PSEG LONG ISLAND

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Utility 2.0 Long Range Plan
2018 Annual Update

Prepared for Long Island Power Authority

June 29, 2018

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Executive Summary

PSEG Long Island is submitting this Utility 2.0 Long Range Plan (Plan) in accordance with Public Authorities Law Section 1020-f(ee) and the Amended and Restated Operations Services Agreement (OSA) dated December 31, 2013, for review by the Long Island Power Authority (LIPA) and the New York State Department of Public Service (DPS). PSEG Long Island is seeking a positive recommendation on the Plan from DPS and incremental funding approval from LIPA.

This Plan is an update to prior plans that date back to the first Utility 2.0 Plan from July 2014. This Plan reflects PSEG Long Island adapting to changing needs of customers, advancing technology and the policy direction and goals developed within the Reforming the Energy Vision (REV) process in New York and consistent with New York State Public Service Commission (PSC) proceedings. The comprehensive program detailed in this filing encompasses foundational technologies, systems and innovative offerings that will empower customers while providing a net societal benefit and lowering electric rates over the life of the project.

To date, LIPA and PSEG Long Island have undertaken numerous notable accomplishments to secure a cleaner and more affordable energy future for Long Island. LIPA leads New York in deploying programs for energy efficiency and clean energy technology. Long Island is home to New York's most aggressive energy efficiency programs, New York's three largest utility-scale solar projects, New York's most vibrant rooftop solar market, New York's first utility-scale battery project, New York's largest deployment of clean fuel cell technology, and now New York's first offshore wind farm—the 90 MW South Fork Wind Farm, which will be in service by the end of 2022. These initiatives are consistent with REV and state policies, are cost-effective, and help to reduce demand for electricity throughout Long Island by 1%-2% per year.

Figure ES-1. REV on Long Island



Source: LIPA

The following are some of the activities PSEG Long Island has successfully completed that lay the foundation for the programs and projects laid out in this Plan.

- **Leader in state for energy efficiency**
  PSEG Long Island has continued to build upon the historic energy efficiency initiatives undertaken by LIPA. In 2016, energy efficiency savings from the PSEG Long Island programs represented approximately 1.55% of overall utility sales and ranked PSEG Long Island within the top seven leading energy efficiency jurisdictions in the country, well ahead of the rest of New York. The efficiency programs offered continue to support all aspects of the customer base and encompass everything from residential home energy reports (HERs) informing customers about the details of their consumption and insights on managing their energy use to large-scale combined heat and power (CHP) projects enabling municipal waste water districts to more efficiently provide services for their customers.

  In early 2018, all residential customers were offered incentives toward the purchase of a smart thermostat and provided access to various energy efficient products through an online energy marketplace.

  The programs have continued to allow Long Island to lead by example in fostering a cleaner and more efficient environment for the next generation to inherit.

- **Leader in state for rooftop solar PV**
  There are now over 40,000 solar PV systems on Long Island, representing about 40% of the systems in the entire state. The residential solar market on Long Island was the first to be fully subscribed under the MW-block program, meaning that rebates for such systems have been phased out. Even without rebates, PSEG Long Island continues to receive about 500 applications per month for electric interconnection, and the market for residential solar PV remains strong.

- **Feed-in tariffs for solar and fuel cells**
  LIPA is the only utility in New York State that has offered feed-in tariffs (FITs) for renewable generation. Thus far, such FITs have led to 85 power purchase agreements (PPAs) totaling 76 MW of solar PV and three PPAs for fuel cells totaling 6 MW of capacity. About 43 MW of this capacity is now in operation, with the remainder in various stages of permitting and construction.

  The fuel cells were selected based upon their locational value to the grid and will defer the need for significant investments in traditional transmission and distribution (T&D) infrastructure when constructed.

- **Largest utility-scale solar projects**
  In addition to the FITs, LIPA has executed PPAs with developers of large, utility-scale solar projects located at Brookhaven National Labs (37 MW), and Suffolk County to install carports (12 MW).

- **South Fork portfolio for Non-Wires Solution (NWS)**
  LIPA also has three significant contracts for NWSs in the South Fork: 90.0 MW of offshore wind, 10.0 MW of battery storage at two locations (5 MW each), and 8.2 MW of demand response and energy efficiency.

- **Town of Huntington microgrid**
  PSEG Long Island is working with developers for a potential microgrid in Huntington, which has received an award under the State's New York Prize initiative.

Building on its ongoing efforts and mission, PSEG Long Island's Utility 2.0 vision is to continue to be a customer-centric, innovative, and forward-looking utility to address industry change, New York's energy policy objectives, and the needs and interests of its customers. Through the proposed programs, initiatives and projects of its Utility 2.0 Roadmap (U2.0 Roadmap), PSEG Long Island will act on this vision and continue to transform to a clean and distributed electrical system consistent with REV and other New York State clean energy policies. PSEG Long Island will do this in three-part progression to:

- **Empower Customers through Advanced Metering Infrastructure (AMI):** The foundational step is to establish a digital and unique connection with all customers through AMI.
- **Explore New Innovative Offerings:** Develop a portfolio of new customer offerings leveraging emerging technologies and third-party solutions through ongoing demonstration.
- **Evolve to a Distributed System Platform (DSP):** Invest in grid functionalities, systems and processes that will enable a distributed grid ecosystem.

Utility 2.0 Filing Overview

Acting on behalf of and in consultation with LIPA, PSEG Long Island has developed this detailed Plan of investment, operational transformation, and customer engagement to chart REV adaptation on Long Island, including:

- **Section 1** provides the drivers that influenced the shape of PSEG Long Island's programs and proposed investments over the span of this Utility 2.0 Plan. The changing nature of the electric industry, the larger goals of New York through REV and other New York State clean energy policies, and the utility's informed view of the needs of its customers are the basis for the program design detailed in this Plan.
- **Section 2** describes how customers will be empowered by the full deployment of AMI across Long Island and all the related capabilities that are planned to leverage this foundational infrastructure including enhanced tools and rate options. PSEG Long Island is also proposing a suite of added AMI-enabled capabilities to improve outage restoration and revenue protection. Additionally, a Utility of the Future (UoF) team together with a Data Analytics initiative will leverage the enhanced data insight from AMI to build the customer and system knowledge that will be integral to becoming a DSP. The in-depth customer engagement program is outlined in this section and is detailed in the *AMI Customer Engagement Plan* provided in Appendix A.
- **Section 3** details the portfolio of innovative projects that individually and collectively test emerging solutions for the PSEG Long Island system and customers that align to larger policy goals of REV. This area is the laboratory to demonstrate the use cases of energy efficiency, demand response, energy storage, and electric vehicles (EVs). The cornerstone is the Super Savers Program demonstration project, which is a NWS effort to attract load response through a multi-solution portfolio of targeted efficiency, demand response, and customer-sited distributed energy resources (DER). This project also makes use of behavioral-based information to change customer energy usage.

- **Section 4** outlines a series of initiatives to begin to transform the Long Island grid towards DSP functionality as defined by REV, evolving the distribution grid into a multi-faceted platform that can functionally integrate DER and foster innovative new business models. Funding is sought to support joining the New York Joint Utilities process as well as for critical analyses and tools for the UoF team including:
    - an advanced interconnection program,
    - a Locational Cost of Service study to enhance understanding of system capacity, and
    - a NWS planning tool to help analyze alternative solutions based upon system requirements and customer profiles.

  The studies and tools developed will be tightly integrated across the Data Analytics initiative and UoF team, and in coordination with New York Joint Utilities process participation, will allow the utility to pursue the integral elements of PSC guidance[1] and current REV best practices.
- **Section 5** provides an overview of the overall Utility 2.0 program budgets and correlating rate impacts. The utility is proposing a suite of investments that have been thoroughly vetted and analyzed using the established New York benefit-cost analysis (BCA) framework. While a positive net benefit was a central measure of which projects would be included in the filing, other important aspects such as testing and learning new approaches as well as the advancement of policy goals focused on lowering carbon and resource diversity were considered.

Utility 2.0 Program Structure

PSEG Long Island, in coordination with LIPA, continues to embark on a strategy to better learn how to meet the needs of its customers today and into the future.

PSEG Long Island is committed to changing the way energy is produced and consumed on Long Island and in New York. PSEG Long Island's strategy is to advance the development of new utility and third-party services or business models and to gain experience with integration of DER to serve the needs of the grid, its customers, and to support New York State policies.

The progression of the energy distribution system over the next 20 years from a centrally-controlled grid composed of siloed assets and linear value chains to a DSP as envisioned by REV entails the series of investments described in this Plan. Implementing these investments is based first on thorough cross-functional development within PSEG Long Island's organization, with a focus on identifying the key functionalities needed and their benefits to system operations and customers.

PSEG Long Island proposes a programmatic structure centered on empowering customers, exploring new offerings, and evolving to a DSP. The areas of investment presented in this Plan align with these three pillars, as listed in Table ES-1. Utility 2.0 Areas of Investment.

[1] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Distributed System Implementation Plan Guidance*, April 20, 2016 and "Guidance for 2018 DSIP Updates," DPS Staff White Paper, April 26, 2018.

Table ES-1. Utility 2.0 Areas of Investment

Empowering Customers	Exploring New Offerings	Evolving to the DSP
AMI Technology and Systems	Super Savers: NWS with Targeted Energy Efficiency	Interconnection Online Application Portal (IOAP)
Program Implementation Support[2]	Utility-Scale Storage	Locational Value Study
Customer Engagement	Behind-the-Meter (BTM) Storage with Solar	NWS Planning Tools
Rate Modernization	EV Program	
Analytics and UoF		
Outage Management		
Revenue Protection		

The proposed investments will be carried out as programs, initiatives and projects as follows:

- **Programs** are an established direction to achieve strategic and policy objectives that will entail initiatives and projects over time.
- **Initiatives** are new efforts that are continued or begun with this filing such as those that take advantage of AMI capabilities, which will become a permanent part of operations over time.
- **Projects** are new technologies and solutions that are being offered to customers, often on a developmental basis, whose ultimate duration will be a function of what is learned in terms of their value to customers and the Long Island electric system.

There are critical interrelationships across the program, initiative, and project areas that establish the building blocks for REV adaptation and the transformation to a DSP. For example, the Data Analytics initiative and UoF team detailed in Section 2.3 will direct the grid studies and analytical tools outlined in Section 4 that are integral to optimizing the role of DER over time.

Utility 2.0 Funding Request

PSEG Long Island prepared capital and operating budgets for the programs, initiatives and projects outlined in its U2.0 Roadmap. Further, PSEG Long Island prepared BCAs comparing the benefits of these investments to the costs per the BCA framework used by the New York State utilities.

[2] Includes Program Management Office (PMO), Business Process Design, and Change Management

PSEG Long Island requests funding as summarized in Table ES-2. The 4-year budget requests represent added costs as a sum of nominal dollar values for 2019-2022. The OPEX column represents both labor and non-labor costs. More details on these values can be found in Section 4.3.

Table ES-2. Summary of Funding Request and Benefit-Cost Ratios for PSEG Long Island Utility 2.0 Programs, Initiatives and Projects

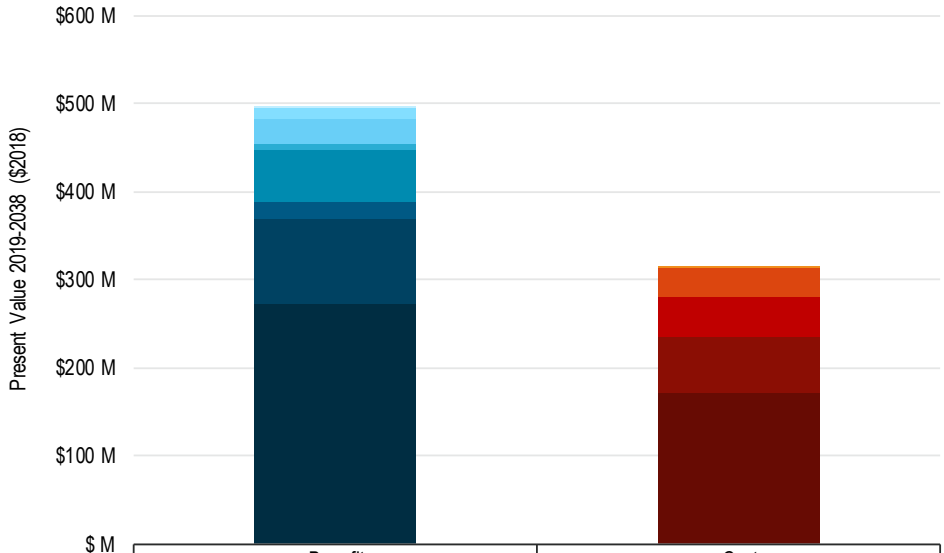
	PSEG Long Island Utility 2.0 Program, Initiative or Project	4-Year CAPEX Request ($M)	4-Year OPEX Request ($M)	4-Year F&PP Request ($M)	Benefit-Cost Ratio (Societal Cost Test)
Empowering Customers	AMI Technology and Systems (Core)	$196.3	$7.5	-	1.58
	Program Implementation Support (Core)	$8.0	$1.0	-	
	Customer Experience (Enabled)	$7.8	$16.4	-	
	Rate Modernization (Enabled)	$9.5	$18.0	-	
	Analytics and UoF (Enabled)	$6.7	$6.3	-	
	Outage Management (Enabled)	$1.0	$0.5	-	
	Revenue Protection (Enabled)	$1.1	-	-	
Exploring Offerings	Super Savers	-	$3.0	$0.1	1.49
	Grid Storage	$4.9	$1.1	-	1.02
	BTM Storage with Solar	-	$0.6	$0.5	1.29
	EV Program	$1.0	$20.5	-	1.29
Evolving to the DSP	IOAP Interconnection	$2.3	$2.3	-	N/A
	Locational Value Study	$1.0	$2.1	-	
	NWS Planning & Analysis Tool	-	$0.5	-	
	All Utility 2.0 Roadmap	$239.4	$79.7	$0.5	1.52

Note: CAPEX = capital expenditure; OPEX = operational expenditure; F&PP = fuel and purchase power

Utility 2.0 Business Case Benefit-Cost Assessment Summary

AMI and its enabled functionalities and services are the cornerstone of the U2.0 Roadmap accounting for $498 million in expected benefits versus $315 million in proposed costs, yielding a BCA ratio of 1.58 from the societal perspective. AMI benefits are driven primarily by operations and maintenance (O&M) savings, reduced customer outage costs, reduced utility outage restoration cost, and avoided capacity-related costs, while enabling vital customer information, tools, and solutions. As summarized in Figure ES-2, the 20-year forward-looking benefit-cost analysis for AMI and AMI-enabled functions indicates an overall net benefit for Long Island's customers and society.

Figure ES-2. AMI Business Case BCA Results



	Benefit	Cost
Net Avoided CO2	$1.8 M	$0.0 M
Avoided Transmission Capacity Infrastructure	$13.7 M	$0.0 M
Avoided Generation Capacity Cost (AGCC)	$27.1 M	$0.0 M
Avoided Energy (LBMP)	$6.7 M	$0.0 M
Avoided Restoration Costs	$60.7 M	$0.0 M
Avoided Distribution Capacity Infrastructure	$17.7 M	$0.0 M
Avoided Outage Costs	$97.9 M	$0.0 M
Avoided O&M	$271.9 M	$0.0 M
Communications Network Equip and Installation	$0.0 M	$1.1 M
PM and Ongoing Business Operations	$0.0 M	$34.2 M
Added O&M	$0.0 M	$44.7 M
Platform and Ongoing IT Operations	$0.0 M	$64.5 M
Meters & Installation Costs	$0.0 M	$170.7 M
Total	$497.6 M	$315.1 M

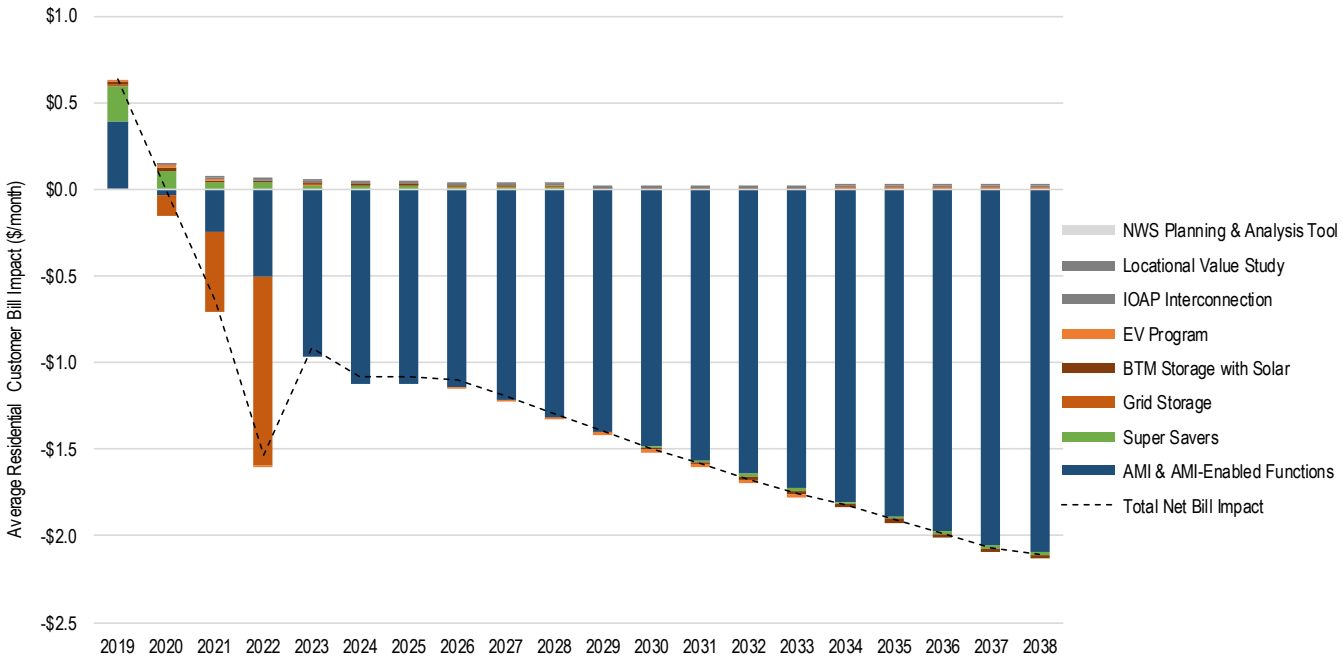
The benefit-cost analyses for all other innovative programs and projects in this filing (i.e., Super Savers, Grid Storage, BTM Storage with Solar, and EV Program) show that societal benefits outweigh the societal costs for each project. These business cases are described in more detail in Section 3.

Utility 2.0 Rate Impact Analysis

The proposed Utility 2.0 program will provide Long Island with foundational AMI functionality and enabling capabilities and innovative offerings that are expected to lower ratepayer bills.[3] The downward pressure on rates is primarily due to operational efficiencies from the automation of meter reading, enhanced revenue protection and prospective revenues from electric vehicles. The collective programs, initiatives, and projects included in this filing will result in lower average customer bills starting in 2021 and onward.

Figure ES-3 shows the monthly impacts on an average residential bill of $150 per month due to the net capital, O&M, fuel & purchase power, and revenue cash flows associated with the U2.0 investments. An average residential customer bill will increase by $0.63 per month in 2019 to pay for the initial expenditures required to ramp up the deployment of AMI and other innovative offerings. By as soon as 2020, PSEG Long Island begins to see reductions in operating expenses and increased revenue due to AMI-enabled revenue protection and electric vehicles[4]. From 2021 through 2038, steadily increasing cost savings and additional revenue lead to significantly reduced monthly customer bills going forward. The bill of an average commercial customer is also expected to be reduced in a similar fashion. More details on the bill impacts can be found in Section 5.

Figure ES-3. Residential Customer Bill Impacts due to Utility 2.0 Investments



[3] Rate impacts were modeled over the next 20 years, 2019 through 2038.

[4] During 2019-2022, the electric vehicle program will be in its planning phase, after which PSEG Long Island will consider developing future incentives such as new tariff rates for promoting off-peak charging. For this reason, the revenue impacts due to electric vehicles were not modeled beyond 2022.

1. Vision and Roadmap

The industry is seeing a significant transformation in how customers are powering their homes and businesses. Increasingly, customers are reducing their energy consumption, generating and storing their own electricity, and electrifying previously fossil fuel-powered building systems and vehicles. Growing up with the tools to manage engagement with their physical and digital worlds at their fingertips, first-time customers will expect greater lifestyle integration from their energy providers. Similarly, commercial customers are facing pressures to keep pace with sustainable, innovative, and customer-centric business models. At the same time, these and many other customers wish to manage their energy costs. In summary, customers expect PSEG Long Island to develop new solutions and processes that will achieve this vision.

PSEG Long Island's vision and Utility 2.0 Roadmap (U2.0 Roadmap) reflect this ongoing disruption and transition within the energy sector as well as the future envisioned by Reforming the Energy Vision (REV). As the utility evolves, PSEG Long Island, working with Long Island Power Authority (LIPA), will continue to evolve its customer-centric, innovative, and forward-looking solutions, initiatives and projects to support its customers, vision, and mission in accordance with New York State's goals as it has done since initiating its Utility 2.0 Plan in 2014.

1.1 State of the Industry: New York State and Beyond

The global energy industry is undergoing a transformation: decarbonization and increasing numbers of distributed solutions and tools are driven by customer preferences and rapidly improving technology. Ever-accelerating technology improvements have translated to a lower price of DER to customers and grid automation capabilities that enhance visibility and allow grid operators to optimize the benefits of interconnected DER. These factors converge to drive a much greater emphasis on customer options and a more agile distribution grid.

In 2014, New York State launched REV to "reorient both the electric industry and the ratemaking paradigm toward a consumer-centered approach that harnesses technology and markets."[5] In its inaugural REV policy order, the New York Public Service Commission (PSC) acknowledged that changing customer preferences, advancing technology, and a societal effort to decarbonize have given rise to a profound rethinking of the planning and operation of the electric system. In this way, REV seeks to diversify electric supply and improve system efficiency by integrating and optimizing customer-sited DER. To realize this vision, the utility business model transitions toward a DSP by incorporating advanced functional requirements to enhance system planning, grid operations, and market facilitation.

REV seeks to transition the energy industry in New York by focusing on its six core policy objectives:[6]

- **Boost system reliability and resiliency:** New York's electricity system needs to be prepared for more severe weather. REV will help achieve greater reliability and resilience, including providing electricity during grid outages through DER.

[5] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Regulatory Policy Framework and Implementation Plan*, February 26, 2015.

[6] Descriptions of the six REV objectives provided by REV Connect: https://nyrevconnect.com/rev-briefings/rev-objectives/.

- **Enable new energy markets and leverage customer contributions:** REV will foster markets that allow customers and companies to use DER and optimize grid assets to create value and deliver energy more efficiently.
- **Enhance customer knowledge and capabilities:** Companies and utilities in New York will provide timely information and insights to customers so that they can better understand and manage their energy use.
- **Ensure fuel and resource diversity:** To make customers less vulnerable to dips in supply and spikes in prices, New York's energy system will integrate multiple sources of generation, demand management, storage, and energy efficiency.
- **Improve system-wide efficiency:** Utilities will adopt new technologies and approaches to improve the utilization of the grid infrastructure by reducing peak demand and implementing alternatives to capital upgrades.
- **Reduce carbon emissions:** REV supports New York's goal to reduce greenhouse gas emissions 40% from 1990 levels by 2030 by encouraging DER, energy efficiency, and demand management.

1.2 PSEG Long Island's Vision and Strategy

PSEG Long Island's mission is to build an industry leading electric service company that places safety first, in all we do, providing our customers across Long Island and the Rockaways with:

- Excellent customer service.
- Best-in-class electric reliability and storm response.
- Opportunities for energy efficiency and renewables.
- Local, caring, and committed employees, dedicated to giving back to their communities.

PSEG Long Island is committed to providing excellent service and valuable information to all its customers in ways that educate them on energy-related decisions. Tomorrow's customers will expect a service experience on par with other industry leaders who, in many cases, are not utilities at all, but customer-centric businesses like Airbnb, Netflix, and Amazon.

Building on its ongoing efforts, mission and the state of the market, PSEG Long Island's Utility 2.0 vision is to be a customer-centric, innovative, and forward-looking utility that provides clean and reliable energy, develops options for new energy products and services, and enables customers to make informed energy decisions.

Figure 1-1. PSEG Long Island's Utility 2.0 Vision and Strategy

PSEG Long Island's Utility 2.0 vision is to be a customer-centric, innovative, and forward-looking utility that is dedicated to a clean, reliable and resilient energy system. PSEG Long Island will achieve this vision by empowering its customers through AMI, exploring new offerings, and evolving to become the utility of the future, known as the DSP, for Long Island and the Rockaways.

Focused on its customers and in support of REV, PSEG Long Island's Utility 2.0 objectives are to:

- Motivate and inspire its customers to increase their understanding of all aspects of their energy needs and options and take active control of their energy usage.
- Build and maintain an intelligent grid focused on improving reliability, quality, and security of the electric system.
- Increase opportunities for market innovation and animation with third-party solutions and partnerships.
- Enhance and operate conventional and non-conventional grid assets based on the most up-to-date data and decision-making tools.

As described further below, PSEG Long Island will employ a three-pronged strategy to execute on its Utility 2.0 vision and objectives by:

- Empowering customers through AMI and its enabled tools and functionality.
- Exploring new innovative offerings, including DER solutions and business models.
- Evolving to the DSP by rethinking the way we do grid and market planning and operations.

1.2.1 Empowering Customers through AMI

PSEG Long Island's customers want to be a part of the energy industry transformation and desire improved reliability, resiliency, and cost-effectiveness of the energy system and customer programs. In response to these needs and interests, PSEG Long Island seeks to modernize the customer experience by offering tools and rate options that encourage customers to proactively manage their energy use, lower their costs, and/or increase their use of DER.

To deliver these tools and options, PSEG Long Island proposes to deploy system-wide AMI that will leverage and expand upon its existing AMI investments and deployments. System-wide AMI will greatly expand the data available for analytics for these customer-facing offerings as well as enable enhanced grid operations including specific initiatives for outage management and revenue protection.

1.2.2 Exploring New Innovative Offerings

PSEG Long Island will continue its efforts to test and incorporate diverse resources to meet customer and system needs through several new DER offerings to customers that include energy storage with solar and electric vehicles (EVs). PSEG Long Island will continue to build upon these programs and explore ways of partnering with third-party market participants to deliver value through business model innovation. PSEG Long Island will execute its strategy to develop its innovative products, solutions, and platforms by:

- Building upon its organizational experience.
- Institutionalizing learning.
- Modernizing rate design.
- Informing the opportunity to scale innovation.
- Engaging customers in new ways.
- Partnering with third-party energy service providers.

1.2.3 Evolving to the Distributed System Platform

To guide the transition of the utility model, the New York PSC defined a set of functions of the DSP. DSP functioning combines planning and operations with the enabling of markets, and investor-owned utilities (IOUs) are to develop Distributed System Implementation Plans (DSIPs).[7] In this filing, PSEG Long Island outlines the steps being taken to incorporate the policy and operational requirements of a DSIP.

PSEG Long Island has undertaken, and plans to further progress, several efforts to develop capabilities and incorporate learnings necessary to build DSP functionality. The proposed data analytics and UoF capabilities will focus on supporting the overall organization in these ongoing efforts in four functional areas: load forecast modeling, special studies and technical support, demonstration projects, and efficiency and renewable energy solutions. These efforts will be bolstered by the proposal to join the New York Joint Utilities to learn and share insights and increasingly align with REV best practices.

1.3 Utility 2.0 Roadmap

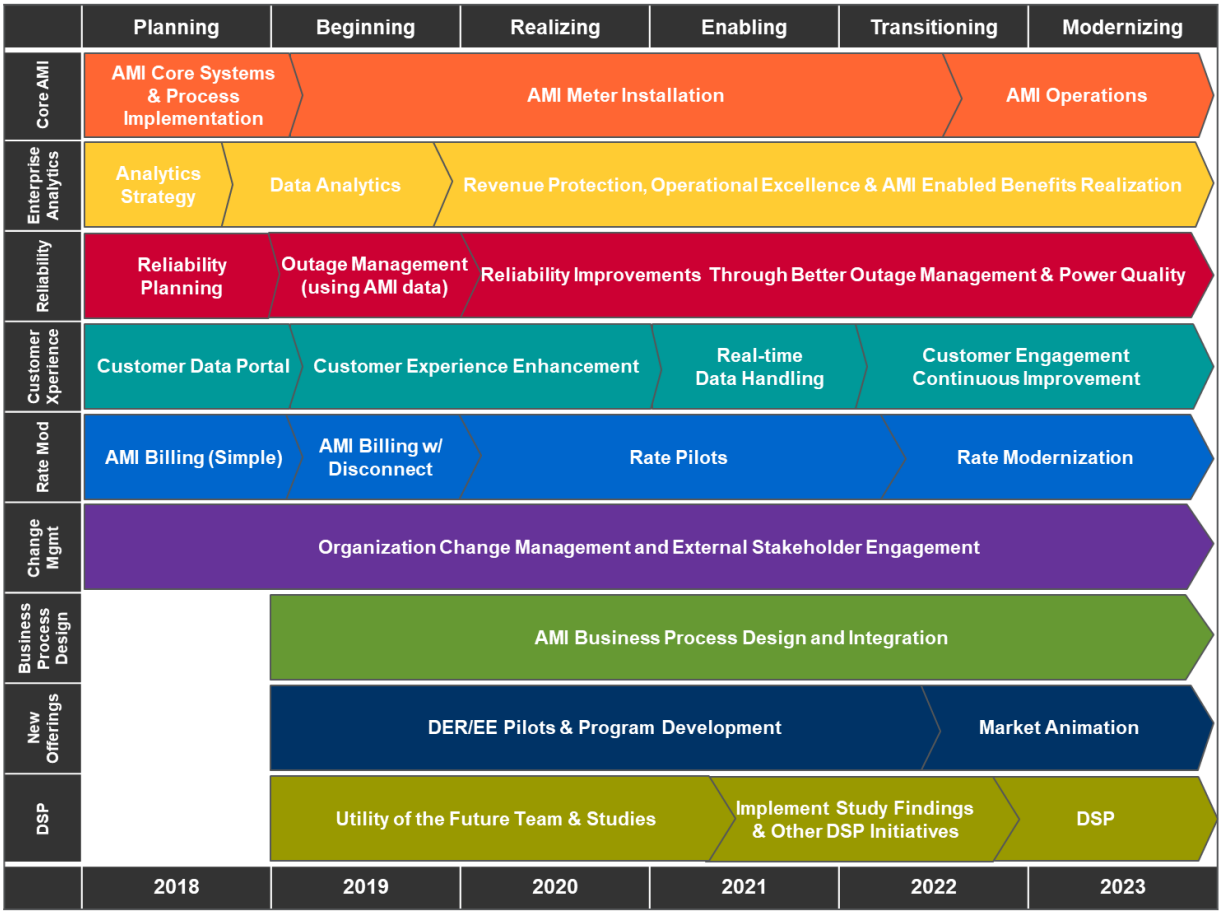
The progression of the energy distribution system over the next 20 years from a centrally controlled grid composed of siloed assets and linear value chains to a DSP as envisioned by REV entails the series of investments described in this filing. The U2.0 Roadmap (Figure 1-2) represents the plan for how PSEG Long Island will execute on its vision to increase engagement with its customers, improve utility operations, and realize a modern, flexible, and robust electric grid.

