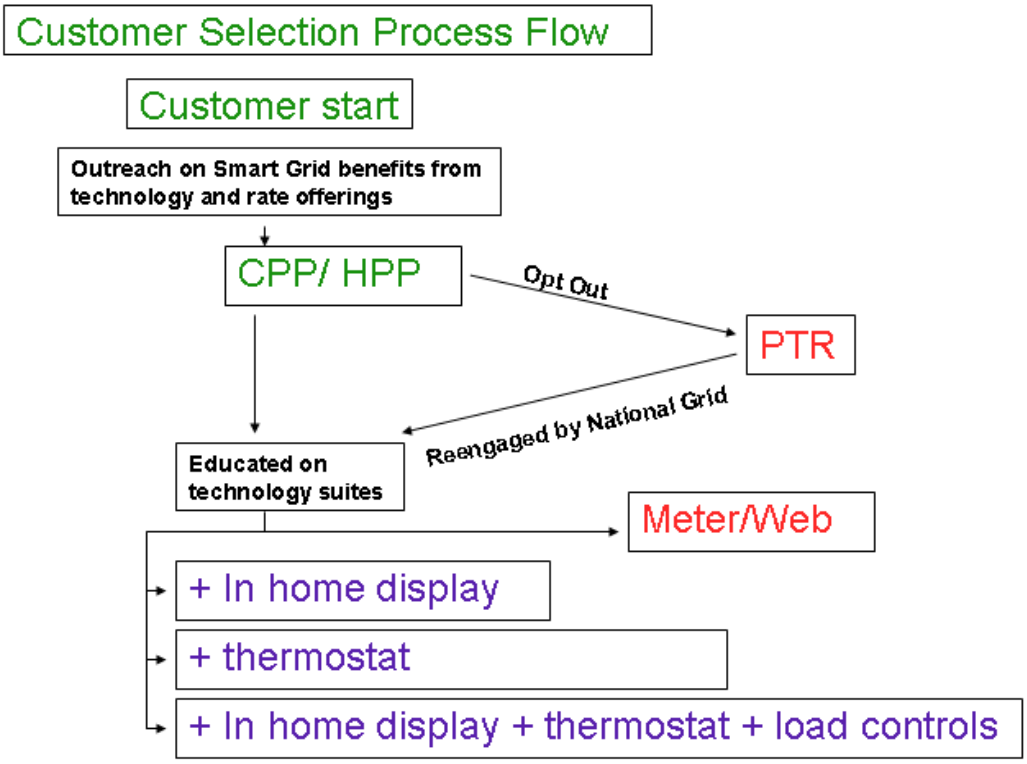


Figure 1. Customer Selection Process Flow.

Opt Out Process

Approximately 6 to 9 months before the pilot implementation, the Company will begin to reach out and educate customers about the benefits of Smart Grid and the opportunities Smart Grid can provide to the customer. Two months before the pilot commences, customers will receive a form to opt out of CPP pricing. Customers will then have 30 days to return the completed form. Those customers who opt-out of CPP will receive Standard Basic Service but will be eligible for the Peak Time Rebate ("PTR") described in Exhibit PTZ-2 for any load reductions during a Critical Peak Period. One week before the pilot commences the Company will notify customers of their rate plan during the Pilot.

Customer Engagement Tactics

A strong customer engagement strategy has proven to be critical in the success of Smart Grid pilot projects, and is also a cornerstone of the Company's overall approach to serving its customers. In order to engage customers, the Company needs to deliver information and messages that will

resonate with customers. To do this, the Company will target customers using multiple, interactive channels and tactics that reach and engage customers in different ways. In addition, engagement should be directed towards the community at large, rather than solely Pilot participants. The sections below describe the Company's approach to developing the messaging, channels and tactics that will most effectively create customer engagement.

Messaging

The Company's first goal in educating the customers on Smart Grid is to eliminate potential adoption barriers. The Company believes that informed customers are best prepared and empowered to make the right decision that best meets their needs

In accordance with the Common Evaluation Framework and its intent, the Company will conduct a pre-pilot survey and messaging research[6]. The pre-pilot survey will help provide a better understanding of each customer. Messaging research will help to determine the customer's key motivation in technology adoption in addition to providing insights on how to best communicate with them. The survey and research will be the first communications with customers.

The findings of both the pre-pilot survey and messaging research will enable the Company to be better informed on how to communicate with customers. Additionally, in order to ensure a consistent customer experience throughout the Pilot timeframe, the same messaging will also be spread across all channels and within each tactic to ensure a holistic and integrated communications approach, regardless of how the customer chooses to engage with the information.

The Company believes the messages to customers will be critical to develop the functional and emotional connections needed affect behavioral change necessary for energy consumption reduction. In addition, the channels by which the Company communicates the messages are also important to ensure the customer can be reached with the messages intended. The Channels and Tactics section below describes how the Company will be reaching out to customers to engage them.

Channels and Tactics

National Grid has identified five major channels through which to engage individual customers in a meaningful and impactful manner. These are as follows:

1. College Co-op
2. Home (Residential) & Business (Commercial & Industrial/C&I)
3. Community Partners & Leaders
4. Retailers & Contractors
5. Local and Social Media

Within these channels, the Company has also developed customer engagement tactics tailored specifically to the context, reach, and capabilities of each channel. These channels and tactics

[6] Company approach to pre-pilot survey and Messaging research found in Evaluation section of the Smart Grid filing.

comprise the Company's customer engagement strategy for the Pilot. All communications associated with the Pilot will aim to drive individual customer engagement, not just build general awareness.

College Co-op Program

The College Co-op Program is designed to be a high quality, cost effective college internship program that will align local student talent with the education and outreach needs of the pilot. The Co-op will be a group of trained and qualified students dedicated to supporting the Smart Grid customer experience by complementing Company resources and responding to customer questions and concerns on:

- pilot choice (rates/technology options)
- in home technology devices
- customer troubleshooting
- provide additional information on Smart Grid
- connect to employee expertise as necessary
- implement local education and outreach tactics on the benefits of Smart Grid.

In addition, the College Coop Program should create momentum to further identify local champions of the program and provide opportunities for increased engagement, to teach customers to use new technology effectively, and to encourage participants to give feedback and support each other in technology applications.

Benefit: Provides customers with knowledgeable personnel they can interact with to help educate, train, resolve questions and drive engagement. More opportunities and sources for education was a key item identified by participants at the Green2Growth Summit and the Company is using this information to build the College Co-op as an important component of the O & E Plan.

Customer Education & Training Venues: The College Co-op, in conjunction with National Grid account managers for C&I customers, will provide select education and training venues for participants such as local seminars, webinars, speakers/community leader forums, and in-home trainings.

Benefit: In-person trainings and community events will drive deeper participation, creating higher participant and customer comfort and satisfaction as well as higher contributions toward the Pilot's 5% energy savings goal.

Programs with Local Schools: The College Co-op participants and additional employee resources will coordinate speaking engagements, assemblies, internship and shadowing programs with local schools from K-12 as well as local colleges in the area. This initiative will enable students to become advocates and potentially volunteers as well as provide them with an opportunity to make a difference in their community.

Benefit: Programs with local schools will help engage students in energy savings, helping to achieve the 5% savings goal. National Grid can also leverage its existing experience with internship and school engagement programs such as the *Engineering Our Future* and *Smart Grid Workforce* programs.

Call Center Support: The Company will train appropriate and dedicated call center staff to be fluent regarding the needs of the Smart Grid Pilot and its customers. A script will be developed which will align with the materials provided to the College Co-op members explaining the technology in simple terms and the ways in which customers will be able to engage and use the technology they have chosen. A dedicated Smart Grid toll free number will be provided and distributed on all print material for customers to call with questions and concerns to the Call Center.

The Company will develop a process to analyze data and common questions/themes from these calls as part of its "listen, test and learn" approach in order to adjust its tactics and messaging throughout the Pilot.

Benefit: A call center is required to address customer questions about the functioning and use of Smart Grid technology. Call centers are particularly important to engage with customers who may not attend events or have access to the internet and desire a person they can immediately contact.

Commercial & Industrial Relationships: For commercial and industrial customers, National Grid relationship managers will work closely with College Co-op members and other Company employees as subject matter experts. The Company will focus on providing face-to-face interaction with C&I customers, collaborating to achieve aggressive energy savings and build multi-customer, multi-industry partnerships where possible to promote the efficient sharing of resources. To pursue key partnerships, the Company can partner with other companies, current sustainability providers, contractors, and consultants, if applicable.

Benefit: C&I customers are often able to save much more on a percentage basis versus residential customers, helping to meet the 5% savings goal put forth in the Green Communities Act. Direct interactions with National Grid will enable these customers to achieve savings.

College Co-op Blog: Members of the Co-op will maintain a community blog with short articles, how-to's, recognition of community members, progress toward goals, and photos from events on the Pilot microsite.

Benefit: Showcasing members of the Co-op as the face of National Grid to the community will help to bring a more personal feeling to the Pilot, with the intent of creating higher customer satisfaction and participation.

Home (Residential) and Business (C&I)

Reaching customers where they live and work is critical to help drive adoption. Various outreach and educational tactics have been developed that enable customers to get more directly involved with energy management at the places where they spend most of their time.

Direct Mail: Direct mail will be used to provide information during the Pre-Pilot and Pilot phase. It will be targeted with unique messaging for each customer segment, as appropriate.

Benefit: Direct mail ensures a very targeted communication to a specific customer or target audience to generate awareness and education as well as elicit a response based on a specific call to action. Direct mail is especially important during the Pre-Pilot phase to help introduce the Technology Packages and Rate Plans to customers. Benchmarking has shown that many customers prefer the mail channel versus other channels for communications with their utility.

Technology of Choice Call: Customers will be called toward the end of the pre-pilot phase to help explain the technology options and obtain their choice for which technology best meets their needs. If a customer wants a demonstration of the technologies, a meeting with a College Co-op program participant will be established.

Benefit: Customers will be empowered with information that better enables them to make the appropriate technology decisions thereby helping to ensure they utilize it to reduce their energy consumption.

Welcome Kit: A welcome kit is a package of information relating to Smart Grid sent to Pilot participants. The welcome kit will include a set of introductory materials distributed to all Pilot participants in conjunction with meter installation. This kit will provide customers with all of the following: a print brochure/booklet detailing Pilot programs, goals in energy reduction for the campaign and motivational materials (how we can all do our part to help out), a to-do checklist for home energy savings (pre-populated notebook + checklist with energy efficiency information) and an engaging, energy related give-away that will provide a constant reminder about reducing energy. The timing of the delivery of welcome kits to customers will align with media and press efforts to generate momentum and engagement at the individual level.

Benefit: In providing a specialized, targeted welcome experience, the Company will build on the initial notification, while providing a simple, intuitive, and directed way to jumpstart both engagement and adoption within the program.

Installation Notification (Call & Door Hanger): An outbound phone call will be made prior to the start of the Pilot to Pilot participants, providing them with smart meter installation information date and advance notification of a welcome kit. A door hanger with the same information will also be left at the residence or business to supplement the phone call.

Benefit: Smart meter installation notifications will provide an opportunity to generate up-front awareness of the Pilot, offering a sense of a personalized level of customer service and help address customers concerns.

Education and Engagement Website/Microsite: A necessary element of the customer experience is a Pilot microsite, which serves as an integrated way to share profile, usage, community and educational information and an events calendar. The website will also be an integral component of the social media strategy, linking the blog, Facebook, and Twitter communities (see below) and providing a platform for how-to-videos, energy use and live chat. A website acts as a critical amplifier for messaging in other channels.

- **How-to Videos**: short, demonstrative videos hosted on the site will provide "how-to" information on how to optimize use of the site and use of in-home technologies to support the Pilot.

Benefit: As a critical aggregator of multiple customer engagement channels, the website provides a central point of destination for customers to provide customer information and engagement opportunities. These opportunities can help customers save money, improve their comfort and convenience, and better access information, support their distinct needs and augment their participation in reaching the 5% reduction goals.

Email: This channel would likely be the main distribution channel for customers who have email as their preferred communication channel.

Benefit: Email communications can be targeted to specific segments or distributed to all participants and is an extremely cost-effective way to reach customers to engage and educate on energy savings.

Print Newsletter: The newsletter will be a print report directly mailed to a targeted set of customers. Additionally, a quarterly newsletter will also be sent to local community leaders. Newsletters will provide customers and community leaders with aggregate participation details and engagement results, featured articles, energy tips and tricks, educational info, event information, and ways to get involved.

Benefit: Print newsletters provide an ongoing way to serve customers who may not have web access, or miss out on other channels of communication, offering a useful connection to both engaged and 'under-engaged' customers. Also, in providing local community leaders with

information and updates on the Pilot, the newsletter serves a supplementary function in meeting their needs for awareness and information on the Smart Grid effort.

Bill Inserts: The bill insert collateral will be included in every month's bill. Pilot customers will receive 1-2 key messages each month, such as data on technology benefits, energy saving tips, local events, or how to get involved.

Benefit: Bill inserts are an effective way to reach customers that receive hard copies of bills. Since customers must open their bill, they will be exposed to the bill stuffer automatically. Bill inserts will contain messages on choice and control participants have with their smart technology

Face-to-Face Customer Outreach: Proactive and reactive face-to-face customer outreach will be conducted by the College Co-op program participants, as well as Company employees, vendors, and community partners.

Benefit: Face-to-face interaction is a necessary component of gaining and maintaining customer trust and engagement. Some customers may not have access to other communications channels such as online or mobile or may not be interested in them. In addition, face-to-face interaction is needed for home visits, demonstrations, and communicating the benefits and function of new meter technology and the Technology of Choice Call mentioned see above). This channel gives the Company the opportunity to engage in a two-way dialogue with participants and customers and augments the "listen, test & learn" approach.

Peer Comparisons, Data Visualizations and Competitions - Data visualization interfaces are a key component of the Pilot because they enable a greater degree of energy savings. Data visualization was also one of the most important items identified by the community at the Green2Growth Summit. The Company, in partnership with a technology vendor, will provide information to customers on energy use and show how customers compare to their peers or neighbors. This behavioral approach has delivered proven energy savings and has been documented by companies like OPower and Efficiency 2.0. Data visualization, manifested on display monitors and customer web portal, provide participants with real-time behavioral cues. For instance, during peak periods, participants may receive a message to power down or hibernate unused computers, delay use of washers and dryers, or adjust thermostats by one or two degrees for a short period. These customer communications would be focused on cost savings to accrue to the customer. To provide customers with one central resource for their information, the Company would intend to have this functionality within the Pilot Microsite.

Benefit: This system provides tangible and emotional incentives for participants to save energy. Energy challenges and social comparisons have proven effective in influencing behavior, not only in the energy savings realm but across multiple sectors and stakeholder groups. Some outside examples include the DARPA Network Challenge[7] and Quest to Learn[8] educational model.

Mobile – Applications (Apps) & Text: Mobile channels like apps and texting are an effective way to engage customers in community-based energy savings. Program information and participation/adoption-driving communications sent via print, web, and other channels will be replicated via mobile and text reinforcing messaging to promote action. For example, customers can receive texts via mobile phones regarding peak pricing events, providing tips on how to save energy and money. Customers will also be able to view and interact with a mobile version of their

[7] DARPA Network Challenge website: http://archive.darpa.mil/networkchallenge/
[8] Quest to Learn website: http://q2l.org/

own customer web portal and will still be able to interact with their in-home devices along with viewing their energy consumption on-the-go.

Benefit: Mobile channels help reach a broad set of customers due to the prevalence of mobile phones across income groups. Mobile phones represent the most prevalent source of communication as 83% of Americans have a cell phone – more than those who have home internet.[9] By supporting mobile, we ensure that customers are able to view relevant campaign materials through cross-channel communications, thereby further driving engagement and awareness needs.

E-Newsletter: Circulated via multiple channels (e-mail, mobile, Pilot website, Twitter, Facebook, etc.), the E-Newsletter will be distributed every quarter. Content will include Pilot information, tips, local event info, call-outs of the most engaged customers, and more.

Benefit: The E-Newsletter provides a key outlet for providing customers with targeted campaign communications on an ongoing basis. This integrative communications channel provides a way to increase customer engagement and participation, thereby driving actions resulting in energy savings (such as adjusting thermostats, use of visualization technology, etc.) in a targeted, low-cost fashion.

Social Media: As described in the Common Evaluation Framework, social media are media for social interaction, using highly accessible and scalable publishing techniques. Social media use web-based technologies to transform and broadcast media monologues into social media dialogues. A common thread running through all definitions of social media is a blending of technology and social interaction for the co-creation of value.[10]

Social media platforms such as Facebook and Twitter are an effective way to communicate with customers. These channels provide real-time opportunities to communicate with the customer and also engage in two-way communication. Facebook and Twitter also support games, apps, and photos, making customer engagement a dynamic and rich experience for those in the Pilot. These platforms also provide geospatial networking such as the "Places" app in Facebook mobile. This can be used to promote customer engagement events. The Company will create a Facebook Group for the Pilot and Twitter account and hash tags for relevant terms. Other social media platforms may be considered as Facebook and Twitter campaigns are effective.

Benefit: Conveying messages through Facebook and Twitter reinforces messaging in other channels, providing a valuable, additional customer touch point. Also, these channels connect customers together, creating a network effect of momentum around the Pilot. Additionally it is easy to provide frequent, low-cost, and timely messages through social media channels.

Community Partners & Leaders

The Company believes that community partners and leaders are a key channel by which to influence customers to adopt Smart Grid. The community, whether defined as a neighborhood, local organization, or schools & colleges, can help to educate and inform customers regarding the benefits of Smart Grid. The partnerships resulting in the Green2Growth summit will enhance the Company's capacity to leverage customer outreach in a unique way.

As an example, through the Green2Growth website, National Grid will have the ability to provide support and links on the benefits of Smart Grid technology, as well as other Green2Growth

[9] Pew Internet and American Life Project website: http://www.pewinternet.org/Trend-Data/Device-Ownership.aspx
[10] Massachusetts Smart Grid Collaborative Common Evaluation Framework, 5.2.4, #6

initiatives including, energy efficiency, renewable energy sources, net metering, etc. Green2Growth activities will involve local community groups, schools, universities, associations, consortiums, and other non-profits throughout the state, as well as DOER, DOE, and other agencies; with the site providing annotated links to relevant sites and events.

In addition, the Company will leverage many of the tactics listed in the Residential and C&I section above including:

- Website/microsite
- E-Newsletter
- Mobile – apps & text
- Blog
- Social media
- Face-to-face and community-based outreach

The Company will develop tactics that are specific to ensuring this broader audience is also educated on the benefits of Smart Grid:

Welcome Kit: Community leaders/influencers will also receive a specialized welcome kit, with details on efforts for the Pilot, the consumer experience, program goals and objectives, events, and how they can get involved.

Benefit: Targeting messages will help to engage community leaders to help make the Pilot successful. This will result in further customer engagement and the potential for more energy savings.

Sustainability Hub: National Grid can provide hands-on education and experience through a model energy display located in the community. The Company will work with community leaders, vendors, and educational partners and leverage current company assets to create a rich experience driving residential and commercial participation, as well as building awareness throughout the whole community.

Benefit: Such an approach can provide an enriching experience for visitors, showcasing the extent of innovation possible, along with the necessary information for applying each innovation in their own home. This will also drive program participation rates if the programs are showcased in the Home. By working with vendors and leveraging current both Company and partnership assets, the Company believes the cost for this tactic to be minimal.

Home Smart Demos: At a customer hosted home, participants can share best practices and tips with each other. The College Co-op program can assist by demonstrating other smart technologies such as rooftop solar, energy use displays, programmable thermostats, electric vehicles, etc. The emphasis for the demonstration program is to use the same technology installed at customer residences to increase engagement and use with the technology package they selected.

Benefit: As community members learn how to implement energy savings in their own homes, they will be able to help contribute at a greater rate to the 5% energy savings goal. In addition, it is more likely that participants will understand how to implement changes after an in-person demonstration versus only receiving written instructions and participants may become community champions, helping others to better understand and adopt the technologies.

Local Advocates Program: Such a program would include a continuous series of events in the community to talk about and demonstrate aspects of the Pilot. Events could include: hosted breakfast presentations to demonstrate and hand-out information, hosting a standing community

event (rotary meeting, business expo, chamber event, etc), educating and training employees in schools, sponsoring town hall meetings, etc. These events would run regularly and continuously throughout the Pilot. Each event will be tailored for a particular audience (e.g. teachers, business owners, neighborhood residents, not-for-profits, etc.)

Benefit: In bringing the community together to talk about the Pilot, National Grid can hear directly from the community, supporting the Company's 'listen, test and learn' approach to the outreach strategy. Additionally, this forum provides an opportunity for cross-collaboration, increasing engagement and creating more efficiency and effectiveness for energy saving initiatives.

Retailers & Contractors

Retailers and Contractors are typically a trusted resource for customers to get educated on products or services. Therefore, this will be another channel by which the Company indirectly communicates with customers about the benefits of Smart Grid. The Company will use the tactics listed in the Residential and C&I section above including:

- Website/microsite
- E-Newsletter
- Mobile – apps & text
- Blog
- Social media
- Face-to-face and community-based outreach

In addition, the following tactics will be deployed:

Training Program: National Grid's College Co-op program will present and demonstrate Smart Grid infrastructure capabilities including communications architecture and metering technology. The team will be equipped with educational collateral and Q&A materials to help retail employees and contractors to address customer questions. This effort can leverage National Grid's existing platforms for its current retail training programs.

Benefit: Retailers and contractors can become important ambassadors for the Pilot. Because they are viewed as technical experts within the community, they will inevitably interact with participants. Their effective interaction with participants can promote energy savings to help reach the 5% energy savings goal.

In-Store Demonstrations: This customer engagement forum will provide the local community the opportunity to interact with and learn more about the technology packages. These seminars will be informal and collaborative and held at a location that is typically a local shopping destination. The customer seminar will provide customers another venue to hear about and have demonstrated the benefits around the technology packages in addition to providing other energy savings tips. These events will be organized and managed by the company and College Co-op program.

Benefit: In-store seminars provide an opportunity for continued education and training for the local community in venue they are familiar with. These events also reinforce the Pilot program's focus on community involvement. Most importantly, this venue provides opportunities for cross-community collaboration on energy-saving initiatives.

Local Media

Another channel that helps to inform and educate customers is their Local Media. This channel will be used to help ensure customers are seeing, reading and hearing about the benefits of Smart Grid from their local community resources. Tactics the Company will deploy are as follows:

Media -'Smart' Forums: Media events, potentially held in the Sustainability Hub venue, will provide program updates on successes and learning from the Pilot. Community members and community leaders would be invited.

Benefit: The Company believes that transparency is the key to building and maintaining customer trust. In addition, this venue provides an opportunity for media coverage of community efforts and perspectives.

Media "Kit": To supplement more localized customer needs, the Pilot will entail the creation of a press kit and use of PR partners across the campaign to involve and inform local media. This method will provide media partners with information on the Pilot, including tracking to program adoption and energy reduction goals, local customer engagement, and opportunities for media placement and support to reach the broadest participant customer and community base.

Benefit: A clear, comprehensive press kit and ongoing follow-up through local media will be crucial to jumpstarting up-front community awareness at the start of the Pilot, ensuring that the effort starts off with a good degree of customer engagement and awareness.