The U2.0 Roadmap describes how and when the utility and its customers receive the capabilities and benefits of AMI and other initiatives and projects. The U2.0 Roadmap also explains that achieving PSEG Long Island's vision is a journey that requires first establishing a foundation and then using a measured approach, building upon this foundation. The U2.0 Roadmap includes all aspects of empowering customers through AMI as well as parallel efforts to educate customers new DER and energy efficiency offerings and to develop DSP capabilities.

With the Utility 2.0 investments in the full deployment of AMI, accompanying customer engagement initiatives, and UoF studies, PSEG Long Island will continue to improve the value proposition to its customers by offering innovative, value-added products and services.

[7] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Distributed System Implementation Plan Guidance*, April 20, 2016 and "Guidance for 2018 DSIP Updates," DPS Staff White Paper, April 26, 2018.

Figure 1-2. Utility 2.0 Roadmap



2. Empowering Customers Through AMI

To enable its vision as a customer-centric, innovative, and forward-looking utility, LIPA began investing in and utilizing AMI in 2009. By 2016, customers throughout the Long Island service territory began experiencing the benefits of AMI. By the end of 2018, approximately 10% of PSEG Long Island's customers will have access to these benefits. Throughout this deployment, PSEG Long Island has been driven to become an AMI-enabled energy service provider that will:

- Engage and promote energy insights to help its customers make smarter energy decisions.
- Offer new rates enabling additional savings for customers.
- Provide faster and more convenient service leveraging AMI.
    - Faster outage detection and restoration times and timely customer communications.
    - Remote connect/disconnect for move-in/out requests.
    - Near real-time reconnection following resolved payment issues.
- Differentiated and tailored customer service to meet specific customer segment needs.
- Improved customer experience with enhanced digital capabilities and streamlined processes.

From these efforts, PSEG Long Island has learned many lessons it will employ as it continues its deployment, customer engagement and rate programs, and organizational initiatives. As proposed, PSEG Long Island seeks to complete the deployment of AMI across its service territory so that it can maximize customer benefits as well as produce operational savings which will have a net positive impact on rates. PSEG Long Island will further leverage AMI to enable capabilities such as:

- Providing customers with information and new rate options to better manage their energy use.
- Deploying an advanced analytics platform to leverage AMI data to gain critical insights into customer needs and dynamic system conditions to drive enhanced system planning.
- Integrating with outage management systems (OMSs) to improve outage restoration.
- Employing revenue protection solutions that reduce theft of service and decrease losses.

To deliver the proposed initiatives, the utility will also undertake both external and internal engagement programs to ensure that customers engage in and receive value from these investments and to ensure the organization is best positioned. As it relates specifically to AMI and customer engagement initiatives, PSEG Long Island proposes developing a Program Management Office (PMO) to support the multi-year AMI program. PSEG Long Island also plans to embark on transformative Business Process Design and Change Management, while updating data privacy and cyber security policies. Finally, PSEG Long Island plans to develop a UoF group dedicated to evolving many of the functions to operate as a DSP. Over time, these initiatives may merge to continue to transform PSEG Long Island's efforts to serve its customers.

2.1 AMI and Progress to Date

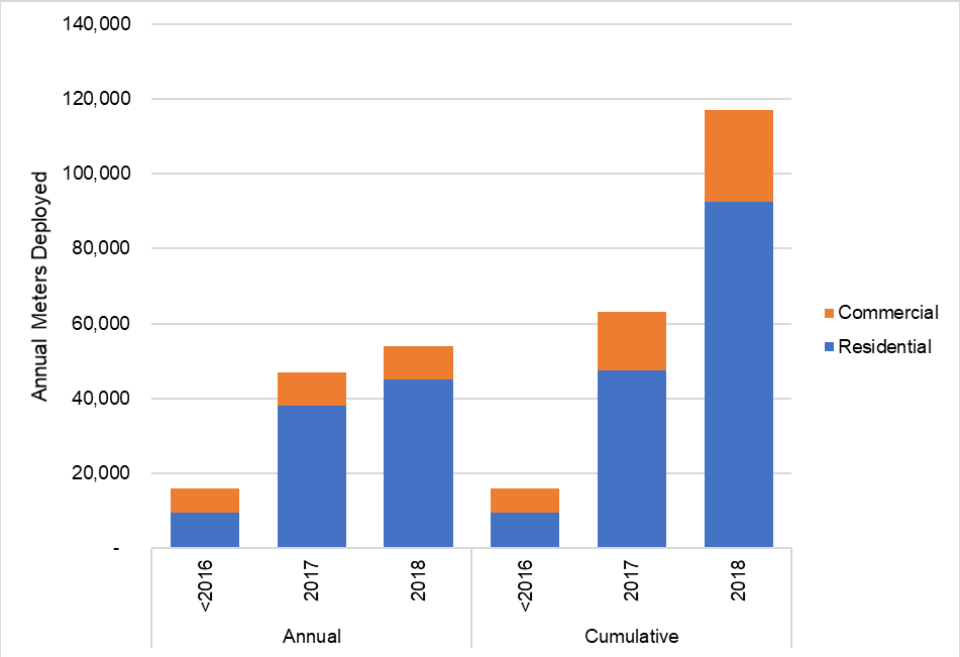
LIPA has undertaken several pilots and selective AMI deployments to help broaden understanding and to gain experience with smart meter technologies. The results have aided PSEG Long Island to understand customer impacts, to develop the necessary technical integration, and to process changes to support the

automation of meter to cash for all LIPA tariff billing rates and to train the workforce to support the installation and troubleshooting of the AMI communications network. PSEG Long Island has also established partnerships with various meter vendors to create a working group and user groups to develop interoperability with multiple meter metrologies and home area networks using mesh technology.

LIPA deployed a MDMS to improve the data integrity of the meter to cash process which in turn provides the customer with usage data in a Customer Portal[8]. The usage data helps educate customers on their usage patterns and helps them make educated decisions to reduce their electric bill. New time-of-use (TOU) rates are marketed as part of enhancing customer experience. MDMS replacement in 2018 will enhance the customer experience with improved an Customer Portal, providing tools for usage comparison, rate analyzation, usage alerts, third party access and secure data through Green Button, a standardized way for customers to get their energy usage data.

During the installation phases of AMI meters and communication network, PSEG Long Island has developed and provided installation and safety training to our installers. In addition, PSEG Long Island has produced and deployed worker productivity-tracking tools to provide timely feedback to installers and to validate PSEG Long Island's full-scale AMI business case assumptions. Numerous small saturation deployments in locations of varying meter density have been tracked to provide even better installation cost projections. Figure 2-1 summarizes the AMI meter deployments installed in the service territory (estimated for 2018) before full-scale deployment begins in 2019.

Figure 2-1. AMI Meter Deployments at PSEG Long Island Forecasted through 12/31/2018



PSEG Long Island is leveraging the island-wide AMI communications network and by the end of 2018 will have installed approximately 10% of the customer base (115,000 meters) measuring over 40% of the system energy. Through these installations, PSEG Long Island has experienced various benefits which include a reduction in estimated bills, remote service operational benefits, improved workforce

[8] Inclusive of portal components relating to AMI (for residential & business), Home Energy Management (residential), business web portal, and PSEG Long Island My Account

management, enhanced customer tools, improved customer outreach, and improved data privacy standards and exceptions management.

2.1.1 Advanced Metering Infrastructure

AMI is an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers. Customer systems include in-home displays, home area networks, energy management systems, and other customer-side-of-the-meter equipment that enable smart grid functions in residential, commercial, and industrial facilities.

This section describes the various smart meter projects and the network deployment performed by LIPA and PSEG Long Island along with the resulting technology experience, customer impacts, systems integration and process outcomes.

AMI Pilots

LIPA evaluated various AMI technologies starting in 2009. The technologies evaluated included a 900 MHz radio frequency (RF) mesh network, 2.4 GHz and 5.4 GHz dual-band RF mesh network, and 450 MHz star point-point network. The testing was performed in the test lab with 50 meters and in 2009 the testing was converted into a field pilot for more use case studies. The pilots were performed in Hauppauge and Bethpage during 2009-2011 (shown in Figure 2-2 and
Figure 2-3).

During this phase, the internal workforce knowledge was developed on the smart meter metrology programs to design the meter configurations to support all LIPA tariff rates including the TOU rates for commercial customers.

Customers were engaged during the pilot phase to inform them about AMI benefits and tools available to assist them in making smarter energy choices. The customers were provided with in-home devices to display the energy usage through the Zigbee connection.

The pilots also provided improvements in the process for network troubleshooting and exceptions management. The internal workforce developed skills in AMI installations as well as communications troubleshooting. The AMI test bed was enhanced to support future rates development in the smart meter and test interoperability standard with various smart device vendors.

Figure 2-2. AMI Pilot Area in Bethpage, New York

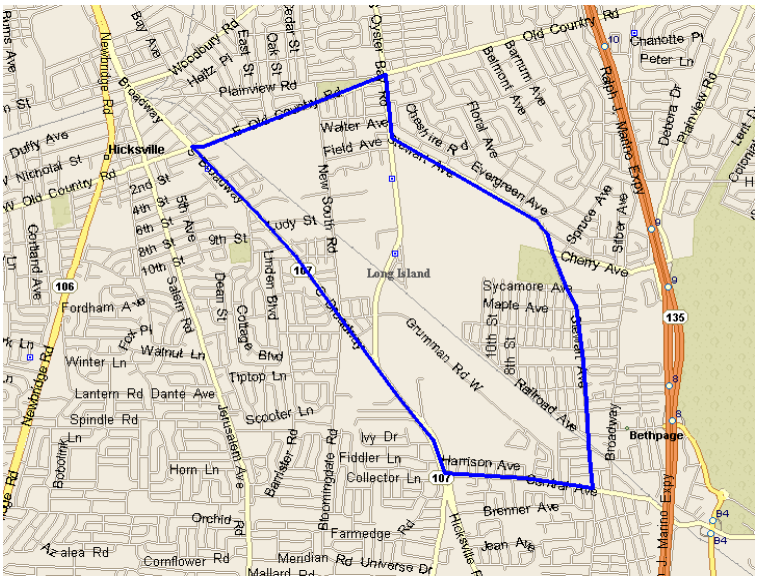
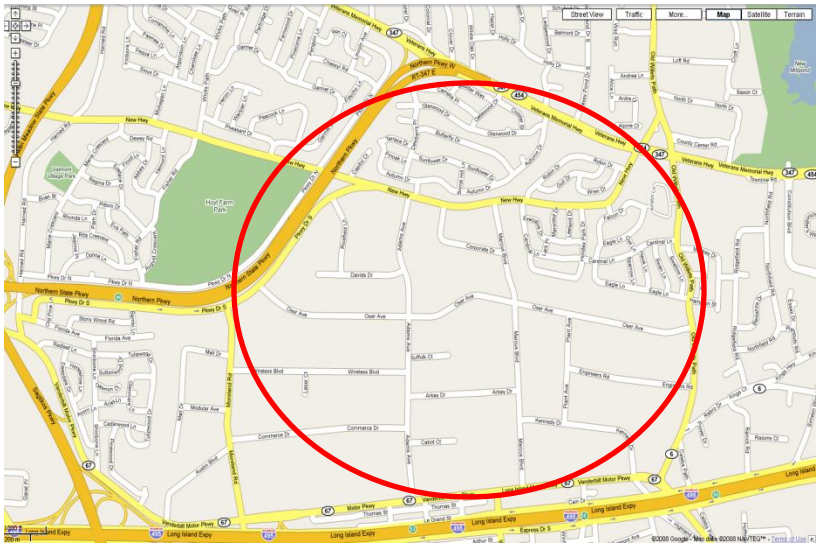


Figure 2-3. AMI Pilot Area in Hauppauge, New York



Route 110 Corridor Smart Grid DOE Pilot

In 2010, the US Secretary of Energy announced $620 million for 32 demonstration projects nationally. LIPA was awarded $12.5 million from the US Department of Energy (DOE) for its Smart Energy Corridor project.

The Smart Grid Corridor project was a collaboration between LIPA, State University of New York (SUNY) at Stony Brook, and Farmingdale State College to create the first Smart Grid on Long Island (Figure 2-4). This project assisted residential, commercial, and industrial LIPA customers in monitoring and reducing energy usage and costs, increase electric reliability, encourage energy efficiency, and create clean energy jobs.

Figure 2-4. Smart Grid Corridor Pilot



The Smart Grid Corridor project included the below key initiatives:

- **Technology:** Demonstration of a full range of smart energy technologies, including substations and distribution feeder automation, AMI, customer-level energy management including automated energy management systems, and integration with distributed generation and plug-in hybrid vehicles (PHEVs).
- **Marketing:** A rigorous market test to identify the optimal combination of features to stimulate customer adoption and acceptance of smart grid technologies including alternative TOU and dynamic pricing plans, varying levels of information and analytical support, web-enabled data visualization options, and enhanced customer outreach efforts.
- **Cyber Security:** Testing of cyber security vulnerabilities in smart grid hardware, network, and application layers in order to develop policies, procedures, and technical controls to prevent or foil cyber-attacks and to harden the smart grid infrastructure.
- **Reliability:** Leveraging new smart grid-enabled data to increase system efficiency and reliability by developing enhanced load forecasting, phase balancing, and voltage control techniques designed to work hand-in-hand with the smart grid technologies.
- **Outreach:** Public outreach and educational initiatives that are linked directly to the demonstration of smart grid technologies, tools, techniques, and system configurations. This includes creation of full-scale operating models demonstrating application of smart grid technologies in business and residential settings.

LIPA has engaged customers during this phase of installation by providing frequently asked questions (FAQs) and education material. A new residential TOU rate was offered to these customers and the company performed a customer class study to develop the usage pattern to improve this rate.

Fire Island AMI Deployment

After Super Storm Sandy in 2012, 70% of the meters on Fire Island were damaged and required replacement. Fire Island is a barrier island off the southern shore of Long Island. Fire Island's customer base is primarily seasonal with a high number of move in/move out requests. Each move in/move out request requires required a special read and service disconnects and reconnects. A business case was approved to replace the meters with AMI technology with the required network coverage to improve the customer billing, provide faster service orders and enhance meter reading performance. LIPA moved forward with the installation of 4,500 AMI meters, two collectors, and 30 routers in 2013.

Customers were engaged during the replacement process with meter change-out notifications. The AMI network improved outage detection and restoration on Fire Island along with remote disconnects and connects and improved response time for the service orders with move in/outs. As a result, the utility has been able to reduce the number of truck rolls to Fire Island by 70%.

New construction standards were developed to address the various challenges in the network pole installation on the South Shore. Lessons learned from the various challenges of the network device installation helped improve the process with the router installations on distribution poles.

Long-Term Estimates

From 2014 to date, PSEG Long Island started installing AMI meters for customers that have long-term estimates in areas with available AMI network coverage. The program is aimed at improving billing for customers.

Appointments are made with these customers and a meter exchange is performed. The AMI meters provided actual usage data thereby reducing estimates and billing issues. Access issues and potential safety concerns have also been reduced. Since 2014, PSEG Long Island has seen a reduction in long-term estimates.

AMI Installation for Billing Improvements

During 2015, PSEG Long Island addressed SUNY Stony Brook's concerns about estimated bills. PSEG Long Island installed collectors on the distribution poles for local backhaul coverage to accommodate the customer's requirements and improve the network connectivity on the north shore of Long Island.

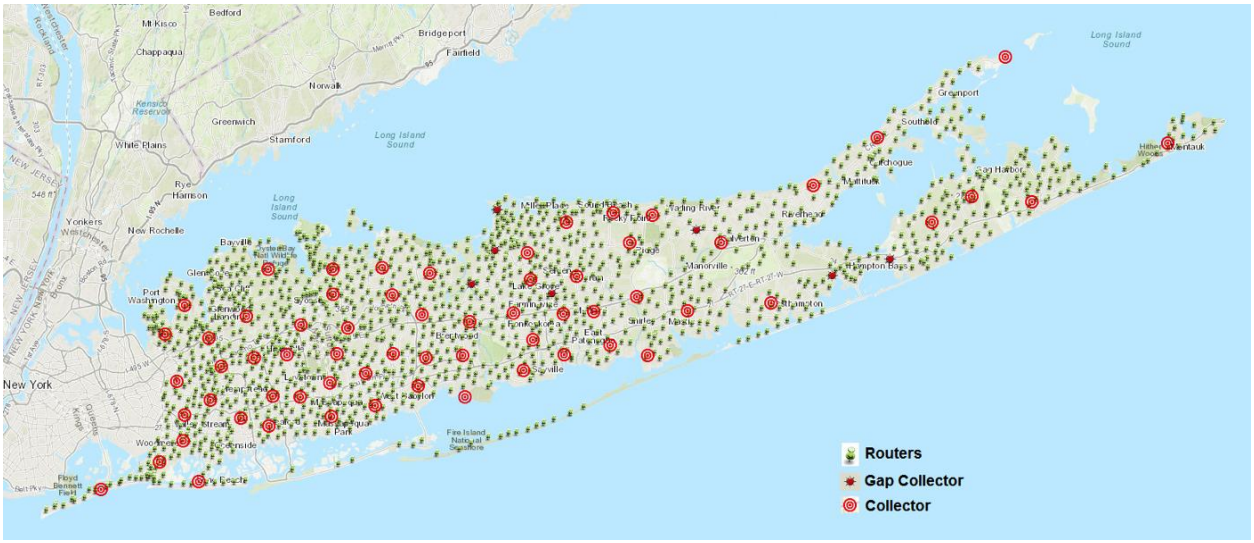
In 2017, PSEG Long Island addressed Long Island Railroad's (LIRR) billing concerns and converted all 136 traction accounts to AMI. The LIRR was engaged with the installation process through PSEG Long Island's Major Account Consultants. Education about the utility's Customer Portal tools and data access for energy management was provided to the LIRR. Further collaboration about future dashboards and power quality management is ongoing. Since the installation, the LIRR has not received an estimated bill. In 2018, PSEG Long Island will install AMI meters on the remaining 400 LIRR non-traction accounts.

PSEG Long Island improved the troubleshooting process of non-communicating AMI meters during the installation phase for AMI meter communication from basements and other hard to reach areas to the network. PSEG Long Island has worked to enhance field tools and troubleshooting methods for technicians and has streamlined work flow processes for communications malfunctions. PSEG Long Island also developed an installation standard for external antennas to boost the signal strength of the meters and trained the work force on the RF troubleshooting techniques.

Island-Wide AMI Network Deployment

As a result of the successes with AMI deployments, in 2016 PSEG Long Island expanded the AMI communications network (Figure 2-5) to cover the entire service territory. The effort focused on deploying 72 collectors and 1,530 routers communicating via radio frequency (RF) throughout the service territory to allow AMI meters to be installed anywhere to support existing or new customers as needed.

Figure 2-5. Existing PSEG Long Island AMI Communication System



PSEG Long Island leveraged process improvements, its trained workforce and competent project management to successfully complete the island-wide network deployment. PSEG Long Island engaged village and town officials to acquire appropriate clearance on the network device installations.

Operations Services Agreement (OSA) Metric Goals

Since 2016, PSEG Long Island has installed the below meters counts with AMI as part of the OSA metric goals. Most meter changes were performed with an AMI-equipped meter, which included customer-generated jobs and the following deployments:

- 5,139 meters installed as part of the OSA goal (2016),
- 47,000 meters installed as part of the OSA goal (2017), and
- 54,000 meters to be installed as part of the OSA goal (2018).

In 2016, AMI deployment focused primarily on targeting the following customer groups:

- Large commercial accounts.
- Critical facilities.
- Net meter customers.
- Locations that pose safety risks to employees.
- Early adopter customers that opt-in for installation of smart meters.

Installation efforts continued in 2017 and 2018, to convert essentially all high consumption and market participant accounts to AMI, including:

- Rate 285 accounts including totalized accounts.
- LIRR traction accounts.
- Recharge New York accounts.
- Retail choice accounts.
- Inter-tie/generation metering points.
- New PV net meter accounts.
- Commercial customers touched (periodics, retirements, damaged, and new business).
- Transition all meters installed to AMI (e.g., PV nets, selectives, periodics retirements, damaged, new).
- Install AMI on targeted safety-related, customer-requested, and long-term estimate accounts.

In 2018, PSEG Long Island plans to install over 54,000 smart meters with a continued focus on:

- Large commercial customers on existing TOU rates.
- Net metered customers.
- Safety-related accounts.
- Bellmore Super Savers saturation deployment.
- Patchogue Super Savers saturation deployment.
- Life support customers.
- Long-term estimates.

PSEG Long Island experienced benefits and improvements, in the following areas, during the last three years of AMI installations.

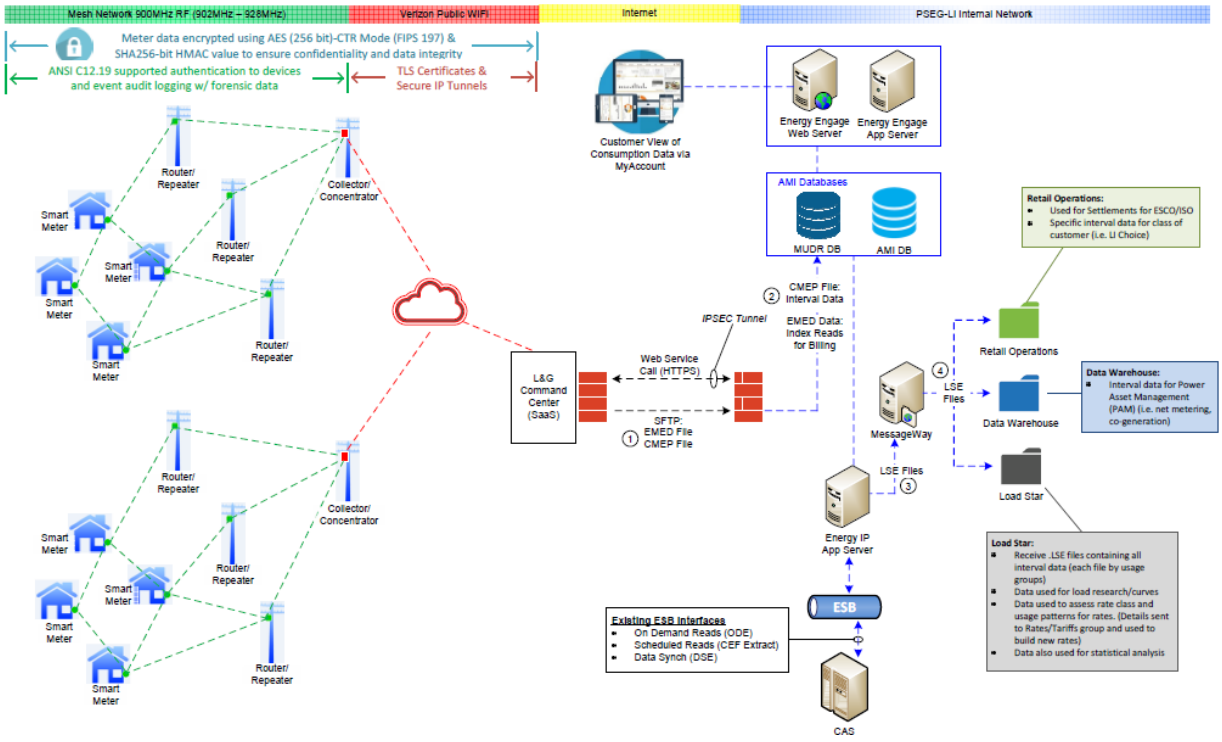
- Training
    - Improved training programs for meter installations.
    - Developed safety training specific to the needs of the installers.
- AMI and MDM Operations
    - Daily Monitoring and troubleshooting of AMI Network.
    - Daily Monitoring of AMI head-end system for data transfer activities, alarms, alerts and events.
    - Meter Data Systems operations for billing data and exceptions management.
    - Data Validation, Estimation and Editing (VEE).
- Work Productivity
    - Developed tools to track the labor costs and work productivity.
    - Tracked customer moments and tampering.

    - Developed process for installation exceptions for unsafe conditions and access issues.
    - Validated the per install cost based on varying meter density.
- Customer Satisfaction
    - Engaged customers with pre-installation letter notification.
    - Made modification to our door hangers to prevent them from falling off.
    - Provided additional information to customers in the field.
    - Developed Opt-Out process.
- Storm Restoration
    - Developed process on monitoring active Single outages in OMS and AMI to improve restoration efforts.
    - Avoided truck rolls using the AMI restoration notifications.
    - Identified Nested outages by analyzing the AMI outage data.
- Theft
    - Identified approximately 10 theft cases by analyzing AMI data
    - Developing an improved revenue integrity process by leveraging AMI data.
- Load Settlement Process
    - Improved load settlement with retail marketers by leveraging the AMI interval data.
    - Improved third party access to the interval data which helped customers explore DER opportunities in the market.
- Safety
    - Automated 1,000 accounts to avoid dog bites.
    - Reduced Occupational Safety and Health Administration goal (OSHA) by 50%.

2.1.2 Meter Data Management System

LIPA procured a MDMS in 2012 to improve the meter to cash process. The MDMS project included system integration (Figure 2-6) with the billing system to automate the transfer of register index reads for billing. The system was developed with configurations to support industry standard data validation rules to maintain the data integrity across the systems. External file transfer interfaces were built to support load settlement, interconnection billing, and rates and pricing load profiling. In addition, PSEG Long Island installed a customer portal to preset customer usage interval data via My Account and support customers to download the data in Green Button format.

Figure 2-6. Systems Architecture Diagram



The MDMS provides individualized, granular, and timely data that is indispensable for customer engagement efforts. The data shared with DER providers can be used to analyze customer usage patterns and develop tailored recommendations for DER. The Customer Portal empowers customers to take control of their energy bills through timely, individualized insights such as usage comparison and pattern analysis.

PSEG Long Island developed a daily operations team for MDMS to support data validation and daily meter-to-cash process monitoring. PSEG Long Island developed processes for exception management on daily reads. In 2017, the company implemented automation of data synchronization between the billing system and the MDMS to improve the daily operation efficiency in support of future full-scale deployment.

With the best practices in place for the meter-to-cash process combined with the conversion of the high-end commercial TOU customers in 2017, there was a significant positive impact within the Billing Department when January to May 2018 is compared to the same period in 2017. The overall billing exceptions associated with these large customers has been reduced by 27% along with the analytical time associated with reviewing the accounts.

In April 2018, PSEG Long Island implemented the automation of service orders related to customer reads for transfer of service and special circumstance. Since its deployment, this added functionality has supported an average reduction of 100 truck rolls a week reducing costs and creating capacity to complete higher valued field work.

In 2018, PSEG Long Island received approval under the 2017 Utility 2.0 filling to replace/upgrade the existing MDMS to enhance the following capabilities:

- Improve the Customer Portal to enhance customer experience.

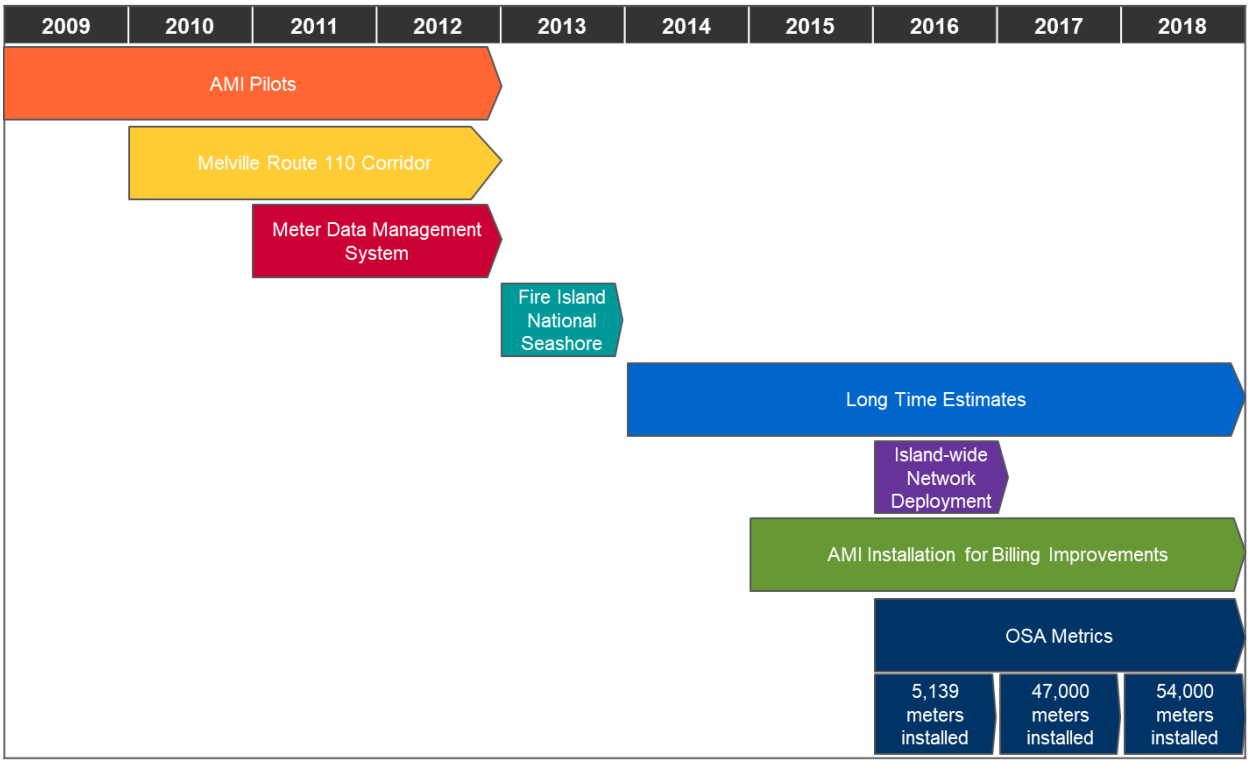
- Enhance system flexibility to support future hourly pricing rates.
- Improve data security.
- Improve daily operations for meter-to-cash process.
- Enhance data VEE.

2.1.3 Progress Roadmap

This substantial investment in and experience with smart meters, AMI communication network, data collection and MDMS software has allowed PSEG Long Island to achieve the following:

- Completed systems and processes to support billing of all current rates, including current TOU and totalized accounts.
- Focused on high energy consuming accounts including the largest commercial and Long Island traction accounts.
- Gained experience in customer engagement regarding smart meters.
- Developed a comprehensive labor strategy to support full-scale deployment of smart meters and address transition of affected employees.
- Cross-trained employees to support all aspects of AMI.
- Gained experience with operational benefits related to AMI including outage and restoration, cycle- and off-cycle meter reading, and worker safety.

Figure 2-7. AMI Progress Roadmap



PSEG Long Island has established the foundation for full-scale AMI implementation. The management and labor work forces are highly trained and ready for full deployment. By the end of 2018, PSEG Long Island will have deployed a robust AMI communications network with approximately 10% of its system's meters fully communicating and measuring over 40% of system load and will have converted the major energy consumers and market participants to AMI.

2.2 Modernizing the Customer Experience

PSEG Long Island's customers want to be a part of the energy industry transformation and desire improved reliability, resiliency, and cost-effectiveness of the energy system and customer programs. In response to these needs and interests, PSEG Long Island seeks to modernize the customer experience by offering tools and rate options that encourage customers to proactively manage their energy use, lower their costs, or increase their use of distributed energy resources (DER).

To deliver these tools and options, PSEG Long Island proposes to deploy system-wide AMI that will leverage and expand upon its existing AMI investments and deployments. Full-scale AMI will greatly expand the data available for analytics for these customer-facing offerings as well as enable enhanced grid operations including specific initiatives for outage management and revenue protection.

Ultimately, with system-wide AMI PSEG Long Island will be able to:

- Engage and promote energy insights to help our customers make smarter energy decisions.
- Offer new rates enabling additional savings for our customers.
- Provide faster more convenient service via remote AMI capabilities.
- Respond faster for outage detection and restoration times and timely customer communications via preferred channels.
- Remote connect/disconnect customers for move-in/out.
- Perform near real-time reconnection following payment after a disconnect for non-payment.
- Differentiate and tailor customer service to meet specific customer segment needs (leveraging analytics and customer engagement platforms).
- Improve overall customer experience with enhanced digital capabilities and streamlined processes.
- Support third party collaboration and partnerships to enhance AMI-enabled customer benefits while supporting REV goals.

PSEG Long Island's AMI Customer Engagement plan is driven by data gathered from:

- Industry research, benchmarking, and lessons learned from peer utilities and working groups
- PSEG Long Island's own AMI deployment experience to date (AMI and rate pilots)
- Customer research informing program design, communication preferences, understanding of current awareness and desires for future services, and customer engagement strategies and tactics

As PSEG Long Island continues to make progress on AMI deployment and the relevant systems integration, the company will continue to assess additional opportunities and/or adjustments to current plans to engage customers, communities, and other stakeholders to help drive AMI-enabled benefits.

PSEG Long Island has a complete plan for engaging customers that is detailed in the *AMI Customer Engagement Plan* included in Appendix A.

2.3 Unlocking the Value of AMI

In this filing, PSEG Long Island is proposing a suite of additional capabilities that are enabled by AMI including improved reliability of the system and new innovative rates for customers, as well as vital data insights for operators and customers.

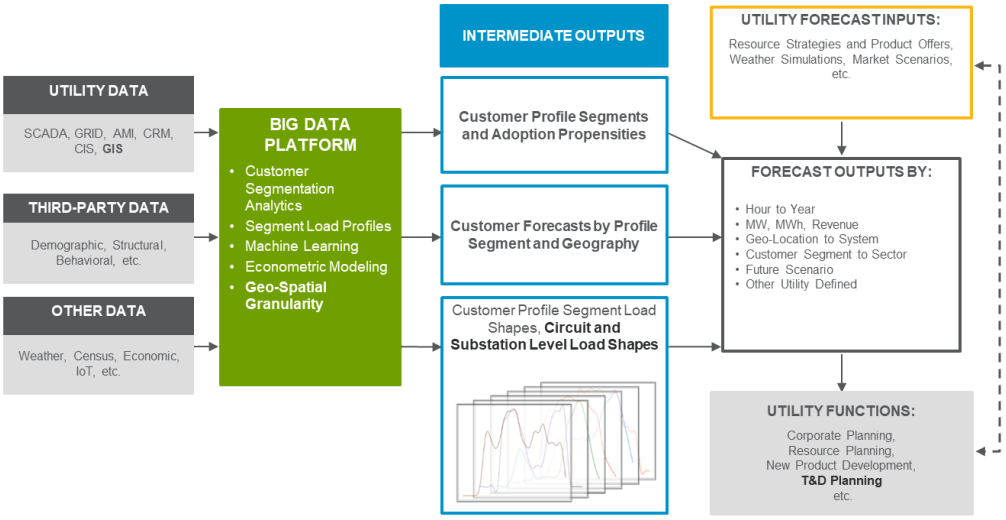
2.3.1 Data Analytics Initiative

Applied analytics are essential to achieve the full value of the AMI-enabled, digital grid. PSEG Long Island's AMI solutions provide more granular data in real-time, fundamentally changing the decision-making process and affecting how customers are served and how assets are managed. With measurement data from AMI meters and other sensors on the network combined with other enterprise and customer data, PSEG Long Island can enhance its analytical capabilities to cover a broad range of applications that are core to maximizing customer benefits and running the UoF.

There are a multitude of deployed use cases at utilities relative to big data analytics. Because utilities differ based on their emerging business needs, technology capabilities, and in-flight enterprise strategic initiatives, use cases are often deployed in different manners and in different stages of maturity model evolution. PSEG Long Island will be addressing use case development from a role-derived perspective and assessing the potential use cases for each functional area within each of the business areas:

- Customer Experience/Marketing
- Customer Operations
- Asset Management
- Security (Physical and Information)
- Market Operations and Load Forecasting
- Revenue Protection
- Outage Management
- Power Purchasing
- Transmission
- Distribution
- Energy Efficiency

Figure 2-8. Bottom-Up, Big Data Use per Customer and Circuit – Advanced and Integrated Utility Functions Planning



Source: Navigant Consulting - Data Management & Analytics

Bottom-up, data-driven insights will dramatically change how PSEG Long Island serves its customers and how it manages the overall business, including improving the decision-making process and performance management.

The key AMI-enhanced big data analytics opportunities for PSEG Long Island include the following:

1. **Customer segmentation for value:** Targeting customers for programs and services to help them better manage their energy costs (e.g., rate options) and encourage adoption of new uses (e.g., use of distributed generation and DER).
2. **Revenue protection:** An AMI network with data analytics will allow PSEG Long Island to identify electric theft more accurately and address it more quickly (see Section 2.3.3).
3. **Outage management:** Big data analytics will enable faster detection, fault isolation, and restoration, which will result in improved customer service and lower outage costs (see Section 2.3.2).
4. **Asset planning and investment optimization:** Granular and real-time data with cloud-enabled advanced analytics to evaluate conditions and investments (condition and risk analysis based asset maintenance strategy).
5. **Demand optimization:** Optimize design of DER, demand response, energy efficiency, and TOU programs based on customer segmentation (propensity models and value segmentation), analyze customer usage profiles, leverage granular TOU data to improve load forecast accuracy and better demand response targeting.
6. **Network planning and management:** Granular interval data improves load modeling, ability to better predict risk areas, and adjust distribution plans (investments, upgrades, and sizing of connections).

PSEG Long Island is currently assessing the long-term strategy and plan for data analytics. Specifically, PSEG Long Island is working with a third-party consulting vendor to produce the following (by 3Q 2018):

- Analytics vision and strategy.
- Current vs. future state findings.
- High-level use cases.
- Mid-level analytics integrated roadmap.

Pending the assessment's findings and recommendations, PSEG Long Island will be looking to:

- Implement a data lake by the end 2019.
- Deploy a Center of Excellence (CoE) group that will govern and execute all data analytics starting with Customer Operations and Transmission and Distribution (T&D), eventually expanding into other enterprise functions.
- Develop use cases and start supporting the business with data analytics tools (first use cases expected as early as 2019 and increasing going forward).

Figure 2-9is a high-level timeline for data analytics implementation.

Figure 2-9. Analytics Initiative Timeline



2018

- Analytics strategy
- Data lake pre-work
- Design voltage optimization pilot

2019

- Data lake implementation
- Data integration, system integration, etc.
- CoE org rollout
- Establish data analytics governance and operating model
- AMI reporting and analytics (from new MDMS independent of Data Lake)
- Start development of use cases
- Conduct voltage pilot

2020-2023

- Continue expansion of use cases
- Develop algorithms, propensity models, computational models, customer segmentation models, etc.
- Deploy decision support tools and data visualization tools to business end users
- Assess voltage optimization pilot results and design system-wide deployment

See Section 2.5 for details on how data analytics fits in the overall AMI business case.

2.3.2 Outage Management

PSEG Long Island's current OMS is an industry standard system that handles typical functionality, such as predicting outage locations and prioritizing restoration efforts. The system relies primarily on customer calls to identify outages and to verify restoration, causing outage information to lag behind real time. Outage management is a key opportunity for AMI-enhanced analytics for PSEG Long Island because significant improvements to restoration time and customer satisfaction can be made by integrating OMS to leverage AMI meter outage data.

OMS integration with AMI and real-time data enable several significant capabilities:

1. **Outage detection and verification:** In addition to customer calls, OMS will also use AMI data. AMI meters send a last gasp message when power is lost, notifying the OMS that an outage has occurred. Additionally, AMI integration enables PSEG Long Island to verify that customer power has been restored without having to wait for customer confirmation. Integration of OMS would enable the utility to notify customers of outages, restoration, and expected restoration times in real time.
2. **Restoration management:** In restoration mode, particularly in major event scenarios, undiagnosed nested outages[9] can occur. OMS would compare against AMI and see where the systems disagree. This allows PSEG Long Island to see that not all customers were restored when the fix was made without having to wait for a customer call. This can reduce restoration times drastically during major events.
3. **Coordination with Distribution Supervisory Control and Data Acquisition (DSCADA):** Integration of real-time data from DSCADA can enable more accurate prediction of outage locations. In addition, operators can see the effect of restoration efforts in real time, such as the effect of closing a breaker.
4. **Identify and track momentary outages and power quality issues:** AMI integrated with OMS allows operators to gain advanced visibility to certain outage conditions and allows for proactive resolution. OMS will enable better identification and tracking of momentary outages and power quality issues, such as high/low voltage or harmonics. Frequently customers do not notice these issues, so they do not call them in; therefore, they are not diagnosed or tracked. These can be indications of greater system problems, such as improper coordination of protection which can ultimately lead to great system disruptions.
5. **Improved reliability reporting:** OMS will enable more efficient and accurate reporting of reliability metrics using AMI data

Overall, leveraging AMI outage data and integrating with OMS will result in quicker outage detection, improved customer satisfaction, fewer outages, faster restoration, reduced restoration cost, and improved reliability metric tracking. See Section 2.5 for details on how the OMS fits into the overall AMI business case.

2.3.3 Revenue Protection

Revenue protection is the process by which PSEG Long Island identifies, tracks, and corrects issues regarding theft of service and incorrect metering conditions. In the current state, PSEG Long Island relies

[9] A nested outage is when field teams close a circuit to restore power but later find there was another outage downstream, which was only discovered later through a customer call.

primarily on meter readers to identify and report theft and irregular metering conditions when they visit the customer premise. In the future state with AMI, PSEG Long Island will use an analytics-enabled case management platform, integrated with MDMS, to identify and resolve these issues in a more thorough, accurate, and timely manner. Reports from field personnel will still be used, but the future system will rely mostly on the information gathered from the large quantity of AMI data. PSEG Long Island will make existing resources more efficient and fully leverage their IBEW 1049 career path agreement to address the initial uptick from better quality reports of theft.

See Section 2.5 for details on how Revenue Protection fits into the overall AMI business case.

2.3.4 Rate Modernization

Under the Rate Modernization program, PSEG Long Island's objective is to align itself with New York State REV goals, offering customers rate options that are simple to understand, easy to compare, and that meet the utility's current and future needs. The AMI Smart Meter program enables the functionality required to modernize PSEG Long Island's rates and provide customers with a wide variety of options and tools to control electric usage and make cost-effective choices with increased convenience.

The U2.0 Roadmap (Section 1.2.1) supports a deliberate and measured approach that allows PSEG Long Island to test and gauge customer acceptance, adoption, and engagement with new rates.

To this end, PSEG Long Island's vision for new rates is to offer customers the following:

- Customer-centric options for obtaining and using energy.
- Easy to understand and easy to adopt rate options.
- Diverse options that reflect the needs of segments.
- Design rate options that allow customers to save money.
- Support of DER.
- Societal benefits such as green energy or low-income programs.
- Personalized tools and solutions that enable effective control and management of energy usage.
- Modernized information system solutions.
- Gadget friendly applications and money- and time-saving features (directed at early adopters and tech-savvy users).
- Easy integration with other technologies and services.
- Means for secure information to be provided to market players.

An important aspect of the Rate Modernization initiative is the design's simplicity—customers can easily understand the effects of rate adoption on their bills, including a clear line-of-sight as to whether it provides them with cost savings or other benefits.

PSEG Long Island's proposed Rate Modernization initiatives provide the approach for engaging customers to improve customer experience and reduce peak demand to flatten the demand curve.

Modernized and sophisticated rates, along with robust customer engagement and home automation systems, also support broader New York State REV goals.

With the customer perspective and the New York DPS Staff Scope of Study related to Rate Reform Scenarios,[10] PSEG Long Island developed an outline of the future focus for the utility and the customer, as presented in Table 2-1.

Table 2-1. PSEG Long Island Utility and Customer Future Focus Outline

Utility	Government and Community Organizations

• Increase customer satisfaction ratings and reputation
• Include residential and business rates
• Reduce peak usage
• Improve system load factor
  ○ Load leveling
  ○ Seasonality
• Support customer-sited and community DER
  ○ Battery storage/discharge
  ○ Solar/wind
  ○ Utility-scale renewables
  ○ Value of Distributed Energy Resources (VDER) Adjustments
• Ensure data and infrastructure security
	• Enhance government partnerships
	• Support income-qualified rates/ riders
	• Provide social and community benefits
	• Meet New York State REV objectives
	• Support community net metering and VDER
	• Include green options
	  ○ Increase use of renewables
	  ○ Reduce carbon

Other Vendors and Market Actors	**Contractors/Trade Allies**
• Plan for home energy management/ home performance • Support online marketplace/rebates as a service • Encourage EVs and battery storage • Support solar and wind projects • Smart home and automation	• Securely share detailed customer usage data • Provide accurate and meaningful tools and information

PSEG Long Island has a detailed plan to engage customers and offer them alternative rates which is more fully described in the *AMI Customer Engagement Plan* in Appendix A.

[10] Staff Scope of Study to Examine Bill Impacts of a Range of Mass Market Rate Reform Scenarios, Page 11, (October 3, 2017) CASE 16-M-0430 et.al.; "The inclusion of behavioral impacts is important to ensure that mass-market customers can understand and will respond in a rational manner to changes in rate design. This may include an evidence-based evaluation of what customers understand, what they are willing to accept, and what actions they are willing to take." And "Longer-term impacts include changes in customer behavior that require capital investments. It is substantially similar to the short-term analysis, other than the cost of the capital improvement must also be considered."

2.3.4.1 Proposed Rate Structures

Remembering PSEG Long Island's vision for new rates, the following eight rates, riders, or strategies—some existing to be updated and some new—are being proposed as part of the Long Range Plan, with their success dependent on full scale AMI deployment.

PSEG Long Island will continue to conduct customer research to refine rate designs and then pilot these proposed rates to test rate structure, communications, and systems. After the pilot is conducted, the utility will obtain and analyze customer and employee feedback. Adjustments will be made prior to the gradual deployment to the full customer base.

Modified Residential and Small Business Short Peak TOU Rate

The 2017 Utility 2.0 Plan included the introduction of a demand reduction demonstration program (Super Savers) for several circuits which emanate from the North Bellmore Substation (see Section 3.2). As part of this Super Savers program, a new Power to Save rate was created (M188/288). This interim pilot rate will offer residential and small commercial customers an opportunity to save on their electric bills by shifting their usage and reducing load during peak hours.

- The proposed rate design will shorten the peak period to 5 hours, from 2:00 p.m. to 7:00 p.m. on weekdays.
- The rate differential in the experimental rate is designed to produce a 3-to-1 peak to off-peak price ratio during the summer, and a 1.5-to-1 peak to off-peak price ratio during the winter.

Modified Medium and Large Business Short Peak TOU Rates

PSEG Long Island currently offers TOU rates for residential and commercial customers, which has limitations, including:

- Adjusts customer delivery charges only.
- Out of date on-peak to off-peak-ratios that do not factor in increasing central air conditioning load.
- Unusually long on-peak periods of up to 12 hours (long peak periods make it difficult for customers to change their behavior to shift load to the off-peak period).
- Three time block periods and two demand charge periods, to be incorporated into rate structure.

PSEG Long Island proposes offering alternative options for medium and large businesses with a shorter on-peak price plan option. The proposed rates will offer the following extended list of benefits:

- Adjusts both customer delivery and power supply charges.
- Involves shorter on-peak timeframe, potentially as short as 3 or 4 hours.
- Proposes a modified time scenario as presented in Figure 2-10.

Figure 2-10. Proposed Time Scenario for Modified Medium and Large Business Short Peak TOU Rates

Rate Class	Target Group	Current # of Time Blocks	Current # of Seasons	Old On-Peak Timeframe	New Modified On-Peak Timeframe
284	Large Business	3 (On-Peak, Intermediate, Off-Peak)	2	8 Hours	4 Hours
285	Large Business	3 (On-Peak, Intermediate, Off-Peak)	2	12 Hours	4 Hours

Residential Three Time Block TOU Rate

The proposed Residential TOU rate is most beneficial to those customers who are able to:

- Limit their energy use during fewer higher-cost weekday hours and shift their usage to off-peak periods.
- Be flexible about when they use major home appliances, such as pool pumps, air conditioners, and clothes dryers.

If customers can shift usage to the off-peak hours, demand-related costs and associated effects are reduced on the system. As a result, the utility will spend less in power supply and capital investments, passing those savings along to all customers.

PSEG Long Island proposes piloting a residential three time block TOU rate with peak, off-peak, and super off-peak (late night) periods. This rate will strive for a 4:1 peak to off-peak pricing ratio[11] on both supply and delivery charges.

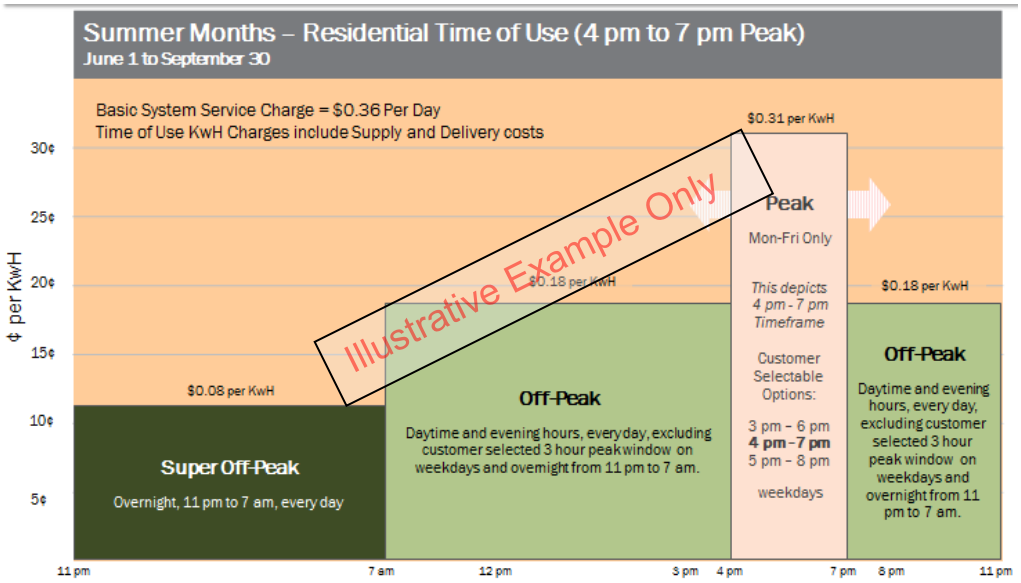
Part of the plan for the pilot will be to test customer preferences for 3-hour peak (3 p.m.-6 p.m., 4 p.m.-7 p.m.) or 4-hour peak (2 p.m.-6 p.m., 3 p.m.-7 p.m.) options and the differences in associated cost.

- Using a 3- or 4-hour (short) on-peak timeframe allows the customer the opportunity to reduce or shift demand easily and manage their usage outside of the peak timeframe.

[11] Peak to off-peak price ratio is one of the strongest predictors of customer peak load reduction, as higher ratios send a stronger price signal to shift consumption away from peak hours. For instance, TOU rates with a 5:1 ratio tend to double the peak reduction compared to a 2:1 ratio.

- Customers are less willing to enroll in a rate and less able to respond once enrolled when the peak periods are excessively long.[12]

Figure 2-11. Residential Three Block TOU Rate Example (Summer Season 4 p.m.– 7 p.m. Peak Option)



This residential three block TOU rate is expected to be piloted in 2020 with up to 10,000 customers for approximately 2 years. After the pilot analysis is complete and any rate, operations, or systems updates are completed, the full deployment of this rate is expected to start in 2022.

In its research, PSEG Long Island customers understood this rate the most clearly and were interested in adopting where it could fit their lifestyle. This worked well for people who can manage their lifestyle to avoid peak times, those that are information seekers and find satisfaction in learning more about their own energy use, those who are financially constrained and motivated to make changes to lower their bills, as well as green-oriented individuals.

Residential Electric Vehicle TOU Rate

EVs are becoming more prominent in the US vehicle market and are expected to number in the tens of millions globally by 2028. Long Island is a leader in EV adoption in New York State.[13] EVs have the potential to dramatically reduce transportation-sector energy use and the associated emissions; they can also support the transition to a more sustainable transportation system.[14]

The Residential TOU EV Rate plan is designed primarily for customers who:

- Own or lease highway PHEVs or battery electric vehicles (BEVs)
- Are not able to manage around the peak periods of the Residential TOU rate options

[12] A Review of Alternative Rate Designs, 2016 Rocky Mountain Institute

[13] Electric Vehicles On Long Island Costs and Benefits, May 2018, Gabel Associates & Energy Initiatives Group

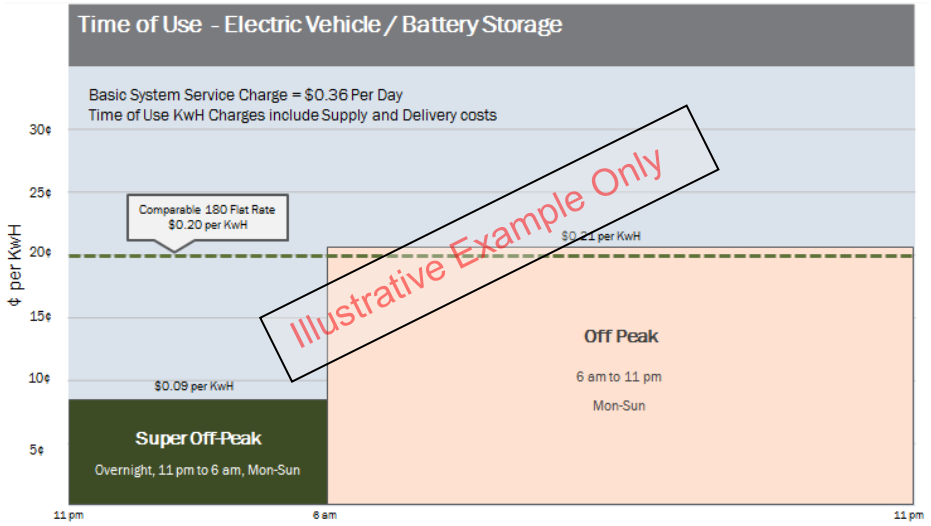
[14] Strategies for Integrating Electric Vehicles into the Grid, February 2018, Siddiq Khan and Shruti Vaidyanathan

Though similar to the Residential TOU Rate Plan, the EV plan offers an additional opportunity to save by charging the vehicle during lower-priced super off-peak overnight hours every day (i.e., between 11 p.m. and 6 a.m.). With the EV Rate plan, customers can save money on their electric bills by setting their EV to charge in this later overnight period without having to manage around the afternoon peak periods for the rest of their households' energy usage.[15]

PSEG Long Island proposes piloting a residential TOU rate with two time blocks:

- Block 1: A standard, flat rate during the day and early evening periods
- Block 2: A super off-peak discounted rate for overnight usage

Figure 2-12. Residential TOU Rate Example with EV/Battery Storage Option



Part of the additional customer research and pilot program process will include researching whether to require proof of EV and/or storage to use this rate, which could potentially provide a rate discount to nonparticipants for existing overnight usage. The EV rate option is rated high for customer satisfaction on the JD Power survey[16] and supports REV objectives.

The Residential TOU rate with EVs is expected to be piloted in 2020 with a small group of customers for approximately 2 years. After the pilot analysis is complete and any rate, operations, or systems updates are completed, the full deployment is expected to start in 2022.

Small Business Short Peak TOU Rate

[15] A 2018 SRP study, *Salt River Project Provides Results of Electric Vehicles Study*, found that "Time-of-Use (TOU) price plans were effective at incentivizing EV drivers to charge later than they normally would, which will help SRP meet customer demand without needing to add power plants." Also, current EV drivers are often referred to as early adopters, and they tend to be more aware of the savings they can see by utilizing TOU plans and charging at certain times of the day.

[16] JD Power 2018 YTD

The Small Business Short Peak TOU rate uses the basic structure from the Residential TOU rate. This rate is most beneficial to:

- Small business customers who can plan to limit their energy use during a few higher cost weekday hours and shift usage to other off-peak periods.
- Customers that can be flexible about when they use major business appliances, such as air conditioners, electric forklifts, or other large demand machines.

If customers can shift usage to the off-peak hours, they can save money on their electric bills and reduce demand.

PSEG Long Island proposes piloting to small businesses a three time block TOU rate with peak, off-peak, and super off-peak (late night) periods. This rate will strive for a 4:1 peak to off-peak pricing ratio on both supply and delivery charges.

PSEG Long Island currently offers Small Business TOU Rate 288, but the on-peak timeframe is 10 hours (10 a.m. to 8 p.m.). Part of the plan for this pilot is to test if customers prefer an appropriate small business shorter peak option (3-, 4-, or 5-hour peak options may be explored).

This Small Business TOU rate is expected to be piloted in 2020 with up to 1,000 customers for approximately two years. After the pilot analysis is complete and any rate, operations, or systems updates are completed, full deployment is expected start in 2022.

Value of Distributed Energy Resources

The Value of Distributed Energy Resources (VDER) mechanism[17] compensates resources based on when and where they provide electricity to the grid. To determine a project's revenue under VDER, New York State developed the Solar Value Stack Calculator. The calculator combines the wholesale price of energy with the distinct elements of DER that benefit the grid: the avoided carbon emissions, the cost savings to customers and utilities, and other savings from avoiding expensive capital investments.

As part of VDER:

- Energy-producing customers are compensated with monetary credits, not volumetric credits (customers will see a dollar credit on their bill).
- Net metering may be replaced with value stack and monetary credits that are converted to dollars instead of allowing customers to bank kilowatt-hour credits. However, monetary credits can roll over to future billing cycles.
- The value of a kilowatt-hour is now related to when and where it is generated (greater compensation in congested parts of the electric grid during periods of high demand).

Green Rate Rider

[17] In support of REV, the New York State PSC established a mechanism to transition to a new way to compensate DER. This mechanism, called VDER, replaces net energy metering.