Ongoing Outreach Efforts to Local Media Outlets: The Pilot will proactively connect with PR and media partners to involve and inform the community on an ongoing basis. As a supplementary effort, the media/PR effort will identify and target local community leaders, who agree to voluntarily track their usage and report back on progress via media outlets. During the Pilot, ongoing media stories and support will drive customer understanding of the Pilot.

Benefit: Ongoing media coverage maintains momentum around participant engagement and community unification around energy savings goals. As a 'listen, test and learn' component, PR may be a clear leverage point to avoid launch issues and begin a successful pilot.

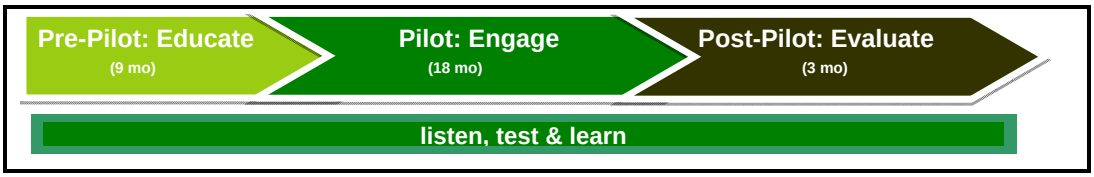
Customer Engagement Timeline

Timing around customer engagement has proved to be a critical aspect of Smart Grid project success. National Grid has developed a plan to allow for more pre-deployment engagement to ensure that customers and other stakeholders are aware of the Pilot and how the technology and findings will benefit their households and businesses. The pre-pilot phase was increased from six months in the previous plan to nine months in the current plan. The company has also extended the length of the Pilot deployment stage to 18 months from 6 to 12 months. The overall Pilot timeline however remains the same at thirty (30) months.

The overall timeline for the Outreach and Education to all 15,000 customers is as follows:

- **Pre-Pilot (~9months):**
  - Conduct pre-pilot and messaging research
  - Communicate the functional and emotional benefits of upgrading the infrastructure and overcome objections, concerns, or fears
  - Communicate functional and emotional benefits of each Technology Package and Rate Plan to enable a choice that best meets customer needs
  - Secure Technology Package and Rate Plan selection

- **Pilot Deployment (~18months):**
  - Launch O&E integrated communications plan by segment, prior to installation, to drive adoption and engagement
  - Monitor communication effectiveness and modify tactics as required to increase utilization
- **Post-Pilot (~3months):**
  In-depth evaluation based on Common Evaluation Framework and additional National Grid measures as deemed necessary
  - Continued implementation of successful tactics and engagement strategies



See Appendix for visual representation of engagement timeline and tactics.

Seasonal timing: Because of the highly seasonal nature of energy use, the Company plans to deploy educational communications on energy efficiency programs and how-to's for summer cooling and for winter heating. This will be an important strategy to meet the 5% energy savings goal. Examples of this could be weatherization, time of day use, adjusting thermostats, etc. Seasonal messaging will go through all communication channels.

Evaluation Plan

The Company has also updated its full Evaluation Plan to align with the Statewide Evaluation Collaborative's Common Evaluation Framework. See the Company's Evaluation Plan document for complete detail on methodologies.

The below section summarizes the aspects of the Evaluation Plan related only to the measurement of the engagement strategy effectiveness, and are as follows:

1) Common Evaluation Framework Alignment
2) Customer Satisfaction Survey
3) Observational Design

Common Evaluation Framework Alignment

As noted earlier, National Grid supports the Statewide Evaluation Collaborative's Common Evaluation Framework and is committed to complying with the direction established by the Technical Subcommittee. The Evaluation Plan provides for a detailed evaluation approach and standards based on the Framework.

In accordance with and the intent of the Common Evaluation Framework, the Company will conduct a pre-pilot survey, details of which can be found in the Company's Evaluation Plan. In addition to what the Company is indicating in the Evaluation Plan, the Company will also conduct

messaging research through survey instruments to understand how best to communicate the Smart Grid offerings to customers in a manner that helps to drive adoption. As noted in the Common Evaluation Framework, some key questions to be understood are: what are the different motivations for choosing to participate; what do customers see as benefits; and what are the participant's awareness of benefits?

The findings of the Messaging research will then directly inform the communications developed to educate and motivate customers to adopt and ultimately reduce their energy consumption.

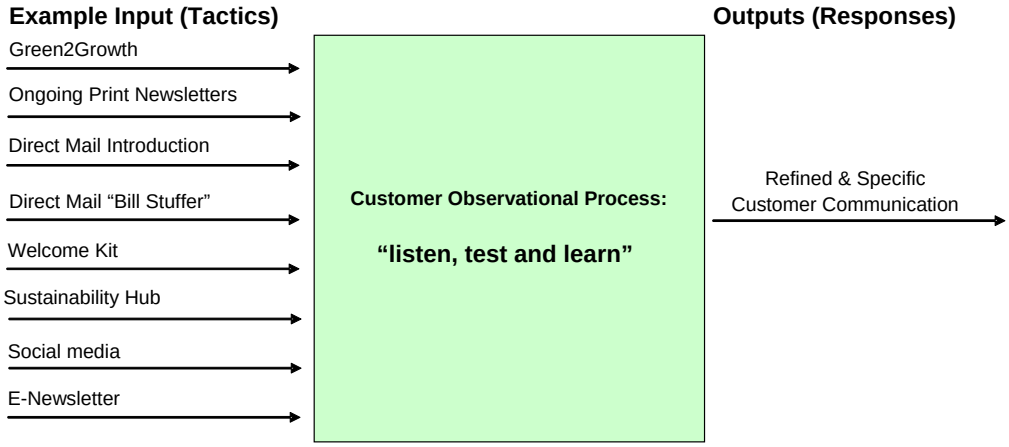
Customer Satisfaction Surveys

In addition to Common Evaluation Framework efforts, the Company will also conduct a Customer Satisfaction survey during the pre-pilot and Pilot phase to obtain insights into customer's likelihood to adopt and use the technology package. This survey will allow the Company to listen to our customers, aligning it with the "listen, test, learn" approach mentioned throughout the Outreach and Education Plan. The survey results will be used to understand customer sentiment and therefore allow the Company to adjust communication and delivery strategies for the various education and outreach efforts over the course of the Pilot.

Observational Design

The Company will test its engagement efforts throughout the Pilot using observational design methods. An observational design will allow the Company to listen to all customers equally by observing and reporting results before tactics are changed to more effective means.

Table 1: Observational Design Method



Through the use of the observational design approach, the Company will strive to determine what communication channels have the largest impact on smart grid adoption, and will be able to shift Pilot resources from less effective channels to the more effective ones over the course of the program.

Summary

In response to community and stakeholder input from the Green2Growthth Summit, a collaborative statewide approach, and technology advances within the energy industry, the Company has updated its outreach and education approach. This new Outreach and Education Plan is now focused on customer engagement rather than general awareness. Given this shift in approach, the new Plan will be implemented with various partners in the community to help customer engage with the new technology packages and ultimately reduce their energy consumption.

Based on the customer engagement tactics indicated above, the below table is a summary of detailed Outreach & Education budget, further detail can be found in, *Appendix 1 – Customer Engagement Budget.*

Description		Duration	Budget
Pre-Pilot (9 months)	Educate	9 months	$ 1,817,780
Pilot: (18 months)	Engage	18 months	$ 510,460
Post-Pilot: (3 months)	Evaluate	3 months	$ 90,000
		Total	**$ 2,418,240**

Appendix

1. Customer Engagement Budget
2. Green2Growth: Customer & Stakeholder Listening Session
3. Sustainability Hub
4. Select Case Studies

APPENDIX 1

Customer Engagement Budget

Based on the customer engagement tactics indicated above, an estimated budget for the Outreach and Education Plan is as follows:

	Engagement Tactic	Description	Budget
Pre-Pilot: Educate (9 months)	**Message Research**	Quantitative research to define and develop communications that will increase likelihood of adoption and usage	$50,000
Throughout Program (30 months)	**College Co-op program**	6 FTEs + 1 Manager (2 FTEs)	$665,600
		Seven computers @ $1200	$8,400
		Training (4 sessions)	$10,000
		NG Facility	$0
Throughout Program (30 months)	**Customer Education & Training Venues**	12 breakfast venues in NG facility with 30 participants @$8pp	$2,880
		8 lunch & learns with 30 participants @$15pp	$3,600
		invitations 9000 @0.36 pp, 6000 @ $0.04	$3,480
		18 webinars – 50 people each, $0.14/min/pp; 60 mins	$7,560
Pilot: Engage (18 months)	**Programs with Local Schools**	Presentations developed to target K-4, 5-8, 9-12, College	$15,000
Pre & Pilot: Engage (27 months)	**Call Center & Training Sessions**	Call Center Support: 18 months	$36,000
		Training (4 sessions)	$10,000
Pilot: Engage (18 months)	**Commercial and Industrial Relationships**	1-1 education and training sessions with Commercial customers at their facility; Existing National Grid Resources & College Co-op Cost	$0
		Collateral material	$3,200
Pre-Pilot: Educate (9 months)	**Direct Mail**	Design, print, & mail color postcard to 9000 customers, 30 months @0.36pp	$97,200
Pre-Pilot: Educate (9 months)	**Technology of Choice Call**	Customer calls to help explain options and arrange a meeting with a co-op person, if needed to help the customer make decision	$60,000
Pre-Pilot: Educate (9 months)	**Installation Notification Call**	1 time @ 0.03/call	$450
Pre-Pilot: Educate (9 months)	**Installation Notification Door Hanger**	Design, print, place 15,000	$32,000
Pre-Pilot: Educate (9 months)	**Welcome Kit (Residential - 15,000 & Community Leaders - 500)**	Design & develop welcome kit including: package, letter, DVD, brochure, engagement item, and mailing.	$200,000

APPENDIX 1

Pre-Pilot: Educate - Pilot: Engage (27 months)	**Education and Engagement Website/Microsite**	Design, develop, test, maintain	$225,000
Pre-Pilot: Educate - Pilot: Engage (27 months)	**"How to" Videos**	Five videos: Design, develop and integrate into the website	$12,500
Pre-Pilot: Educate - Pilot: Engage (27 months)	**Email**	6000 customers, 1/month, 30 months @$0.04pp	$7,200
Pre-Pilot: Educate - Pilot: Engage (27 months)	**Print Newsletter**	1/quarter (10 total) for 9000 customers plus 500 community/retailer leaders	$63,650
Pre-Pilot: Educate - Pilot: Engage (27 months)	**Bill Inserts**	2 sided, 4 color, 1/month for 15,000 customers, 30 months	$15,750
Pilot: Engage (18 months)	**Face-to-Face Customer Outreach**	College Coop 1-1 education and training at customer homes, Included in College Co-op Cost	$0
		collateral material	$9,600
Pre-Pilot: Educate (9 months)	**One time system & production setup fee**	Initial paper report setup / output integration for *Energize Home Energy Reporting*	$75,000
Pre-Pilot: Educate (9 months)	**Messaging campaign execution upload/ integration**	Includes web texting and mobile apps. Service fee for campaign upload / integration into reports. Excludes creative and segmentation work.	$75,000
Pre-Pilot: Educate (9 months)	**One time National Grid Report Branding**	One time standard Home Energy Report Template setup and delivered with National Grid Branding	$18,000
Pilot: Engage (18 months)	**Print Production & Mailing, 12 reports per year**	Includes cost for migration to Portal only use (customers will not be able to receive paper and use portal. Includes Mobile App for online user.)	$409,860
Pre-Pilot: Educate - Pilot: Engage (27 months)	**E-Newsletter**	10 newsletters, 1/quarter, 6000 customers & 500 community/retailer leaders	$38,350
Pre-Pilot: Educate - Pilot: Engage (27 months)	**Social Media**	Facebook, Twitter, YouTube: Existing National Grid Resources	$0
Pilot: Engage (18 months)	**Sustainability Hub**	Demonstration area of smart grid and its benefits	$50,000
Pilot: Engage (18 months)	**Home Smart Demos**	30 demos with hostessing costs of 20 people @ $15pp and invitations	$9,000

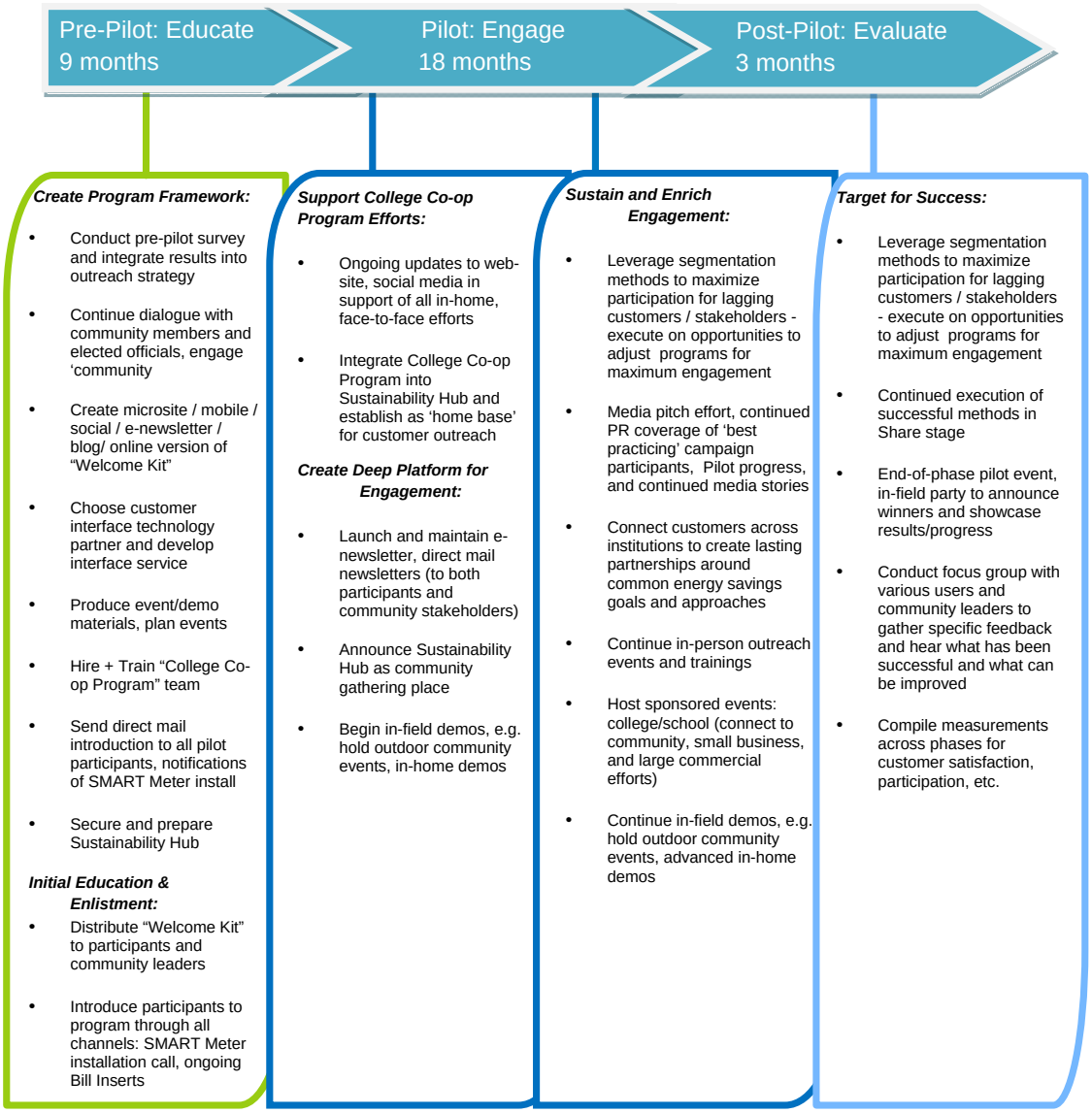
APPENDIX 1

Pre-Pilot: Educate - Pilot: Engage (27 months)	**Local Advocates Program**	8 breakfast venues in NG facility with 20 participants in academia or municipality @$8pp	$1,280
Pre-Pilot: Educate - Pilot: Engage (27 months)	**Training Program (Retailers & Contractors)**	8 lunch and learns at retailers store, 20 people @$15pp, invitations and give-away; collateral material development and printing	$2,400
		Collateral material	$3,480
Pilot: Engage (18 months)	**In-Store Demonstrations**	6 held in-store; partnerships to pay for set-up and demo items, and Company hostessing costs of 20 people @ $15pp and invitations	$1,800
Pilot: Engage (18 months)	**Translation Services**	Translate education materials throughout the Pilot into one language	$12,000
Throughout Program (30 months)	**Media-'Smart' Forums**	4 (1 pre, 2 during, 1 post) lunch forums with 50 people @ $15 pp; National Grid or other free facility	$3,000
Throughout Program (30 months)	**Media Kit**	Smart Grid information provided to over a dozen media outlets to keep them abreast: Existing National Grid Resources	$0
Throughout Program (30 months)	**Ongoing Outreach Efforts to Local Media Outlets**	Proactive and reactive outreach to media outlets for 30 months	$90,000
Post-Pilot: Evaluation (3 months)	**Customer Satisfaction Surveys**	Quantitative research to understand customer's barriers to adopt and use the technology. Enables message modifications.	$90,000
Post-Pilot: Evaluation (3 months)	**Observational Design**	Determines communication channel effectiveness	$0
		Total Budget	$2,418,240

APPENDIX 1

Timeline and Associated Outreach

The below is a depiction of how the Pilot is planned to proceed This is a visual representation only and is not intended to be a rigid framework, given the 'listen, test and learn' approach may lead to moving educational elements forward or upward in the timeline. Additionally, many educational methods may be spread over more than one phase.



APPENDIX 2

Customer and Stakeholder Listening Sessions- Green2Growth Summit

Overview

On September 19-20, 2011, National Grid hosted a Green2Growth community summit in Worcester to hear directly from 300 stakeholders, including residential and commercial customers, as well as representatives of government, the DPU, technology providers and vendors, community organizations, academic institutions, students, and the media. The event allowed Worcester residents and community members to contribute their own ideas to a vision, process, and desired outcome for a positive transformation of Worcester's economic base. The event explored how to build upon the unique qualities, assets and history of Worcester while taking advantage of new investment in sustainable development and smart energy technology. The stated purpose of the event was to "design a road map to transform Worcester into the innovative energy leader of a smarter Commonwealth."[1]

The Company used this summit to gather customer and community input and cultivate a rich, partnership-based mode of interaction and engagement. The community event was a cross-functional collaboration between several groups representing virtually all of the Pilot scope and planned area. The summit steering committee, with National Grid, consisted of members from:

The City of Worcester	Worcester Business Development Corporation
YWCA Central Massachusetts	Worcester Community Action Council
Worcester Polytechnic Institute	Massachusetts Low-income Energy Affordability Network
The Learning Circle	The Institute for Energy & Sustainability
To the Point	American Red Cross of Central Massachusetts
Clark University	Case Western Reserve University (moderator)

The summit was led by David Cooperrider, creator of the "Appreciate Inquiry" approach to stakeholder engagement and ideation. An Appreciative Inquiry summit is a large group planning, designing, or implementation meeting that brings a whole system of internal and external strengths together in a concentrated way to work on a task of strategic importance. Moreover, it is a meeting where everyone is engaged as a designer, across all relevant and resource-rich boundaries, to share leadership and take ownership for making the future of a significant effort and opportunity successful. As a self defined "asset-based approach" it starts with the belief that every organization, and every person in that organization, has positive aspects that can be built upon.[2] The Appreciative Inquiry process resulted in significant stakeholder input across the two day session, and concluded with the identification of points of contact for further refinement of ideas.

[1] Green2Growth website: http://www.green2growth.com/EventDetails/
[2] Green2Growth website: http://green2growth.com/AboutTheProcess/

APPENDIX 2

As part of the Summit, participants identified 15 opportunity areas for the community and Pilot. After identifying these opportunity areas, participants self-selected into small groups to help flesh them out, summarized their findings, and identified a point of contact for further communication and refinement of the idea in partnership with stakeholders both present at the Summit as well as additional stakeholders. The following is a summary of the opportunity areas explored at the Summit:

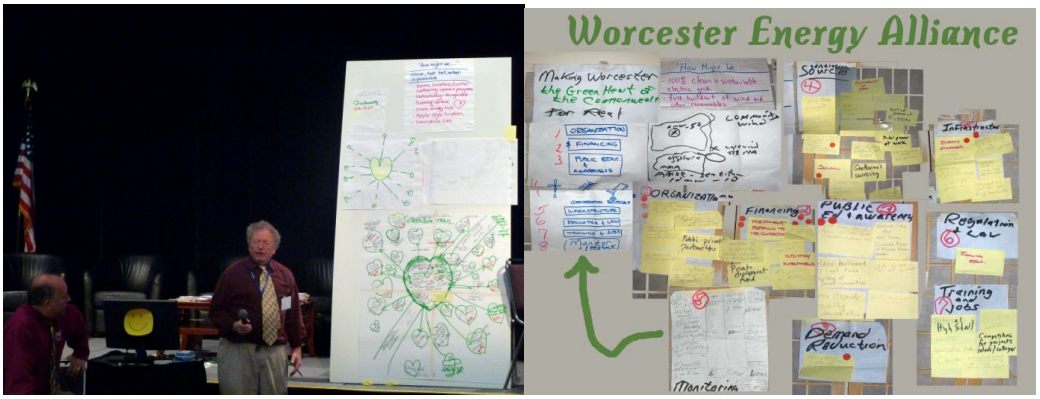
Opportunity Areas

Opportunity Area	Description/Ideas
Sustainability Center	Venue for green job training, demonstration center
Asset Roadmap / Green Monster Scoreboard / Awards	Visual representation of green assets around Worcester, "Green Monster" and Green "Academy Awards" for innovation
Keep the $ flowing into Worcester	Link energy investments to economic development
Video Challenge	Student-produced videos presenting energy challenge(s)
Green2Growth business network	Local businesses commit to match energy and percent dollar savings based on residential savings
Job shadowing and training	Students receive training from National Grid employees on energy saving initiatives to be applied in the community
Renewable project development forum	Central website including: zoning laws, financial subsidies, discussion page, information, clearinghouse, link-up page, and land rental listing
Achieving net zero	Setting aggressive energy savings goals for the community, including having some homes and buildings achieve the "net zero" status
Greening the heart of Worcester	Urban farming, community gardening, and edible landscapes, potentially powered by solar technologies
"Worcester, come near to our heart"	Student led video around deep cultural change in the community
Low-income leadership	Initiatives to lower the energy burden on low-income families and create ways to engage this group in energy savings and innovation
Greening the transportation of Worcester	Make public transportation more user-friendly through highly-visible, color-coded public stops, and transit-oriented development
Green declaration of independence	This opportunity area group worked on identifying an overall vision statement[3] and set of principles for the "Green2Growth" initiatives.
Worcester's Sustainable Portfolio	Create an economic base around innovation that will lead to a sustainable investment cycle
Keep the Momentum Going	Establish community ownership of *Green2Growth* and form an

[3] *"We the people of the Green2Growth Summit commit ourselves to building a sustainable community which will thrive within the limits of our natural land base. We commit to improve the quality of life for our generation and future generations. We demand freedom from the tyranny of fossil fuels and other limited approaches of the past. To that end, we pledge to these universal principles: Respect our history; be inclusive and build on our community heritage; innovate with optimism; take a measurable approach; balance all the inputs and outputs; create choices; achieve progress through doing; and integrate our approaches."*

APPENDIX 2

'Rapid Prototyping' Exercise



'Rapid Prototyping' Exercise – How the working groups captured their thinking and ideas during the summit.