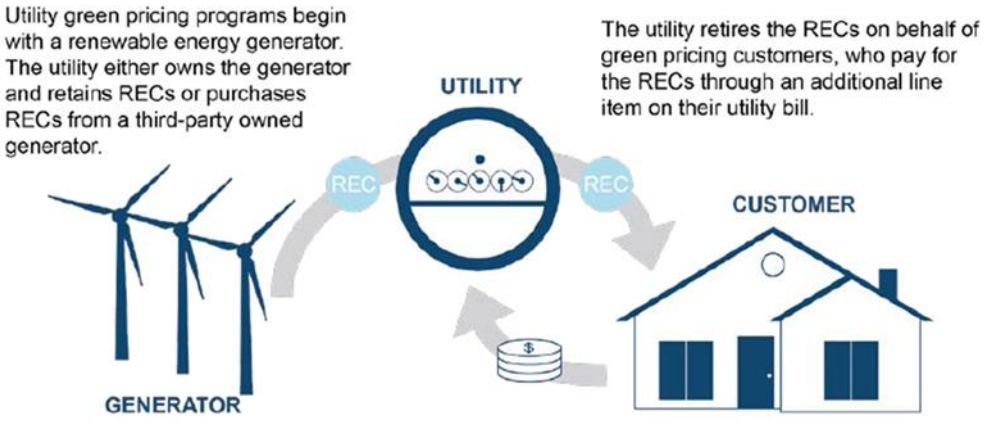
Rate riders create additional value by letting customers vote with their money. This can be particularly interesting to households who want to do more for the environment, help the community, and/or support renewable infrastructure.

Some customer segments are focused on doing their share to promote a clean environment and support a sustainable independent energy future. If provided a program that aligns with their values, these customers tend to be willing to pay an incremental amount to invest in clean and renewable energy options.[18]

PSEG Long Island currently offers a green rate option called Green Choice Program (Figure 2-13).

- Participants pay a few additional dollars each month to purchase environmental attributes, which help support the growth of green electric generation. The long-term goal is to reduce dependency on fossil fuels.
- An environmental attribute represents reduced greenhouse gases (GHGs) associated with replacing old, inefficient electric generation facilities with those that use clean, renewable resources such as wind, hydroelectric, or bioenergy.

Figure 2-13. How Utility Green Pricing Programs Work



Source: The National Renewable Energy Laboratory's 2017 Status and Trends in the U.S. Voluntary Green Power Market report

PSEG Long Island will offer enhanced Green Rates riders as part of the new rate options, which will provide two additional options for customers to promote a clean environment and support a sustainable independent energy future. These enhanced Green Rate riders can be used in conjunction with any rate option: flat or TOU type.

- **Renewable Energy Credit (REC) option:** Allows customers to contribute to acquisition of additional RECs, issued when 1 MWh of electricity is generated and delivered to the electricity grid from a renewable energy resource such as solar or wind power.
- **Power Purchase Agreement (PPA) option:** Allows customers to contribute toward the additional investment by PSEG Long Island in local green or renewable sources (e.g., wind, water, solar) by paying an additional fee. Contributions may go toward renewable energy sources

[18] JD Power data has shown variations of this type of rate option to be the no. 1 most satisfying alternative rate choice.

such as a specific local solar or offshore wind farm (higher customer satisfaction) or may be more generic across Long Island.

PSEG Long Island proposes to conduct two concurrent pilot programs: one with RECs and one with local PPAs with a small number of customers. These pilot programs are targeted to start in 2021 and run for approximately 2 years. After the pilot analysis is complete and any rate, operations, or systems updates are completed, full deployment is expected to start in 2023. PSEG Long Island may test customer preference for the REC and PPA options as part of customer research and in a few variations during the pilot. In addition, customer research may be used to test a potential Green Rate Solution Bundle of products and services.

In its research, PSEG Long Island found that there are three main types of customers that are likely to adopt this type of rate. They include: green-oriented and motivated individuals who are already acting on being green in other contexts, individuals that have unrealized green ambitions but do not understand what they can do to be more environmentally conscious, and individuals with concerns about the stability and safety of the grid. While fewer customers may adopt this rate than the TOU rate, customers on this rate tend to be the most satisfied of all the rate options, as the JD Power survey results show.

Good Neighbor Rider

The Good Neighbor rider allows customers to contribute additional dollars over the cost of their electric usage to provide support to the community (e.g., contribute toward nature conservancy, the American Red Cross, local organizations, or help offset low-income customer electric bills). Customers can either choose recurring fixed dollar contributions or contributions as a percentage of their monthly bill.

The rider may appeal to customers who want to contribute to charity but want an easy way to do it, or customers who want to assist low-income or veteran populations within their community. Customers on this rate will need to feel their money is going directly to their community in Long Island and not a national organization. Salt River Project (SRP) is a utility that PSEG Long Island has looked at closely as a reference case for a number of differentiated rate offerings (see Sect. 2.3.2 Benchmarking & Research). Good Neighbor contribution choices offered by SRP include Arts & Culture, Civic & Environmental, Education, and Health & Human Services. Additional customer research is required to determine the best options for community organizations and program design.

This Good Neighbor rider is expected to be piloted in 2021 with a small number of customers for approximately two years. After the pilot analysis is complete and any rate, operations, or systems updates are completed, full deployment is expected to start in 2023.

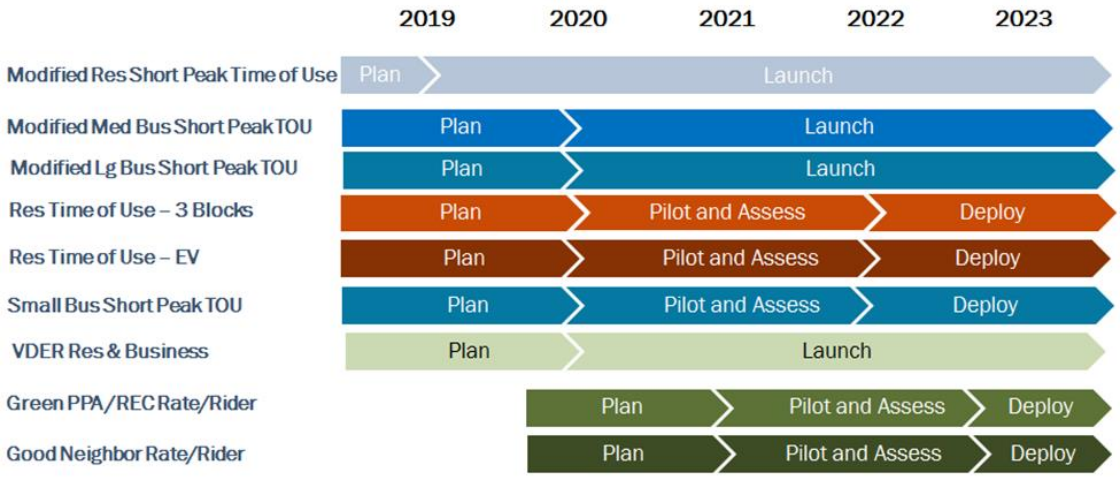
The Good Neighbor rider was appealing to PSEG Long Island customers who appeared to be less actively involved in charities or other ways of giving back to the community due to work or family responsibilities. Several customers desired transparency in knowing specifically what their money would be supporting and would only be interested in this option if they could choose specifically where their money should go. Participants who had already established ways of giving back or contributing to their community were not interested in this rate.

2.3.4.2 Rate Modernization Deployment Plan

PSEG Long Island drafted the 5-year U2.0 Rate Modernization Roadmap in Figure 2-14 based on industry analysis and early high-level customer feedback. The series of phases, each broken down into

stages for planning and development, piloting and assessment, targeted launch, and full deployment for each new rate implemented a method for measuring new pricing options that was successful for other customer-centric best-in-class utilities.

Figure 2-14. Roadmap for Measuring Newly Implemented Rates



PSEG Long Island researched industry best practices and leading-edge technological advances to consider a wide variety of rate options and to avoid pursuing paths that create customer dissatisfaction or undesirable changes in customer behavior. Rate structures and customer engagement options were reviewed against the New York State REV objectives and other needs such as, reducing peak load, flattening demand curves, and offering opportunities for customers to save money.

Embedded in the *AMI Customer Engagement Plan* (Appendix A), is PSEG Long Island's Rate Modernization implementation approach that:

- Reflects feedback previously received to inform Voice of the Customer research, education, and awareness programs that inform customers of their rate options as tailored to their lifestyles
- Leverages historical data to check if the new rate structure is a good fit.
- Provides tools and information needed for the customer to thoroughly understand their performance under the rates after adoption.

2.3.4.3 Future Innovation and Improvement

As home automation and the Internet of Things (IoT) become mainstream, additional opportunities will become relevant to larger customer segments. After establishing a foundation of successful alternative rate options, PSEG Long Island will continue to evaluate different rate options and structures that may include including the following:

- **Mandatory Hourly pricing**: Under this rate, customers would be charged a price for electricity that varies from hour to hour and day to day based on real-time market prices. Typically, the price will be higher during peak usage times (summer and winter seasons) and lower during off-peak usage times. The objectives of this rate design are to pass along to the customer the additional cost per kilowatt-hour for additional consumption and promote reductions in the peak demand of electricity at times when the price is more expensive than the customer is willing to pay.

Although PSEG Long Island's power supply is significantly hedged against market prices (hourly locational based marginal pricing [LBMP]) due to fixed price and fuel-based power purchase agreements and grandfathered transmission congestion contracts, energy prices can and do vary significantly from hour to hour. Hourly LBMP still represents a cost that is incurred or avoided for changes in load that might be affected by mandatory hourly pricing. Nevertheless, to understand whether and in what form mandatory hourly pricing should be proposed and implemented in Long Island, PSEG Long Island will need to study the effect of charging hourly prices and evaluate potential mechanisms to recover any differences between the revenue received and the underlying cost of the power supply. For PSEG Long Island, commercial and industrial (C&I) customers with maximum demands above 500 kW represent the target market for mandatory hourly pricing. These customers represent approximately 20% of total annual sales.

- **Critical Peak pricing (CPP)**: CPP is a time-based rate design that increases the price of electricity consumed for participating customers during specific hours of a declared critical event. There are usually between 10 and 20 events identified as CPP per year for most utilities. CPP is used with and is often overlaid onto TOU rates. The utility identifies these CPP events based on high forecast demand and advises customers 24 to 48 hours in advance. The CPP price to off-peak price ratio can be as high as 14:1, which provides significant incentive to curtail during CPP hours. The primary objective of this rate design is to promote reductions in the peak demand on the most critical days of the year.

  CPP might appeal to customers who have a semi-flexible schedule, seek cost savings, and are willing to respond to events a handful of times per year. Customers must be able to be contacted on short notice for CPP to work well, typically through apps and other technology. Accuracy and timing of such messaging for CPP events is critical because it involves a call to action. It should be noted that a number of utility companies are moving away from using CPP because it has proven difficult to effectively communicate with customers to change behavior on short notice and has not proven an effective cost recovery tool, as there are only a limited number of days and hours per year being called.

  CPP was considered but is not being proposed in this filing because it is not apparent that CPP would advance PSEG Long Island's vision of operating a customer-centric utility. In its research, PSEG Long Island found that customers find CPP rates confusing and difficult to respond to effectively. Customers surveyed responded negatively to this rate, interpreting it as a deprivation of comfort at times when they may need it the most. For some, it sparked feelings of resentment: "Why would I have to pay more for electricity when I most need to use it?" Others thought that with this rate they would feel taken advantage of or punished for using more electricity, something they are already paying for and they feel entitled to.

  PSEG Long Island offers and promotes a demand response program with customer rebates. These positive incentives coupled with new TOU rate options will be a strong foundation to evaluate future needs.

- **Residential Demand Automation (Smart Home Rate):** A demand charge is applied to the highest usage incurred over a short segment of time (30, 60 minutes) during the peak hours for the entire billing cycle. The demand charge can have multiple tiers with increasing cost based on customer usage: averaged across multiple time blocks, highest demand during the peak period, or a ratcheted level over a pre-defined lookback period

  Demand rates are based on how energy is used during the day. Participants who spread out their energy evenly throughout the day and hold their usage below a demand threshold receive a lower bill. This rate could appeal to customers who can balance their energy use throughout the day through careful management of appliances. Demand rates are difficult for customers to

understand and respond to; however, there are customers with the ability to leverage automation that may find this rate attractive.

PSEG Long Island has identified through a survey of best-in-class utilities the following best practices regarding demand charges:

- Customer-friendly TOU rate options that shift usage off peak are preferable to demand charges.
- Demand response incentive programs are preferable to customer penalty programs.
- Demand ratchets should be avoided or eliminated due to low customer satisfaction.
- Recognize that demand is difficult for customers to understand.
- Demand charges work best in conjunction with home automation and customer preference tools that select and prioritize equipment for curtailment (e.g., pool pump number 1, water heater no. number 2, etc.).
- Demand charges should average the peaks over several hours or days occurring during the peak periods (e.g. average top five peaks during the month that were in the 4 p.m. - 7 p.m. weekday timeframe).
- Demand charges should be designed to ensure that customers that limit demand save money.

In its research among PSEG Long Island customers the demand rate was a harder sell among the utility's research participants due to the lack of awareness as to how their energy habits impact demand, the intangible aspects of multiple devices drawing electricity concurrently, the short amount of time concurrent demand can happen yet applied to the entire billing period and resistance to giving up control of their energy management habits to home automation solutions.

At the same time, PSEG Long Island is aware that as the industry advances toward greater adoption of distributed energy resources and intermittent renewables, its rate structure will need to be regularly examined and updated to ensure adequate recovery of fixed and demand-related costs. PSEG Long Island will continue to investigate these rate structures and the technology needed to support them. PSEG Long Island is also closely monitoring the rate design working groups conducted by the New York Department of Public Service, which will determine how the State's investor owned utilities innovate and adapt their rate designs to prepare for the transformational forces affecting the industry. The rate modernization engine proposed in this plan will give PSEG Long Island the flexibility, speed, and agility, to adapt to these changes.

2.3.5 Utility of the Future Team

PSEG Long Island proposes establishing a cross-cutting UoF Team. The mission of the UoF Team will be to take ownership for and proactively drive the development of REV-related capabilities and meet REV objectives as they evolve in the New York regulatory environment. This effort is consistent with the PSEG Long Island business strategy to continue to align with REV objectives and other New York State policy goals.

The UoF Team will serve as one of PSEG Long Island's core business functions. It will support and integrate closely with AMI analytics as well as spearhead the utility's shift from system-level planning, capital investment, and tariff design to granular, more locational-based T&D planning, T&D capital investment, technical and market demonstrations, policy development, and innovative tariff design. The UoF Team will address six core functional areas:

- **Load forecast modeling:** Develop comprehensive locational, temporal, and probabilistic forecasting models, processes, and data to support DSIP-like implementation.
- **UoF special studies and technical support:** Perform technical analysis and studies to identify system issues and potential solutions, such as studies to evaluate and act upon regulatory orders, to assess system impacts of DER, and provide technical support for interconnection.
- **UoF demonstration projects:** Evaluate projects, facilitate industry collaboration, support grid advancement, demonstrate commitment to REV objectives through projects, and represent PSEG Long Island at various industry and stakeholder working groups to shape DSIP proposals and regulatory environment.
- **Energy efficiency and renewable energy:** Support studies in conjunction with T&D Planning with respect to customer-sited demand response, battery storage, renewable and energy efficiency DER technologies, and their relative contributions to system relief considering temporary and locational details.
- **Volt/VAR optimization:** The integration and optimization for DER requires a dynamic balancing of voltage across the distribution system. Voltage optimization is an intelligence gathering and optimization process that helps balance voltage in real time. PSEG Long Island will engage in circuit-by-circuit studies of voltage, transformer loading, phase balance, and fuse sizing. The models will study each feeder at the primary and voltage levels, down to the individual service points where the AMI meters reside. These studies will reveal previously unknown issues and will revise current design and operating principles to correct them.
- **Joint Utilities of New York membership:** PSEG Long Island intends to join the Joint Utilities of New York as a full member in 2018. By so doing, PSEG Long Island will have insight and increasing familiarity with the best practices and latest thinking regarding DSP, such as DER hosting capacity, DG interconnection, data sharing, and VDER.

The UoF Team will work with other departments to collect and organize the data needed to inform DER and non-wires solution (NWS) planning functions. The UoF will perform studies that are entirely independent of the current functions and roles fulfilled by T&D and Operations, although the departments will coordinate. The team will work within the AMI Analytics team and the proposed organizational structure will be established as soon as practical in the 2019 fiscal year.

The UoF will develop VDER capabilities and NWS tools and help manage DER related pilots and projects. A key initial focus of the UoF Team will be to support the foundational requirements established under the VDER order, which seeks to deliver a more accurate, value-based compensation framework across all New York State utilities to benefit all customers. However, moving forward, the UoF Team will be responsible for progressing PSEG Long Island toward more developed DSP functionality.

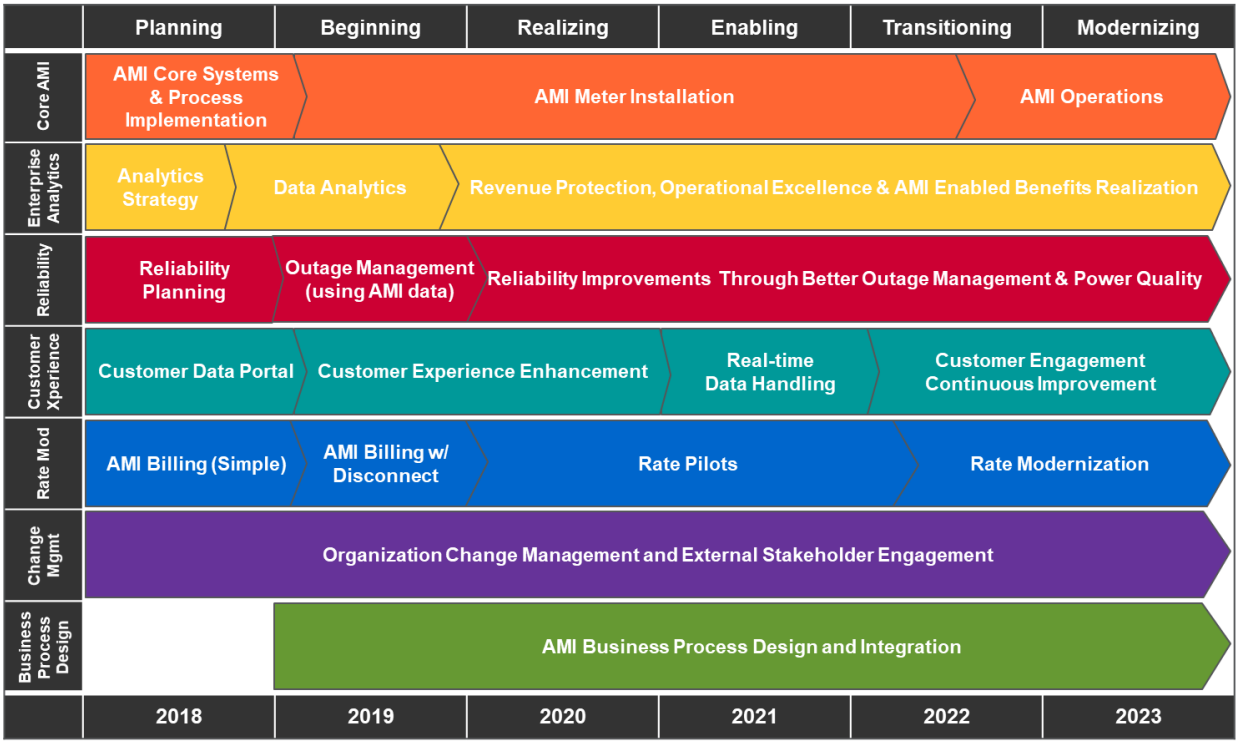
2.4 Forward-Going Implementation Plan

AMI implementation involves all areas of a utility as the AMI program will touch every customer, every point on the electric distribution grid, and all the information systems and data that are responsible for the customers and electric operations. Because of the complexity of the AMI program, PSEG Long Island will establish a PMO that will establish the AMI program governance model, and key tools and process that help ensure activities within the organization are in-line with AMI program strategic vision. In parallel to the strategic deployment of meters and, later, new rate options that promote AMI-enabled benefits, PSEG Long Island will also create and execute a Customer and Stakeholder Engagement plan that includes communications to customers and internal and external stakeholders.

2.4.1 AMI in the Utility 2.0 Roadmap

The AMI Roadmap, a portion of the overall U2.0 Roadmap, describes the 5-year evolution of AMI from the initial planning stage to the fully AMI-enabled operational utility. The U2.0 Roadmap illustrates the progression of each of the core AMI capabilities through this journey and represents a yearly theme for the overall AMI program.

Figure 2-15. AMI Roadmap



2.4.1.1 Planning Stage (2010-2018)

By the time full-scale AMI deployment begins in January 2019, PSEG Long Island will have deployed a robust AMI communications network with over 100,000 fully communicating AMI meters measuring over 40% of system load and will have converted the major energy consumers and market participants to AMI.

PSEG Long Island has established the foundation for full-scale AMI implementation. PSEG Long Island has also achieved the following:

- Completed systems and processes to support billing of all current rates, including current TOU and totalized accounts.
- Focused on high energy consuming accounts including the largest commercial and Long Island traction accounts.
- Gained experience in customer engagement regarding smart meters.
- Developed a comprehensive labor strategy to support full-scale deployment of smart meters and address transition of affected employees.

- Cross-trained employees to support all aspects of AMI.
- Has gained experience with operational benefits related to AMI including outage and restoration, cycle- and off-cycle meter reading, worker safety, etc.

PSEG Long Island is also working on the following in 2018:

- Implementing the new MDMS and enhancements to the Customer Portal.
- Establishing the program organization to support full-scale AMI deployment and is planning for the next year's initiatives.

These initiatives will further lay the foundation for enabling some of the AMI capabilities, including the following:

- Development of a big data strategy, which will provide the platform for enterprise data analysis and reporting.
- Start of a mobile application project to engage customers.
- Development of OMS integration with AMI, which will extend into 2019, will allow use of AMI data to enhance the detection and restoration of power outages.

PSEG Long Island will be well prepared to begin the mass communication and rollout of AMI to the rest of its customers.

2.4.1.2 Beginning Stage (2019)

Leveraging the thorough planning and systems development that occurred in the Planning Stage, PSEG Long Island will begin the rollout of one million AMI meters over 4 years. Consequently, the utility and AMI program team's focus is on operational excellence by ramping up the AMI meter installation rate while minimizing the exceptions and impact on customers and normal utility operations. PSEG Long Island's customer communication is critical in this stage to ensure that customers are fully aware of the benefits and capabilities of their new AMI meters and the services the utility will begin to offer. See *AMI Customer Engagement Plan* (Appendix A)for a description of the utility's customer outreach.

PSEG Long Island's primary objective for this stage is to establish a positive customer experience through the seamless exchange of a customer's legacy meter with an AMI meter. The utility will also begin activities that enable some of the AMI benefits, such as:

- Further automating the service disconnect switch in the AMI meter.
- Analyzing the data from the installed AMI meters to identify opportunities to improve operations.
- Enhancing the Customer Portal to enable Green Button Connect.
- Enhancing and integrating the billing system, OMS, MDMS, and enterprise analytics platform.

While these activities are progressing, PSEG Long Island will begin planning for two major initiatives important to the utility, the customers, and REV. The utility will begin creating new rates and designing pilots (PSEG Long Island will conduct up to nine different rate pilots) that will establish the long-term direction for Rate Modernization. Additionally, PSEG Long Island will begin designing the pilots and requirements for the various DER and energy efficiency programs, which will determine the suitability and benefits from these market-enabling technologies and services.

2.4.1.3 Realizing Stage (2020)

After stabilizing the AMI deployment and the information systems enabled in the Planning and Beginning Stages, PSEG Long Island and its AMI-engaged customers will begin to realize the incremental benefits of the AMI investment. In this stage, the utility will complete the customer presentation and engagement platform for both residential and commercial customers. This will provide its customers with more accurate and reliable data as well as ongoing communication and the significant historical data needed to understand and control their energy usage.

PSEG Long Island, with more than 300,000 AMI-enabled customers and services, will begin up to four rate pilots and DER/energy efficiency pilots to evaluate the effect and opportunity of Rate Modernization and market animation. Over the next 2-3 years, the utility will identify the technology, services, and communications that achieve the maximum potential and benefits for its customers while improving the reliability and flexibility of its services.

The utility will use the AMI data and its enhanced data analytics capabilities to analyze and improve the operation and reliability of the electric grid. From the analysis and simulations, PSEG Long Island will accurately model and understand the electrical response to changes in operational settings by demonstrating conservation voltage reduction (CVR) and Volt/VAR optimization (VVO) as part of the Super Savers Program targeting critical circuits. This understanding can allow PSEG Long Island engineers to establish plans and costs to implement enhancements and operational programs (e.g., CVR and VVO) on a broader basis to improve the overall reliability of the network while decreasing customer consumption and energy costs. Collectively, these capabilities will represent a much greater system planning process for PSEG Long Island. This process will be responsive to the PSC DSIP guidance and part of a transition to DSP functionality. Additionally, PSEG Long Island will use the increasing number of AMI meters and any lessons learned to improve its overall response to system outages.

2.4.1.4 Enabling Stage (2021)

PSEG Long Island should have more than 50% of its customers AMI-enabled and realizing some of the benefits from the AMI investment by this stage. The utility should also be gaining a better understanding of its electric network, customers, services, and products from the data analysis and pilots. PSEG Long Island will be leveraging the data analytics platform and the volumes of AMI data to identify more benefits and savings, such as revenue protection and irregular meter conditions, as well as ongoing improvements to operating the AMI technology. The utility will now be ready to enable the next generation of benefits and capabilities from the AMI foundation that is being built.

PSEG Long Island will begin enhancing its systems and technology to enable real-time data collection, processing, and presentation of AMI data as needed for the advanced features and services planned for the AMI solution. The utility will complete the first set of Rate Modernization and market animation pilots and will begin planning for the services and products it will offer to customers with AMI meters.

2.4.1.5 Transitioning Stage (2022)

PSEG Long Island will complete the AMI meter rollout in this stage, with the expectation that all customers will be AMI-enabled. The focus of this stage will be transitioning the program, utility, and its customers from AMI deployment and execution to full engagement with the AMI technology and its data. Customers and the entire electric network will realize the planned benefits from AMI and will begin looking for next generation capabilities and benefits.

While AMI transitions to an operational mode, PSEG Long Island will be realizing the long-term vision for the AMI investment, including new ways to interact with customers, modernizing rates and services, and animating the market with new products to control and manage energy resources. PSEG Long Island will be communicating these new services and products to the customer base and implementing operational processes to manage and continuously improve them.

2.4.1.6 Modernizing Stage (2023 and Beyond)

The Modernizing Stage is the future of PSEG Long Island and its customers. The utility will have become a fully AMI-enabled utility with digitally-enabled customers. Customers will engage with the utility through more information and control of their energy consumption; they should become a participant in the energy community using these new products and services. PSEG Long Island will continue to modernize the rates and services available to its customers while improving the reliability and operation of the electric grid using advanced analytics and operations capabilities. Ultimately, PSEG Long Island will be in a position to start enabling the DSP vision for New York State.

2.4.2 Full Scale Deployment

PSEG Long Island has planned for broader AMI deployment starting in 2019, and considerable efforts have been made to develop and pilot new installation techniques in anticipation of full-scale saturation deployments in 2019.

PSEG Long Island plans to install 1,070,000 AMI meters over a four-year period starting in January 2019 and completing by the end of 2022. This installation plan is an “outside in” deployment where installation crews will start at each end of the service territory and work toward the middle. Table 2-2 summarizes the portion of AMI meters that are planned to be installed as funded by the Utility 2.0 effort. The remaining meters are to be installed using PSEG Long Island’s existing capital budget.

Table 2-2. AMI Meter Planned Deployment through Utility 2.0 Funding

Meter Type	2019	2020	2021	2022
Residential	210,000	210,000	210,000	210,000
Commercial	20,000	20,000	20,000	20,000

In preparation and planning for the broader deployment of AMI, PSEG Long Island has applied the following experience and lessons learned:

- PSEG Long Island will leverage its highly skilled and productive IBEW workforce to deploy one million AMI meters over a 4-year period using internal labor rather than employing a third-party meter installation vendor. Other utilities, including Oncor, United Illuminating, and Puget Sound Energy, have successfully implemented AMI using internal labor forces.
- Enhancement of the Meter Inventory Management and Work Management Systems to support the receipt, transportation, and installation of more than 1,500 AMI meters per day.
- Replacing the existing MDMS and Customer Portal to improve the AMI customer billing and data presentment.
- Investigating an enterprise analytics platform.
- Analyzing the existing AMI meters to identify meter problems and diversion or theft.

- Establishing the organizational structure to support full AMI deployment and future ongoing operations post-deployment.
- The AMI installation must be supported with enhanced field tools to improve the installation process; this should include barcode scanning and field imaging of the removed meter. These tools and processes will increase the administrative accuracy to replace the legacy electric meter with an AMI meter and reduce potential billing errors and customer impact. These tools and processes are currently under development as part of the Planning Stage of the roadmap (See Section 2.4.1.1).