In addition to feedback in their workbooks and through the Opportunity Area Small Groups, the facilitators gathered additional stakeholder input during the session including:

- Feedback on a survey about the vendors with demonstrations in the Exhibit Area of the conference
- Informal feedback from Summit participants
- Summit website blog[4] and email contact[5] for summit comments:
- Expert comments from the keynote speakers and panelists including:

Mayor of Worcester	Chairwoman, Massachusetts Department of Public Utilities
Manager, City of Worcester	Cisco, Senior Vice President and General Manager of Smart Grid
President, To the Point	BestBuy, Senior Director of Home and Energy Management
Principle Engineer, South Mountain	Fairmount Minerals Professor, Weatherhead School of Management, Case
Senior Policy Advisor at Green For All	MIT Lecturer, Author, Founder, Society for Organizational Learning
Program Manager, Energy and Conservation, City of Worcester	Assistant Attorney General, Bureau Chief, Business and Labor Bureau

How the Summit influenced the revision of the Pilot Proposal

The Summit influenced the revision of the Pilot Proposal in several key ways:

- Updates to Outreach and Education plan reflect community-based interests and preferences on communication and engagement
- Updates to technology plan take into account inputs from Summit stakeholder

[4] Summit Blog: http://www.green2growth.com/Blog/
[5] Summit email contact: feedback@green2growth.com

APPENDIX 2

Email and Survey Stakeholder Feedback

Theme	Quote	Organization
Community Engagement	I have a great interest in energy conservation and being "green." On top of using efficient lights I try my best to keep my electricity use as low as possible by powering off my electronics at night and not leaving the lights on.	Resident
Community Engagement	Our city has to be smarter, cleaner and greener if we're going to grow and thrive	City of Worcester, Mayor
Community Engagement	Green Jobs like installing wiring, solar panels, construction for commercial, industrial and residential building is necessary.	TurnItAround Consulting Group
Environmental Responsibility	It would be a moral tragedy for the people who were hurt first and worst in the pollution based economy, benefit last and least from a the green economy.	Senior Policy Advisor at Green For All
Environmental Responsibility	Currently, building a super-energy efficient underground house within city limits. I am looking for any help I can get and would be willing to offer what I have learned thus far.	Resident – Local Environmentalist
Environmental Responsibility	As a School Committee Member and a former principal in Worcester I believe that it is essential that we look for ways of educating our students about ways to go "green," save our resources through conservation.	School Committee Member
Technology & Progress	I like the idea of using the latest technology to monitor my electric usage.	MA Dept of Energy Resources
Technology & Progress	My research and company both relate to the present grid and the development and operation of the future grid. I would like to learn about the plans for the future and hopefully be involved with developing the technologies that will enable the smart grid.	Clark University and Machflow Energy
Summit/multi-stakeholder experience	I am a master's student in Environmental Science and Policy at Clark University. For a long time, I have been very interested in climate change, sustainability, energy, etc. I am now beginning an internship with Absolute Green Energy of Worcester.	Clark University Graduate Student
Summit/multi-stakeholder experience	It's heartening to see a utility company working to change business as usual, and Worcester is an ideal locale, with top-down and bottom-up support for greening our economy. I would like to be part of the process.	Worcester Green Jobs Coalition; Worcester Energy Barn-Raisers

APPENDIX 3

Worcester Sustainability Hub

Customer Learning the Technology

The Sustainability Hub concept is a direct initiative resulting from the Green2Growth Summit. Coincidently, this idea has been successfully demonstrated at Duke Energy's Envision Center. The Sustainability Hub will be an area destination for the community to experience interactive exhibits and education on energy technology, local sustainability efforts and provide hands-on access to the Smart Grid technology & rates offered by the Pilot. National Grid is leading the development of the Sustainability Hub by partnering with vendors, local institutions and community stakeholders to create an easily accessed, fully integrated showcase and learning center. The Sustainability Hub concept is modeled after the Apple Store concept[1] to leverage best practice in the customer experience.

When a customer enters the Sustainability Hub, they will be welcomed by National Grid employees, partner vendors, community partners and College Co-op participants providing guidance on what the Sustainability Hub can offer and act as an ambassador to direct visitor inquiries and interests. Customers and visitors interested in energy and sustainability technology can get information and first hand access to the technologies of the future and today, from energy efficiency appliances to smart grid devices to Renewables. Pilot customers can bring their devices for in-person repair, assistance, and education. In addition, internet access terminals will be made available for participants that may not have access in their homes.

The Hub will feature museum-style electronic learning exhibits that introduce customers to partnering consumer products and direct access to the Pilot's smart grid devices. These exhibits will demonstrate customer actions that can impact reductions in energy use and costs. In addition, the Sustainability Hub will conduct and illustrate a multi-media dashboard that shows how customer's consumption amount, consumption time, time of use, and rate plan affects their smart grid pilot outputs, including monthly consumption and bill impacts.

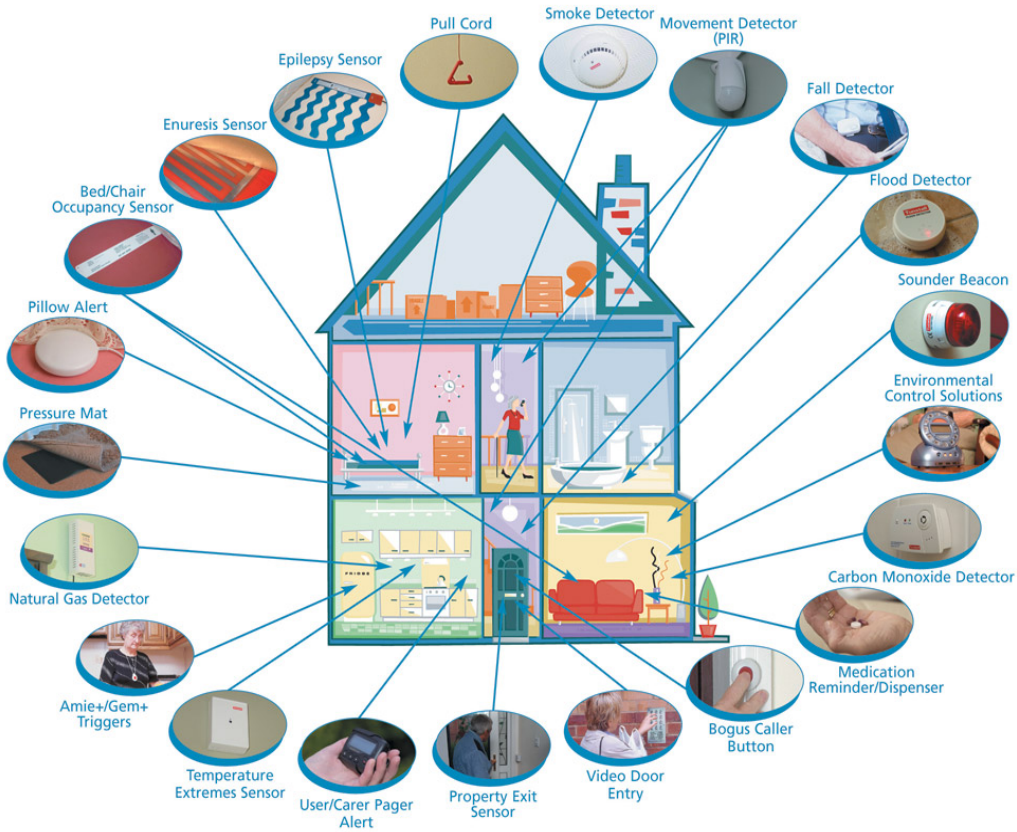
To maximize participation and visitation, the space will be in a highly accessible location, such as ground floor retail space with ample parking available. The Sustainability Hub will also be promoted throughout the Pilot within the Outreach & Education plan, raising visibility of the Sustainability Hub and encouraging customers to visit to address concerns. It will also be promoted via the Green2Growth website, all local and regional media contact and other communication channels available from National Grid and its partners. The intent is to the generate interest in the Sustainability Hub within the Pilot boundaries and beyond.

[1] Modeled after the Apple Store. Source: WATHI EU, LUC , "Apple Stores"; 9-502-063; Harvard Business School. R E V : MAY 2 0 , 2 0 1 0, page 4

APPENDIX 3

The demonstration would cover the following technology:

- Energy efficiency treatments (i.e.: windows, spray in insulation, tankless water heater)
- Controllable & programmable appliances
- Controllable & programmable in-home management technologies
- Advanced meters
- Access to customer interactive energy portal
- Display illustrating smart grid distribution grid devices
- Local demonstrations on sustainability/renewables



The Sustainability Hub will offer interactive exhibits and off-the-shelf energy lifestyle improvement tools and appliances along with

APPENDIX 3

smart in-home controllable devices which are all part of smart grids two-way communications connecting the customer with the utility.

Collaboration

In addition to museum-style learning exhibits, the Sustainability Hub would be designed to foster two-way dialogue between Company employees, engineers, partnering vendors, community stakeholders, and College Co-op participants. This interaction would allow customers to provide real-time feedback on the smart grid pilot and technology to National Grid, participating smart grid manufacturers and the Massachusetts' Department of Public Utilities. National Grid believes that this will enhance the qualitative measurement and verification of the Outreach and Education efforts and provide additional feedback mechanisms for the "listen, test & learn" approach. The space will also include a Choice Desk, where customers could learn about, try on, and adopt smart grid devices for their participation in the pilot.

Office without Borders

To attract the highest density of Worcester customers, the Sustainability Hub can offer an open Community Office space, equipped with full conference capabilities for the community to host community based meetings, education and academic tours. Through this center of exchange, National Grid hopes to become more invested and integrated in communities and with customers to best address their concerns, questions and needs as it relates to their Pilot experience.

Location

To make an opportunity like this effective, National Grid would need approximately 1,000 square feet of ground level retail with access to major highways and with ample parking for customer visits and bus tours. National Grid has had initial meetings with stakeholders who have offered to partner with us in providing appropriate, cost effective space.

Cost Model

The Sustainability Hub is being developed with a partnership model approach with the expectation that space, equipment, most services and overhead will be donated in part by community, stakeholder and vendor partners. Estimated cost totaling $50,000 has been assembled through field visits and discussions with potential partners.

APPENDIX 4

Select Case Studies

PG&E

Pacific Gas and Electric Company Smart Meter roll out was piloted in Bakersfield, California and was met with challenges due to weather-related timing and coinciding rate changes.

PG&E was a pioneer in the AMI field, being one of the first utilities to invest $2.2 billion prior to ARRA funding. Moreover, it has been proven that the metering technology used in PG&E's pilot was sound.[1] It is commonly believed that PG&E's smart meter pilot would have been more successful if it had included a robust O & E component, particularly before deployment to convey the benefits of smart meter to the customer base.

Implications of lack of outreach and education efforts prior to deployment:

- Law suits[2]
- Opt out requirement[3]
- Substantial resources devoted to fixing problem
- Ultimate loss of customer trust
  - Increased scrutiny led to more questions about usefulness, higher rates, privacy issues, and health concerns.
  - Negative perceptions of the company led to political friction and regulatory criticism.

Duke Energy

Duke Energy Envision Charlotte: a collaborative partnership among major employers, building owners and managers along with municipal and technology leaders. The aim of the pilot was to become a global model for environmental sustainability with measureable community results. In specific, they aimed to achieve a 20% reduction of energy use and 10% peak demand reduction in five years for 70 commercial buildings in a highly concentrated, urban area. By achieving its vision and goals, Envision Charlotte aims to "demonstrate Charlotte's national leadership as a sustainable, progressive, cost-efficient place to do business" and promote economic growth. On behalf of the Clinton Global Initiative, former president, Bill Clinton, said "The initiative will combine Smart Grid technology, energy education, and automation technology to create a sustainable, and a replicable model of energy efficiency."[4]

To engage customers, Duke utilized partnerships as a foundational component of an integrated customer communications model. They have also founded a Steering Committee, received buy-in from NGOs, city, business leaders, and policymakers. Duke's *Envision Centers* in

[1] Structure Group report commissioned by CPUC: http://www.cpuc.ca.gov/NR/rdonlyres/2B0BA24E-E601-4739-AC8D-DA9216591913/0/StructureExecutiveSummary.pdf
[2] San Francisco Chronicle/SF Gate website: http://articles.sfgate.com/2009-11-10/business/17179299_1_usage-data-pg-e-new-meters
[3] CPUC Ruling: http://docs.cpuc.ca.gov/efile/RULINGS/143742.pdf
[4] *Enhancing Access to Modern Technology* Plenary of the 2010 Clinton Global Initiative

APPENDIX 4

Erlanger, Kentucky and North Carolina State University also provide customers with interactive exhibits of Duke's thinking on the Smart Grid. Some of Envision Charlotte's communication platforms include:

- Direct discussions with commercial partners
- Envision Centers (featuring interactive exhibits to demonstrate Smart Grid, renewable and energy efficient technologies; promoting the importance of renewable power to meet the clean energy needs of tomorrow and helps outline how customers can play an important role in helping reducing greenhouse gas emissions.)
- Other: Screen display in building lobbies, Intra-customer competitions, DVD, etc

Karla M. Corpus
Senior Counsel
NY Regulatory

January 17, 2017

VIA ELECTRONIC DELIVERY

Honorable Kathleen H. Burgess
Secretary
New York State Public Service Commission
Three Empire State Plaza, 19th Floor
Albany, New York 12223-1350

RE: Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (REV)

NATIONAL GRID: CLIFTON PARK DEMAND REDUCTION REV DEMONSTRATION PROJECT-IMPLEMENTATION PLAN

Dear Secretary Burgess:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") hereby submits for filing the Clifton Park Demand Reduction REV Demonstration Project Implementation Plan as required by the REV Demonstration Project Assessment Report ("Assessment Report") filed by the New York State Department of Public Service Staff ("Staff") with the Commission on December 1, 2016 in Case 14-M-0101.[1]

Please direct any questions regarding this filing to:

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[1] The Assessment Report was re-issued on December 28, 2016, removing references to a trademarked term and a trademarked acronym.

National Grid looks forward to continuing to work collaboratively with Staff as it proceeds with the implementation of the Clifton Park Demand Reduction REV Demonstration Project.

Respectfully submitted,

/s/ Karla M. Corpus

Karla M. Corpus
Senior Counsel

Enc.

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nationalgrid

Demand Reduction REV Demonstration Project

in

Clifton Park, New York

Implementation Plan

Case 14-M-0101

TABLE OF CONTENTS

EXECUTIVE SUMMARY

On July 1, 2016 Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or the "Company") filed a proposal for the Demand Reduction REV Demonstration Project (the "Project")[1] designed to provide residential customers in the Town of Clifton Park ("Clifton Park" or the "Town") with price signals, tools and information, enabled by infrastructure investments and distributed energy resources ("DER"),[2] to reduce electric demand during peak times and inform the Reforming the Energy Vision ("REV") proceeding. The purpose of this implementation plan (the "Implementation Plan") is to describe National Grid's detailed execution plans for the Project.

The Project aligns with the New York Public Service Commission's ("Commission") Order Adopting a Ratemaking and Utility Revenue Model Policy Framework ("REV Track Two Order") wherein the Commission asserts "[o]ne of the most important objectives of REV is improving overall system efficiency including the efficiency of capital investment to create value for customers. Toward that objective, electric peak reduction is among the most immediate priorities for REV implementation."[3]

National Grid believes that it is possible to create more responsive relationships with customers by leveraging critical infrastructure, customer outreach and engagement, deep energy insights and actionable information, as well as price signals and DER products and services, which incentivize customers to reduce peak electric load and overall electric and gas energy use. Toward that end, the following elements are included in the Project:

- Infrastructure
  - Advanced Metering Functionality ("AMF")
  - Volt/VAR Optimization (includes Conservation Voltage Reduction) ("VVO")
- Customer Outreach & Engagement
- Deep Energy Insights & Actionable Information
- Price Signals
  - Peak Time Rewards ("PTR")
  - Voluntary Time-of-Use ("VTOU") Rate
- DER Services
- Community Choice Aggregation ("CCA") Support

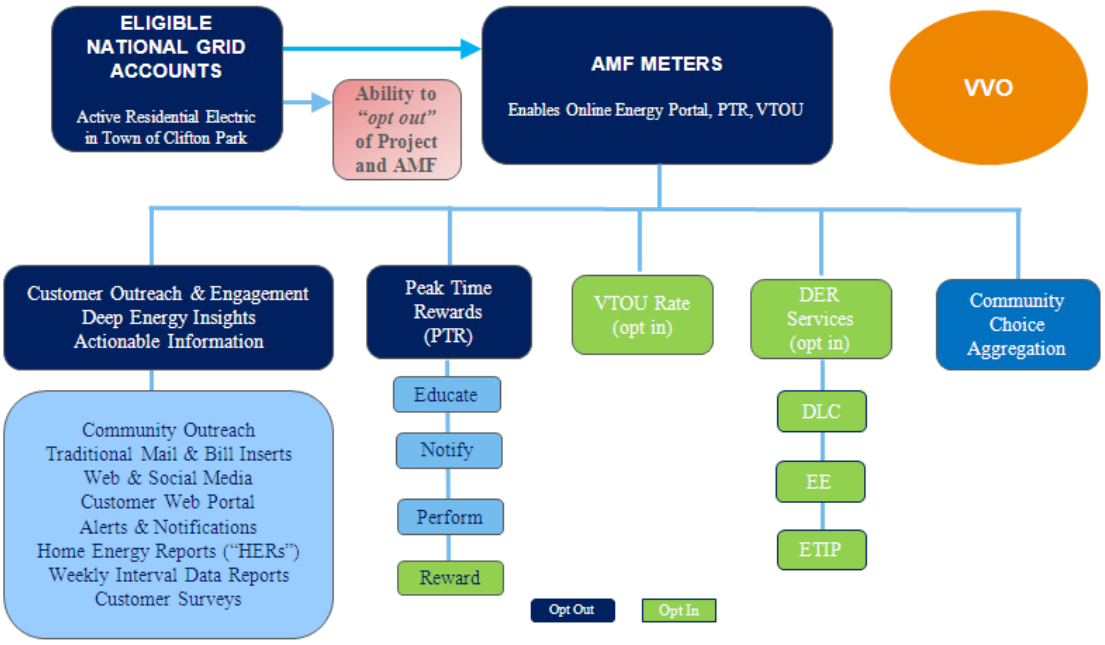
[1] National Grid's July 1, 2016 submittal was an errata filing to replace the proposed Customer Convenience Demonstration Project for Clifton Park, contained within the Company's July 1, 2015 submittal of a suite of REV demonstration projects, with a renamed project entitled "Demand Reduction Demonstration Project" to reflect the substantial revisions in scope from the original July 1, 2015 filing.
[2] For the Clifton Park REV Demonstration Project, "DER" is defined as including energy efficiency, demand response, and renewable distributed generation offerings, consistent with the Commission's definition in Case 14 -M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision* ("REV Proceeding"), Order Instituting Proceeding (issued April 25, 2014), p. 25.
[3] REV Proceeding, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework ("Track Two Order") (issued May 19, 2016), p. 72.

PROJECT DESIGN

Project Components Details

A summary of the Project's key services and offerings are provided below in Figure 1 (Project Overview Diagram). With the exception of VVO, customers can opt-in or opt-out of each Project element. A description of each Project element follows.

Figure 1: Project Overview Diagram[4]



Infrastructure

National Grid will install infrastructure intended to provide benefits to the Company's Clifton Park customers and enable other key Project elements. These infrastructure enhancements include:

- AMF; and
- VVO.

[4] Note: A customer who opts out from the AMF meter installation will still have access to monthly consumption and other data on the web portal. Although PTR is an opt-out Project element, a customer will need to accept the terms and conditions on the vendor's website *(i.e.*, opt in) in order to earn points and rewards.

AMF

National Grid, working with its partners in the Project, will replace the existing electric meters installed at residential premises in Clifton Park with Commission-approved meters that have the capability of communicating, through cellular technology, near real-time electric interval data to these customers.[5]

Existing gas meters will also be upgraded to communicate gas usage through the electric meters. These enhanced metering capabilities are designed to:

- Provide customers with access to near real-time data about their electrical and gas usage;
- Provide greater knowledge of residential customers' load shapes;
- Enable timely messaging to customers about their energy consumption allowing for proactive energy consumption decisions;
- Allow valuation of electric demand response (*e.g.*, rewards to customers) based on projected and actual demand;
- Support the assessment and possible monetization of the impact PTR events may have on installed capacity ("ICAP") tags for electric mass-market customers, and
- Facilitate the offering of new services and functions.

AMF deployment in Clifton Park will replace existing National Grid meter reading and billing processes. AMF meters will be read and data transferred over the cellular network to National Grid for utility billing. Data will also be transferred to Project partners over secure networks in order to enable Project elements including the customer web portal. Interval data will also be used for Project deployment of PTR, billing of the VTOU rate, and to support authorized Project evaluation activities.

AMF deployment is anticipated to commence the end of the first quarter of 2017. Customer letters introducing the Project and the AMF installation process will be distributed at least one month meter installations begin. This allows for a period during which customers can opt out of the AMF metering technology as well as certain other aspects of the Project.

Customers choosing not to have AMF installed will be directed to a specialized team at the National Grid contact center. The contact center will direct Customer Meter Services ("CMS") to not install an AMF meter for those customers who choose to opt out. These customers will retain their existing automatic meter reading ("AMR") meter, or if they had previously elected the "AMR Opt-Out Option,"[6] retain a non-AMR meter. Additionally, during the Project term, customers will have the option to have their AMF meter removed and replaced with an AMR meter at no cost to the customer.

[5] Case 16-E-0023, *Petition of Itron Inc. for Approval of the OpenWay Centron 4G LTE Commercial Meter Line*, Order Approving Itron OpenWay Centron 4G LTE Commercial Meter (issued November 23, 2016). The meter vendor, Itron, is assessing whether future changes to the cellular communication network used for the AMF rollout (*e.g.*, "4G" to "5G") would require upgrades to meter hardware and/or software. For the three years of the Project, the vendor anticipates no changes to the cellular network requiring hardware or software upgrades. National Grid, in collaboration with the vendor, will continue to assess the impacts of cellular communications network changes when assessing scalability of the Project.
[6] *See* P.S.C. No. 220 Electricity, Niagara Mohawk Power Corporation d/b/a National Grid, Schedule for Electric Service ("National Grid Electricity Tariff"), Rule 25.6, *et seq*.

National Grid will track the number of targeted customers that choose to opt out of AMF during the initial opt-out period, as well as those choosing to have AMF meters removed during the Project term.

Existing AMR meters that will be replaced by AMF technology will be cataloged and reviewed for depreciation status. National Grid will work with New York State Department of Public Service Staff ("Staff") to ensure proper accounting for meters that are depreciated and retired.

The steps for AMF deployment:

First Article Meters[7] delivered to National Grid	January 6, 2017
User Acceptance Testing Complete	February 2017
Go Live Declared	March 2017
Field Deployment of Meters	Through May 31, 2017

VVO

National Grid will enhance the efficiency of the electric distribution system through the installation of software and devices that better regulate the voltage of the distribution system. These system enhancements will benefit all customers connected to the substations being upgraded. Working with the Project's VVO partner, National Grid will install devices on the distribution system that monitor voltage along with advanced controllers for voltage regulators and reactive capacitors.

National Grid will evaluate the extent to which optimized regulation of the voltage and power factor of the electric distribution system benefits customers, ultimately reflected by improved feeder power factor, flatter voltage profiles, reduced feeder losses, reduced peak demand, and reduced energy consumption by customers.

VVO will include:

- Three Substation Transformer Load Tap Changers;
- Eleven Feeders, including:
  - 11 Line Voltage Monitors,
  - 39 Advanced Switching Capacitors, and
  - 8 Pole Top Regulators;
- Central controller and data concentrator installed at the National Grid Control Center in Liverpool, New York;
- Supervisory control through supervisory control and data acquisition ("SCADA") and Energy Management System ("EMS"), and
- Cellular connectivity between all field, substation devices, and the data concentrator.

[7] First article meters are initial production runs made to validate specifications and built before manufacturing the entire meter population.

The schedule for VVO deployment is as follows:

Elnora circuit devices installed	May 2017
Grooms Road circuit devices installed	September 2017
Elnora Substation make-ready work	May 2017
Grooms Road Substation make-ready work	June 2017
VVO system commissioning	November 2017
VVO fully deployed	December 2017

Customer Outreach and Engagement

National Grid will engage residents of the Clifton Park community to educate energy consumers about the Project and solicit input. The strategies to be used include:

- Community outreach;
- Mail and bill inserts; and
- Web and social media.

Community Outreach

To effectively engage the Town, National Grid will work to engage community leaders through coordination with the Town leadership, small group meetings with targeted organizations, and open community-wide meetings.

Coordination with Town leadership

National Grid will work with the Town leadership, particularly the Government Re-Thinking Energy & Environment Now ("G.R.E.E.N") Committee, to refine many of the important Project details.

National Grid anticipates meeting with Town leadership on a monthly basis to provide key Project updates and receive Town feedback on Project progress. If meetings are not necessary or impractical in a given month, National Grid may provide written progress updates and solicit feedback where appropriate. The below Table 3 summarizes engagement with the Town to date.

Table 3: National Grid Town Engagement to Date

Meeting Date	**Agenda**
August 26, 2016	Met with Town leaders to discuss a CCA-like energy procurement model
September 12, 2016	Discussion of Project status and discussion of Town leaders' interest in CCA
October 14, 2016	Follow-up meeting on Project status and interest in CCA with those Town leaders that requested additional information

Small group meetings with targeted organizations

National Grid will reach out to key community organizations to understand their concerns and expectations for the Project. National Grid's goal is to create ongoing outreach and communication opportunities with groups from a wide range of social networks within the community. These groups can include faith-based communities, neighborhood associations, schools, sports and recreation groups, book clubs, civic organization, and employers. National Grid believes that engaging these groups throughout the Project will build a steady stream of participation.

Specifically, National Grid will engage these community organizations in the following manner:

- Identify and engage local contractors, retailers, and others in the business community that can market, sell, and install DER products and services;
- Reach Clifton Park customers to educate them about Project opportunities (*e.g.*, PTR, DER products and services, VTOU pricing, etc.), and
- Solicit feedback on key aspects of the Project.

Open community-wide meetings

National Grid will also engage Town leadership at meetings open to the entire community through a series of Town meetings. The goals of these meetings are to:

- Gauge community buy-in to the Project from engaged community members, collecting contact information for future engagement;
- Solicit ideas for additional energy services important to the community for inclusion in the Project, and
- Educate Town leaders on key aspects of the Project (*e.g.*, VTOU pricing) that they can promote through their personal networks.

Each outreach approach is intended to reinforce others to build awareness, interest, and participation in the Project. By providing multiple opportunities to interact, SC-1 customers will receive more information to make educated decisions about energy use while National Grid will remain apprised of additional community education opportunities.

Prospective Tactics	February				March				April				May				
	6	13	20	27	6	13	20	27	3	10	17	24	1	8	15	22	29
Tabling: Clifton Park Shopping Center	X				X				X				X				
Classroom Prep: Shenendehowa Central Schools (1 HS, 3 MS, 8 ES)			X				X				X				X		
Tabling: Clifton-Park Halfmoon Public Library		X				X				X				X			
Tabling: Clifton Park Town Justice (Clifton Commons)				X				X				X					X
Tabling: YMCA Clifton Park		X				X				X				X			
Cap Region Spring Home Show										X							
Science and Health Discovery Night (Shen H.S.)												X					
Van: Clifton Park Winterfest	X																
Van: Clifton Park Farmers Market (Date TBA: Summer 2017)																	
Van: Clifton Park Farm Fest (25th Annual) - (Date TBA: Fall 2017)																	

Mail and Bill Inserts

Prior to the installation of AMF, National Grid will deliver a set of communications to introduce Clifton Park customers to the new interval meter benefits and key Project elements available immediately and in the future. These communications will be sent in the form of reports delivered by direct mail, bill stuffers, and email (see attached Appendix B - Sample Smart Energy Introduction Letter to Customers, and Sample Bill Insert from National Grid affiliate's Worcester Smart Grid Pilot, for examples from other smart energy pilots). National Grid will send a welcome packet prior to the installation of AMF focused on education. Following the installation of AMF, customers will receive educational materials focused on the various Project elements. Table 4 below summarizes the outgoing communications to customers by type, volume, and date.

Table 4: High-Level Project Rollout Schedule

Project Element	Mail Volume	Mail Dates
Meter Letter	14,409	February 2017
Welcome Letter	13,689	Rolling basis
Points and Rewards Enrollment	11,609[8]	Rolling basis
VTOU Rates	14,409	March –April 2017
DER Opportunities	14,409	November 2017

In all communications to customers, National Grid will provide a dedicated phone number and trained team of representatives who will be prepared to answer questions on Project specifics.

Web and Social Media

National Grid continues to expand the existing Clifton Park micro-site, a component of the Company's current nationalgrid.com website, to include information on the Project for all Clifton Park residents. The Project website will include the following information:

- AMF details including technology specifics, rollout schedule, and opportunity to opt out;
- Information about PTR and the VTOU rate;
- Energy services information and sign-up options for DER products and services immediately available and services that will be available once AMF is installed (*e.g.*, PTR); National Grid will include bi-weekly or monthly geo-targeted content to the Clifton Park area in the Facebook and Twitter editorial calendars. Content will include Project updates and customer stories gathered in the field. National Grid will create the post(s), set-up targeting, monitor and reply to

[8] Assumes 20% of targeted Clifton Park customers are already participating in the existing National Grid electric and gas energy efficiency programs, the Electric Residential Engagement Program and the Gas Residential Engagement Program (formerly known as the Residential Building Practices and Demonstration Programs), and are already receiving HERs and enrolled in the associated Points and Rewards offerings. Analysis to confirm Point and Rewards enrollment of the Clifton Park population is in progress.

customer inquiries, and provide metrics. Web and social media avenues will include frequent content updates as outlined below. Ngrid.com/cliftonpark will be updated throughout the year to announce the rollout of new products and services and will include Project-specific information;
- Bill inserts will be incorporated four times per year as new Project elements are rolled out, and
- Social media updates will be on-going throughout the year.

See Appendix B, Sample National Grid Affiliate's Social Media Messages, for examples of National Grid Facebook posts.

Customer Research

National Grid will deploy customer surveys to support analysis and tracking of progress on hypothesis test questions and to support the Project deployment. Surveys will gather information on customer attitudes and experiences on various Project elements. The information gathered will identify outreach and engagement approaches that may need to be modified to further enhance customer participation.

An initial baseline survey of Clifton Park residents was deployed in October 2016. This research indicated that customer age ranges have different needs to support their energy decisions. Given these research findings, National Grid will segment the Clifton Park customer population by age as well as their current level of HERs participation (via the Company's existing Electric Residential Engagement Program and Gas Residential Engagement Program), to allow for tailored messaging to better support customer segments throughout the Project. The identified segments are:

- HERs[9] participants who currently log in and use the portal to view their monthly energy usage;
- HERs Participants who have never logged into the portal; Young (18-54);
- HERs Participants who have never logged into the portal: Older (55+);
- HERs Non-Participants; Young (18-54), and
- HERs Non-Participants; Older (55+) SC-1 eligible non-residential accounts (*e.g.*, religious-based organizations).[10]

Future Project surveys will be rolled out strategically with the deployment of different aspects of the Project. For example, a survey may be deployed after meter installations are complete and initial AMF education materials are distributed to provide feedback on customer experiences with meter exchanges and the effectiveness of AMF education.

Deep Energy Insights and Actionable Information

National Grid will work with the Company's engagement partner to increase customer engagement by providing interactive energy insights and actionable information. Customers will be presented with actionable energy information and will be provided with messaging about the benefits of energy

[9] *Id.*
[10] Non-residential SC-1 eligible accounts provide an opportunity for community-based engagement within this Project.

efficiency, demand reduction, and pricing programs that encourage shifting energy usage to lower price, off-peak times of the day.

Customers will be engaged in energy insights and actionable information via a variety of channels and strategies, including digital communications, traditional mail, a customer web portal, alerts and notifications, HERs, customer education reports, and weekly reports.

Customers who do not wish to receive specific communications can choose to opt out by notifying National Grid. Customers will be engaged via the channels outlined in the below Table 5 (Customer Communication Channels).

Table 5: Customer Communication Channels

Communication Channel	**Description**
Web Portal	National Grid web experience will be customized for Clifton Park customers and will present electricity and gas usage, and behavioral messaging. (Visit at ngrid.com/cliftonpark)
High Bill Alerts	High bill alerts delivered via email. Alerts will utilize AMF data to identify customers trending towards a high bill and inform them of a potential high bill.
Home Energy Reports ("HERs")	The existing HER channel will be leveraged to promote tailored energy-saving products and services.
Emailed Home Energy Reports ("eHERs")	The existing eHERs messaging channel will be leveraged to promote energy-saving products and services.
Weekly Interval Data Reports	Customers with AMF will be sent an opt-in weekly interval data report via an email giving them insights on how they are using energy on a weekly basis.

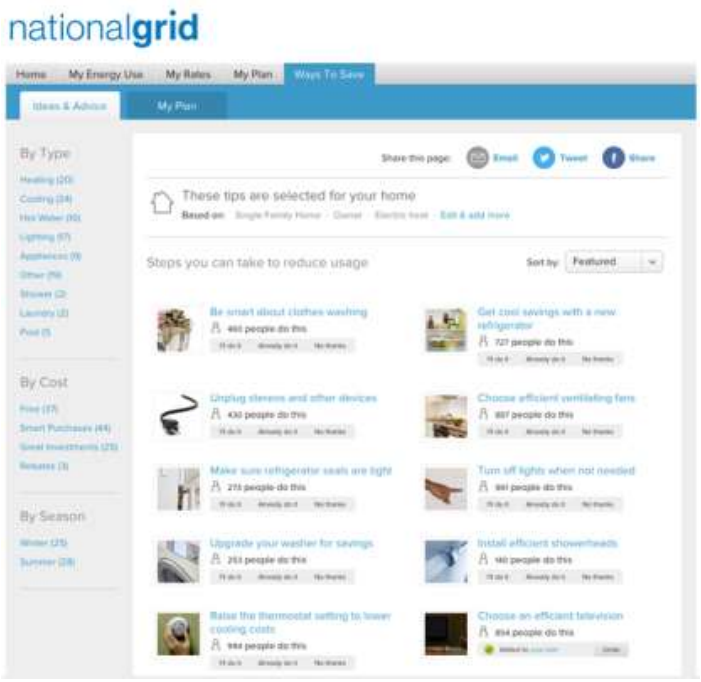
Web Portal

Customers will be engaged through the National Grid website, which will have customized data presentment specific to Clifton Park customers. Prior to AMF rollout, the digital experience will include monthly electric and gas usage information, and promotional messaging about National Grid energy-saving products and services. The digital experience will be significantly enhanced after AMF meters are installed. Specifically, customers will have access to the following features:

- Interval energy usage tracking (See Figure 4);
- Energy savings recommendations (See Figure 5), and
- Energy usage alerts (See Figure 6).

Figure 4: Energy Usage Tracking

Figure 5: Energy Savings Recommendations



High Bill Alerts

In addition to displaying alerts on the web portal, high bill alerts will be sent by email (see Figure 6 below) when customers are on track to exceed their typical energy usage each month. This usage threshold and notification date will be set by National Grid with input from the Company's engagement partner. These alerts will also include links ("calls to action") on how customers can save energy.

National Grid will aim for limited frequency of alert messages to any individual customer.

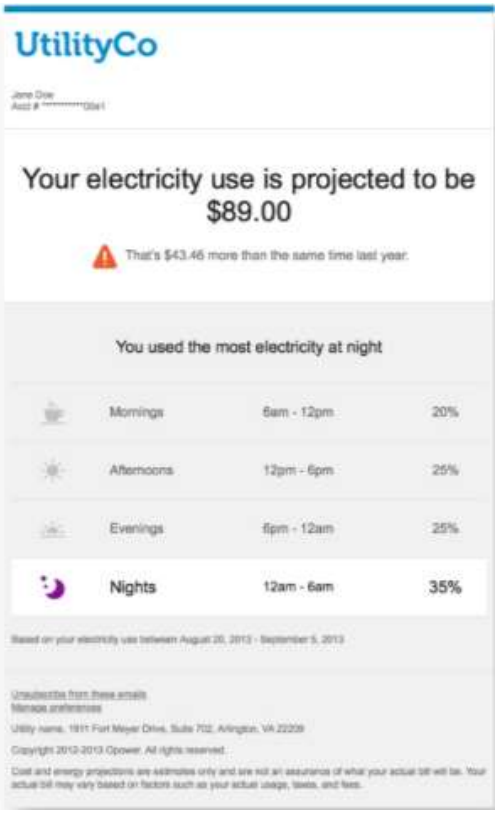
Home Energy Reports

National Grid currently delivers HERs to approximately 8,000 customers in Clifton Park through ongoing National Grid energy efficiency programs, the Electric Residential Engagement Program and the Gas Residential Engagement Program, as detailed in the Company's Energy Efficiency Transition Implementation Plans (ETIPs).

Weekly Interval Data Reports

National Grid will send weekly interval data report emails to customers that have AMF meters installed. These reports will give customers additional insights into the daily electricity usage and provide behavioral nudges and targeted tips to promote energy conservation.

Figure 6: Email Message Usage Alerts



Price Signals

National Grid's goal is to design electric energy price signals that achieve the greatest possible impact in the form of reduced peak energy usage in order to better align usage patterns with the realities of the electric grid, recognizing the location, time, and attributes of energy reductions.

Ultimately, reducing peak electric energy usage will benefit customers by lowering the amount of expensive peak energy procured, minimizing the cost to operate the electric grid, and decreasing the need for additional infrastructure investment.

To reach this goal, National Grid will balance the following factors:

- Peak reduction per customer;
- Number of customers participating, and
- Customer satisfaction.

The Project seeks to test if residents are presented with energy price signals whether they will act to reduce local and system peak loads. The Project is designed to offer two forms of price signals: PTR and the VTOU rate. PTR provides rewards for taking action at specific times, while the VTOU rate design provides pricing that encourages off-peak energy use.

PTR

Through a single marketing message, "Reduce Your Energy Usage and Earn a Gift Card Reward," National Grid will seek to incentivize Clifton Park customers to reduce electric use during specified peak times. Participating customers will be rewarded for curtailing electric load through behavioral actions such as turning off lights and adjusting their thermostats.

Key elements of PTR include:

- Event performance analytics performed on all customers with AMF;
- No penalties for failure to reduce load during PTR events;
- Pre-event and post-event notifications;
- Rewards earned by those enrolled in "Points and Rewards"; and
- Rewards awarded based on participation in up to 20 PTR events per year.

Event performance analytics

All electric customers that receive an AMF meter will be targeted for PTR. This will provide insight on community-level load curtailment. Event analytics will be performed comparing modeled expected consumption to actual consumption based on AMF interval data during the event period. Determinations will be made whether Project participants curtailed electric load or not.

Customers that choose to opt out of PTR will not receive PTR notifications. Customers can opt out of PTR even if they have an AMF meter.

No penalties

PTR is a rewards program based on positive motivation. There are no penalties for failure to curtail load during events.

Pre-event and post-event notifications

Pre-event notifications will inform customers of the time frame and date of event with recommendations on how to reduce usage during the event.

Post-event notifications will inform customers if their data reflected they curtailed load during the event, and whether they earned points that can be redeemed for rewards.

"Points and Rewards" enrollment

In order for individual customers to earn rewards they must enroll in "Points and Rewards" and accept the vendor's terms and conditions.

Awarding and distributing rewards

There may be up to 20 PTR events per year during the summer electric capability periods of June through September. Rewards will be awarded based on whether or not individual customer data reflects electric load curtailment during specified events compared to modeled expected load. Customers are able to earn points for each event and can redeem points for rewards at any time

PTR events will be called by National Grid, and may be triggered by a number of indicators that will be further defined. Some examples of peak event triggers include:

- High Day Ahead Locational Marginal Price ("LMP");
- High temperature;
- High humidity; and
- Various electric transmission restrictions that may arise (*e.g.*, feeder specific).

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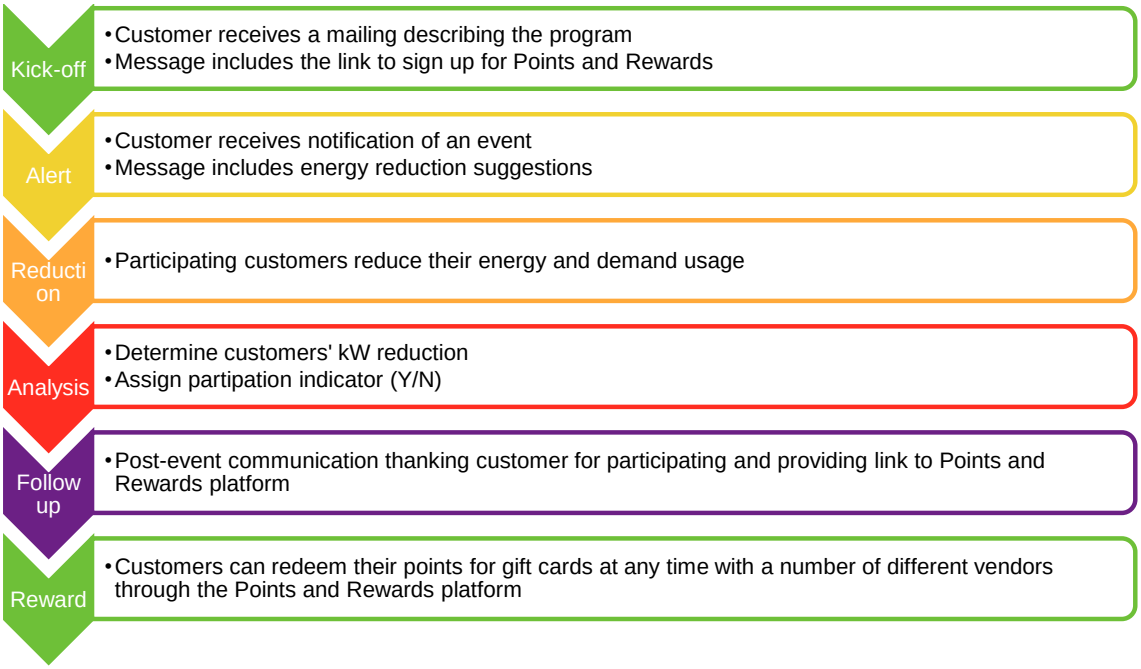
Figure 7 below provides an overview of the PTR program.

Figure 7: PTR Customer Experience



Key PTR schedule items:[11]

PTR education communications	2nd Qtr. 2017
Launch event period	3rd Qtr. 2017 (and annually through September 2019)
Evaluation of PTR performance	4th Qtr. 2017

VTOU Rate

The VTOU rate[12] will be tested in Clifton Park on an opt-in basis. The VTOU rate, which became effective December 1, 2016, includes three rate periods: on-peak, off-peak and super-peak. Delivery rates differ for on-peak and off-peak usage, and commodity rates vary based on customers' on-peak, off-peak and super-peak usage. The specific time-of-use periods are as follows:

[11] Time periods shown are predicated on having the engagement vendor under contract by the end of the 1st Qtr. 2017. If that is not achievable, dates shown will likely slip. Any schedule changes will be reflected in Project Quarterly Reports.
[12] *See* National Grid Electricity Tariff, Service Classification 1, Special Provision L, "Residential Optional Time of Use Delivery and Commodity Rate."

	Delivery Rate Period	Commodity Rate Period
On-Peak	7am-11pm	7am-11pm*
Off-Peak	11pm-7am	11pm-7am
Super-Peak		2pm-6pm (June-August)**

*Excluding Super-Peak period **Excluding weekends and holidays

Customers who elect the VTOU rate are placed on the rate for an initial one-year term, which continues month to month thereafter until canceled by the customer upon written notice to the Company. The VTOU rate is designed for the delivery and commodity portions of the customer bill, however, participating electric customers may choose to take supply from a retail access supplier in lieu of the VTOU commodity portion.

VTOU customers that receive supply service from a retail access supplier will receive the VTOU distribution delivery rate for their On-Peak and Off-Peak usage in the VTOU Delivery Rate Periods but their electric supply and corresponding supply charges will be provided by their retail access supplier. The electric supply provided by the retail access supplier will be provided in accordance with the Company's standard tariff retail access program and will not use the Commodity Rate Periods specified for the VTOU rate.

Additionally, if the customer received supply service from the Company during their initial one-year term on the VTOU rate, and provided a copy of their New York State Department of Motor Vehicles registration for a plug-in electric vehicle ("EV") at their Premise at the time they enrolled in the VTOU rate, they will be eligible for a one-time bill protection guarantee. The Company will perform a one-time comparison of 12 months of the customer's charges under the VTOU rate to what the customer would have paid under the standard tariff. If this comparison indicates the customer would have paid less on the standard tariff rate, the Company will credit the customer the difference in their next retail bill.

While the VTOU rate is available across the Company's service territory, its inclusion in the Project allows National Grid to test how enabling technology, such as AMF and associated energy insights and actionable information, influences the adoption of time-of-use rates.

National Grid will file a petition with the Commission to modify the VTOU rate for Project participants. Under the existing tariff provision, VTOU customers are required to pay an incremental customer charge of $3.36 per month (for metering required for the VTOU rate). The petition will request a modification to the VTOU customer charge to eliminate the incremental customer charge to reflect the use of AMF technologies funded through the Project and that no additional metering costs will be passed on to Project participants that adopt the VTOU rate.

Key VTOU Schedule items:

VTOU rate effective date	December 1, 2016
Petition modifying VTOU for participants	To be filed by February 2017
Billing system modified for VTOU AMF billing	To be completed by March 2017
VTOU marketing	April-September 2017

DER Services

In addition to reducing peak load through energy insights, actionable information and price signals, National Grid seeks to animate the market by working with third-party DER providers and/or facilitating DER providers' services as part of the Project. DER products and services will be opt-in offerings to customers, publicized via the customer engagement channels outlined above as well as community outreach. DER services may include energy efficiency, demand response, or renewable distributed generation opportunities.