2.4.3 Program Implementation Support

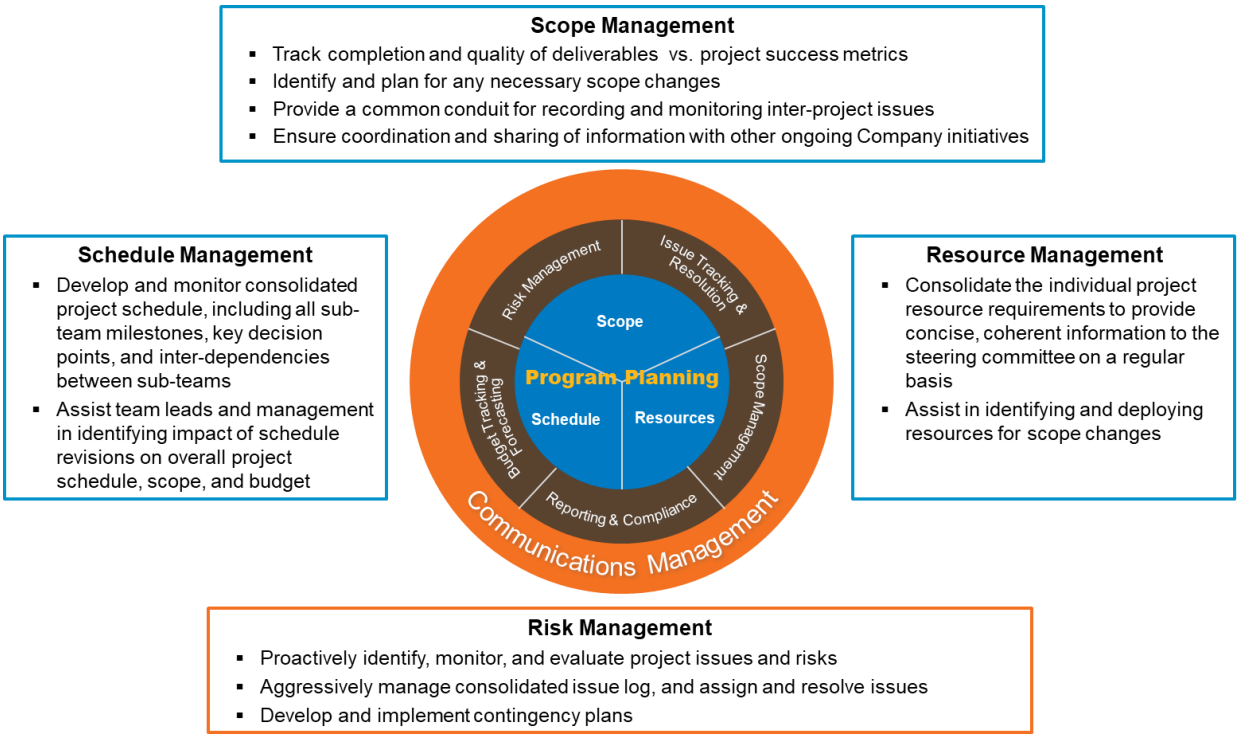
Due to the elaborate implementation required for a full AMI rollout—including research, deployment, customer engagement, and rate design—PSEG Long Island will establish a PMO. The PMO will provide guidance and stewardship that helps ensure activities within the organization are in-line with the goals of the AMI program. The PMO will help ensure various project teams are effectively working together by providing a common set of tools and services. The PMO will be based on existing operations and maintenance (O&M) labor being converted to capitalized labor during the four-year deployment period. Once AMI is fully deployed, these resources will revert back to O&M. Details on PMO headcount can be viewed in Table 2-12.

In addition to PMO, AMI implementation support will include Business Process Design and Change Management initiatives discussed in sections 2.4.3.2 and 2.4.3.3 respectively.

2.4.3.1 Program Management Office

PSEG Long Island recognizes the need for a robust governance and program management plan to implement and support the multi-year AMI deployment and associated projects and initiatives. The utility will engage a PMO support vendor to provide structured PMO services. The PMO will provide foundational processes to meet the requirements of managing program costs and delivery on time and on budget. The PMO will have three core responsibilities along with overall risk management duties, as presented in
Figure 2-16.

Figure 2-16. PMO Core Responsibilities



The PMO will also help ensure PSEG Long Island leadership re-affirms the appropriate targets to drive business benefits over the course of the program.

See Section 2.5 for details on how PMO support fits into the overall AMI business case.

2.4.3.2 Business Process-Led Transformation

PSEG Long Island is embarking upon a significant transformation of its operations through the deployment of an AMI infrastructure across its entire service territory. In preparation, the utility will need to redesign its operational business processes to make use of the functionality through this technology. AMI can deliver many advantages, and PSEG Long Island is focused on achieving these additional operational benefits to augment its reputation as an efficient, customer-oriented, and clean energy organization. In particular, the utility is focused on achieving the following objectives:

- Further improve customer service and bring new benefits to its customers.
- Continue to provide electricity at reasonable cost to its customer base.
- Broaden its portfolio of energy efficiency, demand response, and demand-side management related programs and services.
- Drive cost out of the operations.
- Improve the quality and efficiency of its business processes.
- Support a diversified supply source portfolio.
- Develop a flexible and scalable solution that would allow PSEG Long Island to respond appropriately to future regulatory efficiency mandates.

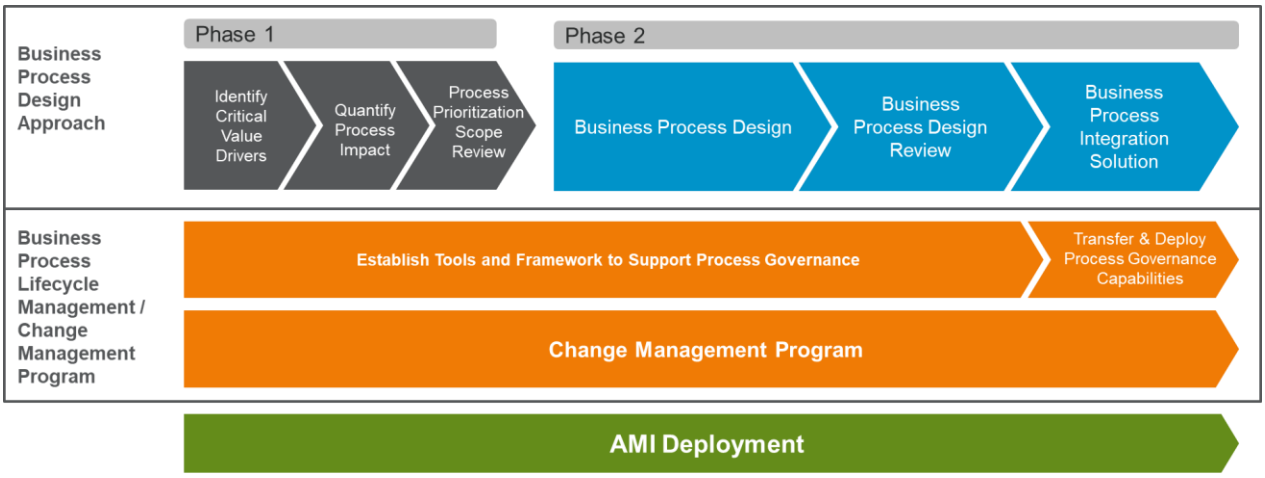
Based on the lessons learned from utility peers and other industry consultations, PSEG Long Island has identified several key factors critical to success:

- **Implement a business solution enabled by technology as opposed to a technology solution.** Although the technology aspects of the overall AMI solution are significant, PSEG Long Island's primary focus is on customer benefits, business outcomes, and business operations.
- **Relentlessly focus on the customer experience.** The AMI program can have a profound impact on the customer experience. The design of the business processes needs to consider the customer at all times, both from an end-state and an implementation and transition perspective. PSEG Long Island understands that, unless managed carefully, AMI implementation could lead to negative customer experiences. Similarly, the utility does not assume putting the infrastructure in place and rolling out the customer engagement technology means that the customer base will adopt the programs and services that PSEG Long Island envisioned introducing. As a result, realizing the desired benefits can be more difficult than initially planned.
- **Prepare for the relevant operational impacts.** Moving to an AMI-enabled operation reality involves understanding the effects across the value chain and preparing relevant business processes and operations to address these challenges.
- **Designing a flexible, scalable, and sustainable solution.** The Business Process Design approach must:
    - Focus on an end solution that allows for a flexible response to future regulatory mandates.
    - Be easily scaled to support new and successful initiatives and programs.
    - Support sustained performance.

  PSEG Long Island's research has shown that, for example, successful pilot programs do not necessarily provide a sustainable solution at scale even if highly informative.
- **Manage the transition.** The journey toward a fully AMI-supported business model takes several years, is highly disruptive, and entails temporarily running parallel infrastructures. The Business Process Design initiative needs to address this transition from current operations to AMI-enabled operations with a structured and proactive approach. Furthermore, the management of the participating vendors' software and hardware product roadmaps is a key component so that end-to-end functionality that works at an early milestone continues to function as new enhancements from various components rollout in future years.
- **Implement comprehensive and focused** Change Management **and communications.** The overall AMI program will have a significant effect on PSEG Long Island employees and customers. It is essential to guide all stakeholders (internal and external) through the change journey, from awareness to understanding and through to buy-in and adoption. Effective Change Management starts from day one of the Business Process Design initiative and continues throughout the life of the initiative; this can dramatically accelerate and improve the adoption of the proposed solution and the achievement of business results.

Figure 2-17 illustrates PSEG Long Island's proposed plan to conduct workstreams that will support the AMI program by enabling business process architecture redesign across impacted customer operations and T&D functions, and facilitating Change Management. To be successful, Change Management activities should begin on day one of the program.

Figure 2-17. Business Process Design and Change Management Approach



2.4.3.3 Change Management

During Business Process Design, the answers and Change Management course of action, or approach, is different for the various process design stakeholder groups:

- **Leadership** as they confirm and reinforce the strategic aspirations for AMI, support decision-making about the future with AMI and its implications, encourage participation from their groups, and assist with the resolution of issues and overall project risk. Providing leadership key insights and gaining their alignment and endorsement will be a key focus for Business Process Design.
- **Employees** directly involved as Business Process Design team members as they challenge the current manual environment, stretch their thinking about what is possible for how work is conducted and how employees interact with customers, and work together day after day with the rest of the team to define the new processes of AMI and what those changes mean to their respective organizations. These individuals will require education both on the art of the possible with AMI as well as education on the project approach, methods, deliverables, tools, and terminology. They must understand their role as both an agent of change for the future and a steward for their respective organization.
- **The broader PSEG Long Island organization** as they engage with the team to review and provide input to the future state design and help set the stage for the changes to come.

Change Management considers the needs and requirements for each of these different stakeholder groups to engage in a meaningful and innovative way.

During Phase 1 of the project, the focus for Change Management will be gaining leadership alignment and setting the stage to engage the project team and broader organization in Phase 2:

- **Identify key stakeholder groups/owners by process area:** One of the first steps in the project will be to identify all the key stakeholders and process owners for each in-scope process area. Identifying these key individuals early is essential for a successful Change Management program. This input feeds a number of Change Management deliverables and serves as a baseline for overall impacted areas of the organization.
- **Key stakeholder expectation alignment and visioning:** Once all key stakeholders have been identified it is critical to gain alignment on the goals, objectives, and outcomes of the AMI

program. This activity would initiate one-on-one discussions with leaders to understand their expectations and current understanding of the outcomes for AMI.

- **Program structure and governance:** The key stakeholders will formulate a set of guiding principles on which key decisions for the project are based. This governance model will ensure a consistent approach to project decision-making.
- **Preliminary impact assessment:** As the key process areas to focus on are being finalized, PSEG Long Island will determine a preliminary view of change impacts from the program. This information will be used to refine and validate key stakeholders, to determine the Phase 2 engagement strategy, and to prepare a process design communication plan. A finalized impact assessment will be completed at the end of Phase 2 once all process changes are known and documented.
- **Stakeholder engagement and change network strategy:** As mentioned previously, determining the right way to engage the organization will be critical. A change network is designed as a structure of individuals throughout the different layers of the impacted organizations who sponsor and advocate the change.
- **Establish communication strategy and Change Management approach for Phase 2:** This activity maps out the necessary communication activities to engage the broader organization during Phase 2. The communication that occurs during Phase 2 starts the learning process by providing contextual information about what is changing within each business process, when those changes would occur, and what they would experience. By leveraging new technologies, the ability to communicate without stakeholders becomes more creative and flexible using tools such as: immersion centers, field visits, focus groups, internal web blogs, webinars, podcasts, etc.

During Phase 2 of the program, when process design activity begins, the Change Management work stream is focused on preparing leadership to drive change, engaging stakeholders to think about and describe the future state, determining the change impacts associated with the process designs, and identifying the necessary actions to drive change during implementation successfully:

- **Leadership coaching for stakeholders to deliver change:** In contrast to traditional components of Change Management such as communications and training, research has shown that the no. 1 driver of change success is the capability of the leadership team to drive change.
- **Training and knowledge transfer for project team members:** The Business Process Design training will be useful to PSEG Long Island employees in the future as they look to maintain or perhaps even change business processes on an ongoing basis. The training will also serve as a level set to ensure that all project team members start with a common and clear understanding of the project governance established early on with key stakeholders.
- **Conduct detailed change impact analysis:** Collaboratively capture the detailed organizational changes necessary to bring the new processes to life. This exercise is both critical to leadership acceptance as well as to categorize and understand the key areas upon which to focus to obtain the new norms and behaviors in the future. Example change impacts include identifying the different stakeholder groups, like Call Center agents or billing agents who will need new skills in the future to interact with and answer customer inquiries. It will include identifying the employee stakeholder groups who will need to understand the new environmental context and rational for AMI such as external stakeholders. It will include identifying the different groups who must change how they think about data and use it differently like customer marketing. These changes will be aggregated by stakeholder/employee group and fed into the implementation U2.0 Roadmap and Change Management strategy.

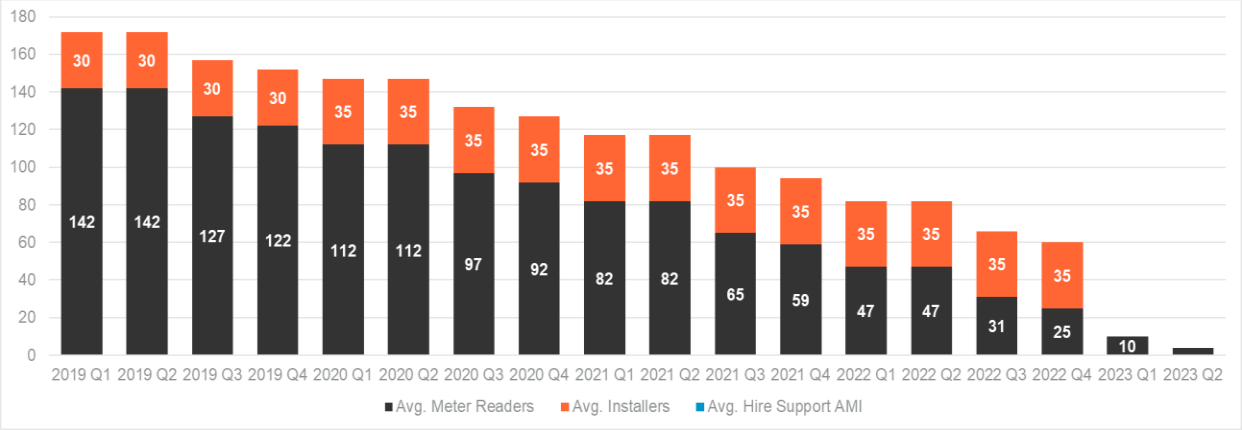
- **Establish stakeholder change readiness baseline:** PSEG Long Island understands the importance of identifying targets up front to evaluate progress, organizational acceptance, and readiness throughout the lifecycle of the project. Only by establishing success criteria for the business and people transformation initiatives can the utility meaningfully report on the progress of its change. PSEG Long Island will work with a data rich Change Management tool designed to show leadership if a change program is on track to deliver benefits and outcomes.
- **Change intensity maps:** In addition to the type of change affecting each stakeholder group, it is also important to understand the amount of change that is occurring across individual stakeholder groups simultaneously. There could be many changes as a result of the Business Process Design project, and there may be other changes occurring throughout the organization impacting the same user groups (i.e., AMI rollout, Customer Portal upgrade, rates engine integration, etc.). PSEG Long Island would evaluate the timing of these changes and their relative effect on stakeholder groups to create a change intensity map that shows stakeholder groups that are at risk (i.e., many changes impacting them at once). This map would help identify potential alterations to the deployment strategy or how to the change plan for certain groups.
- **Change management strategy:** Once the change impacts for the stakeholders are understood along with the organization's intensity level for change in each area, a Change Management strategy is completed to architect the change activities for the remainder of the program. This strategy outlines, by group, the actions that need to be completed to move people from an awareness of the change to true commitment and acceptance.

See Section 2.5 for details on how Business Process Design and Change Management support fits into the overall AMI business case.

2.4.4 Labor Transition Plan

To address the organizational change impact, PSEG Long Island is developing a detailed approach regarding how labor will be affected by the phased implementation of AMI through 2022. PSEG Long Island will utilize the aforementioned staffing processes to ensure that all impacted employees are transitioned seamlessly into new positions along with achieving business case labor cost savings via normal workforce attrition thus avoiding any forced employee separation (Figure 2-18). PSEG Long Island has a demonstrated commitment to supporting its internal workforce and partnering with IBEW Local 1049 to proactively develop a staffing model for the utility of the future that serves both the employees and its customers by improving customer services, supporting AMI deployment, and improving storm response.

Figure 2-18. 2019-2022 Meter Services Workforce Planning for AMI Deployment and Meter Reading



The utility will develop a plan that seeks to protect the interests of its workforce (as it has done historically) and balance that with its transition to new technology that signals changes in its business operations and practices. That plan will follow from both the implementation plan for AMI and from the implementation of REV as it develops; it will also include the utility's overall business needs for the services it provides, not limited to electric service. As this business plan indicates, the savings that are expected from AMI implementation are not limited to savings on labor costs; they also include multiple other benefits such as outage management, customer satisfaction, and other societal benefits.

To accomplish a smooth workforce transition, PSEG Long Island's Meter Services organization has partnered with IBEW Local 1049 to develop and implement a career path program. This program provides job duty flexibility along with insuring that all impacted Meter Service employees are available to be trained for more technical job duties and promotion opportunities. In addition to the Meter Services career path initiative, on an annual basis the company engages in a structured resource planning process that seeks to align the staffing and skills of the workforces to meet the changing requirements of the business. It is during this process that head count trends, attrition impacts, and new business requirements are considered to develop an enterprise wide staffing model.

2.4.5 Data Privacy

PSEG Long Island has assessed its Data Privacy framework, practices and procedures as recommended by the National Institute of Standards and Technology (NIST). PSEG Long Island has already put in place safeguards that protect customer information from unauthorized access or improper use.

As recommended by the Commission, this assessment is based on recommendations found in the National Institute of Standards and Technology Interagency Report (NISTIR) 7628 (Revision 1) issued in September 2014. This three-volume report, *Guidelines for Smart Grid Cybersecurity*, (Guidelines) provides an analytical framework for organizations to develop cyber security strategies tailored to each user's combinations of smart grid-related characteristics, risks, and vulnerabilities.

The following section provides an overview of what is contained within the NISTIR recommendations across the 18 categories along with PSEG Long Island's status on each category as summarized below. PSEG Long Island is completely aligned with 10 out of 18 recommendations, partially aligned with 7 out of 10, and only one recommendation remains an open item at this time (PEV Privacy Concerns category). Below sections also include PSEG Long Island's plan of action where the category status indicates partial or no alignment.

Status:

● – Currently in alignment with the standard

◐ – Partially in alignment with the standard

○ – Not in alignment

1. Management and Accountability

Assign privacy responsibility. Each organization collecting or using smart grid data from or about customer locations should create (or augment) a position or person with responsibility to ensure that privacy policies and practices exist and are followed. The company currently follows the process of letter of authorization for third party organization rom the customer to access meter data. The organization files these documents for future reference.

Establish privacy audits. Audit functions should be modified to monitor all privacy related energy data access. The company has internal audits for internal controls with AMI technology. The company has periodic review of personally identifiable information (PII) policies to protect customer data. More processes will be developed in the future to increase the data privacy in MDM and the Customer Portal.

Establish or amend incident response and law enforcement request policies and procedures. Organizations accessing, storing, or processing energy data should include specific documented incident response procedures for incidents involving energy data. Company currently not aligned with above requirement. The company will actively investigate Smart grid data incident reporting process and will evaluate this requirement in the future.

Status: ◐

2. Notice and Purpose

Provide notification for the personal information collected. Any organization collecting energy data from or about consumers should establish a process to notify customer account inhabitants and person(s) paying the bills (which may be different entities), when appropriate, in a clearly worded description of the data being collected, why it is necessary to collect the data, and the intended use, retention, and sharing of the data. The company requires third party to provide a letter of authorization from the customer prior to providing any usage data. In the future, the Customer Portal will include Green Button Connect and other means for the customer to provide third party access via the Portal securely with access controls.

Provide notification for new information use purposes and collection. Organizations should update consumer notifications whenever they want to start using existing collected data for materially different purposes other than those the customer has previously authorized. The Green Button Connect and other third-party access controls in the new Portal will provide customer notification when the data is accessed by any third party to whom customer has provided access.

Status: ●

3. Choice and Consent

Provide notification about choices. The customer notification should include a clearly worded description to the recipients of services notifying them of (1) any choices available to them about information being collected and obtaining explicit consent when possible; and (2) explaining when and why data items are or may be collected and used without obtaining consent, such as when certain pieces of information are needed to restore service in a timely fashion.

The Company provides clear notification about choices made available to them on the Company published Privacy Statements (i.e., Choice Regarding our Use and Disclosure of your Customer Information to Third Parties). Additionally, the Privacy Statements provide instances that are excluded from customer choice (i.e., circumstances required by law, regulation or order).

Status: ●

4. Collection and Scope

Limit the collection of data to only that necessary for smart grid operations, including planning and management, improving energy use and efficiency, account management, and billing.

Obtain the data by lawful and fair means and, where appropriate and possible, with the knowledge or consent of the customer.

The company collects the customer usage data for billing and power quality monitoring. The data is collected in a secure and encrypted process. The type of data collected and the usage of the data is clearly communicated to the customers through the focus groups and via PSEG Long Island's website FAQs.

Status: ●

5. Use and Retention

Review privacy policies and procedures. Every organization with access to smart grid data should review existing information security and privacy policies to determine how they may need to be modified.

Limit information retention. Data, and subsequently created information that reveals personal information or activities from and about a specific customer location, should be retained only for as long as necessary to fulfill the purposes that have been communicated to the energy customers. After the appropriate retention period, data should be aggregated or destroyed.

All Organizations (internal and external) accessing the data systems go through a periodic cyber security online course from IT department, making sure all process and procedures are followed. The utility regularly reviews and updates their policies in this area and the Records Management policy applies to all collected data and records.

Status: ●

6. Individual Access

Access to energy usage data. Any organization possessing energy data about customers should provide a process to allow customers access to the corresponding energy data for their company's account.

Dispute resolution. Smart grid entities should establish documented dispute resolution procedures for energy customers to follow.

Customers are currently able to access their usage data via My Account. The Customer Portal provides customer with details of daily, monthly, and yearly usage data with monthly comparisons. The future Portal will provide more tools like rate analyzer and other usage comparison charts to educate customers more on their usage pattern and ideas on saving energy. Currently the customers can fill a web form to file a request or complaint via the My Account.

Status: ●

7. Disclosure and Limiting Use

Limit information use. Data on energy or other smart grid service activities should be used or disclosed only for the authorized purposes for which it was collected.

Disclosure. Data should be divulged to or shared only with those parties authorized to receive it and with whom the organizations have told the recipients of services it would be shared.

The Company Privacy Statement limits the purposes for which data collection is authorized, for example billing, customer service, data analysis, fraud monitoring, power quality etc. In future, the Privacy Statement will provide customers a list of authorized parties that customer energy data may be shared with via the Green Button Connect.

Status: ◐

8. Security and Safeguards

Associate energy data with individuals only when and where required. For example, only link equipment data with a location or customer account when needed for billing, service restoration, or other operational needs.

De-identify information. Energy data and any resulting information, such as monthly charges for service, collected as a result of smart grid operations should be aggregated and anonymized by removing personal information elements wherever possible to ensure that energy data from specific customer locations is limited appropriately. This may not be possible for some business activities, such as for billing.

Safeguard personal information. All organizations collecting, processing, or handling energy data and other personal information from or about customer locations should protect all information collected and subsequently created about the recipients of smart grid services from loss, theft, unauthorized access, disclosure, copying, use, or modification.

Do not use personal information for research purposes. Any organization collecting energy data and other personal information from or about customer locations should refrain from using actual customer data for research until it has been anonymized and/or sufficiently aggregated to assure to a reasonable degree the inability to link detailed data to individuals.

PSEG Long Island has policies detailing the handling of PII and energy data, including instructions on the protection of all restricted, sensitive, and critical data. Energy data is only linked with individuals when required to conduct business operations and data analysis. Additionally, the company does not share customer information including energy data or other personal information for research purposes without proper non-disclosure agreements (NDAs).

Status: ●

9. Accuracy and Quality

Keep information accurate and complete. Any organization collecting energy data from or about customer locations should establish policies and procedures to ensure that the smart grid data collected from and subsequently created about recipients of services is accurate, complete, and relevant for the identified purposes for which they were obtained, and that it remains accurate throughout the life of the smart grid data within the control of the organization.

The company's MDMS system has detailed VEE logics built in to continuously ensure the accuracy and completeness of the Meter data for billing and data analysis. The company has internal controls on the AMI process to ensure accuracy of the billing process with the AMI data.

Status: ●

10. Openness, Monitoring, and Challenging Compliance

Policy challenge procedures. Organizations collecting energy data, and all other entities throughout the smart grid, should establish procedures that allow customers to have the opportunity and process to challenge the organization's compliance with their published privacy policies as well as their actual privacy practices.

Perform regular privacy impact assessments (PIA). Any organization collecting energy data from or about customer locations should perform periodic PIAs with the appropriate timeframes, to be determined by the utility, based upon the associated risks and any recent process changes and/or security incidents.

Establish breach notice practices. Any organization with smart grid data should establish policies and procedures to identify breaches and misuse of smart grid data, along with expanding or establishing procedures and plans for notifying the affected individuals.

The company had process and procedures in place for customers to challenge the data and its privacy. The customers can submit a web form with request or complaint. The company will review the customer's request or complaint and will address them with high importance and with timely response. The company will evaluate future PIA process for any external organizations that have access to customer data. The internal organization with smart grid data access follows the company security and PII process to ensure data privacy. The company will include AMI data privacy as part of the regular audits.

Status: ◐

11. Personal Information in the Smart Grid

Determine which data items will significantly lessen or remove the ability to link to specific addresses or individuals whenever they perform their data anonymization activities.

The company policies are in practice to make sure when to utilize the customer data during the data analyzation. The organization that performs this data makes sure that data is stored in a secured place and to only access when needed. Additionally, the company does not share customer information including energy data or other personal information for research purposes without proper NDAs.

Status: ●

12. Wireless Access to Smart Meters and Secondary Devices

If future wireless technology is used to transmit aggregate home or business energy consumption information for a unique location or dwelling, then **that usage data should also be protected** from unauthorized use, modification, or theft prior to sufficient aggregation to protect privacy.

The company has implemented Zigbee pilots to make sure the interoperability devices follow a secure provisioning to keep the data secure when transferred from the meter to the wireless device. The wireless device should follow the Smart Energy Profile (SEP1.x or 2.X) Standards. The company will have the authority to open / close the provisioning window to commission any external device.

Status: ●

13. Commissioning, Registration, and Enrollment for Smart Devices

Privacy issues that should be addressed related to the registration of these devices with third parties include: determining the types of information that are involved with these registration situations; controlling the connections which transmit the data to the third party, such as wireless transmissions from home area networks; and determining how the registration information is used, where it is stored, and with whom it is shared.

At each step in this process, the customer, utility, and third-party provider should **ensure that data flows have been identified and classified**, and that privacy issues are addressed throughout, from initial commissioning up through service delivery.

The company has implemented Zigbee pilots to make sure the interoperability devices follow a secure provisioning to keep the data secure when transferred from the meter to the wireless device. The wireless device should follow the Smart Energy Profile (SEP1.x or 2.X) Standards. The company will have the authority to open / close the provisioning window to commission any external device. The company in the future will invest more into more interoperability standards to allow the flexibility for the customers to choose the wireless device. The company will explore into a communication process between the utility, customers and third party to address any privacy issues while transmitting data to the customer and third party.

Status: ◐

14. Smart Grid Data Access by Third Parties

Provides data privacy recommendations for third parties in accessing smart grid data

PSEG Long Island currently provides access to third parties for the AMI data via My Account. The company has secure policies in place for accessing My Account. In the future,, customers will be able to control the third-party access levels via Customer Portal.The company will explore other options to make the third-party access more secure.

Status: ◐

15. Plug-In Electric Vehicles (PEVs) Privacy Concerns

Specific solutions or mitigations for PEV potential privacy issues should be explored as technology solutions are deployed going forward. System and infrastructure architects and engineers should stay aware of potential issues.

The company currently has no EV data privacy policies. The company will explore into the future data privacy standards for PEV customers.

Status: ○

16. Awareness and Training

Privacy and information security training. Organizations should support training by ongoing awareness communications, to their workers that have job responsibilities involving customer and energy usage data. Organizations should also consider providing information to their customers and the public to help them to better understand the privacy issues related to the smart grid, along with how the organization is working to mitigate the associated risks, and also steps the public can take to better protect their own privacy.

The company has information security training and awareness programs in place for employees including PII training and the Information Security Policy.

Status: ●

17. Mitigating Privacy Concerns within the Smart Grid

PIAs. Any organization that collects personal information, or information that can reveal information about personal activities, can identify areas where privacy protections are necessary by performing a PIA. A PIA can be performed internal to the organization, or by an objective outside entity.

Audits. An audit is a structured evaluation of a person, organization, system, process, enterprise, project, or product. Among other mitigations, audits can be used to determine compliance levels with legal requirements and to identify areas where policies are not being followed. An audit should ideally be performed by an objective entity that is not a member of the area being audited.

Privacy use cases. Use cases can help smart grid architects and engineers build privacy protections into the smart grid. The Privacy Use Cases in the NISTIR document are focused on data privacy in selected

smart grid scenarios, making them unique amongst the many tools, frameworks, and standards that are noted above.

The company conducts multiple cyber security audits annually through internal and external third parties. As noted in recommendation 10, the Company will begin conducting PIAs on implemented AMI systems as part of regular audit plans.

Status: ◐

18. Emerging Smart Grid Privacy Risks

Entities should remain aware of emerging smart grid privacy risks.

The Company has an enterprise Risk Management program and periodic entitlement review process on user access designed to identify, assess, mitigate, and monitor material risks across the company. More Data privacy risks will be explored to make the data secure in the future as the systems grows.

Status: ◐

Table 2-3. Summary of the NIST 18 Recommendations

Recommendation	Status
Management and Accountability	◐
Notice and Purpose	●
Choice and Consent	●
Collection and Scope	●
Use and Retention	●
Individual Access	●
Disclosure and Limiting Use	◐
Security and Safeguards	●
Accuracy and Quality	●
Openness, Monitoring, and Challenging Compliance	◐

Recommendation	Status
Personal Information in the Smart Grid	●
Wireless Access to Smart Meters and Secondary Devices	●
Commissioning, Registration, and Enrollment for Smart Devices	◐
Smart Grid Data Access by Third Parties	◐
PEV Privacy Concerns	○
Awareness and Training	●
Mitigating Privacy Concerns within the Smart Grid	◐
Emerging Smart Grid Privacy Risks	◐

2.4.6 Cyber Security

PSEG Long Island cyber security foundation is aligned with NIST SP 800-53, SANS Top 20, the DOE Office of Electric Delivery and Reliability Cybersecurity Capability Maturity Model (C2M2) and SOX Controls. The NIST SP 800-53 is to ensure the confidentiality, integrity, and availability (CIA) of systems and data through a risk based management process to regularly evaluate all aspects of the program, including review of policies, standards, and procedures in addition to the actual implementation of technical, administrative, and physical controls. These objectives support the Company's goal to provide reliable electric service to consumers, commercial entities, and government agencies
PSEG Long Island CIA security foundation is based on the following pillars.

1. Security Framework
2. Governance
3. Risk and Threat Management
4. Authentication
5. Authorization
6. Auditing

2.4.6.1 Security Framework

PSEG Long Island cyber security framework is a combination of technical, administrative, and physical controls extracted from the NIST 800-53, SANS Top 20 Controls, North American Electric Reliability Corporation Critical Infrastructure Protection (NERC-CIP), and SOX and applied to the corporate and highly sensitive utility networks and/or devices. All business and IT applications, infrastructure, utility

specific systems and devices are evaluated based on their business needs and criticality to the business. Highly critical systems are isolated with their own firewalls and community. Security policy is applied across the board with practices and procedures documented by responsible staff as required.

NIST 800-53, SANS Top 20 Controls, NERC-CIP and/or SOX controls are applied to new/upgrade projects, operations, and other PSEG Long Island relevant activities. Cyber security policy and practice is driven by the following principals.

1. Secure the perimeter.
2. Defense in depth.
3. Separation of duties.
4. Least privilege (users and admins and contractors).
5. Non-repudiation

2.4.6.2 Governance

Governance is a critical aspect of a utility and security is an integral part of that.

Corporate Security Governance

PSEG Long Island cyber security is part of the Chief Information Security Office (CISO) for cyber security. It is decomposed into two separate teams 1) security engineering and 2) compliance. Additionally, it is integrated functionally with NERC-CIP, operations, infrastructure, and application teams and provides constant oversight and direction, and security evaluation.

PSEG Long Island cyber security provides regular reporting of Security Operations (e.g. ongoing scanning), and Security Project Status. PSEG Long Island executes regular review and resolution of security incidents.

Operations Security Governance

PSEG Long Island cyber security has a formal role in the Change Management and NERC-CIP Board membership reviewing and approving all relevant changes to operations. PSEG Long Island cyber security provides review and feedback on proposals and RFI for security relevant impact. All external vendors undergo a risk assessment identifying missing, and/or broken security controls that do not comply with PSEG Long Island security policy. Vendors are required to come into compliance with policy.

Compliance (Internal and External)

PSEG Long Island cyber security performs internal compliance audits and supports external compliance audits. Audit findings are documented, tracked, reported, and resolved. External audits are actively supported for data collection, evaluation, results reporting, tracking, and results resolution. Northeast Power Coordinating Council is the Northeast regional entity for NERC that performs PSEG Long Island NERC-CIP audits. Corporate audits are performed by KPMG. Vulnerability and penetration test audits are performed from an approved list of vendors selected through the RFP process.

External Security Governance

PSEG Long Island cyber security has an active relationship with most trade and federal entities around energy. Some examples are National Association of Regulatory Utility Commissioners, Electricity Subsector Coordinating Council (ESCC's) Cyber Mutual Assistance Program UNITED Consortium, UNITE, FBI Cyber Security, Department of Homeland Security, and other law enforcement agencies. These interactions keep PSEG Long Island cyber security informed of cyber trends, technologies, and incidents.

Security Management

PSEG Long Island cyber security management actively includes risk management, information security policies, procedures, standards, guidelines, baselines, information classification, security organization, and security education. These core components serve as the foundation of a corporation's security programs. The objective of security and a security program is to efficiently protect the company and its assets.

Risk and Threat Management

Risk and Threat Management is a prioritized top-down approach for managing PSEG Long Island's threat exposure. This approach allows PSEG Long Island cyber security to assess threats to assets and information, then determine steps necessary to protect assets and information.

Risk Management Framework (NIST 800-53)

NIST 800-53 is a risk based methodology that requires system categorization, selection of relevant controls, baseline, assessment, authorization, and monitoring controls. Control categories are technical, administrative, and/or physical.

PSEG Long Island cyber security categorizes its Information Systems, identifies relevant security controls and iteratively applies security controls against the system/device being considered. Using Change Management, designs are approved or rejected based on the adherence to security requirements. Systems are evaluated using techniques and tools such as vulnerability and penetration tests, manual and third-party penetration testing to compliment normal operations testing.

Prioritized Threat Model

PSEG Long Island cyber security threat model prioritizes customer facing systems (e.g., web applications), vendor facing, and internal systems (e.g., privilege access, vertical and horizontal attacks).

Integrated Life Cycle Management

PSEG Long Island cyber security is actively involved in all phases of life cycle management with specific roles and responsibilities and artifacts. This includes for example RFPs, vendor review, risk assessments, requirements, architecture, design, testing for new or upgrade projects as well the operations support.

Patch Management

PSEG Long Island's patch management policy is to patch systems (applications, infrastructure), highly sensitive networks, operations, and non-operations. Vendors are monitored for patch releases and applied regularly after evaluation and Change Management review and approval.

Incident Management

PSEG Long Island cyber security has a formal incident management program with identified members and roles. The policy addresses detection, analysis, remediation, reporting, and tracking of incidents.

Vulnerability Management

PSEG Long Island cyber security routinely performs asset scanning and vulnerability remediation. New projects are scanned and hardened per policy. Scan findings are tracked, reported, and resolved.

Penetration Testing

PSEG Long Island cyber security performs third-party penetration testing. Externally facing interfaces and critical internal assets are penetration and vulnerability tested including new/updated projects.

Security Testing

PSEG Long Island cyber security validates and verifies the performance of security functions as designed and approved.

2.4.6.3 Authentication

Account Management

PSEG Long Island policy requires unique accounts (user and system) individually assigned and owned and tracked. Password policy requires hard passwords (length, complexity), and regular renewal for users and administration. Accounts are expired for inactivity or when employment ends or is suspended. Account review for highly sensitive areas and corporate occurs regularly. Account Management is reserved to specific administrators based on system and/or application responsibilities.

Central Authentication Using SSO

PSEG Long Island uses single sign-on authentication implemented for corporate systems. Authentication for highly sensitive areas is a separate system with accounts and passwords.

Remote Access

PSEG Long Island security requires secure remote access (e.g., VPN, TLS, etc.) using two-factor authentication for employees and contractors. Contractors are provided hardened PSEG laptops or secure portal access.

Logging and Monitoring

PSEG Long Island security logs all access attempts in a common logging system using restricted access and separation of roles. Access attempts are monitored and failures alerted. Access investigation occurs when thresholds are exceeded.

Authorization

PSEG Long Island security policy requires all users to be assigned roles specific to their responsibilities (i.e., least privileged). Access is controlled through group membership, privileges, etc. Access attempts are alerted for specific resources. Access violations are logged and alerted with time stamps, user id, and activity.

2.4.6.4 Auditing

Audit Focus

PSEG Long Island security focuses on authorization, activity (e.g., password renewal, privileges, separation of duties), account management), accountability (non-repudiation), and manual review.

External Audits

PSEG Long Island performs annual corporate audits from external sources and on-demand audits for highly sensitive areas. Audits are tracked, recorded, reported and findings resolved.

Internal Audits

PSEG Long Island performs regular audits (e.g., quarterly, semi-annually, periodically) for corporate and sensitive areas. Audits are tracked, recorded, reported and findings resolved.

Audit Controls

PSEG Long Island uses the following controls previously discussed:

1. Risk assessments.
2. Security testing.
3. Vulnerability scanning.
4. Penetration testing

2.5 Business Case Summary

PSEG Long Island has prepared a business case that includes AMI and all associated program benefits and costs, as well as the budget request for each relevant area. Costs and benefits throughout this document are presented in two different formats:

- **Benefit-cost analyses (BCAs)** assess the expected benefits and costs over the analysis period (2019-2038) from the societal cost test (SCT) perspective.[19] These analyses first determine the annual values of costs and benefits in nominal dollars, then calculate a present value summed over 20 years using a 6.11% nominal discount rate.[20] The outputs are generally shown in the form of a stacked bar graph with numerous benefit and cost streams to provide a visual of the most important value streams and a representation of the benefit-cost ratio.
- **Budget request summaries** show a 4-year view of PSEG Long Island's actual funds being requested to execute the project proposed in this filing. These outputs are shown as nominal dollars in 2019-2022 and as a 4-year total, and the funding requirements are split by three categories (i.e., capital, O&M, and fuel and purchased power [F&PP]). Labor impacts (i.e., internal FTEs at PSEG Long Island) are shown for informational purposes.

2.5.1 Overview of Benefit-Cost Analysis

Overall, PSEG Long Island expects a positive societal impact from the AMI program over the 20-year analysis period. The present value of benefits to society is expected to be $497.6 million, while the costs are $315.1 million. Figure 2-19 summarizes the benefits and costs per year, in nominal dollars, along with the cumulative net present value of the AMI investment which indicates a payback period of 11 years.

[19] For more details on cost tests, see Section C.1.2.

[20] The discount rate is based upon PSEG Long Island's weighted average cost of capital (WACC).

Figure 2-19. AMI Business Case Annual Cash Flow Analysis from SCT Perspective

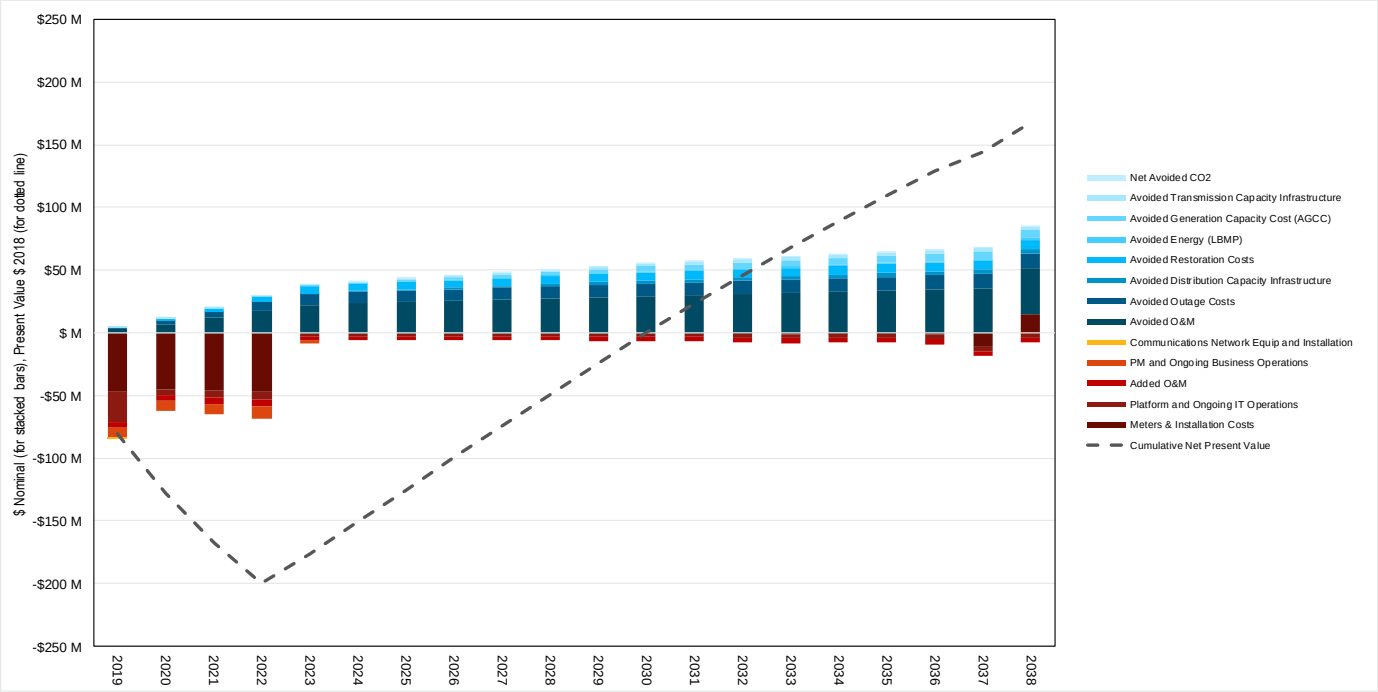
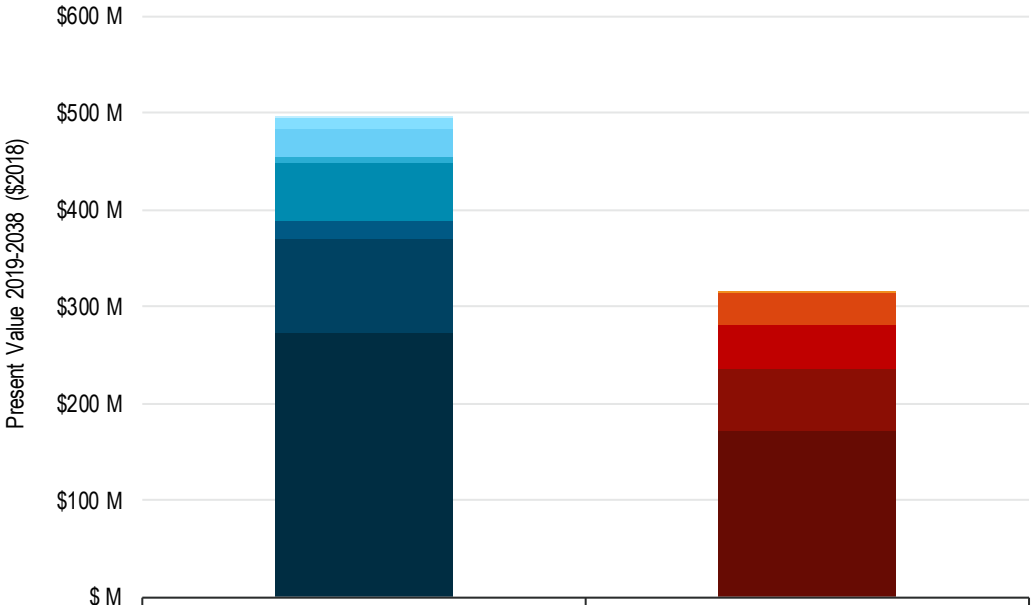


Figure 2-20 shows the expected present value of benefits and costs of the AMI business case over a 20-year period from the societal perspective. This output represents a present value view of the cash flow analysis shown above in Figure 2-19.

Figure 2-20. AMI Business Case SCT Stacked Benefits and Costs (2019-2038)



	Benefit	Cost
Net Avoided CO2	$1.8 M	$0.0 M
Avoided Transmission Capacity Infrastructure	$13.7 M	$0.0 M
Avoided Generation Capacity Cost (AGCC)	$27.1 M	$0.0 M
Avoided Energy (LBMP)	$6.7 M	$0.0 M
Avoided Restoration Costs	$60.7 M	$0.0 M
Avoided Distribution Capacity Infrastructure	$17.7 M	$0.0 M
Avoided Outage Costs	$97.9 M	$0.0 M
Avoided O&M	$271.9 M	$0.0 M
Communications Network Equip and Installation	$0.0 M	$1.1 M
PM and Ongoing Business Operations	$0.0 M	$34.2 M
Added O&M	$0.0 M	$44.7 M
Platform and Ongoing IT Operations	$0.0 M	$64.5 M
Meters & Installation Costs	$0.0 M	$170.7 M
Total	$497.6 M	$315.1 M

Table 2-4 shows the present value of benefits and costs, the net present value, and the benefit-cost ratio from the SCT, the utility cost test (UCT), and the rate impact measure (RIM) test based on the DPS BCA Framework. The UCT views benefits and costs from PSEG Long Island's perspective and does not included benefits such as avoided emissions or customer outage benefits. The RIM test is similar to the UCT except that gained utility revenue (e.g., from theft detection or other revenue protection benefits) is treated as a benefit. More details on cost test definition can be viewed in Appendix C.1.3.

Table 2-4. Cost Test Summary

Output Parameter	SCT	UCT	RIM
PV of Benefits	$498 million	$398 million	$582 million
PV of Costs	$315 million	$315 million	$327 million
Net Present Value	$183 million	$83 million	$255 million
B/C Ratio	1.58	1.26	1.78

Overall, the AMI investment has a positive impact by all cost tests. The details behind benefits and costs by cost test can be viewed in Appendix C.2.

2.5.2 Monetized Benefits of AMI

This section summarizes the monetized benefits that support the AMI business case. Many of the benefits shown in the tables below are specific to the SCT and align with Figure 2-20. Some other benefits, such as bill savings and revenue protection, are not counted in the benefits or costs under the SCT and therefore do not show up in Figure 2-20. These values are marked with an asterisk (*) in the tables below.

Table 2-5 shows the monetized benefits that accrue to customers. It is important to note that numerous other benefits such as increased customer experience, access to real-time data, and better DER program offerings will be realized by customers through AMI. The analysis team treated these benefits as qualitative.

Table 2-5. Monetized Customer Benefits

Benefit Category	Description	Present Value (2019-2038)
Bill Savings*	Customers can save energy on their bills through modernized rate structures such as TOU rates. This value is only counted in the RIM test and is not applicable in the SCT and UCT tests.	$12.4 million
Avoided Outage Costs	PSEG Long Island can identify and fix outages faster using nested outage detection, which reduces the customer minutes of outage (CMI) for both residential and commercial customers. A reduction in CMI has an inherent value to customers.[21] This value is treated as a benefit in the SCT.	$97.9 million

** Value not counted in the SCT benefits or costs*

Table 2-6 shows the monetized benefits accrued to society-as-a-whole. These values are treated as benefits under the SCT and do not apply to the UCT and RIM tests.

[21] For example, a retail customer may lose out on sales during a power outage and would value avoided outages differently than a residential customer. More details can be read in the LBNL Cost of Reliability Study (https://emp.lbl.gov/publications/updated-value-service-reliability)

Table 2-6. Monetized Societal Benefits

Benefit Category	Description	Present Value (2019-2038)
Carbon Savings	Carbon emissions are reduced two-fold: (1) lower emissions from reductions in wholesale energy consumption, and (2) reductions in vehicle emissions through the automation of meter reading and meter services.	$1.8 million
Pollutant Savings	Pollutant emissions (i.e., NOx, SOx) are reduced due to reductions in vehicle miles driven through the automation of meter reading and meter services. This value is negligible relative to the other benefit streams.	$0.0 million

Table 2-7 summarizes the monetized benefits associated with utility operational efficiencies. All of these values are counted as a benefit under the SCT, UCT, and RIM.

Table 2-7. Monetized Utility Operational Benefits

Benefit Category	Description	Present Value (2019-2038)
Reduced Meter Reading Costs	Reduced O&M expenses due to reduced meter reading labor and vehicle costs.	$171.9 million
Reduced Meter Services Costs	Reduced O&M expenses due to reduced meter services labor and vehicle costs. Meter services include expenses related to service connects and disconnects, and no trouble found calls.	$83.4 million
Reduced Call Center and Billing Costs	Reduced labor due to Call Center and billing efficiencies.	$10.3 million
Reduced Outage Restoration Costs	Reduced mutual assistance and internal costs associated with storm restoration due to improved restoration efficiency associated with AMI integration with the OMS.	$60.7 million

Table 2-8 shows the monetized benefits associated with reducing wholesale energy consumption and reduced generation, transmission, and distribution capacity infrastructure costs.

Table 2-8. Monetized Wholesale Energy and Capacity Benefits

Benefit Category	Description	Present Value (2019-2038)
Avoided Generation Capacity Costs[22]	Reduced generation capacity costs due to a reduction in peak load from the implementation of rate modernization.	$27.1 million
Avoided Transmission Capacity Costs	Reduced transmission capacity costs due to a reduction in peak load from the implementation of rate modernization.	$13.7 million
Avoided Distribution Capacity Costs	Reduced distribution capacity costs due to a reduction in peak load from the implementation of rate modernization.	$17.7 million
Avoided Wholesale Energy Costs	Reduced wholesale energy costs associated with a reduction in system energy consumption due to rate modernization. This category also includes the value of shifted energy consumption due to TOU rates.	$6.7 million

Table 2-9 summarizes the benefits associated with gained utility revenue. These values are not counted under the SCT and therefore are not visible in Figure 2-20.

Table 2-9. Monetized Utility Revenue Benefits

Benefit Category	Description	Present Value (2019-2038)
Revenue Protection from Theft/Tamper*	Revenue gained from identifying electricity theft and tamper of meters.	$104.5 million
Revenue Protection from Move-in/Move-out*	Revenue gained due to the ability of PSEG Long Island to connect and disconnect customers more efficiently during the move-in/move-out process.	$2.3 million
Meter Accuracy*	Revenue gained from have more accurate readings of meters. Electro-mechanical meters generally underestimate consumption, especially as the meters age.	$69.5 million
Reduced Bad Debt and Write-offs*	Reduced bad debt and write-offs associated with the implementation of prepaid billing.	$8.2 million

** Value not counted in the SCT benefits or costs*

[22] PSEG Long Island's internal planning analysis is currently forecasting lower capacity values on Long Island relative to the avoided costs used to calculate this benefit stream which are based on the 2018 DPS ICAP Model. These internal values may be considered in future investment decisions.

2.5.3 Line Item Budgets and Staffing Request

PSEG Long Island's total budget request for AMI and AMI-enabled functions is summarized in Table 2-10. Note that this table only shows added costs. It is also important to view these numbers in the context of reduced costs and net costs, which can be viewed in Section 5.

Table 2-10. Funding Requirements for AMI and AMI-Enabled Functions

Cost Type	4-Year Total	2019	2020	2021	2022
Capital Costs	**$230.3**	$71.0	$51.9	$53.2	$54.2
Non-Labor O&M Costs	**$45.0**	$12.8	$9.3	$10.4	$12.5
F&PP Costs	**-**	-	-	-	-
Labor O&M Costs	**$4.7**	$0.8	$1.0	$1.4	$1.5

Table 2-11 shows a summary of the added, removed, and net FTEs by capital and O&M for AMI and AMI-enabled functions.

Table 2-11. Net FTEs for AMI and AMI-Enabled Functions

FTE Type	2019	2020	2021	2022	2023+
Added Capital	19	19	21	21	0
Removed Capital	0	0	0	0	0
Net Capital FTEs	**19**	**19**	**21**	**21**	**0**
Added O&M	4	5	7	7	12
Removed O&M	19	49	81	118	146
Net O&M FTEs	**-15**	**-44**	**-74**	**-111**	**-134**

Table 2-12 shows the added capitalized FTEs needed for the 2019-2022 AMI deployment period. The FTE types with an asterisk (*) represent capital FTE positions that are filled with PSEG Long Island's existing O&M resources. It is assumed these FTEs revert back to O&M in 2023 and beyond.

Table 2-12. Added Capital FTEs for AMI and AMI-Enabled Functions

FTE Type	2019	2020	2021	2022	2023+
Deployment PM*	1	1	1	1	0
Dispatch Supervisor*	1	1	1	1	0
Dispatch Crew*	5	5	5	5	0
Supervisor for Installations*	3	3	3	3	0
Meter Shop	6	6	6	6	0
Analytics CoE	3	3	5	5	0
Total Added Capital FTEs	**19**	**19**	**21**	**21**	**0**

Table 2-13 summarizes the added O&M FTE resources. The two RF technicians remain with PSEG Long Island after the deployment period. Half of the Analytics CoE team is capitalized during the deployment period, then all 10 team members become O&M starting in 2023.

Table 2-13. Added O&M FTEs for AMI and AMI-Enabled Functions

FTE Type	2019	2020	2021	2022	2023+
RF Tech	1	2	2	2	2
Analytics CoE	3	3	5	5	10
Total Added O&M FTEs	**4**	**5**	**7**	**7**	**12**

Table 2-14 shows a summary of the removed O&M FTEs as a result of the AMI implementation. FTE Types with an asterisk (*) are positions that become temporarily capitalized during the 2019-2022 deployment phase. The remaining FTE reductions are assumed to be achieved through natural attrition within PSEG Long Island.

Table 2-14. Removed O&M FTEs for AMI and AMI-Enabled Functions

FTE Type	2019	2020	2021	2022	2023+
Deployment PM*	1	1	1	1	0
Dispatch Supervisor*	1	1	1	1	0
Dispatch Crew*	5	5	5	5	0
Supervisor for Installations*	3	3	3	3	0
Meter Reading	7	31	55	82	108[23]
Other Meter Services	2	8	15	22	29[24]
Meter Services Mgmt.	0	0	1	4	7
Call Center Representative	0	0	0	0	1[25]
Billing Rep Representative	0	0	0	0	1[26]
Total Removed O&M FTEs	**19**	**49**	**81**	**118**	**146**

[23] Based on PSEG Long Island's projections of attrition, the reduced number of meter readers increases to 112 for 2024 and beyond.

[24] Based on PSEG Long Island's projections of attrition, the reduced number of other meter services FTEs increases to 30 for 2024 and beyond.

[25] This business case estimates that there will be 2 call center representatives removed for 2024 and beyond.

[26] This business case estimates 1 incremental billing representative FTE will be removed per year through 2023-2028, for a total of 6 FTEs removed in 2028 and beyond.

3. Exploring New Innovative Offerings

PSEG Long Island's Utility 2.0 programs and supporting filings comprise a comprehensive response to market and policy drivers and are designed to move Long Island toward a clean and resilient energy future. Consistent with REV, PSEG Long Island strives to build an energy system that is increasingly adaptable and efficient by driving greater customer engagement and improved capacity utilization. Over time, the utility sees an increasing role for DER, anchored by full deployment of AMI, which will move the utility to become the DSP that can integrate these diverse resources and third-party solutions to benefit its customers.

PSEG Long Island is proposing DER that will provide value to both the customers and the utility. The following are PSEG Long Island's plans for projects that align with and support New York State policy toward an increasingly clean, intelligent, mobile, and distributed energy ecosystem in this filing.

3.1 Proposed and Ongoing Programs

The proposed and ongoing programs described in this section exemplify PSEG Long Island's strategy to move toward its vision by exploring new innovative offerings. This section details the components of that step and contemplates steps to be taken.

3.1.1 Utility 2.0 Projects and Reforming the Energy Vision

The following are PSEG Long Island's plans for projects that align with and support New York State policy toward an increasingly clean, intelligent, mobile, and distributed energy ecosystem.

- **Super Savers Program – a Demonstration Project for NWS Including Value-Based Targeted Energy Efficiency:** NWS have the potential to reduce customers' electric bills, improve reliability, and defer capital infrastructure. Super Savers Program is an innovative, geographically targeted NWS that combines targeted energy efficiency, demand response, and market animation through customer engagement to deliver targeted load reduction, energy savings, and enhanced customer empowerment and education. Super Savers Program engages customers with smart meters to animate value-based efficiency in constrained areas. Super Savers Program utilizes a spectrum of innovative customer tools such as targeted efficiency, home energy reports (HERs), smart thermostats as well as targeted VVO, a process of optimally managing voltage levels and reactive power to achieve more efficient grid operation. This project will inform PSEG Long Island plans for engaging and animating customers with smart meters as an alternative to traditional wire solutions to build a cleaner, more resilient, and more affordable grid for its customers.

  Super Savers is designed to be a targeted program focused on discrete portions of the system where load growth can be stemmed to defer system investment. If the pilot effort proves successful PSEG Long Island will consider additional locations on Long Island where it can be utilized.

- **Advanced Storage**: In the 2018 State of the State speech, New York Governor Andrew M. Cuomo announced a 1,500 MW energy storage goal for New York by 2025 with plans for longer-term goals that will be established later this year. PSEG Long Island supports the state goal and recognizes the important role advanced storage will provide in moving toward the DSP.
    - **Utility-Scale Advanced Storage:** PSEG Long Island plans to pursue a utility-scale advanced storage project to replace or defer conventional grid assets to provide system flexibility and to adapt to the evolving needs of the grid. The advanced storage project can relieve a soon to be overloaded distribution circuit, while also helping to integrate renewable generation in a way a conventional wires solution cannot. These projects will provide PSEG Long Island with valuable experience to improve its processes of identifying and implementing advanced storage to meet electric system needs including installed capacity, distribution, and sub-transmission needs in the future.
    - **Behind the Meter Storage Plus Solar including Locational VDER Compensation:** In support of REV, the New York State PSC established a mechanism to transition to a new way to compensate DER like solar power and energy storage. PSEG Long Island proposes to implement a behind-the-meter (BTM) residential energy storage program using a ten-year term tariff incentive program in the Locational System Relief Value (LSRV) areas where customers will receive higher rates of compensation that reflect the locational value of each solar plus storage system. This program, that is targeting 7.6 MW of residential energy storage to be deployed across Long Island, will be open to commercial and residential customers, collected through aggregators.
- **Electrifying Transportation:** New York State has committed to reducing statewide GHG emissions by 40% in 2030 and 80% by 2050 from 1990 levels. With the transportation sector emissions comprising over one-third of state GHG emissions, meaningful steps to achieve New York's climate goals must reduce emissions from cars, trucks, buses, and other vehicles. Electrification of transportation is the process of powering all these vehicles by plugging into the electrical grid which requires customer EV adoption and the availability and convenience of charging infrastructure. As identified in REV Track One Order[27] a large penetration of EVs has potential to strain distribution infrastructure, as recharging may occur during summer peak hours on many residential distribution circuits.