DER providers will gain value by leveraging National Grid's communications channels to those customers opting in to receive such communications, and in turn, DER providers will contribute toward Project revenues in the form of referral incentive fees.

Direct Load Control ("DLC")

The National Grid Connected Solutions DLC program was launched across the National Grid service territory in 2016. The DLC program works with qualified smart appliances, including thermostats and water heaters, and aims to automatically reduce peak electric usage.

Customers that enroll in the DLC program will receive $30 in the first year and an additional $20 at the end of each following year as long as they participate in at least 80% of called events. Participants who opt in to the program will be notified when demand response events are scheduled to reduce overall demand during peak, critical hours of the electric summer capability period.

Participating customers will give National Grid the right to control their electric load during peak times (*e.g.*, automatically changing thermostat settings by 2 degrees during an event). Participating customers will receive electronic event notifications as well as emails. Customers will be able to opt out of any specific event.

National Grid will track enrollment rates resulting from Project-specific promotions of the DLC program within Clifton Park and report results annually.

Insulation and Air Sealing

DER providers will offer home energy assessments and energy efficiency retrofit services in Clifton Park to customers that have expressly opted in to receive such marketing.

Additional DER Products and Services

Based on Town and Project participants' feedback, National Grid will provide additional DER product and service opportunities to residents in Clifton Park that have expressly opted in to receive marketing materials such as an EV adoption campaign, and other distributed generation opportunities such as solar photovoltaic ("PV") technology.

CCA Support

National Grid has engaged with Clifton Park officials and community members on the potential for CCA. As directed in Staff's Assessment Report of the Project, community-level supply procurement activities would follow the framework outlined in the Commission's CCA proceeding.[13] Should the Town decide to move forward with CCA, National Grid will support the Town's efforts to identify opportunities where the Project and CCA could bring value to the Clifton Park community.

Potential areas of synergies between the Project and CCA may include:

- Opportunities to use the Project engagement and outreach platform to help inform Clifton Park customers of the Town's CCA actions and how CCA would interact with different Project elements;
- Opportunities for a selected energy supplier to partner in PTR though funding of rewards and ability to call PTR events based on day-ahead market prices, and/or
- Providing a platform to promote the selected retail supply provider's DER opportunities.

Project Opt-In / Opt-Out Summary

Table 6: Project Component Overview

	OPT IN	OPT OUT
Infrastructure		
AMF		X
VVO	*Distribution System Level*	
Communications		
Customer Outreach and Engagement		X
Deep Energy Insights and Actionable Information		X
Price Signals		
PTR		X*
VTOU	X	
DER Products and Services		
Energy Efficiency	X	
DLC	X	
Other DER (*e.g.*, EV, solar PV)	X	
CCA		
CCA Coordinated by Town		X**

* All customers with AMF will be included in PTR notifications on an opt-out basis. To receive PTR rewards, customers will need to enroll (opt in) and accept the PTR reward provider's terms and conditions.
** CCA opt out will be implemented in accordance with the Commission's requirements for a municipally-sponsored CCA.

[13] Case 14-M-0224 – *Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs*. Order Authorizing Framework for Community Choice Aggregation Opt-Out Program (issued April 21, 2016).

TEST STATEMENTS

National Grid and its partners will test the validity of the hypotheses shown in Table 7, Test Statements, below. The results of hypothesis testing will be tracked and documented and then used to inform and modify subsequent offerings to Clifton Park residential customers.

Table 7: Test Statements

Test Statement…	**If…**	**Then…**
1. Infrastructure: Infrastructure investments will bring benefits to customers.	A. National Grid builds out the required infrastructure and offers AMF to Clifton Park residents...	Clifton Park residents will accept the technology and receive deep energy insights.
	B. VVO is installed in Clifton Park…	All Clifton Park customers will see a reduction in electric consumption as a result of distribution system efficiencies.
2. Customer Engagement: Timely, customized communications and information will enable Clifton Park residents to make electric and gas energy choices that align with REV principles.	A. National Grid and its partners deliver customized and actionable information to Clifton Park residents using channels preferred by customers...	Clifton Park residents will make informed and engaged energy choices resulting in greater satisfaction with their electric and gas energy providers.
3. Price Signals: Price signals can result in Clifton Park residents acting to reduce local and system peak electric loads.	A. Clifton Park residents have the opportunity to participate in a PTR program …	Clifton Park residents will be willing to reduce their electric energy usage resulting in points and rewards.
	B. Clifton Park residents targeted for increased electric rate education …	Clifton Park residents will be more likely to adopt the electric VTOU rate.

4. DER Services (Business Models and Revenue Streams): Informing customers about DER products and services will increase the adoption of DER and create new revenue streams for National Grid.	A. National Grid provides Clifton Park residents with information about specific value-added DER products and services from select partners...	Clifton Park customers will be more likely to adopt such DER products and services.
	B. If National Grid provides opportunities for select DER providers to educate Clifton Park residents who opt in to receive such products and services marketing …	These partners will share a portion of their incremental revenue with National Grid.
5. Community Supply Procurement: Utilities can add value to the CCA process.	A. Clifton Park pursues CCA… …	National Grid will use Project-specific outreach and education channels to support the Clifton Park CCA.

TEST POPULATION

The Town of Clifton Park represents a growing suburban region with increasing energy usage and is well positioned to adopt advanced energy options that will benefit residents. The Project will target the approximately 14,400 National Grid residential electric customers in the Town of Clifton Park. Approximately 86% of these accounts are also National Grid residential natural gas customers.

According to the 2010 US Census, the Clifton Park community has a population of 36,705 and is upper-to-middle class (median income: $80,908).[14]

[14] http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

TEST SCENARIOS

See Table 8, Test Scenarios, below, for all Project test scenarios and metrics.

Table 8: Test Scenarios

Scenario	Description
Infrastructure	
AMF:	Approximately 14,400 residential electric accounts in the Town of Clifton Park will be targeted for AMF installation on an opt-out basis. National Grid will test the deployment of AMF meters on an opt-out basis. Customers that do not opt out of AMF installation will have access to interval data on the customer portal and to deep energy insights.
VVO:	VVO will be deployed at two substations for the electric distribution system that combined serve about 90% of Clifton Park accounts. VVO is expected to be fully operational by December 2017. VVO performance will be verified through the VVO measurement and verification ("M&V") report. M&V activities include measuring system performance by turning the system on and off, and measuring voltages and loads.
Customer Outreach and Engagement / Deep Energy Insights and Actionable Information	
Energy Information and Engagement	National Grid will test customer engagement in response to energy information by examining customer awareness, interest, comfort, knowledge, and satisfaction with Project offerings through customer surveys. National Grid will seek to understand the role specific engagement campaign events have on VTOU and DER adoption rates. National Grid will use a variety of communications channels to educate customers about the Project and its offerings. National Grid will implement customer surveys approximately every six months to determine customer levels of awareness and understanding of Project offerings.

	The Customer Energy Portal is designed to leverage AMF data capabilities combined with energy education to enable customers to better understand and better manage their energy use. National Grid will determine overall differences in pre- and post-energy consumption of Project participants, and attempt to attribute savings across Project elements (*e.g.*, outreach, insights, PTR participation, VTOU adoption, DER adoption, etc.). Electricity and gas savings will be analyzed separately.
Price Signals	
Peak Load Reduction Test:	National Grid will test PTR event participation rates defined by the delta between expected and actual electric load as measured by AMF data. National Grid will track the number of customers participating in PTR events and their average load reduction, along with aggregate community load reduction during events. National Grid will track enrollment in Points and Rewards and reward earnings rates. All Clifton Park residential customers who do not opt out of AMF installation will be targeted for participation in PTR. Customers with AMF that enroll in Points and Rewards will be eligible to earn rewards for curtailing electric load at specified times. National Grid will also identify when PTR events overlap with DLC program events and examine the impact DLC program participation may have on overall curtailment of customers that participate in both programs.
VTOU Rate:	National Grid will compare the VTOU adoption rate in Clifton Park with that in the rest of the Company's service territory to test the impact of enabling technology and targeted communications on rate adoption. If TOU analysis tools are deployed, National Grid will examine their influence on adoption of VTOU.
DER	
Customer adoption of DER products and services	National Grid will test the impact of targeted communications and education on the adoption rate of DER products and services (*e.g.*, home assessments, insulation and air sealing, DLC, energy efficiency, etc.). Currently identified DER services include:

	• Insulation and air sealing, and home energy assessments • DLC, and • National Grid ETIP Portfolio. Future DER opportunities may include EVs, solar PV, and other offerings. National Grid will also monitor enrollment in the DLC program within Clifton Park and compare that to the existing benchmark of 7%.[15]
Development of new revenue streams for National Grid	National Grid will test the ability of the Company to earn revenues from generation of leads to DER providers.
CCA	
Town adoption of CCA	Should the Town decide to pursue CCA, National Grid will use demonstration-specific communication channels to help educate and inform customers about CCA and Town-specific CCA activities. These communications channels include the demonstration website, banner ads in the customer portal, HERs, and demonstration related mailings.

MILESTONES AND CHECKPOINTS

As the Implementation Plan is an evolving, working document, refinements to scope of work for Project partners and internal National Grid teams are expected as the Project progresses. Modifications will be captured in quarterly reports and meetings with Staff.

Milestones:

There are several points in the Project that will serve as critical milestones including:

- *First Article Meters Delivered to National Grid* — *January 2017*
- *Verizon Connectivity to Support First Article Testing* — *January 2017*
- *Meter First Article Approved* — *January 2017*
- *Phase 1 User Acceptance Testing Complete* — *February 2017*
- *CCA Decision by Town* — *1st quarter 2017*

[15] Adoption rate is based on comparable adoption rate for National Grid DLC "Cool Kenmore" program.

- *Phase 1 Go-live Declared* *March 2017*
- *Completion of AMF Installation Expected* *May 2017*

Check Points:

Check Point	**Description**
Infrastructure	
AMF Opt Out:	National Grid will monitor ongoing customer opt-out rates of AMF meters. Measure: Customer opt-out rate of AMF meters. How and When: Meter opt-out rate will be assessed upon initial 30 day opt-out period, and during Project deployment. Resources: National Grid billing system and call center statistic tracking. Expected Target: Opt-out rate not to exceed 10%. Solution / Strategies in case of results below expectation: If the opt-out rate is greater than 10%, National Grid will obtain customer feedback through surveys to determine why and update the marketing strategy accordingly.
VVO System Benefits:	Measure: System level electric energy and demand reduction. How and When: VVO M&V will be conducted at the end of the Project and will include intermittent field testing and a VVO M&V report. Resources: Utilidata, National Grid Advanced Engineering Team Expected Target: • Save over 5.99 million kWh annually • Reduce demand by over 1.98 MW • Avoid over 4,216 metric tons of carbon dioxide emissions[16] Solution / Strategies in case of results below expectation: If the M&V Report shows significantly different results than anticipated, National Grid will engage the VVO partner for further examination of performance assumptions against results.
Customer Outreach and Engagement / Deep Energy Insights and Actionable Information	
Customer Outreach and Engagement and Deep Energy Insights and Actionable Information	Measure: Customer satisfaction with Project and Project-specific components such as outreach and education, customer portal and deep energy insights, electric savings (kWh, KW) and gas (dth) savings. How and When: Annual customer surveys will gather quantitative and qualitative insight to customers' experience with the Project. A baseline survey was performed in October 2016. A pre-/post-billing analysis will be performed after the Project is completed and there is sufficient consumption data available to do so.

[16] Figure calculated using EPA generic conversion: 7.03 x 10^{-4} (eGRID, U.S. annual non-baseload CO^2 output emission rate, year 2012 data).

	Resources: National Grid Customer Insights Team Expected Target: • Expected increase in customer satisfaction of 2%, with stretch of 5%. • 5% reduction in electricity and gas usage. Solution / Strategies in case of results below expectation: Revisit engagement approaches based on survey results and customer inputs. If survey results demonstrate lack of awareness or understanding of Project offerings, outreach and engagement tools will be revisited to re-focus communications efforts.
Customer Energy Portal Engagement	Measure: Determine customer portal engagement levels. How and When: Tracked monthly throughout Project. Resources: Engagement vendor Expected Target: • Number of customer portal users • Login rates (total by month) • Web logins (all transactions by customers) • Top 5 visited site selections (by calendar month) • Customer enrollment in Points and Rewards campaign • Cumulative customer Points and Rewards events • Points and Rewards redemption. Solution / Strategies in case of results below expectation: National Grid and its partner will analyze portal metrics on a regular basis to identify if outreach efforts need to be redirected to increase online engagement.
Price Signals	
Peak Time Rewards:	Measure: Measure customer participation and load reduction across PTR events. How and When: After each event and end of capability period. Resources: National Grid Advanced Data Analytics and Meter Data Services Expected Target: • 40-50% participation rate per event • 0.50 kW average electric reduction per customer per event Solution / Strategies in case of results below expectation: If PTR participation rates are lower than expected, the communication strategies and reward structure will be revisited.
VTOU Rate:	Measure: Customer rate adoption and load shift. How and When: Throughout Project. Resources: National Grid Advanced Data Analytics Team and /or evaluation contractor Expected Target: • Benchmark of 6-38% adoption, with target of 24% adoption for VTOU rates. • A proxy for expected load shift is under development. Solution / Strategies in case of results below expectation: If VTOU adoption rates are lower than anticipated, communications strategies will be revisited.

DER	
DER Opportunities:	Measure: Customer adoption of DER products and services introduced through Project. How and When: Over project life. Resources: DER providers, National Grid Procurement Team Expected Target: Adoption rate specific to each DER provider. Expected DER adoption rates will be developed for individual DER offerings as they are included in the Project. Solution / Strategies in case of results below expectation: Revisit DER engagement strategy.
DER Related Revenue Streams	Measure: How many DER providers willing to share DER revenues. How and When: Over Project life. Resources: DER product and service providers, National Grid Procurement Expected Target: Potential revenues from DER providers will be determined based on individual DER offerings and providers, and National Grid's ability to provide leads within customer data sharing regulations. Solution / Strategies in case of results below expectation: Recruit additional DER providers based on customer interest solicited through customer surveys. Revisit revenue stream structure.
CCA	
CCA Test	Measure: If the Town pursues CCA, National Grid will use Project-specific outreach and education channels to support customer engagement in CCA. These channels include Project-specific web, customer portal banner space, HERs, and Project-specific mailings. How and When: At CCA initiation and during CCA opt-out period, using Project channels. Resources: Town leadership and National Grid. Expected Target: Three of four Project outreach channels. Solution / Strategies in case of results below expectation: If the Town CCA opt-out rate is higher than the Town expects, National Grid will work with the Town to supplement their outreach efforts.

Conditions and Barriers

Consumer Protections

Residential customers participating in the Project will continue to be protected under the Home Energy Fair Practices Act ("HEFPA") which includes provisions addressing termination of service for non-payment, offers of deferred payment agreements to customers in arrears, and a host of other consumer protections.

Staff's Assessment report addressed the sharing of customer data with third parties. National Grid will limit sharing of customer data in accordance with Company policy[17] and the proposed "Aggregated Data Privacy Policy Statement of National Grid" filed with the Commission on November 1, 2016 in accordance with the Track Two Order.[18] Based on Staff's direction, National Grid will not be required to seek a waiver for sharing confidential customer data with Project partners working on behalf of the Company to provide analytics associated with the Project.

Channel or Market Challenges

This Project is designed to bring a multitude of options and solutions to residents of Clifton Park to reduce participants' demand. National Grid is moving forward in a purposeful manner so as to not overwhelm customers with information and communications. Monitoring the tone and frequency of communications, while also making them relevant and actionable, should help to minimize the number of customers choosing to opt out. National Grid intends to monitor the opt-out rate closely to ensure that key information such as usage alerts, price signals, and opportunities to earn rewards continue to be accessible to the majority of participants.

PROJECT STRUCTURE AND GOVERNANCE

Project Team

Executive Sponsorship

National Grid has assigned an executive sponsor for each of its REV Demonstration Projects, recognizing that active sponsorship is a critical success factor for successful project management. Executive sponsor responsibilities include:

- Accountability for the ultimate success of the project;
- Vision and leadership throughout the project;
- Time commitment and active engagement throughout the project, and
- Addresses conflicts and ensures senior stakeholders are engaged and supportive.

Core Project Team

- Philip Austen, Director Solutions Delivery - Executive Sponsor
  (Tel.: 516-545-4753/ Email: pausten@nationalgrid.com)
- Melissa Piper, Solutions Delivery - Project Manager
  (Tel.: 315-428-5002/ Email: Melissa.Piper@nationalgrid.com)
- Ara Tadevossian, Information Solutions – Project Manager
- (Tel.: 315-428-6695/ Email: Ara.Tadevossian@nationalgrid.com)

[17] National Grid Group Information Security Management, Data Privacy Policy, Global Information Security Policy, Issue 2.4.
[18] REV Proceeding, *supra* note 3, p. 157.

- John Spring, Partnerships and Joint Ventures
- (Tel.: 781-907-3694/ Email: John.Spring@nationalgrid.com)
- Paul Wassink, Customer Solutions
- (Tel.: 781-907-2681/ Email: Paul.Wassink@nationalgrid.com)
- Kara Fedors, Solutions Delivery
- (Tel.: 781-907-2244/ Email: Kara.Fedors@nationalgrid.com)

Internal Stakeholders

There are various departments within National Grid that are critical to the delivery of this Project. They include:

- Bill Project Management and Services
- Communications and Marketing
- Community and Customer Management
- I/S Relationship Network Strategy
- Legal and Regulatory
- Load Research and Analysis
- Meter Data Services
- Electric Pricing
- Strategic Communications
- Advanced Data and Analytics

Roles and Responsibilities

See Table 11, Roles and Responsibilities, below, for key Project responsibilities. Note that the roles and responsibilities in this document focus on the Project, and do not fully detail related activities.

Table 11: Roles and Responsibilities

National Grid Role / Responsibility	**Description**
Support conceptual design and lead detailed program implementation	Provide necessary data, and expertise for the Project design work
Engage community stakeholders	Gather qualitative data and interview stakeholders regarding expectations for various parts of the Project
Deploy advanced infrastructure	Work with stakeholders to obtain necessary approvals and implement infrastructure deployment
Manage and coordinate vendors and partners	Manage and coordinate third parties implementing various aspects of the Project
Deploy VTOU rate	Provide customers with educational information surrounding the VTOU rate
Secure waiver from VTOU tariff by filing a petition for Commission approval	Prepare and file petition for tariff waiver
Town of Clifton Park Role / Responsibility	**Description**
Feedback on Project plan	Evaluate National Grid Project plan
Represent residential community at-large	Represent residential constituency and serve as customer advocate for various Project components
Evaluate feasibility of pursuing a CCA	Decide if a CCA model is beneficial to the Town

Department of Public Service Staff, Public Service Commission Role / Responsibility	**Description**
Provide feedback on quarterly reports for Project	Review progress against Project objectives and recommend any corrective actions
Approve National Grid infrastructure proposals	Review infrastructure proposals and provide necessary approvals following appropriate review and oversight
Provide feedback to National Grid on rate plans	Review and provide recommendations on alternative rate plans that are aligned with PSC goals and provide customer value
Act on National Grid's petition for VTOU tariff waiver	Approve tariff waiver

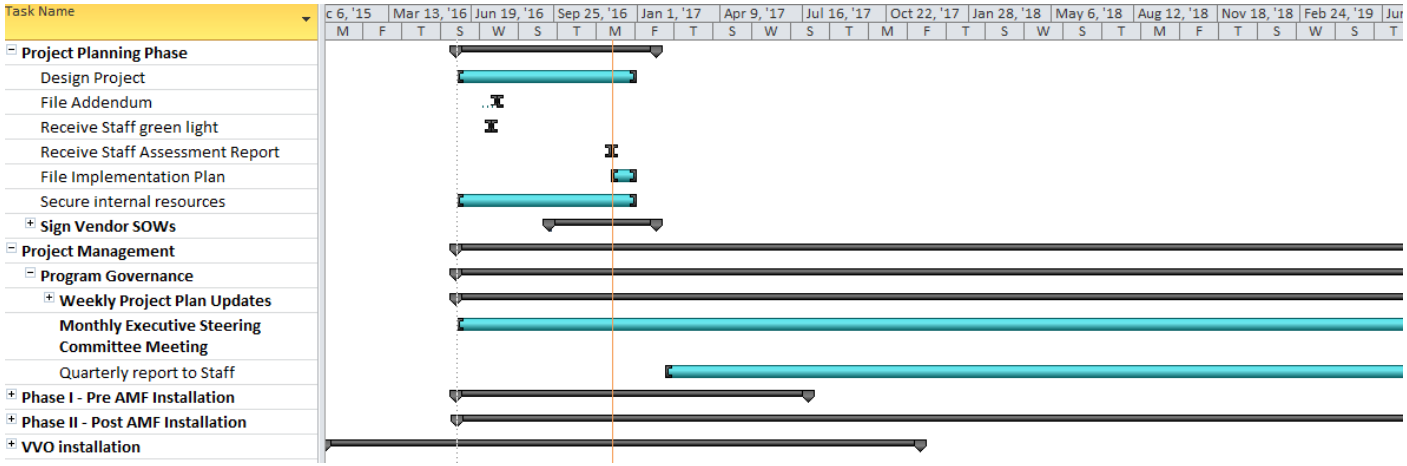
Governance

Project governance will include the Core Project Team (as set forth above) and will consist of monthly conference calls and in-person meetings at milestone points to report on Project schedule, identified risks, Project status, and the projected costs and benefits of services under development.

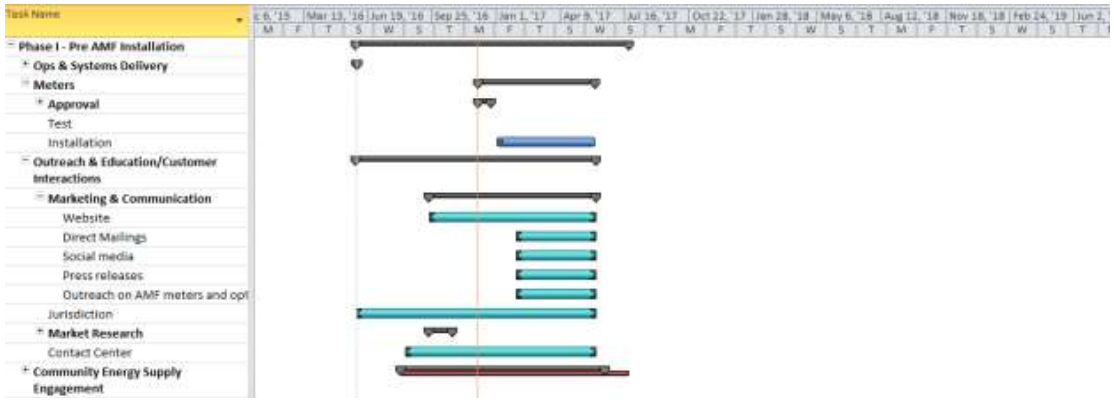
WORK PLAN

See Figure 16, Project Timeline and Milestones, below, for an overview of the Project work plan.

Figure 16: High Level Project Plan



Phase I: Pre-AMF Installations



32

Phase II: Post-AMF Installations

PROJECT BUDGET

Summarized below in Table 13 is the Preliminary Budget with estimated costs for the first three years of the Project.

Table 13: Three-Year Preliminary Budget

Expense Type	Year 1	Year 2	Year 3
Capital	$9,059,785	$1,393,391	$0
O&M	$7,515,597	$4,628,086	$4,222,477
Total	$16,575,382	$6,021,477	$4,222,477

National Grid has held discussions to determine levels of interest in a revenue-sharing model for lead generation for DER services. National Grid will continue to work with Staff to determine the potential for a revenue-sharing model for DER services adopted by residents, recognizing that express consent from customers is necessary in order to market potential leads to DER service providers.

National Grid will only share data with partners or vendors if the act of sharing the data complies with Company policy and New York State rules and regulations governing the sharing of confidential personal information, unless the customer provides express consent to share such information.

REPORTING STRUCTURE

Quarterly progress reports will be provided to Staff. These reports will include an overview of project progress against timeline/plan and results as they become available. The quarterly report template is provided below in Figure 17, Quarterly Report Template, and will continue to be refined as the Project progresses.

Figure 17: Quarterly Report Template

QUARTERLY REPORTING TEMPLATE

Milestones
Last Project Milestone:
Next Project Milestone:

Tasks/Timeline
Completed Project Tasks Since Last Report:
Changes or Impacts to Schedule since Last Report:
Lessons Learned:
Work Stream Coordination:

Risks
Identified Risks:
Risk Mitigation Plan:

Finance
Total Incremental Spend to Date:
Target Incremental Spend:
Actual Incremental Spend:
Incremental Spend Variance:
Non-Incremental Spend:
In-kind and grant support (specifically for REV Demo):

Additional Notes:

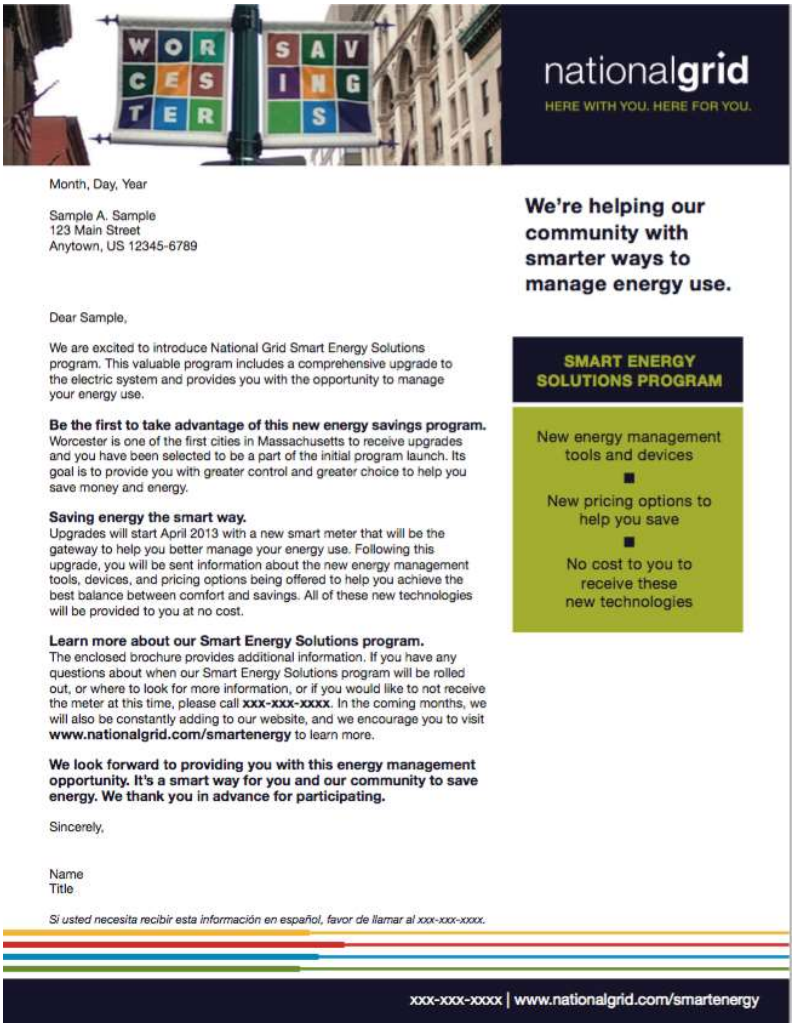
Appendix A – REV Alignment

REV Objective	Demonstration Alignment
Enhance customer knowledge and tools that will support effective management of the total energy bill	The Project leverages the capabilities of interval metering technologies on cellular networks to generate near real-time information on customers' electric and gas usage.
	This information will be shared via an interactive, customer-friendly portal as well as direct communications and alerts that educate and engage customers with actionable information that they can use to reduce their electric and gas energy use.
Market animation; leverage customer contributions	The Project animates the market by leveraging partnerships with DER providers in efforts to achieve wider deployment of DER.
	Additional energy industry-related services are animated by the Project, including technology and platform developers and providers delivering actionable information.
System wide efficiency	Through Peak Time Rewards, the Project tests the potential for mass-market participation in electric distribution system management opportunities.
	Participants in the Project will receive AMF meters and all customers in Clifton Park will benefit from VVO installation to further improve overall electric system efficiency.

System reliability and resiliency	The Project provides opportunities to manage the electric distribution system with aggregated mass-market demand-response and VVO.
Reduction of carbon emissions	The Project supports Clean Energy Standard goals of carbon emission reductions through reduced energy consumption.
Partnerships with third-party service providers	The Project has multiple, market-animating partnerships with DER, technology, and platform providers. It is designed to promote DER adoption.

Appendix B – Outreach and Engagement

Sample Smart Energy Introduction Letter to Customers



Sample Bill Insert from National Grid's Worcester Smart Grid Pilot

Sample National Grid Social Media Messages

REDACTED

Exhibit __ (AMI-3R)

Case 17-E-0238
Case 17-G-0239

Rebuttal Testimony of The Advanced Metering Infrastructure Panel

Exhibit ___ (AMI-3R)

Analysis of dynamic pricing by The Brattle Group economists

Ahmad Faruqui and Jenny Palmer

Submitted to the EDI Quarterly

The Discovery of Price Responsiveness – A Survey of Experiments involving Dynamic Pricing of Electricity

Ahmad Faruqui and Jenny Palmer[1]

Abstract

This paper surveys the results from 126 pricing experiments with dynamic pricing and time-of-use pricing of electricity. These experiments have been carried out across three continents at various times during the past decade. Data from 74 of these experiments are sufficiently complete to allow us to identify the relationship between the strength of the peak to off-peak price ratio and the associated reduction in peak demand or demand response. An "arc of price responsiveness" emerges from our analysis, showing that the amount of demand response rises with the price ratio but at a decreasing rate. We also find that about half of the variation in demand response can be explained by variations in the price ratio. This is a remarkable result, since the experiments vary in many other respects – climate, time period, the length of the peak period, the history of pricing innovation in each area, and the manner in which the dynamic pricing designs were marketed to customers. We also find that enabling technologies such as in-home displays, energy orbs and programmable and communicating thermostats boost the amount of demand response. The results of the paper support the case for widespread rollout of dynamic pricing and time-of-use pricing.

Introduction

Electric utilities, which run a capital-intensive business, could lower their costs of doing business by improving their load factor. Other capital intensive industries, such as airlines, hotels, car rental agencies, sporting arenas, movie theaters routinely practice a technique known as dynamic pricing to improve load factor. In dynamic pricing, prices vary to reflect the changing balance of demand and supply through the day, through the week and through the seasons of the year.

Congestion pricing, a simpler form of dynamic pricing, is used to regulate the flow of cars into central cities. Parking spaces in most central cities are priced on a time-of-day basis and in some cities such as San Francisco the prices are varying dynamically. In California, special lanes on freeways are priced dynamically and the Bay Bridge charges toll on a time-of-use basis.

But it has been difficult for electric utilities to follow these examples. There has always been doubt that electric users can change their usage patterns. To assuage these doubts, in the late 1970s and early 1980s, a dozen electricity pricing experiments were carried out with time-of-use rates in the United

[1] The authors are economists with The Brattle Group, based in San Francisco. They are grateful to fellow economist Sanem Sergici of Brattle for reading an early draft of this paper. Comments can be directed to ahmad.faruqui@brattle.com.

States.[2] They showed that customers do respond to such rates by lowering peak usage and/or shifting it to less expensive off-peak periods. But smart meters that would charge on a time-of-day basis were expensive in those days and little progress occurred in the ensuring years. Even now, less than one percent of the more than 125 million electric customers in the United States are charged on a time-of-use basis.

However, the California energy crisis of 2000-01 reinvigorated interested in dynamic pricing, not only in that state but globally. Over the past decade, two dozen dynamic pricing studies featuring over one hundred dynamic time-of-use and dynamic pricing designs were carried out across North America, in the European Union and in Australia and New Zealand.[3]

These experiments have yielded a rich body of empirical evidence. We have compiled this into a database, *D-Rex*, which stands for *D*ynamic *R*ate *ex*periments. This contains the following data from each pilot: details of the specific rate designs tested in the pilot, whether or not enabling technologies were offered to customers in addition to the time-varying rates, and the amount of peak reduction that was realized with each price-technology combination. The *D-Rex* results provide an important perspective on the potential magnitude of impacts with different dynamic rate approaches and should inform the public debate about the merits of smart meters and smart pricing. Across the 129 dynamic pricing tests, peak reductions range from near zero values to near 60 percent values. However, it would be misleading to conclude that there is no consistency in customer response.[4]

We focus on nine of the best designed, more recent experiments to examine the impact of the peak to-off peak price ratio on the magnitude of the reduction in peak demand, or demand response. Because the amount of demand response varies with the presence or absence of enabling technology, such as a smart thermostat, an energy orb or an in-home display, we separate those pricing tests without and with enabling technology. We find a statistically significant relationship between the price ratio and the amount of peak reduction, and quantify this relationship with a logarithmic model. This relationship is termed the Arc of Price Responsiveness. We find that for a given price ratio, experiments with enabling technologies tend to produce larger peak reductions, and display a more price-responsive Arc.

Sidebar: The Dynamic Rates

[2] For an early summary, see Ahmad Faruqui and J. Robert Malko, "The Residential Demand for Electricity by Time-Of-Use: A Survey of Twelve Experiments with Peak Load Pricing," *Energy*, Volume 8, Issue 10, October 1983. For more recent surveys, see Ahmad Faruqui and Jenny Palmer, "Dynamic Pricing and its Discontents," *Regulation*, Fall 2011 and Ahmad Faruqui and Sanem Sergici, "Household Response to Dynamic Pricing of Electricity – A Survey of 15 Experiments," *Journal of Regulatory Economics*, October 2010. Faruqui and Palmer also discuss the more common myths that surround legislative and regulatory conversations about dynamic pricing.

[3] Most dynamic pricing studies have included multiple tests. For example, a pilot could test a TOU rate and a CPP rate and it could test each rate with and without enabling technology. Thus, this pilot would include a total of four pricing tests.

[4] See, for example, the concluding remarks in an otherwise excellent paper by Paul Joskow, "Creating a smarter U.S. electrical grid," *Journal of Economic Perspectives*, Winter 2012.

Time-of-Use (TOU). A TOU rate could either be a time-of-day rate, in which the day is divided into time periods with varying rates, or a seasonal rate into which the year is divided into multiple seasons and different rates provided for different seasons. In a time-of-day rate, a peak period might be defined as the period from 12 pm to 6 pm on weekdays, with the remaining hours being off-peak. The price would be higher during the peak period and lower during the off-peak, mirroring the variation in marginal costs by pricing period.

Critical Peak Price (CPP). On a CPP rate, customers pay higher peak period prices during the few days a year when wholesale prices are the highest (typically the top 10 to 15 days of the year which account for 10 to 20 percent of system peak load). This higher peak price reflects both energy and capacity costs and, as a result of being spread over relatively few hours of the year, can be in excess of $1 per kWh. In return, the customers pay a discounted off-peak price that more accurately reflects lower off-peak energy supply costs for the duration of the season (or year). Customers are typically notified of an upcoming "critical peak event" one day in advance but if enabling technology is provided, these rates can also be activated on a day-of basis.

Peak Time Rebate (PTR). If a CPP tariff cannot be rolled out because of political or regulatory constraints, some parties have suggested the deployment of peak-time rebate. Instead of charging a higher rate during critical events, participants are paid for load reductions (estimated relative to a forecast of what the customer otherwise would have consumed). If customers do not wish to participate, they simply buy through at the existing rate. There is no rate discount during non-event hours. Thus far, PTR has been offered through pilots, but default (opt-out) deployments have been approved for residential customers in California, the District of Columbia and Maryland.

Real Time Pricing (RTP). Participants in RTP programs pay for energy at a rate that is linked to the hourly market price for electricity. Depending on their size, participants are typically made aware of the hourly prices on either a day-ahead or hour-ahead basis. Typically, only the largest customers —above one megawatt of load — face hour-ahead prices. These programs post prices that most accurately reflect the cost of producing electricity during each hour of the day, and thus provide the best price signals to customers, giving them the incentive to reduce consumption at the most expensive times.

The Dynamic Pricing Studies

The *D-Rex* Database contains the results of 129 dynamic pricing tests from 24 pricing studies.[5] As shown in Figure 1, these results range from close to zero to up to 58 percent. Part of the variation in impacts comes simply from the fact that different rate types are being tested. Filtering by rate in Figure 2, some trends begin to emerge. We observe that the Critical Peak Pricing (CPP) rate tends to have higher impacts than Time-of-Use (TOU) rates, likely because the CPP rates have higher peak to off-peak price ratios. We can also filter by the presence of enabling technology, as in Figure 3, and observe that for the same rates, the impacts with enabling technologies tends to be higher.

[5] 23 of the 24 studies are pricing pilots. The other study is PG&E's full scale rollout of TOU and SmartRate.

Figure 1. Impacts from Residential Dynamic Pricing Tests, Sorted from Lowest to Highest

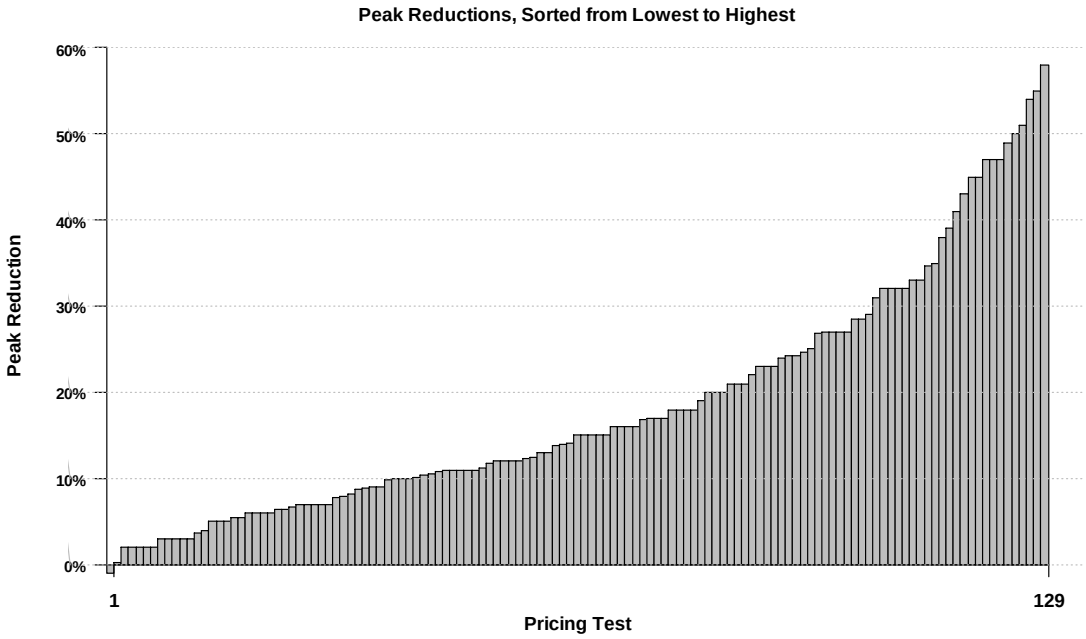
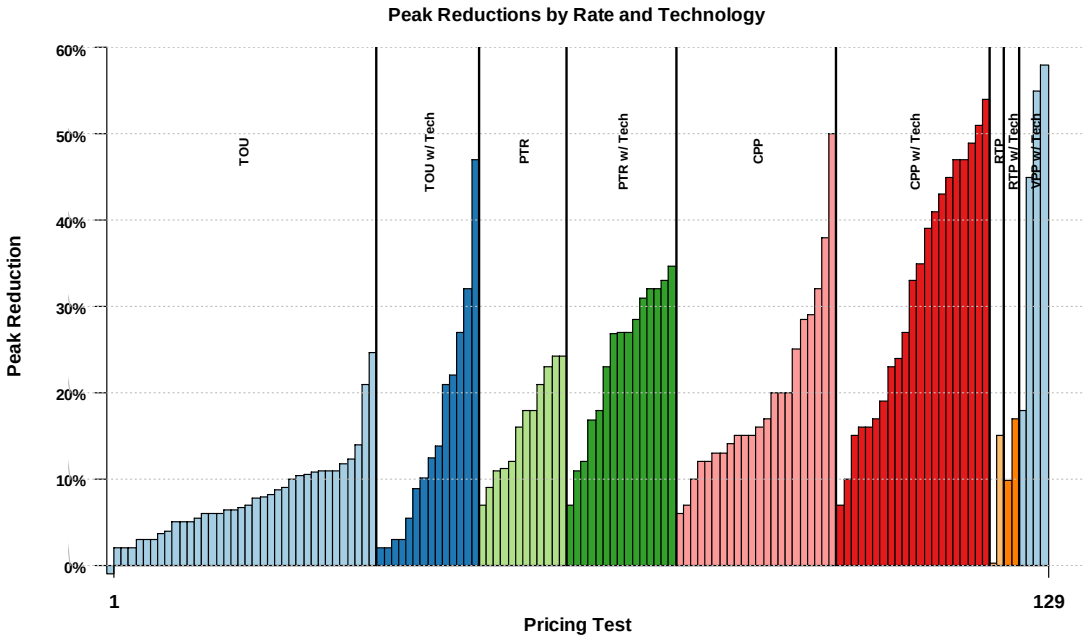


Figure 2. Impacts from Pricing Tests, by Rate Type

Figure 3. Impacts from Pricing Tests, by Rate Type and Presence of Enabling Technologies



Even with the rate and technology filters, there remains significant unexplained variation. In order to understand the cause of this variation, we first limit the sample to only the best-designed studies which have reported the relevant data. We selected studies in which samples are representative of the population and the results are statistically valid. Moreover, we selected studies in which participants were selected randomly, as opposed to volunteers responding to a mass mailing. The nine best-designed pilots, shown in Table 1, include 42 price-only tests and 32 pricing tests with prices *cum* enabling technology.[6] In these 74 tests, the peak reductions range from 0% to just under 50%. The remainder of this paper focuses on explaining the variation in these results.

[6] OG&E was not included in these screened results because only the draft results are available thus far. When these results are finalized, they will be included in this analysis.

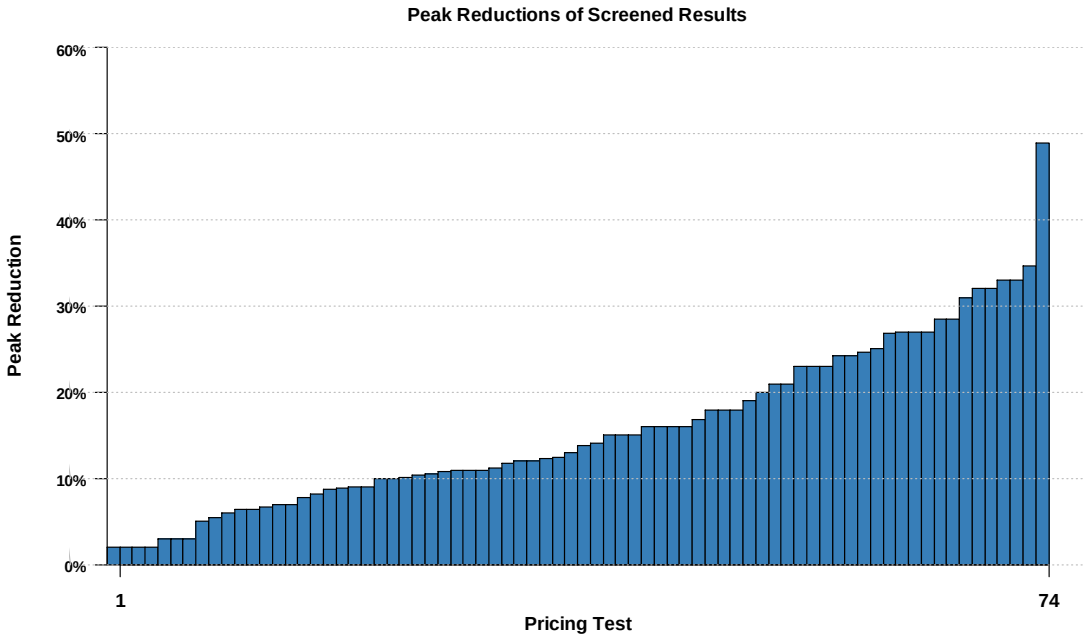
Table 1. Features of the Nine Dynamic Pilots

Utility	Location	Year	Rates	Enabling Technologies	Number of Tests
Baltimore Gas & Electric	Maryland	2008, 2009, 2010	CPP, PTR	CPP w/ Tech, PTR w/ Tech	17
Connecticut Light & Power	Connecticut	2009	TOU, CPP, PTR	TOU w/ Tech, CPP w/ Tech, PTR w/ Tech	18
Consumers Energy	Michigan	2010	CPP, PTR	CPP w/ Tech	3
Pacific Gas & Electric (Full scale rollout)	California	2009, 2010	TOU, CPP	Not tested	4
Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison (Statewide Pricing Pilot)	California	2003, 2004	TOU, CPP	CPP w/ Tech	4
Pepco DC	District of Columbia	2008, 2009	CPP, PTR, RTP[2]	CPP w/ Tech, PTR w/ Tech, RTP w/ Tech	4
Salt River Project	Arizona	2008, 2009	TOU	Not tested	2
Utilities in Ireland[2]	Ireland	2010	TOU	TOU w/ Tech	16
Utilities in Ontario	Ontario, Canada	2006	TOU, CPP, PTR	Not tested	6
				Total	**74**

1. Run by the Commission for Energy Regulation (CER)

2. The two RTP pricing tests are excluded from this analysis because they do not have a clear peak to off-peak price ratio.