  The EV program proposed by PSEG Long Island addresses New York policy goals on adoption, infrastructure and modernization of the grid to accommodate increasing penetration of EVs. Specifically, the EV program consists of four components:

    - Outreach and Marketing
    - Fleet Vehicle Purchase
    - Commercial Workplace Charging Program
    - Residential Smart Charging Program

  The last two components above are focused on the benefits that managed charging brings to the overall electricity system. PSEG Long Island intends to perform the mapping identified in the fifth component, Direct Current Fast Charging (DCFC) Mapping, and the results from that may be considered in the 2019 Utility 2.0 filing. Appendix D provides a recommended transitional pricing mechanism for customers who choose to install a DCFC system.

Table 3-1 summarizes the linkages between these projects and New York State policy.

[27] CASE 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision.

Table 3-1. Alignment of New Offerings with New York State REV Policy

PSEG Long Island Proposed Projects	REV	NWS (1)	New Energy Efficiency White Paper	Energy Storage Roadmap (3)	Electrification of Transportation (4)	DSIP (5)	Clean Energy Standard (CES) (6)	VDER (7)
Super Savers Program - NWS Including Value-Based Efficiency	✓	✓	✓			✓		✓
Advanced Storage: Utility-Scale Advanced Storage	✓	✓		✓		✓		
BTM Storage Plus Solar including Locational VDER	✓			✓		✓		✓
Electrifying Transportation	✓				✓			

Notes:
(1) https://nyrevconnect.com/non-wires-alternatives/
(2) https://www.nyserda.ny.gov/-/media/Files/Publications/New-Efficiency-New-York.pdf
(3) Expected to be released June 2018 by the New York State Energy Research and Development Authority (NYSERDA)
(4) https://rev.ny.gov/
(5) REV and DSIP orders http://www3.dps.ny.gov/W/PSCWeb.nsf/All/C12C0A18F55877E785257E6F005D533E?OpenDocument
(6) https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard
(7) http://www3.dps.ny.gov/W/PSCWeb.nsf/All/8A5F3592472A270C8525808800517BDD?OpenDocument

3.1.2 Energy Efficiency Today

Today, PSEG Long Island funds its energy efficiency program through a separate annual filing. PSEG Long Island's energy efficiency programs make a wide array of incentives, rebates, and programs available to PSEG Long Island residential and commercial customers to assist them in reducing their energy usage and thereby lowering their bills, as well improve the environment through the success of the programs.

PSEG Long Island has partnered with industry leader Lockheed Martin to deliver the energy efficiency programs to the public. PSEG Long Island's energy efficiency program consists of four elements for its residential customers, a multi-faceted program for the utility's commercial customers and its legacy demand response program, Edge.

PSEG Long Island's energy efficiency program has recently expanded offerings to include:

- Rebates and incentives for the installation of energy efficiency measures which save oil and propane in residential homes and commercial buildings.
- Incentives and outreach strategies to enable the development of a market for combined heat and power (CHP) projects in commercial buildings.
- Higher incentives and increased program outreach for geothermal heating and cooling technologies.
- A targeted commercial energy efficiency program.

- Funding for the statewide Clean Energy Communities Program administered by the New York State Energy Research and Development Authority (NYSERDA).
- Customer engagement through a behavior based Home Energy Management Program.
- An online marketplace where customers can purchase LED lamps, smart thermostats, and other efficient appliances (http://www.energyfederation.org/psegliny)

PSEG Long Island's program philosophy and delivery is structured to be able to respond to market changes and to be able to respond to available cost-effective energy efficiency opportunities throughout any given year. PSEG Long Island will continue to offer residential and commercial customers established programs and incorporate additional innovative programs and measures to add to their energy savings opportunities. In 2017, PSEG Long Island shifted its savings emphasis from capacity to energy with 2017 goals at 40.17 MW and 236,819 MWh. The budget for 2017 was $87 million dollars (includes legacy demand response program).

3.1.3 Future Projects to Explore

PSEG Long Island is committed to changing the way energy is produced and consumed on Long Island and in New York. As the utility evolves toward a DSP, PSEG Long Island envisions steady evolution of its customer-centric, innovative, and forward-looking solutions, initiatives and programs, and projects to support its mission while supporting New York's energy policies and goals.

Future PSEG Long Island Utility 2.0 filings may explore:

- Expanding upon its marketplace to offer new products and services to customers. Partnerships and new business model demonstrations with third-party marketers in key markets such as electrification of transportation, clean heating and cooling initiatives, or in the revamping of the LIPA Edge 2.0 Program.
- C&I customer resiliency services including the use of advanced storage with market partners.

3.2 Super Savers Program – a Demonstration Project for Non-Wire Solutions Including Value-Based Targeted Energy Efficiency

The Super Savers Program is a geographically targeted NWS consisting of targeted energy efficiency, commercial and residential demand response, HERs, and a market animation standard offer. Super Savers employs a full suite of solutions to deliver targeted load reduction, energy savings, and enhanced customer empowerment and education. The extension of the existing Super Savers Program in North Bellmore (authorized under the 2017 Utility 2.0 filing) to the Patchogue area, a PSEG Long Island community in Suffolk County, New York, will provide additional system investment deferral value and extend a broad suite of energy and demand saving opportunities to Patchogue customers as part of diversifying the customer base experimenting in the Super Savers Program. If this pilot program proves successful, PSEG Long Island will consider expanding Super Savers to other load pockets on Long Island.

3.2.1 Current State

The Super Savers Patchogue is proposed new for 2019 and 2020. The Super Savers Program in North Bellmore was approved in 2017 and is currently being implemented for 2018 and 2019.

Super Savers Program Update

In 2017, PSEG Long Island proposed a Super Savers Program demonstration project in North Bellmore in Nassau County that was approved and is currently being implemented. The North Bellmore demonstration project includes the same features that are proposed for Patchogue and PSEG Long Island is not requesting additional funding for the North Bellmore demonstration project. The O&M budget authorized for the North Bellmore pilot was $2.5 million with initial spending forecasted at overall $1.0 million in 2018, $0.75 million in 2019, $0.50 million in 2020 and $0.25 million in 2021.

One key change from the 2017 filing's program design is the introduction of a Standard Offer $/kW/year payment for qualified capacity savings in the North Bellmore load pocket beginning in 2019. This offering will mirror that which is being proposed for Patchogue (described below), and leverage the previously approved $2.5 million O&M budget that were budgeted for Super Savers Program demonstration project in North Bellmore for 2018-2019. PSEG Long Island plans to apply the remaining balance of the unspent 2018 budget in North Bellmore for 2019. The budget request for the standard offer in Patchogue is half of the amount planned for North Bellmore, consistent with the relative size of the overall Patchogue budget.

Table 3-2 presents a description and status update of the Super Savers Program demonstration project in North Bellmore currently being undertaken.

Table 3-2. Super Savers Program Demonstration Project in North Bellmore Updates

Major Components	Description	Status Update & Near-Term Forecast
Residential Smart Plugs	Direct control of Room A/C	Official start date TBD; targeting summer 2018
Residential Smart Savers/Commercial System & Distribution System Relief Programs	Enhanced Incentives for Demand Response – Residential Smart Thermostats & Commercial Load Relief >=50kW	Updated Tariff statements with enhanced incentives went into effect May 1, 2018
Behavioral	HERs, Online Home Energy Analyzer, Advanced Utility Analytics	First HER received by Bellmore customers in June 2018 with a PSEG Long Island welcome letter explaining the Super Savers Program
Standard Offer for Capacity Savings	Market animation initiative that provides a market price signal for qualified peak demand savings which may be offered to market by any qualified firm	Currently in planning and development, expected to be broadcast to the commercial marketplace in North Bellmore by January 2019. Working with NYS on coordination regarding pay for performance

Major Components	Description	Status Update & Near-Term Forecast
Residential Targeted Energy Efficiency	Targeted On-line Marketplace promotions, increased promotion of Energy audits and Home Performance with ENERGY STAR programs	Working with the Home Energy Management platform provider and the Marketplace provider on coordinated offerings
TOU Rates	Time-variable rates to increase incentive for load shifting	Currently expected to be promoted after six months of AMI data accumulation – late Q4 2018
VVO/CVR	Comprehensive engineering analysis of voltage, phase balancing, fuse sizing, and transformer loading	Study and pilots are ongoing, and will continue through 2019

3.2.2 Project Description

Spearheaded by the installation of AMI, the Super Savers Program demonstration project in Patchogue will directly mirror the Super Savers Program demonstration project already being implemented in North Bellmore, and will similarly include a broad series of components including energy audits, enhanced rebates for select capacity-saving energy efficiency measures, HERs for residential customers, and enhanced incentives for participation in existing demand response programs including the Smart Savers Wi-Fi thermostat demand response program for residential customers and the Enhanced Commercial System and Distribution relief programs for non-residential customers. In addition to those design elements, a new 'standard offer' for coincident capacity savings is proposed for Patchogue as part of an effort to animate the market and send a clear price signal to deliver qualified capacity savings.

3.2.2.1 Goals/Drivers/Rationale

The objective of the Super Savers Program is to experiment and test approaches to achieve localized peak demand reduction, via a variety of customer engagement programs, to delay and/or potentially eliminate the need for distribution upgrades in a load constrained area. By establishing new communication channels with customers in addition to program marketing, PSEG Long Island seeks to create a virtual community of 'Super Savers' that are aware of the need for localized capacity reduction and can respond by participating in new and enhanced programs sponsored by PSEG Long Island that offer unique participation incentives. PSEG Long Island received approval in the 2017 Utility 2.0 plan to implement a Super Savers Program demonstration project and is currently proceeding with implementation of the project in North Bellmore.

The Super Savers Program demonstration project in Patchogue is designed to reduce peak demand for the geographically targeted area shown in Figure 3-1 with a series of programs to reduce load on two distribution circuits (8AX-653 and 8AX-654). PSEG Long Island selected Patchogue based upon the potential near-term future need for new capital investment due to the potential for new lump load projects; ongoing installation of AMI; concentration of residential customers and their loads; and feeder profiles that offer high load reduction potential. PSEG Long Island believes that by managing demand-side customer load with targeted projects, such as CVR pilot (Section 3.2.6) it can most effectively optimize system investments while engaging and empowering local customers.

Key objectives of the Super Savers Program in Patchogue include:

- Successfully implement an innovative solution to demonstrate the ability to defer likely near-term local infrastructure investments in support of REV.
- Evaluate the ability of a standard offer to animate market-based solutions from third parties aimed at providing cost effective demand savings.
- Utilize AMI granular consumption data and home energy management tools to drive overall customer energy savings.
- Leverage new and existing energy efficiency technologies with unique customer marketing approaches to increase customer participation.
- Utilize the lessons learned from the program to continuously improve future offerings in other constrained areas.

Figure 3-1. Super Savers Program Demonstration Project in Patchogue Load Reduction Target Area

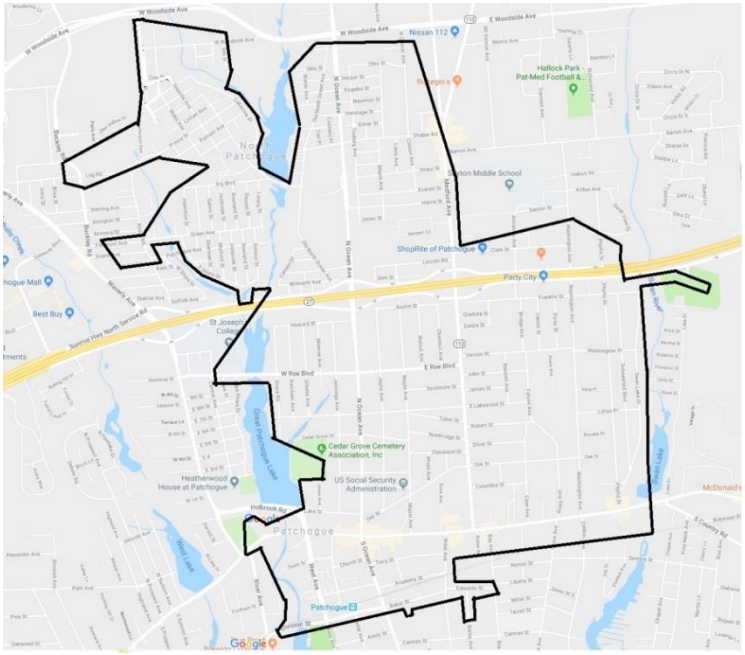
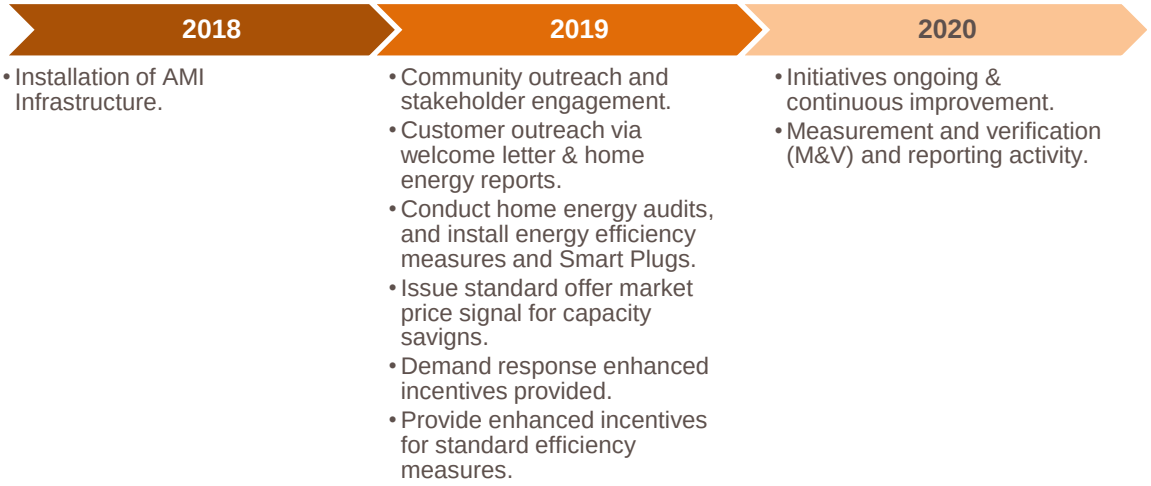


Figure 3-2. Super Savers Program Demonstration Project in Patchogue – Timeline



3.2.2.2 Community Outreach and Messaging

A key factor in ensuring the success of the Super Savers Program and driving participation demand for its energy savings programs is ensuring the program is well communicated to customers. The Super Savers Program will seek to engage and challenge the virtual Super Savers community of customers being served by the same circuit(s) with a shared goal of eliminating/delaying the need for new infrastructure with cleaner, cheaper, and more customer-friendly solutions. Messaging will be deployed via the free form text area of HERs and specific push messaging via email, in addition to a welcome letter and the possibility of other advertising. Periodic direct mailings will be issued to allow for more detailed messaging and relationship building. Customer communications will reference the web site where appropriate as a vehicle for customer to learn more information. The website will offer program overview information as well as a FAQs section, a project area map, energy efficiency tips, applicable program offers, and more. Community messaging can be more powerful in homogeneous areas such as Patchogue, which has fairly consistent home size and average income demographics. To the extent possible, outbound communications will include the Super Savers community's collective progress toward savings goals, and personalized tools such web-based home energy audits will encourage goal setting. PSEG Long Island will seek to ensure that community leaders and relevant organizations are aware of the Super Savers Program to help facilitate the success of the program.

3.2.2.3 Enhanced Rebates for Energy Efficiency – Super Savers Program Demonstration Project in Patchogue

PSEG Long Island currently offers a variety of rebates for energy efficiency measures. In the Super Savers Program targeted areas, PSEG Long Island will offer enhanced rebates that are up to 50% greater than those offered across the rest of the utility's service territory. These will apply for select measures that yield higher than average capacity savings, such as for air conditioners, air-source heat pumps, pool pumps, LED lighting in commercial buildings. These premium incentives will further reduce first-cost barriers for customers and encourage quicker adoption of efficient equipment. In addition to enhanced rebates for efficient equipment, PSEG Long Island will offer free energy audits that include a suite of direct-install measures consistent with those currently offered by the Home Performance with ENERGY STAR Program such as LEDs, low-flow devices, and duct sealing. Following an energy audit, customers will be provided with a prioritized list of recommendations and rebate packages to complete

weatherization and building shell efficiency measures. Enhanced incentives and low-interest financing through the GJGNY NYSERDA program will also be available to customers as an additional incentive to complete more comprehensive home efficiency investments.

3.2.2.4 Demand Response – Commercial – Super Savers Program Demonstration Project in Patchogue

Commercial customers participating in PSEG Long Island's existing Commercial System Relief and Distribution Load Relief programs will be offered enhanced incentives for capacity in the Super Savers Program areas. PSEG Long Island will offer enhanced rebates that are up to 50% greater than those offered across the rest of the utility's service territory to send a more valuable price signal and encourage broader participation in these ongoing programs during peak events.

3.2.2.5 Demand Response – Residential

PSEG Long Island's existing Smart Savers residential Wi-Fi thermostat demand response program will offer enhanced incentives. Residential customers in Patchogue are already eligible to participate in this program; however, PSEG Long Island will offer enhanced customer incentives that are up to 50% greater than those offered across the rest of the utility's service territory to send a more valuable price signal and encourage broader participation.

PSEG Long Island also intends to test a new technology measure in this program targeting direct control of room air conditioners offered by Think Eco (Figure 3-3). PSEG Long Island will install a Smart Plug at no cost to participating residential customers with room air conditioners. The Smart Plug is a Wi-Fi connected device that provides customers with the ability to remotely control their room AC or other device remotely using a smartphone or computer. Working directly with Think Eco, PSEG Long Island will be able to remotely cycle room air-conditioner during peak load events to produce capacity savings. Customers will have the ability to override (opt-out) of participation. To encourage continued participation in following summers, customers will receive a $25 incentive for participation during curtailment events. Think Eco's smart plug technology provides customers with minute-level consumption data for connected devices (e.g., room A/Cs) which offers customers an additional layer of information about their energy consumption habits.

Figure 3-3. Think Eco Modlet Smart Plug



Source: http://www.thinkecoinc.com/

3.2.2.6 Behavioral Efficiency

All residential customers will receive HERs approximately every other month as a means of providing customer education and providing a more detailed view of in-home energy use. Additionally, residential customers for which the utility has email addresses will receive electronic HERs (eHERs) every month. HERs and eHERs will leverage granular consumption data from AMI meters to provide more insight to both customers and PSEG Long Island. Additionally, HERs will leverage an online home energy analyzer that allows customers to conduct an online audit of their home by inputting key characteristics such as the number of occupants and common behavioral patterns. This online audit will provide suggestions for further energy savings and enhance the relevance of information provided by the HERs. Additionally, all customers will also receive periodic communication letters from PSEG Long Island providing additional outreach and information on offers and progress related to the Super Savers program.

3.2.2.7 Market Standard Offer for Capacity Savings

Consistent with the objectives of REV, PSEG Long Island plans to demonstrate an innovative 'standard offer' for capacity savings in the Super Savers Program areas (North Bellmore and Patchogue) to stimulate broader participation from the market in these targeted areas. PSEG Long Island envisions a payment for coincident peak demand savings of $700/kW for first-year, verified peak demand savings occurring in 2019 and 2020 to any eligible market participant that registers with PSEG Long Island and delivers targeted capacity savings. PSEG Long Island may additionally consider offering a $/kWh energy payment in 2020, depending on budget availability, progress on State-wide pay-for-performance efforts and market response to the capacity payment. The capacity purchase offer amount will be paid to aggregators that contract to provide firm capacity relief to PSEG Long Island, and it is the responsibility of the aggregator to recruit and contract with customers to install appropriate technologies allowing for capacity relief at contracted levels during peak usage periods. PSEG Long Island envisions that a pay-for-performance contract focused on portfolio achievements will be executed with each aggregator. Depending upon the nature of the technologies installed, there may be the requirement that aggregators provide risk mitigation in the form of an insurance policy that protects PSEG Long Island in the event of resource non-performance or underperformance. PSEG Long Island may specify a measure lifetime requirement to ensure long-life demand reduction measures are installed such as batteries installed at customer sites.

This program will provide PSEG Long Island with early experience and insight into details of the transactional marketplace solutions envisioned as an underpinning of REV policy. Important lessons learned will inform the feasibility of adoption of this approach more broadly across other load constrained areas or even across the full PSEG Long Island service territory. This program is a flexible and open market solicitation that seeks to innovate and animate the market for capacity savings in creative ways. PSEG Long Island is sending a price-signal to the market for capacity savings, and anticipates that a small group of third-party aggregators will register with PSEG Long Island as qualified capacity relief providers and will recruit customers and install load reducing technologies (e.g. batteries and advanced controls). Third party aggregators will receive the standard offer price from PSEG Long Island, but may negotiate their own pricing terms directly with customers for installation of demand saving technologies. PSEG Long Island will pay third-party aggregators/installers a capacity payment based upon the actual performance provided on a portfolio level. PSEG Long Island plans to coordinate with New York State regarding approaches to the calculation of actual demand reduction if there are cases where metering measurement is not appropriate.

3.2.3 Customer Engagement Plan

The communication strategy being deployed on the Supers Savers Program is to positively engage customers throughout their experience from meter installation all the way through their second year of the program. Leveraging the installation of their smart meter, along with online tools, customized data, program offers and energy reports, the communication's objective is to increase customer awareness, education and engagement in their energy use and management. This program is unique in that the target customer base is clearly defined geographically within the scope of the four load circuits under review. This will drive some of the communication channels selected to reach these 10,500 Super Saver customers in North Bellmore, plus another 5,000 customers in Patchogue.

The communications plan is to provide customers information, collateral, and online tools to help raise their education level around their energy use (awareness), how their appliances work and energy consumed (information) and how they can modify their behaviors to achieve energy and cost savings (engagement). The plan will also include messaging shaped in part on the learnings the company has gathered from both moderator-led customer focus groups and one on one customer interviews. Future research is planned as a touchpoint for customer's feedback.

The customer engagement plan will include but not be limited to the following components:

- Direct mail: Customers within the project area will receive a pre-installation letter 45-60 days prior, outlining the installation process along the benefits associated with smart meter.
- Automated Calls: Customers will receive an automated call reminding them of their scheduled meter installation 2 weeks prior.
- Door hanger: A door hanger will be left at the customer premise as part of the installation process, alerting the homeowner that their smart meter installation has been completed.
- Additional direct mail/email communications:
    - As a member of the Super Savers program, customers will receive a bi-monthly direct mail HER, which will provide them with customized data on their usage, customer energy efficiency tips, highlight available program offers and a comparison of their usage vs. similar homes in their neighborhood.
    - Customers who have emails registered with PSEG Long Island will also receive email versions of the HER along with bimonthly emails on topics such as the online energy analyzer, product or rebate promotions, new rate options, etc.
    - Digital and non-digital customers will also receive a bimonthly letter on various topics/offers aimed at educating customers and providing them the tools and tips to modifying their energy consumption. These letters will be important in keeping customers actively engaged in the program.
- Website: Customer communications will reference the web site where appropriate as a vehicle for customer to learn more information. The website will offer program overview information as well as a FAQs section, a project area map, energy efficiency tips, applicable program offers, etc.
- Collateral: Collateral around the Super Savers program will consist mainly of brochures and flyer highlighting a program overview, customer benefits, some FAQs, energy tips, and website information.

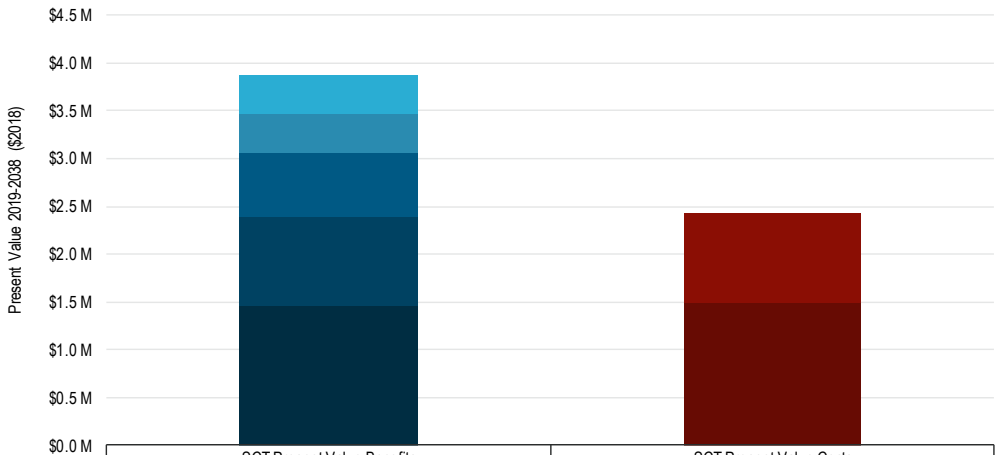
3.2.4 Discussion of Costs and Benefits

PSEG Long Island's proposed Super Savers Program demonstration project in Patchogue has an SCT benefit to cost ratio of 1.60. The North Bellmore Super Savers Program demonstration project has an SCT benefit to cost ratio of 1.41[28]. The benefits include: avoided generation capacity cost, avoided energy, avoided T&D capacity infrastructure, and net avoided CO_2. Avoided T&D capacity infrastructure is the largest benefit and accounts for both PSEG Long Island's avoided transmission capacity infrastructure cost and avoided distribution infrastructure costs that were estimated for both the Patchogue and North Bellmore load pockets. The primary driver of the SCT difference between Patchogue and North Bellmore is the respective value of avoided distribution capacity infrastructure. Unquantified benefits may include, and are not limited to, enhanced participant comfort from installation of weatherization and HVAC measures and water savings from direct-install measures installed during energy audits.

Costs include program administration (including measurement and verification [M&V] costs) and participant DER costs. Participant DER costs account for customers' share of incremental first cost associated with above-baseline efficient equipment (less enhanced rebates) and a share of cost for customers that may run an onsite backup generator to satisfy their load during commercial demand response events.

The results from the SCT for Patchogue and North Bellmore are graphically represented in Figure 3-4 and Figure 3-5 respectively, with details in Table 3-3 and Table 3-4 respectively.

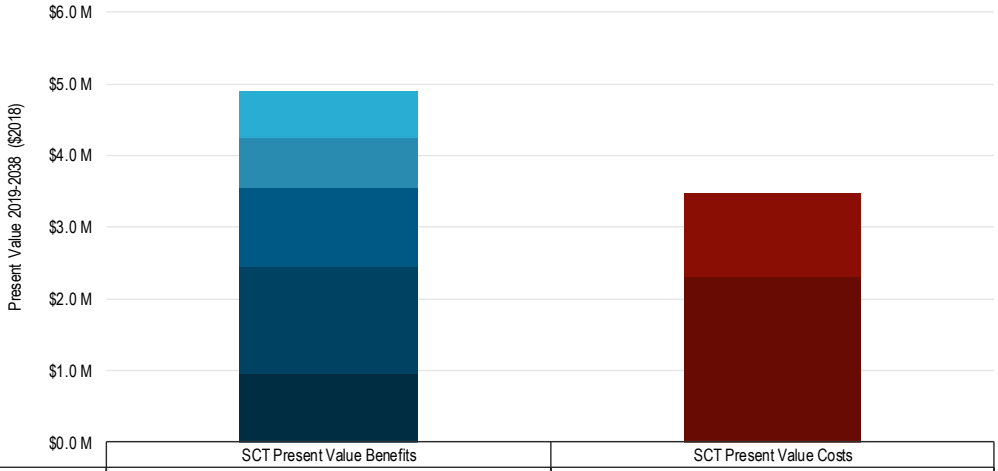
Figure 3-4. Super Savers Program Demonstration Project Patchogue Present Value Benefits and Costs of SCT



	SCT Present Value Benefits	SCT Present Value Costs
Participant DER Cost	$0.0 M	$0.9 M
Program Administration Costs	$0.0 M	$1.5 M
Net Avoided CO2	$0.4 M	$0.0 M
Avoided Transmission Capacity Infrastructure	$0.4 M	$0.0 M
Avoided Generation Capacity Cost (AGCC)	$0.7 M	$0.0 M
Avoided Energy (LBMP)	$0.9 M	$0.0 M
Avoided Distribution Capacity Infrastructure	$1.5 M	$0.0 M
Total	$3.9 M	$2.4 M

[28] Note: North Bellmore's BCA result represents the entirety of costs and benefits for the program, which also includes 2018. While the budget request is focused on 2019 only, for BCA purposes all years must be included to properly evaluate the program.