Figure 4. Impacts from Pricing Tests, by Rate Type and Presence of Enabling Technologies

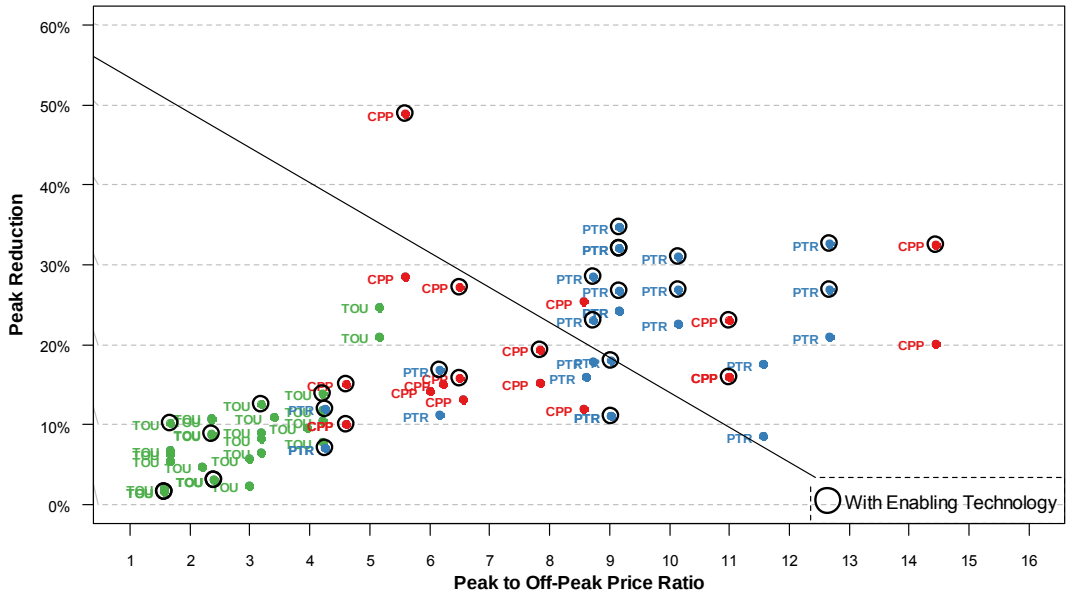


Methodology

The nine best-designed studies in *D-Rex* include 42 price-only test results and 32 price-cum-enabling technology test results for a total of 74 observations. For each result, we plot the all-in peak to off-peak price ratio against the corresponding peak reduction. As expected, the CPP and PTR rates tend to have higher peak to off-peak ratios than the TOU rates, with some overlap, and those rates with higher price ratios tend to yield greater peak reductions.[7] It also appears that that the enabling technology impacts may be greater than those with price only.

[7] For the PTR rate, the effective critical peak price is calculated by adding the peak time rebate to the rate that the customer pays during that time period.

Figure 5. Impacts from Pricing Tests by Peak to Off-Peak Ratio, Showing Rate Type and Presence of Enabling Technologies



The plot suggests that peak impacts increase with the price ratio but at a decreasing rate. The logarithmic model would model rapid increases in peak reduction in the lower price ratios, followed by slower growth.[8]

Logarithmic Model

$$y = a + b * \ln(price\ ratio)$$

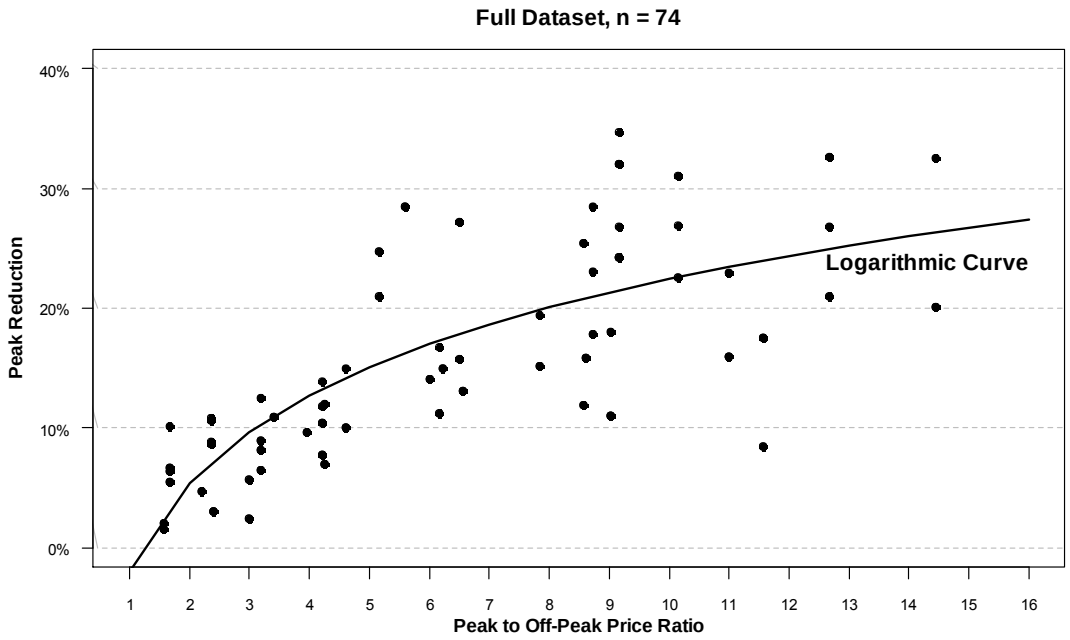
where $y = peak\ reduction\ percent$

Results

When we fit the logarithmic model to the full dataset (n = 74), it yields a coefficient of 0.106 with a standard error of 0.012, significant at the 0.001 level. In other words, as the price ratio increases, the peak reduction is also expected to increase. The peak-to-off-peak price ratio successfully explains 49 percent of the variation in demand response. The logarithmic curve suggests that if the peak to off-peak price ratio were to get as high as 16, the peak reduction could be close to 30 percent.

[8] We also considered a logistic growth model that features slow growth at lower price ratios followed by moderate growth, followed by an upper bound peak reduction. The results were not significantly different with this functional form.

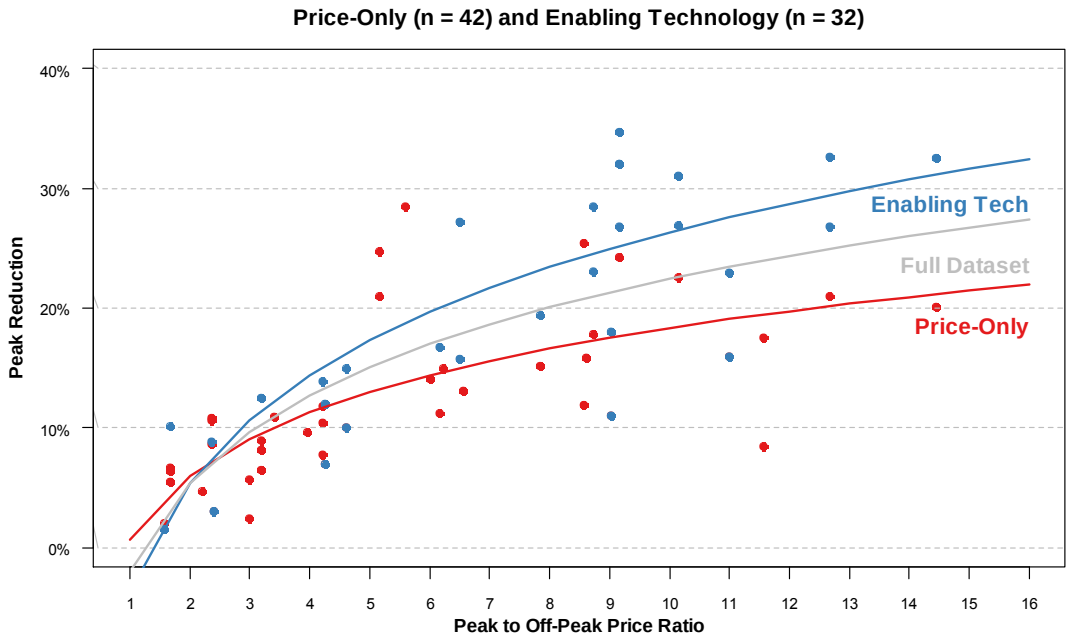
Figure 6. Impacts from Pricing Tests by Peak to Off-Peak Ratio with the Fitted Logarithmic Curve



We can narrow down the model to focus on the price-only observations separately from the enabling technology observations. With this data, the model yields a coefficient of 0.077 with a standard error of 0.012, again significant at the 0.001 level. The coefficient is slightly lower here than in the full dataset, suggesting that the impacts increase more slowly in the absence of enabling technology. In this case, the adjusted R-squared value is 48 percent, meaning the ratio again explains almost half of the variation in response. The logarithmic curve suggests that if the peak to off-peak price ratio were to get as high as 16, the peak reduction would be slightly over 20 percent.

With the enabling technology tests, we find that the curve has a steeper slope than the result with price-only tests. The coefficient of the enabling technology curve is 0.130 which has a standard error of .02. The regression successfully explains 53 percent of the variation in demand response. With a peak to off-peak ratio of 16, the peak reduction is expected to be over 30 percent.

Figure 7. Impacts from Pricing Tests by Peak to Off-Peak Ratio with the Fitted Logarithmic Curves, Segregated by Presence of Enabling Technologies



The full regression results for the three different data specifications are shown in Table 2 below. In each case, the coefficient on the natural log of the price ratio is positive and significant at the 0.001 level.

Table 2. Regression Results

Coefficient	Full Dataset		Price-Only		Enabling Technology	
Ln(Price Ratio)	0.10611	***	0.07682	***	.13029	***
	(0.01254)		(0.01220)		(0.02164)	
Intercept	-0.01985		0.00654		-0.03668	
	(0.02234)		(0.02071)		(0.04080)	
Adjusted R-Squared	0.4916		0.4852		0.532	
F-Statistic	71.59		39.65		36.24	
Observations	74		42		32	

Standard errors are shown in parentheses below the estimates
*** = 0.001 significance
** = 0.01 significance
* = 0.05 significance

Conclusion

In our view, the results presented in this paper provide strong support for the deployment of dynamic pricing. They conclusively show that customers are responsive to changes in the price of electricity. In other words, they lower demand when prices are higher. Moreover, the results suggest that the presence of enabling technology allows customers to increase their peak reduction even further. These results may be used to quantify the potential peak reductions that may be expected when new dynamic rates are rolled out and to monetize these benefits using estimates of the avoided capacity of capacity and energy.[9]

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[9] On the monetization of benefits arising from smart meters and dynamic pricing in the context of the EU, see Ahmad Faruqui, Dan Harris, and Ryan Hledik, "Unlocking the €53 billion savings from smart meters in the EU: How increasing the adoption of dynamic tariffs could make or break the EU's smart grid investment," *Energy Policy*, 2010.

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Biography of Authors

Ahmad Faruqui is a principal with The Brattle Group. He has been analyzing time-varying experiments since the beginning of his career in 1979 and his early work is cited in the third edition of Professor Bonbright's canon on public utility ratemaking. The author of four books and more than a hundred papers on energy policy, he holds a doctoral degree in economics from the University of California at Davis and bachelor's and master's degrees from the University of Karachi.

Jennifer Palmer is a research analyst at The Brattle Group. Since joining The Brattle Group in 2009, she has worked with a wide range of utilities on dynamic pricing and advanced metering projects. For several utilities, she has developed dynamic tariffs, simulated the impacts of these rates on customer consumption patterns, and estimated the resulting system-level benefits. She has a bachelor's degree in economics with a certificate in environmental studies from Princeton University.

Appendix

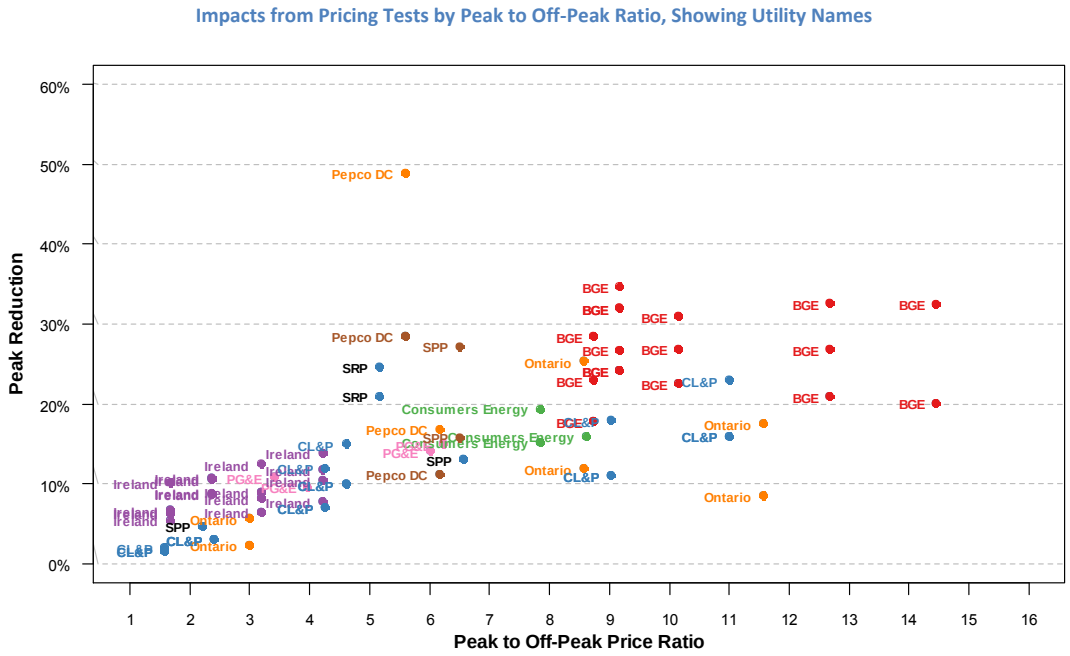
Impacts from Pricing Tests by Peak to Off-Peak Ratio, Showing Utility Names
Peak Reduction
60%
50%
40%
30%
20%
10%
0%
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Peak to Off-Peak Price Ratio
Pepco DC
BGE
SPP
SRP
Ontario
CL&P
Consumers Energy
PG&E
Ireland

Exhibit __ (AMI-4R)

Case 17-E-0238
Case 17-G-0239

Rebuttal Testimony of The Advanced Metering Infrastructure Panel

Exhibit ___ (AMI-4R)

Analysis of the Staff AMI Panel's five percent meter replacement recommendation

Exhibit___(AMI-4R)
Schedule 1
Page 1 of 1

Analysis of Staff 5% Electric AMR Replacement Proposal

	Percent of Electric AMR Meters Greater than X-years of Age																			
	< 18	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
FY 21	86.47%	13.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 22	41.28%	58.72%	8.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 23	29.50%	70.50%	53.72%	3.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 24	33.31%	66.69%	65.50%	48.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 25	37.64%	62.36%	61.69%	60.50%	43.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 26	42.21%	57.79%	57.36%	56.69%	55.50%	38.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 27	46.31%	53.69%	52.79%	52.36%	51.69%	50.50%	33.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 28	51.12%	48.88%	48.69%	47.79%	47.36%	46.69%	45.50%	28.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 29	55.05%	44.95%	43.88%	43.69%	42.79%	42.36%	41.69%	40.50%	23.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 30	58.05%	41.95%	39.95%	38.88%	38.69%	37.79%	37.36%	36.69%	35.50%	18.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 31	62.72%	37.28%	36.95%	34.95%	33.88%	33.69%	32.79%	32.36%	31.69%	30.50%	13.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 32	65.67%	34.33%	32.28%	31.95%	29.95%	28.88%	28.69%	27.79%	27.36%	26.69%	25.50%	8.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 33	68.89%	31.11%	29.33%	27.28%	26.95%	24.95%	23.88%	23.69%	22.79%	22.36%	21.69%	20.50%	3.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 34	71.97%	28.03%	26.11%	24.33%	22.28%	21.95%	19.95%	18.88%	18.69%	17.79%	17.36%	16.69%	15.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 35	76.61%	23.39%	23.03%	21.11%	19.33%	17.28%	16.95%	14.95%	13.88%	13.69%	12.79%	12.36%	11.69%	10.50%	0.00%	0.00%	0.00%	0.00%	0.00%
FY 36	81.60%	18.40%	18.39%	18.03%	16.11%	14.33%	12.28%	11.95%	9.95%	8.88%	8.69%	7.79%	7.36%	6.69%	5.50%	0.00%	0.00%	0.00%	0.00%
FY 37	85.00%	15.00%	13.40%	13.39%	13.03%	11.11%	9.33%	7.28%	6.95%	4.95%	3.88%	3.69%	2.79%	2.36%	1.69%	0.50%	0.00%	0.00%	0.00%

Annual Replacement % 5.00%

Exhibit ___ (AMI-5R)

Case 17-E-0238
Case 17-G-0239

Rebuttal Testimony of The Advanced Metering Infrastructure Panel

Exhibit ___ (AMI-5R)

Electric meter AMR and gas ERT replacement schedules used to calculate avoided AMR costs

Exhibit___(AMI-5R)
Schedule 1
Page 1 of 2

Electric AMR Meter Replacement Schedule for Avoided AMR Cost Estimate

	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	FY 33	FY 34	FY 35	FY 36	FY 37	FY 38
Yearly Replacement	42,618	42,618	315,936	855,548	285,993	42,618	42,618	42,618	34,155	0	0	0	0	0	0	0	0	0
% Replaced by Year	2.50%	2.50%	18.53%	50.19%	16.78%	2.50%	2.50%	2.50%	2.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aggregate Replaced	42,618	85,236	401,172	1,256,720	1,542,713	1,585,331	1,627,949	1,670,567	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722	1,704,722
Aggregate % Replaced	2.50%	5.00%	23.53%	73.72%	90.50%	93.00%	95.50%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Annual Replacement % 2.50%
Meter Life (In years) 20

Exhibit___(AMI-5R)
Schedule 1
Page 2 of 2

Gas ERT Replacement Schedule for Avoided AMR Cost Estimate

	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	FY 33	FY 34	FY 35	FY 36	FY 37	FY 38
Aggregate % Replaced	1.59%	3.18%	23.09%	46.97%	70.86%	76.59%	78.18%	79.78%	81.37%	82.96%	84.55%	86.14%	87.74%	89.33%	90.92%	92.51%	94.11%	95.70%	97.29%	98.88%
% Replaced by Year	1.59%	1.59%	19.90%	23.88%	23.88%	5.73%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%	1.59%
Yearly Replacement	10,000	10,000	125,000	150,000	150,000	36,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Aggregate Replaced	10,000	20,000	145,000	295,000	445,000	481,000	491,000	501,000	511,000	521,000	531,000	541,000	551,000	561,000	571,000	581,000	591,000	601,000	611,000	621,000

Annual Replacement % 1.59%
ERT Life (In years) 19

Exhibit __ (AMI-6R)
REDACTED

Case 17-E-0238
Case 17-G-0239

Rebuttal Testimony of The Advanced Metering Infrastructure Panel

Exhibit ___ (AMI-6R Confidential)

Comparison of the ESAI Energy LLC ("ESAI") and the Staff AMI Panel's ICAP forecast

Annual Avoided Generation Capacity Costs (AGCC) due to 1 kW reduction in Peak Load*
All Prices in 2017 Dollars

Year	AGCC at Transmission Level	
	Staff Forecast ROS	ESAI Forecast ROS
2017	[redacted]	[redacted]
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		

*Based on 2017 Gold Book
**AGCC at Distribution Level = AGCC at Transmission Level / (1-Distribution Losses)
Assumed Distribution Losses:

NYC = New York City (Load Zone J)
LHV = Lower Hudson Valley (Load Zones GHI)
LI = Long Island (Load Zone K)
ROS = Rest of State (Upstate Load Zones A-F)
NYCA=NY Control Area (Statewide)

Exhibit __ (AMI-7R)

Case 17-E-0238
Case 17-G-0239

Rebuttal Testimony of The Advanced Metering Infrastructure Panel

Exhibit ___ (AMI-7R)

Updated BCA results for changes to costs and benefits and the ICAP forecast sensitivity

REDACTED

Original Filing (April 28, 2017) AMI BCA

Category	Scenario 1 Opt-In Lo - 20 Year NPV SCT	Scenario 1 Opt-In Lo - 20 Year NPV UCT	Scenario 1 Opt-In Lo - 20 Year NPV RIM	Scenario 2 Opt-In Hi - 20 Year NPV SCT	Scenario 2 Opt-In Hi - 20 Year NPV UCT	Scenario 2 Opt-In Hi - 20 Year NPV RIM	Scenario 3 Opt-Out Lo - 20 Year NPV SCT	Scenario 3 Opt-Out Lo - 20 Year NPV UCT	Scenario 3 Opt-Out Lo - 20 Year NPV RIM	Scenario 4 Opt-Out Hi - 20 Year NPV SCT	Scenario 4 Opt-Out Hi - 20 Year NPV UCT	Scenario 4 Opt-Out Hi - 20 Year NPV RIM
Costs												
AMI Meter and Installation Cost Table 4-1												
AMI Electric Meter Equipment and Installation	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05
AMI Gas ERT Equipment and Installation	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37
AMI Inventory	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12
Support Infrastructure	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37
Total	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**
Communications Network Equipment and installation Table 4-2												
Network Equipment and Installation	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62
Communication Network Installation Management	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30
Backhaul	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07
Total	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**
Platform and Ongoing IT Operations Costs Table 4-3												
Total	**$ 226.64**	**$ 178.29**	**$ 178.29**	**$ 226.64**	**$ 178.29**	**$ 178.29**	**$ 226.64**	**$ 178.29**	**$ 178.29**	**$ 226.64**	**$ 178.29**	**$ 178.29**
Project Management and Ongoing Business Operations Cost Table 4-4												
Equipment and Installation Refresh Cost	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13
Ongoing Business Management	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47
Customer Engagement Cost	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95
Project Management	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49
Total	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**
Revenue Benefits Table 5-10 (Negative Cost)												
Reduction in Theft of Service	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55
Reduction in Write-offs and Inactive Meter Consumption	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50
Total	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**
Total Cost	**$ 607.98**	**$ 512.22**	**$ 405.18**	**$ 607.98**	**$ 512.22**	**$ 405.18**	**$ 607.98**	**$ 512.22**	**$ 405.18**	**$ 607.98**	**$ 512.22**	**$ 405.18**
Benefits												
Avoided O&M Costs Table 5-1												
AMR Meter Reading	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51
Meter Investigation	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00
Remote Connect and Disconnect	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78
Reduction in Damage Claims	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79
Total	**$ 117.79**	**$ 86.08**	**$ 86.08**	**$ 117.79**	**$ 86.08**	**$ 86.08**	**$ 117.79**	**$ 86.08**	**$ 86.08**	**$ 117.79**	**$ 86.08**	**$ 86.08**
Avoided AMR Costs Table 5-2												
Capital	$ 254.35	$ 225.40	$ 225.40	$ 254.35	$ 225.40	$ 225.40	$ 254.35	$ 225.40	$ 225.40	$ 254.35	$ 225.40	$ 225.40
Operations & Maintenance	$ 21.24	$ 18.05	$ 18.05	$ 21.24	$ 18.05	$ 18.05	$ 21.24	$ 18.05	$ 18.05	$ 21.24	$ 18.05	$ 18.05
Total	**$ 275.60**	**$ 243.45**	**$ 243.45**	**$ 275.60**	**$ 243.45**	**$ 243.45**	**$ 275.60**	**$ 243.45**	**$ 243.45**	**$ 275.60**	**$ 243.45**	**$ 243.45**
Customer Benefits Table 5-8												
Volt-VAR Optimization	$ 21.76	$ 15.06	$ 15.06	$ 21.76	$ 15.06	$ 15.06	$ 21.76	$ 15.06	$ 15.06	$ 21.76	$ 15.06	$ 15.06
Energy Insights/High Usage Alerts	$ 53.62	$ 39.46	$ 39.46	$ 53.62	$ 39.46	$ 39.46	$ 53.62	$ 39.46	$ 39.46	$ 53.62	$ 39.46	$ 39.46
Time Varying Pricing	$ 42.45	$ 29.63	$ 29.63	$ 91.35	$ 78.54	$ 78.54	$ 169.78	$ 156.97	$ 156.97	$ 365.39	$ 352.58	$ 352.58
Total	**$ 117.83**	**$ 84.16**	**$ 84.16**	**$ 166.73**	**$ 133.06**	**$ 133.06**	**$ 245.16**	**$ 211.50**	**$ 211.50**	**$ 440.77**	**$ 407.11**	**$ 407.11**
Societal Benefits (CO_2 Emmission Reductions) Table 5-9												
AMR Meter Reading	$ 7.62	$ -	$ -	$ 7.62	$ -	$ -	$ 7.62	$ -	$ -	$ 7.62	$ -	$ -
Meter Investigations	$ 2.75	$ -	$ -	$ 2.75	$ -	$ -	$ 2.75	$ -	$ -	$ 2.75	$ -	$ -
Remote Connect and Disconnect (CO_2)	$ 32.88	$ -	$ -	$ 32.88	$ -	$ -	$ 32.88	$ -	$ -	$ 32.88	$ -	$ -
Energy Insights/High Usage Alerts (CO_2)	$ 23.48	$ -	$ -	$ 23.48	$ -	$ -	$ 23.48	$ -	$ -	$ 23.48	$ -	$ -
Time Varying Pricing (CO_2)	$ 5.99	$ -	$ -	$ 11.97	$ -	$ -	$ 23.94	$ -	$ -	$ 47.89	$ -	$ -
Total	**$ 72.72**	**$ -**	**$ -**	**$ 78.70**	**$ -**	**$ -**	**$ 90.67**	**$ -**	**$ -**	**$ 114.62**	**$ -**	**$ -**
Total Benefit	**$ 583.93**	**$ 413.69**	**$ 413.69**	**$ 638.82**	**$ 462.59**	**$ 462.59**	**$ 729.23**	**$ 541.03**	**$ 541.03**	**$ 948.78**	**$ 736.64**	**$ 736.64**
Net Benefit	**$ (24.05)**	**$ (98.53)**	**$ 8.52**	**$ 30.84**	**$ (49.63)**	**$ 57.42**	**$ 121.24**	**$ 28.81**	**$ 135.85**	**$ 340.80**	**$ 224.42**	**$ 331.46**
Benefit to Cost Ratio:	**$ 0.96**	**$ 0.81**	**$ 1.02**	**$ 1.05**	**$ 0.90**	**$ 1.14**	**$ 1.20**	**$ 1.06**	**$ 1.34**	**$ 1.56**	**$ 1.44**	**$ 1.82**

REDACTED

Revised AMI BCA

Category	Scenario 1 Opt-In Lo - 20 Year NPV SCT	UCT	RIM	Scenario 2 Opt-In Hi - 20 Year NPV SCT	UCT	RIM	Scenario 3 Opt-Out Lo - 20 Year NPV SCT	UCT	RIM	Scenario 4 Opt-Out Hi - 20 Year NPV SCT	UCT	RIM
Costs												
AMI Meter and Installation Cost Table 4-1												
AMI Electric Meter Equipment and Installation	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05
AMI Gas ERT Equipment and Installation	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37
AMI Inventory	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12
Support Infrastructure	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37
Total	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**
Communications Network Equipment and installation Table 4-2												
Network Equipment and Installation	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62
Communication Network Installation Management	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30
Backhaul	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07
Total	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**
Platform and Ongoing IT Operations Costs Table 4-3												
Total	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**
Project Management and Ongoing Business Operations Cost Table 4-4												
Equipment and Installation Refresh Cost	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13
Ongoing Business Management	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47
Customer Engagement Cost	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95
Project Management	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49
Total	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**
Revenue Benefits Table 5-10 (Negative Cost)												
Reduction in Theft of Service	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55
Reduction in Write-offs and Inactive Meter Consumption	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50
Total	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**
Total Cost	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**
Benefits												
Avoided O&M Costs Table 5-1												
AMR Meter Reading	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51
Meter Investigation	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00
Remote Connect and Disconnect	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78
Reduction in Damage Claims	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79
Storm OMS Benefit	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01
Interval Meter Reading	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85
Total	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**
Avoided AMR Costs Table 5-2												
Capital	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95
Operations & Maintenance	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64
Total	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**
Customer Benefits Table 5-8												
Volt-VAR Optimization	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04
Energy Insights/High Usage Alerts	$ 53.62	$ 39.46	$ 39.46	$ 160.85	$ 118.39	$ 118.39	$ 53.62	$ 39.46	$ 39.46	$ 160.85	$ 118.39	$ 118.39
Time Varying Pricing	$ 28.17	$ 19.55	$ 19.55	$ 59.24	$ 41.09	$ 41.09	$ 89.81	$ 62.31	$ 62.31	$ 188.82	$ 130.98	$ 130.98
Electric Vehicle Pricing	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66
Total	**$ 107.11**	**$ 76.71**	**$ 76.71**	**$ 245.41**	**$ 177.18**	**$ 177.18**	**$ 168.74**	**$ 119.47**	**$ 119.47**	**$ 374.99**	**$ 267.07**	**$ 267.07**
Societal Benefits (CO_2 Emmission Reductions) Table 5-9												
AMR Meter Reading	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -
Meter Investigations	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -
Remote Connect and Disconnect (CO_2)	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -
Energy Insights/High Usage Alerts (CO_2)	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -
Time Varying Pricing (CO_2)	$ 4.37	$ -	$ -	$ 8.74	$ -	$ -	$ 13.93	$ -	$ -	$ 27.87	$ -	$ -
Incremental VVO	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -
Total	**$ 42.70**	**$ -**	**$ -**	**$ 47.07**	**$ -**	**$ -**	**$ 52.26**	**$ -**	**$ -**	**$ 66.19**	**$ -**	**$ -**
Total Benefit	**$ 534.58**	**$ 392.25**	**$ 392.25**	**$ 677.25**	**$ 492.72**	**$ 492.72**	**$ 605.78**	**$ 435.01**	**$ 435.01**	**$ 825.96**	**$ 582.60**	**$ 582.60**
Net Benefit	**$ (59.27)**	**$ (108.31)**	**$ (1.27)**	**$ 83.40**	**$ (7.84)**	**$ 99.20**	**$ 11.93**	**$ (65.55)**	**$ 41.49**	**$ 232.11**	**$ 82.04**	**$ 189.09**
Benefit to Cost Ratio:	**$ 0.90**	**$ 0.78**	**$ 1.00**	**$ 1.14**	**$ 0.98**	**$ 1.25**	**$ 1.02**	**$ 0.87**	**$ 1.11**	**$ 1.39**	**$ 1.16**	**$ 1.48**

Revised AMI BCA w/ ESAI ICAP Sensitivity

	Scenario 1 Opt-In Lo - 20 Year NPV			Scenario 2 Opt-In Hi - 20 Year NPV			Scenario 3 Opt-Out Lo - 20 Year NPV			Scenario 4 Opt-Out Hi - 20 Year NPV		
Category	**SCT**	**UCT**	**RIM**	**SCT**	**UCT**	**RIM**	**SCT**	**UCT**	**RIM**	**SCT**	**UCT**	**RIM**
Costs												
AMI Meter and Installation Cost Table 4-1												
AMI Electric Meter Equipment and Installation	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05	$ 217.79	$ 193.05	$ 193.05
AMI Gas ERT Equipment and Installation	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37	$ 56.60	$ 50.37	$ 50.37
AMI Inventory	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12	$ 4.64	$ 4.12	$ 4.12
Support Infrastructure	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37	$ 13.86	$ 12.37	$ 12.37
Total	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**	**$ 292.90**	**$ 259.92**	**$ 259.92**
Communications Network Equipment and installation Table 4-2												
Network Equipment and Installation	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62	$ 7.94	$ 6.62	$ 6.62
Communication Network Installation Management	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30	$ 8.19	$ 7.30	$ 7.30
Backhaul	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07	$ 2.77	$ 2.07	$ 2.07
Total	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**	**$ 18.90**	**$ 15.98**	**$ 15.98**
Platform and Ongoing IT Operations Costs Table 4-3												
Total	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**	**$ 212.50**	**$ 166.63**	**$ 166.63**
Project Management and Ongoing Business Operations Cost Table 4-4												
Equipment and Installation Refresh Cost	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13	$ 8.28	$ 6.13	$ 6.13
Ongoing Business Management	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47	$ 24.18	$ 18.47	$ 18.47
Customer Engagement Cost	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95	$ 25.61	$ 22.95	$ 22.95
Project Management	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49	$ 11.47	$ 10.49	$ 10.49
Total	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**	**$ 69.55**	**$ 58.03**	**$ 58.03**
Revenue Benefits Table 5-10 (Negative Cost)												
Reduction in Theft of Service	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55	$ -	$ -	$ 42.55
Reduction in Write-offs and Inactive Meter Consumption	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50	$ -	$ -	$ 64.50
Total	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**	**$ -**	**$ -**	**$ 107.05**
Total Cost	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**	**$ 593.85**	**$ 500.56**	**$ 393.51**
Benefits												
Avoided O&M Costs Table 5-1												
AMR Meter Reading	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51	$ 45.78	$ 33.51	$ 33.51
Meter Investigation	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00	$ 5.47	$ 4.00	$ 4.00
Remote Connect and Disconnect	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78	$ 57.08	$ 41.78	$ 41.78
Reduction in Damage Claims	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79	$ 9.46	$ 6.79	$ 6.79
Storm OMS Benefit	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01	$ 2.83	$ 2.01	$ 2.01
Interval Meter Reading	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85	$ 1.11	$ 0.85	$ 0.85
Total	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**	**$ 121.74**	**$ 88.95**	**$ 88.95**
Avoided AMR Costs Table 5-2												
Capital	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95	$ 242.24	$ 208.95	$ 208.95
Operations & Maintenance	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64	$ 20.80	$ 17.64	$ 17.64
Total	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**	**$ 263.04**	**$ 226.59**	**$ 226.59**
Customer Benefits Table 5-8												
Volt-VAR Optimization	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04	$ 14.51	$ 10.04	$ 10.04
Energy Insights/High Usage Alerts	$ 53.62	$ 39.46	$ 39.46	$ 160.85	$ 118.39	$ 118.39	$ 53.62	$ 39.46	$ 39.46	$ 160.85	$ 118.39	$ 118.39
Time Varying Pricing	$ 40.77	$ 27.75	$ 27.75	$ 87.58	$ 59.54	$ 59.54	$ 129.96	$ 88.44	$ 88.44	$ 279.17	$ 189.78	$ 189.78
Electric Vehicle Pricing	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66	$ 10.81	$ 7.66	$ 7.66
Total	**$ 119.71**	**$ 84.91**	**$ 84.91**	**$ 273.76**	**$ 195.63**	**$ 195.63**	**$ 208.90**	**$ 145.60**	**$ 145.60**	**$ 465.35**	**$ 325.87**	**$ 325.87**
Societal Benefits (CO2 Emmission Reductions) Table 5-9												
AMR Meter Reading	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -	$ 3.35	$ -	$ -
Meter Investigations	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -	$ 1.21	$ -	$ -
Remote Connect and Disconnect (CO2)	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -	$ 14.43	$ -	$ -
Energy Insights/High Usage Alerts (CO2)	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -	$ 15.05	$ -	$ -
Time Varying Pricing (CO2)	$ 4.37	$ -	$ -	$ 8.74	$ -	$ -	$ 13.93	$ -	$ -	$ 27.87	$ -	$ -
Incremental CVR	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -	$ 4.28	$ -	$ -
Total	**$ 42.70**	**$ -**	**$ -**	**$ 47.07**	**$ -**	**$ -**	**$ 52.26**	**$ -**	**$ -**	**$ 66.19**	**$ -**	**$ -**
Total Benefit	**$ 547.18**	**$ 400.45**	**$ 400.45**	**$ 705.60**	**$ 511.17**	**$ 511.17**	**$ 645.94**	**$ 461.14**	**$ 461.14**	**$ 916.31**	**$ 641.40**	**$ 641.40**
Net Benefit	**$ (46.67)**	**$ (100.11)**	**$ 6.93**	**$ 111.75**	**$ 10.61**	**$ 117.65**	**$ 52.08**	**$ (39.42)**	**$ 67.62**	**$ 322.46**	**$ 140.84**	**$ 247.89**
Benefit to Cost Ratio:	**$ 0.92**	**$ 0.80**	**$ 1.02**	**$ 1.19**	**$ 1.02**	**$ 1.30**	**$ 1.09**	**$ 0.92**	**$ 1.17**	**$ 1.54**	**$ 1.28**	**$ 1.63**

REDACTED

Division 2-9

Request:

Regarding the AMF investments described in Schedule PST-1, Chapter 4, please describe in detail any reasons why the Company might not be able to pursue the scenario where it shares costs with Niagara Mohawk.

Response:

The Company would not be able to share costs with Niagara Mohawk Power Corporation (Niagara Mohawk) if the New York State Public Service Commission (NYPSC) does not approve Niagara Mohawk's AMI plan. As detailed in the Company's response to Division 6-18, Niagara Mohawk is currently seeking regulatory approval from the NYPSC to implement AMI as part of its April 2017 rate case (Cases 17-E-0238 and 17-G-0239). Through the rate case process, Niagara Mohawk has agreed to convene a collaborative with Department of Public Service Staff and interested parties to refine and update its AMI business plan. The Company will file a report with a revised AMI business plan no later than October 1, 2018 for NYPSC review and approval. Although there is no required timetable for the NYPSC to act on the filing, Niagara Mohawk is hopeful to obtain direction in early 2019.

(This response is identical to the Company's response to Division 8-9 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-10

Request:

Regarding the AMF investments described in Schedule PST-1, Chapter 4:

a. Please provide the Company's best estimate of the probability of being able to share costs with Niagara Mohawk.

b. Please use the probability provided in response to (a) to estimate the expected value of the cost of the AMF initiative.

c. Please provide the Company's best estimate of when it will be able to determine whether it will be able to share costs with Niagara Mohawk.

Response:

a. National Grid is currently seeking regulatory approval to implement AMI for Niagara Mohawk Power Corporation (Niagara Mohawk) as detailed in the Company's response to Division 2-9. The Company cannot meaningfully estimate the likelihood of approval at this time.

b. See response to part a. above.

c. Niagara Mohawk filed for service territory-wide electric and gas AMI implementation as part of its April 2017 rate case. Through the rate case process, Niagara Mohawk has agreed to convene a collaborative with Department of Public Service Staff and interested parties to refine and update its AMI business plan. The Company will file a report with a revised AMI business plan no later than October 1, 2018, for New York Public Service Commission review and action. Although there is no required time table for the New York Public Service Commission to act on the filing, Niagara Mohawk is hopeful to obtain direction in early 2019.

(This response is identical to the Company's response to Division 8-10 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-11

Request:

Regarding the AMF investments described in Schedule PST-1, Chapter 4, does the Company plan to collect the undepreciated costs associated with the existing meters that are removed? If so, how? If not, why not?

Response:

Yes. The Company plans to recover the costs through normal depreciation rates of the associated rate base.

(This response is identical to the Company's response to Division 8-11 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-12

Request:

Regarding the AMF investments described in Schedule PST-1, Chapter 4, in the benefit-cost analysis, does the Company include the undepreciated costs associated with the existing meters that are removed? If so, how? If not, why not?

Response:

No. The undepreciated costs associated with existing meters that are replaced by AMF meters are sunk costs and, therefore, should not be factored into the benefit-cost analysis.

(This response is identical to the Company's response to Division 8-12 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-13

Request:

Please provide the Company's annual number of customers with electric vehicles for each of the past five calendar years.

Response:

Please see the Company's response to Division 1-22, part a., which reads as follows:

a. Please see the table below.

YR2013	**YR2014**	**YR2015**	**YR2016**	**YR2017**[1]
210	223	530	731	1026

(This response is identical to the Company's response to Division 8-13 in Docket No. 4770.)

[1] 2017 data is through September 30, 2017.

Prepared by or under the supervision of: John Leana

Division 2-14

Request:

Please provide the Company's System Average Interruption Frequency Index and System Average Interruption Duration Index for the last five years in machine-readable format with formulas intact.

Response:

Attachment DIV 2-14 contains Narragansett Electric's historical SAIFI and SAIDI values for the years 2012 through 2016. No formulas are contained within the attached file as a result of the dynamic nature of the Company's outage management data, which does not allow the Company to go back and capture with precision the data points that make up each of these indices.

(This response is identical to the Company's response to Division 8-14 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

The Narragansett Electric Company				
Major Storm Excluded				
Year	SAIFI	SAIDI	SAIFI Target	SAIDI Target
2012	0.90	65.99	1.05	71.9
2013	0.72	57.28	1.05	71.9
2014	0.78	54.06	1.05	71.9
2015	0.94	64.63	1.05	71.9
2016	0.97	69.13	1.05	71.9

Division 2-15

Request:

Refer to Appendix 4.2, AMF BCA Methodology, and Workpaper 4.1, AMF costs.

a. For Workpaper 4.1, please provide the full workbook in electronic format, with all formulae intact, showing the calculations of the costs and benefits, as well as how these costs and benefits were aggregated to form the tables contained in Appendix 4.2.

b. For Workpaper 4.1 and Appendix 4.2, please provide the key assumptions used in the calculation of each benefit or cost and an explanation of how such assumptions were developed, with supporting materials.

Response:

a. Workpaper 4.1 is a summary table developed from the output of the AMF BCA models, which the Company filed as Attachment DIV 1-1-1 (Rhode Island only scenario) and Attachment DIV 1-1-2 (multi-jurisdiction scenario) to its response to Division 1-1.

   The costs and benefits listed in Workpaper 4.1 were aggregated to form the summary tables included in Appendix 4.1, not Appendix 4.2 as referenced in the question; therefore, the Company is providing this response with respect to Appendix 4.1. The 20-Year NPV (FY20$) values included in the Appendix 4.1 tables were aggregated based on the categories identified in the "Group" column of Workpaper 4.1 on Pages 1 through 3. Similarly, the deployment period capital costs included in the Appendix 4.1 tables are the sum of FY20 through FY22 CapEx costs by "Group" outlined in Workpaper 4.1.

b. The AMF BCA models referenced in (a) above include dedicated tabs for the calculation of the cost and benefit elements included in the BCA analysis and summarized in Workpaper 4.1. All values utilized by the calculations are cross-referenced to input tabs (i.e. system inputs, benefit inputs, cost inputs) within the models. Furthermore, each of the calculation inputs contains a cross-reference to source documentation. Please see Attachments DIV 2-15-1 and DIV 2-15-2 CONFIDENTIAL for the majority of source documents for the AMF BCA models. The Company also provided a few incremental source documents as Attachment 2-4-2 CONFIDENTIAL to the Company's response to Division 2-4.

(This response is identical to the Company's response to Division 8-15 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-16

Request:

Refer to page 2 of Chapter 4 – AMF in PST-1, where it is stated that the Company's AMF proposal will allow the Company to explore "the opportunity to partner with other parties that could share in the cost and benefit from the access to a state-wide communications system." Please list the other parties that the Company has been in contact with or expects to be in contact with regarding the sharing of the cost and benefit of the state-wide communications system.

Response:

The Company has commenced an effort to explore the value of a state-wide communications system with the external support from a consultant. Through this effort, the Company has identified possible partners, as outlined on Page 15 of Schedule PST-1, Chapter 4 - AMF (Bates Page 83 of PST Book 1). The Company is planning to initiate a more detailed analysis and engage with interested parties during the Detailed Planning and Procurement phase. This analysis will ultimately determine the total lifecycle costs of the development of a state-wide communications system and identify value drivers for the Company and other potential partners.

(This response is identical to the Company's response to Division 8-16 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-17

Request:

Refer to page 5 of Chapter 4 – AMF in PST-1, where it is states that the AMF program includes "an analytics platform to convert raw data into intelligent information for use in decision making by customers and the Company." Please provide examples of the types of intelligent information provided via the analytics platform that will be used by customers and the Company.

Response:

The basis for the intelligent information envisioned in this case are the interval electric and gas readings that the Advanced Metering Functionality (AMF) meters and natural gas ERTs are collecting in more frequent intervals, respectively. The conversion of this raw data provides customers with greater detail and intelligent insights about their energy usage and costs, which can be displayed through channels such as the proposed Energy Management Portal. Please see section *1.3.3 Customer Engagement Products and Services* on Page 10 of Appendix 4.1 – AMF Technology & BCA, REDACTED (specifically Figure 4-2 on Page 11) (Bates Pages 11-12 of PST Book 2) for more information and illustrative examples of how the Energy Management Portal can convert raw interval usage data into intelligent information that can be employed by customers to increase education and personalized engagement with their usage.

Additionally, this intelligent information can be used to deliver new services for customers such as notifications and alerts of high usage patterns, participation in time-varying rates, and the ability to share data with qualified third parties via the Green Button Connect My Data functionality. This information also can provide enhanced customer solutions such as participation in energy efficiency and demand response programs, a solar marketplace, and electric vehicle adoption, all of which are elements noted within the Customer Energy Management Platform. An illustrative example of the Customer Energy Management Platform and its features is shown within Figure 4-3 on Page 13 of Appendix 4.1 – AMF Technology & BCA, REDACTED (Bates Page 14 of PST Book 2).

The real-time interval data provided by the AMF will contribute to increasing the forecast accuracy of the Company's electricity and gas operations and planning needs. The granular raw data can serve as a basis for better understanding individual customer load profiles, which reflect true-to-life energy consumption profiles far better than the current aggregated customer class type profiles currently utilized. In addition, the specific energy usage behavior and activities can help the Company evaluate the efficacy of energy efficiency, distributed generation and demand response implementation and provide future insights to plan for these activities.

The intelligent information can also serve as a proof of concept for evaluating nonintrusive load monitoring systems in the future. This would enable the Company to fully account for the

disaggregated loads and their respective profiles, which are critical in measuring emerging technologies such as electric vehicles, photovoltaics, energy storage systems, etc.

(This response is identical to the Company's response to Division 8-17 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana

Division 2-18

Request:

Refer to page 6 of Chapter 4 – AMF in PST-1, where it states that the "Company estimates that approximately 33% of electric meters will be installed in FY2021, followed by 67% in FY2022." Please describe how the Company intends to decide where to deploy AMF first, both in terms of service rates and geographical regions.

Response:

The Company intends to develop a more detailed meter deployment plan during Fiscal Year 2019 as outlined in Schedule PST-1 Chapter 4, Pages 23–24 (Bates Pages 91-92 of PST Book 1). The process to develop the detailed meter deployment plan will consider a number of factors including, but not limited to, deployment efficiency, installation resource levels, and benefit realization, and is expected to include stakeholder input.

(This response is identical to the Company's response to Division 8-18 in Docket No. 4770.)

Prepared by or under the supervision of: John Leana