Figure 3-5. Super Savers Program Demonstration Project North Bellmore Present Value Benefits and Costs of SCT



	SCT Present Value Benefits	SCT Present Value Costs
Participant DER Cost	$0.0 M	$1.2 M
Program Administration Costs	$0.0 M	$2.3 M
Net Avoided CO2	$0.7 M	$0.0 M
Avoided Transmission Capacity Infrastructure	$0.7 M	$0.0 M
Avoided Generation Capacity Cost (AGCC)	$1.1 M	$0.0 M
Avoided Energy (LBMP)	$1.5 M	$0.0 M
Avoided Distribution Capacity Infrastructure	$0.9 M	$0.0 M
Total	$4.9 M	$3.5 M

Table 3-3. Super Savers Program Demonstration Project Patchogue Benefits and Cost Details

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
1	Avoided Generation Capacity Cost (AGCC)	• Super Savers Program savings coincident with PSEG Long Island peak load multiplied by marginal capacity cost ($65 / kW-year in 2019)	$672,011	
2	Avoided Energy (LBMP)	• Energy generated by Super Savers Program projects multiplied by PSEG Long Island's marginal energy cost ($41 / MWh in 2019)	$933,636	
3	Avoided Transmission Capacity Infrastructure	• Based on the system average marginal transmission cost ($29 per kW in 2019).	$404,366	
4	Avoided Distribution Capacity Infrastructure	• Peak load reduction coincident with PSEG Long Island peak load multiplied by marginal Patchogue load pocket capacity infrastructure investment deferral value ($299 /kW-year in 2020)	$1,458,722	
5	Net Avoided CO_2	• Energy generated by Super Savers Program projects multiplied by PSEG Long Island's avoided carbon cost adder ($22 / MWh for all years)	$408,106	
6	Program Administration Costs	• Program management, M&V of program performance, third-party professional services costs, contractor and implementation costs, and marketing.		$1,493,461

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
7	Participant DER Cost	• Customer incremental cost of energy efficiency measures, commercial customer incremental cost of BTM generator usage during demand response events, incremental customer cost associated with participation in projects funded by the standard offer.		$931,386
	Total Benefits		**$3,876,840**	
	Total Costs			**$2,424,847**
	SCT Ratio			**1.60**

Note: Individual budgets may not sum to totals due to rounding.

Table 3-4. Super Savers Program Demonstration Project North Bellmore Benefits and Cost Details

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
1	Avoided Generation Capacity Cost (AGCC)	• Super Savers Program savings coincident with PSEG Long Island peak load multiplied by marginal capacity cost ($65 / kW-year in 2019)	$1,127,536	
2	Avoided Energy (LBMP)	• Energy generated by Super Savers Program projects multiplied by PSEG Long Island's marginal energy cost ($41 / MWh in 2019)	$1,482,516	
3	Avoided Transmission Capacity Infrastructure	• Based on the system average marginal transmission cost ($29 per kW in 2019).	$683,524	
4	Avoided Distribution Capacity Infrastructure	• Peak load reduction coincident with PSEG Long Island peak load multiplied by marginal North Bellmore load pocket capacity infrastructure investment deferral value ($98 / kW-year in 2021)	$949,584	
5	Net Avoided CO_2	• Energy generated by Super Savers Program projects multiplied by PSEG Long Island's avoided carbon cost adder ($22 / MWh for all years)	$653,457	
6	Program Administration Costs	• Program management, M&V of program performance, third-party professional services costs, contractor and implementation costs, and marketing.		$2,306,825
7	Participant DER Cost	• Customer incremental cost of energy efficiency measures, commercial customer incremental cost of BTM generator usage during demand response events, incremental customer cost associated with participation in projects funded by the standard offer.		$1,167,700
	Total Benefits		**$4,896,616**	
	Total Costs			**$3,474,524**
	SCT Ratio			**1.41**

Note 1: Individual budgets may not sum to totals due to rounding.

Note 2: North Bellmore's BCA results represent the entirety of costs and benefits for the program, which also includes 2018. While the budget request is focused on 2019 only, for BCA purposes all years must be included to properly evaluate the program.

The combined SCT ratio for Patchogue and North Bellmore is 1.49.

3.2.5 Budget Request

PSEG Long Island's budget request for the Super Savers Program demonstration project in Patchogue is shown in Table 3-5. This budget represents 50% of the non-AMI related budget approved for the Super Savers Program Demonstration Project in North Bellmore to reflect the relative size of Patchogue. All costs are O&M except for enhanced incentives for the existing Commercial System Relief and Distribution Load Relief Programs. PSEG Long Island is not forecasting any additional FTEs for the Super Savers Program demonstration project in Patchogue.

Table 3-5. Super Savers Program Demonstration Project in Patchogue Project Budget

Component	2019	2020	2021	2022	4-Yr Total
Capital Costs	-	-	-	-	-
O&M Costs	$827,407	$827,407	-	-	$1,654,813
Fuel and Purchased Power (Commercial DR Incentives)	**$7,875**	**$7,875**	**$7,875**	**$7,875**	**$31,500**

Note: Individual budgets may not sum to totals due to rounding. Estimated annual spending is subject to change based upon uptake of individual components, such as the standard offer.

Table 3-6. Super Savers Program Demonstration Project in North Bellmore Project Budget

Component	2019	2020	2021	2022	4-Yr Total
Capital Costs	-	-	-	-	-
O&M Costs	$1,332,155	-	-	-	$1,332,155
Fuel and Purchased Power (Commercial DR Incentives)	**$14,250**	**$14,250**	**$14,250**	**$14,250**	**$57,000**

Note: Individual budgets may not sum to totals due to rounding. Estimated annual spending is subject to change based upon uptake of individual components, such as the standard offer.

The Super Savers Patchogue Program leverages a suite of programs to produce peak capacity reduction. Table 3-7 provides a summary of annual budgets per program.

Table 3-7. Super Savers Program Demonstration Project in Patchogue Summarized O&M Budget

Sub-Initiative	2019	2020	2019 & 2020 Total
Targeted Energy Efficiency & Enhanced Incentives	$322,044	$322,044	**$644,087**
Think Eco-Residential DR	$36,688	$36,688	**$73,375**
Behavioral – Residential	$41,606	$41,606	**$83,211**
Market Standard Offer	$250,000	$250,000	**$500,000**
Program Administration & Marketing	$127,070	$127,070	**$254,139**
Savings Measurement & Verification	$50,000	$50,000	**$100,000**
Total	**$827,407**	**$827,407**	**$1,654,813**

Note: Individual budgets may not sum to totals due to rounding.

3.2.6 Volt/VAR Optimization/Conservation Voltage Reduction Super Savers Pilot Program

PSEG Long Island has limited visibility into the distribution system downstream of the substation. As such, voltage is managed on a substation basis instead of on each circuit individually. Additionally, pole-top transformer loading and phase balance are difficult to study. As depicted in Figure 3-6, this can lead to several types of undiagnosed problems on PSEG Long Island's distribution system. Voltage issues and equipment overloading are impacting customer power quality and field equipment life cycles. Incorrectly sized fuses can lead to momentary outages, and unplanned transformer failures can cause sustained outages. In many cases, voltage may be higher than it needs to be, leading to unnecessary customer energy consumption which can lead to several types of undiagnosed problems on PSEG Long Island's distribution system. Voltage issues and equipment overloading are impacting customer power quality and field equipment life cycles. Incorrectly sized fuses can lead to momentary outages, and unplanned transformer failures can cause sustained outages. In many cases, voltage may be higher than it needs to be, leading to unnecessary customer energy consumption.

As part of the Super Savers Program Demonstration Project, the VVO, transformer load monitoring (TLM), phase balancing, and fuse sizing study is a set of AMI-enabled engineering analyses and capital investments that will advance PSEG Long Island toward the following goals:

- Efficient T&D of electric power.
- Improved power quality and reliability.
- Promoting distributed generation and resource diversity.
- Enabling DSP.

PSEG Long Island plans to conduct these efforts as part of its Super Savers Program in North Bellmore and Patchogue to inform future applications across its service territory. These analyses will provide significant benefit to the customer, society, and the environment. Preliminary study of other utilities indicates that CVR alone could reduce energy consumption by 1%, which would reduce fuel costs dramatically. On the other hand, these investments may require significant capital expenditure to implement. The study will provide key data points on both costs and benefits, to be used in future business cases that will quantify the costs and benefits of extending these investments to the system as a whole.

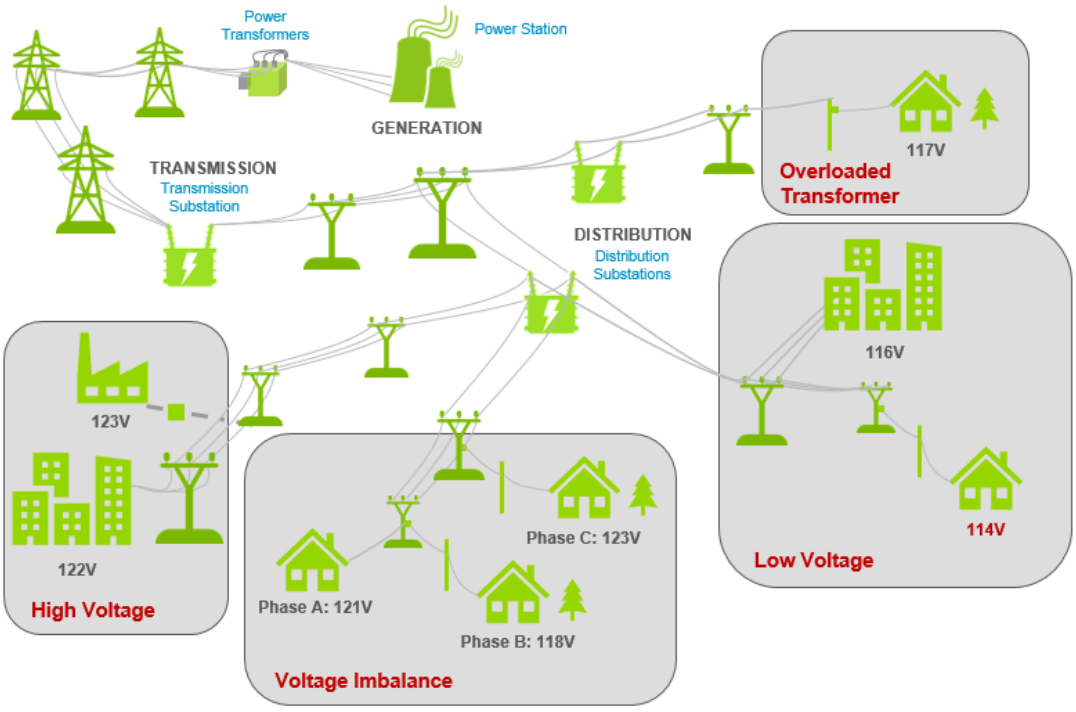
This study is an expansion of the approach used in the North Bellmore area. It is a model-centric approach consisting of iterative study evaluation and field recommendations to obtain improved voltage, loading, losses, and protection performance. Models will be created by engineers using distribution power systems analysis software which will be used to test various changes to system design and operation. The study will consist of the following components:

1. VVO and CVR including Contact Making Voltmeter (CMV) settings resulting in improved voltage profile and reduced customer consumption.
2. Improved phase balancing for loss reduction.
3. TLM of pole top transformers for reduction in outages and increased equipment lifetime.
4. Improved fuse sizing to better coordinate branch fuses and outgoing breaker, to reduce momentary outages.

PSEG Long Island will engage in circuit-by-circuit studies of voltage, transformer loading, phase balance, and fuse sizing. To facilitate this process, PSEG Long Island will be developing a data analytics capability to collect data from multiple systems, including AMI, and to automate aspects of this process. This effort will automate the process of model creation which is the foundation of electric power flow studies used in T&D planning as basis for system design. This includes integration of AMI, physical system attributes from GIS, SCADA/PI data, CIS information, etc. The models will study each feeder at the primary and voltage levels, down to the individual service points where the AMI meters reside. These studies will reveal previously unknown issues, and will revise current design and operating principles to correct them. As seen in Figure 3‑5, high voltages will be lowered and voltage profiles flattened to reduce line loss and excessive customer energy consumption; voltage imbalances will be corrected to reduce line loss; low voltages will be raised to improve customer power quality; and incorrectly sized equipment will be replaced to reduce momentary and sustained outages.

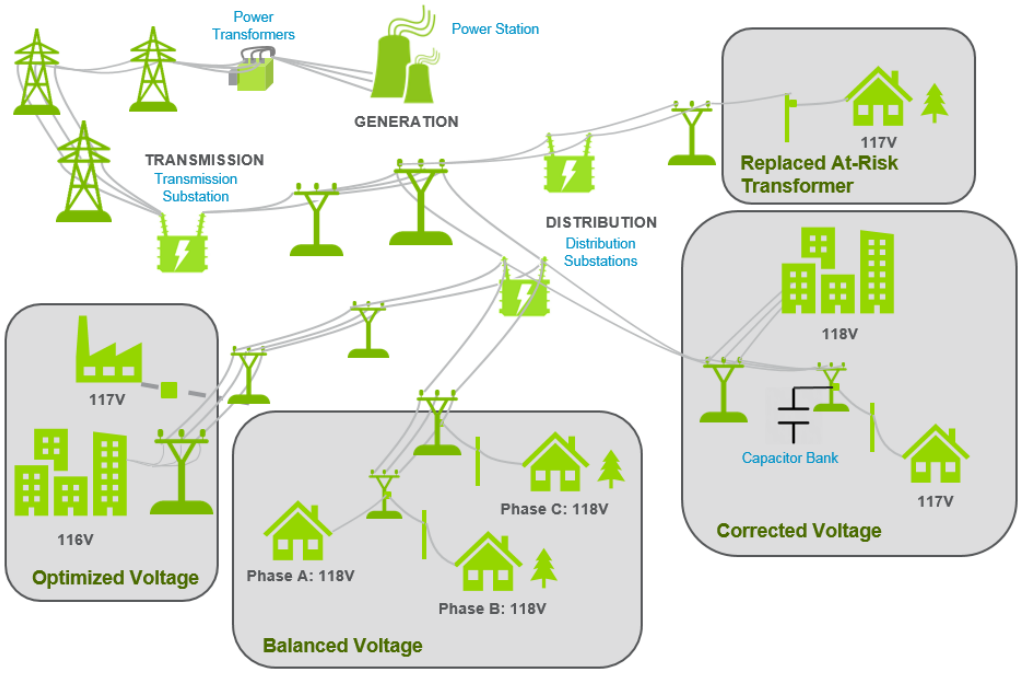
PSEG Long Island will perform these studies to correct issues discovered during this process. The result will be a more efficient, reliable distribution system, with higher power quality and reduced capital expenditure.

Figure 3-6. Distribution Current State



Source: Navigant

Figure 3-7. Distribution Future State



Source: Navigant

A key component of the study is the development of a data analytics capability that will continuously integrate data from disparate systems and automate the model creation. This includes 15-minute voltage and load data from AMI, physical system attributes from GIS, and equipment settings from SCADA/PI. This data analytics capability will also consist of a server database to store the models and large volume of data, and an interface with MDMS.

Planning Volt/VAR Optimization

This initiative is a circuit-by-circuit study of voltage and voltage management operating principles. Based on preliminary study, it is expected that PSEG Long Island will be able to reduce the voltage set-points systematically, enabling an expected energy reduction of 1% or more. In some cases, these studies will reveal previously unknown voltage outliers – both high and low – that must be corrected. Expected investments are new capacitor banks, capacitor bank controllers, and replacement of under or over-sized equipment that are creating voltage issues. This project is a key enabling investment to advance REV goals, including the DSP.

Transformer Load Monitoring

TLM will utilize the additional data from the AMI system to estimate the loading on service transformers with much greater accuracy than previously done. PSEG Long Island will be able to identify under-sized transformers that are at risk of failure due to overloading. This will extend the equipment lifetime, and will reduce outages associated with unplanned failures.

Phase Balancing

Phase balancing will rely on AMI data to identify significant loading imbalances on the distribution system. These imbalances cause excessive line losses and uneven voltage profiles. This project will address these unbalance issues by reconfiguring the distribution network to rebalance loads more evenly. As a standalone project, this investment will improve system efficiency. As an enabling investment, it is foundational for improved voltage management with dynamic VVO. Phase balancing will be a set of circuit-by-circuit studies done concurrently with planning VVO, TLM, and fuse sizing, and will utilize the same software tools.

Fuse Sizing

Fuse sizing is a review of the distribution protection system, which primarily consists of fuses. The main driver for this investment is to improve customer power quality through better coordination of the distribution protection system to minimize momentary outages and service interruptions.

Dynamic Volt/VAR Optimization

Dynamic VVO is not a portion of this study, but the outcomes will lay the groundwork for future business cases regarding this investment. Dynamic VVO will consist of a system-wide investment in field equipment controllers and communications, along with a central software management system to operate the field equipment to optimize voltage. This central system will calculate, in real time, the optimal voltage profile on each distribution line in PSEG Long Island's service territory, and it will issue control signals to capacitor banks, voltage-regulating transformers, and transformer load-tap changers, to maintain the desired profile.

3.3 Advanced Storage: Utility-Scale Storage Program

The Utility-Scale Storage Program proposes to replace or defer several conventional grid assets with energy storage devices to provide system flexibility and adapt to the evolving needs of power supply. These resources contribute to the system flexibility necessary to reach the Governor's goals of supplying 50% of the state's energy needs with renewable generation by 2030 (CES) and the Statewide goal of 1,500 MW of battery energy storage on Long Island by 2025. After a review of several potential opportunities, this proposed program consists of 2.5 MW of utility-owned storage, but provides the framework to continue to evaluate additional opportunities in future years. As increasingly detailed assessment of grid needs is performed and additional use cases are developed, additional storage implementations can be justified.

To launch this program, PSEG Long Island is requesting a 4-year budget (2019-2022) of $4,913,784 capital costs to cover the purchase and $1,090,863 to cover the O&M expenditures for the proposed projects.

New York has aggressive and industry-leading policies and goals for the installation of utility-scale battery storage with a specific goal to support New York State's goal of 1,500 MW of storage PSEG Long Island proposes to help New York achieve its policy objectives, and bring tangible benefits to PSEG Long Island customers in part through the installation of 2.5 MW of new utility-scale battery storage between 2019 and 2022. Several different projects were evaluated, and this one was selected as the highest benefit-cost.

Figure 3-8. Utility-Scale Storage



Source: Nextera Battery System

Energy storage will assist with deferring or delaying the need to build new distribution substations, reduce the overall demand on T&D infrastructure during peak load days, and help advance renewable energy development on- and off-shore of Long Island by being a storehouse for clean energy. Contrary to conventional substation upgrades, storage devices provide value through secondary use cases bidding the capacity resource into the wholesale markets. As the level of offshore wind generation increases in pursuit of Governor Cuomo's goal of obtaining 50% of New York's electricity from renewable sources by 2030, the value of the flexibility provided by storage devices also grows in importance. A dynamic and adaptable electric grid is necessary to integrate the resources required to reach the state's clean energy goals, and a key component is increasing the amount of utility-scale battery storage. PSEG Long Island identified several planned T&D upgrades in the PSEG Long Island territory to compare the benefit and cost of a battery energy storage solution to a more conventional grid upgrade.

3.3.1 Project Description

A total of three planned T&D substation upgrades were identified as candidates for a battery storage solution. As the procurement of battery resources is still a new process, these candidates were selected such that the grid need would not become critical until 2023 at the earliest, with anticipated installation in 2022. The Miller Place and Brightwaters locations are projected to continue their load growth, each requiring another 2.5 MW battery unit starting in 2027.

As the load forecasts are not guaranteed and the procurement is not immediately necessary, these second batteries are not requested in the filing. At this time, PSEG Long Island is planning to pursue a LIPA-owned solution, providing direct control over the resource and avoiding additional costs. Lessons learned from the South Fork PPA RFP will be used to improve the efficiency of the upcoming procurement. PSEG Long Island reviewed the following three battery storage projects:

- Miller Place: Avoid distribution bank upgrades
- Brightwaters: Avoid distribution bank upgrades
- South Manor: Avoid transmission line re-conductoring at South Manor substation.

The proposed battery storage project sizes and detail are described in Table 3-8.

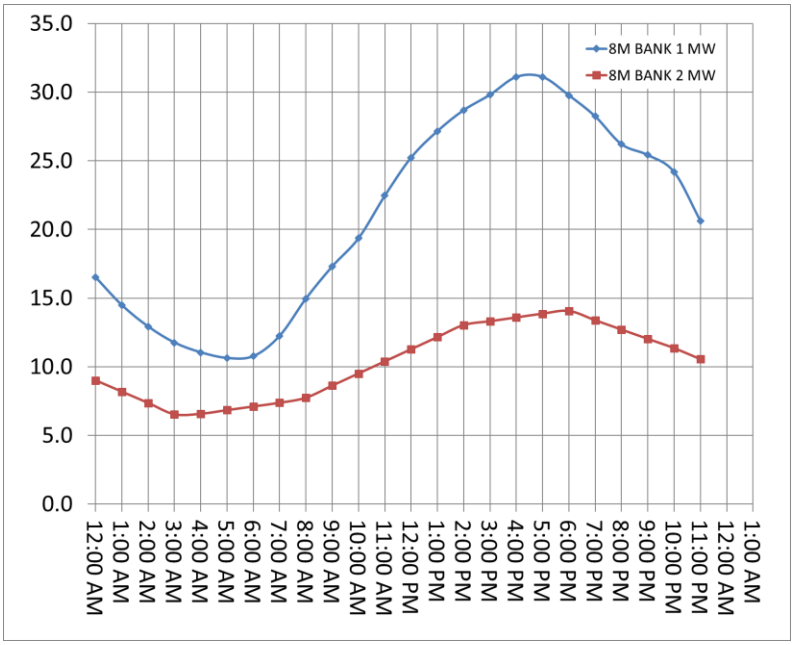
Table 3-8. Project Descriptions – Utility-Scale Storage Program

Storage Project Name	Energy Capacity (MWh)	Power Capacity (MW)	Estimated Deferred Cost ($)	Grid Need Description
Miller Place	12.5	2.5	$15 million	Substation in a residential area has forecast load growth over the planning limit starting in 2023. Both banks at substation are already full and there is no room for expansion. Storage unit could be located within a short distance and connected rather than constructing a new substation. Local air quality requirements prevent diesel generator installation. Projected load growth may require another battery of the same size in 2027.
Brightwaters	15	2.5	$10 million	Substation has forecast load growth over the planning limit starting in 2023, requiring a new bank to be installed. Local air quality requirements prevent diesel generation installation. Projected load growth requires another battery of the same size in 2027.
South Manor	20	5	$7.75 million	Transmission line forecast to exceed loading limits in 2023. Conventional replacement would require line re-conductoring to increase capacity.

The procured energy storage units will be owned by LIPA and have the primary use case of reducing load during the relevant transmission or distribution peak period to keep electric current safely below thermal planning limits. This requires the storage to be charged during lower load times and made available for discharge to offset loads at the distribution operator's discretion.

However, the load peaks are highly correlated to weather and temperature, and can be predicted to a sufficient degree of accuracy that the battery units only need be reserved for the primary use case during specific summer peak days. This allows them to be used for secondary use cases such as participation in the wholesale markets in the large majority of the year, providing an additional value stream that would not be available to a conventional grid upgrade.

Figure 3-9. Projected Miller Place Loading



When the utility operators are confident the resource will not be needed to reduce peak loading, it can bid into the market run by the New York Independent System Operator (NYISO) to provide frequency regulation, charging and discharging to help the transmission grid operator instantaneously balance electric supply and demand in order to maintain system frequency and prevent damage to electrical equipment. The revenues gained through market participation would be returned to customers as payment against the capital costs of the devices.

In addition to the primary use case of deferring or replacing a specific substation upgrade and direct secondary use cases like wholesale market participation, the operation of the storage project contributes to other system needs such as generation capacity. While the devices are being dispatched to support their primary use case, the distribution and generation peaks are mostly coincident, so reducing load during distribution peak will also reduce the generation capacity required. If load were to continue increasing at Miller Place substations and additional capacity reduction were required, the total deferral value would be reallocated across all necessary projects.

Key program values are detailed in Table 3-9.

Table 3-9. Key Program Inputs – Utility-Scale Storage Program

Input	Value	Unit	Source
Miller Place Asset Deferral Value	$229.05	$/kW-year	PSEG Long Island
Brightwaters Asset Deferral Value	$152.70	$/kW-year	PSEG Long Island
South Manor Asset Deferral Value	$59.17	$/kW-year	PSEG Long Island
Marginal Generation Capacity Cost	$65.43	$/kW-year	DPS ICAP Model 2018
Projected Ancillary Service Revenues[29]	$82.36	$/kW-year	NYISO Market
Avoided Transmission Asset Value[30]	$36.45	$/kW-year	PSEG Long Island

3.3.1.1 System Size and Site Selection

Planned distribution upgrades for 2022 and onward were reviewed to identify projects suitable for replacement with battery energy storage. These opportunities are mostly driven by load growth on circuits with relatively tight distribution peaks that can be efficiently smoothed with short to medium duration batteries, in these cases 3-4 hours. Lithium-ion batteries have most usually been selected for this type of use case and has been experiencing price declines as the technology matures. The system sizes were selected to reduce the peak loading of each of the substations back below the planning limits using the standard distribution planning processes. While these opportunities have not yet gone through the full planning process, Miller Place has been identified as a space-constrained location with no additional room available within the substation footprint.

Mobile versions of battery solutions can also be considered if additional similar deferral opportunities can be identified by distribution planners such that the same battery unit can be used to defer multiple grid upgrades over time. There is uncertainty in the incremental costs for insurance, permitting and transport of mobile units. If willing vendors can be found to guarantee some of these uncertainties and the correct series of deferral opportunities can be identified, mobile batteries will be given strong consideration alongside stationary units.

3.3.1.2 Schedule

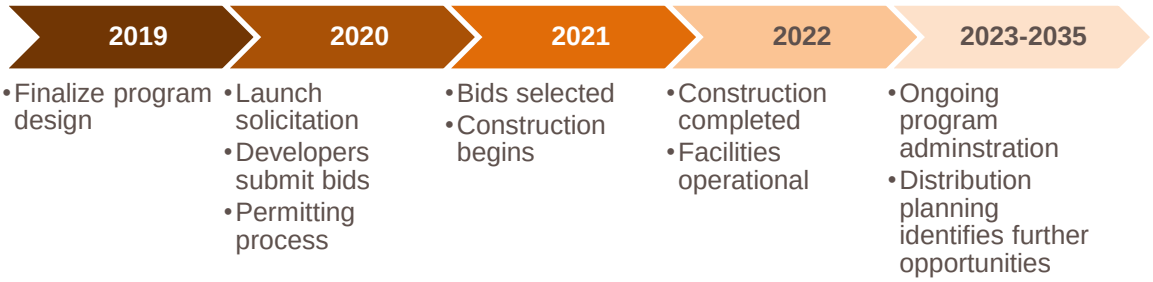
Figure 3-10 provides an estimated timeline for the rollout of the Miller Place battery storage solutions. While it is not projected to be needed in service for the primary use case until the summer of 2023, they will be installed in 2022 to take account of potential delays in the integration of new technologies. As additional potential locations are identified through the distribution planning process, PSEG Long Island will propose additional deployments. With program solicitation expected to launch in 2019, and project construction anticipated to take place from 2020 - 2022, with 2.5 MW deployed by 2022. The deployment

[29] Assumes the unit participates in all non-summer months, along with a flat 3% annual escalator of 2017 historical rates. The device will be required to meet a directed charge/discharge set point every 6 seconds, and paid based on its performance.

[30] 2023 valuation for reference; changes over time. De-rated from this number by the estimated coincidence of transmission and distribution peak. Included to stay aligned with calculations for other DER projects.

of additional capacity will be reviewed in an ongoing manner to ensure all distribution needs are met. As the storage resources are more flexible, but have a significantly higher cost per unit of demand relieved than conventional upgrades, the long-term demand forecast accuracy is critical to meeting the need cost-effectively.

Figure 3-10. Program Timeline – Utility-Scale Storage



3.3.1.3 Goals/Drivers/Rationale

PSEG Long Island's utility-scale storage proposal supports several state goals for renewable generation and electrical grid flexibility. Energy storage is an integral component of any high renewable penetration power system and its importance only increases as the level of intermittent resources rises.

The Utility-Scale Storage proposal is intended to provide the grid flexibility required to transition to a high renewable electrical grid. Particularly as large amounts of offshore wind generation are installed off of Long Island and transmission line constraints limit the ability to transmit the generation to the rest of the state, battery storage can reduce renewable curtailment and more efficiently use existing transmission capacity.

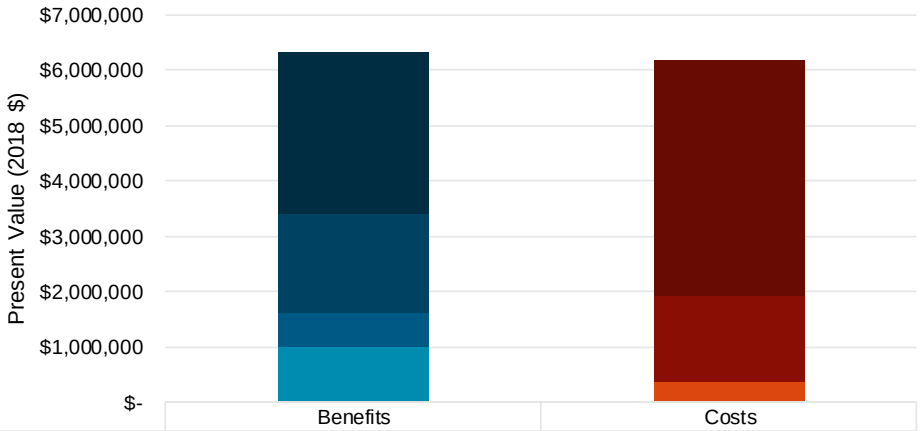
3.3.2 Discussion of Costs and Benefits

PSEG Long Island's proposed Utility-Scale Storage Program has a SCT benefit to cost ratio of 1.02. The benefits include: avoided generation capacity cost, grid asset deferral, and frequency regulation market revenues. Avoided generation capacity cost is currently the largest benefit, but is sensitive to the overall projections of capacity requirements and may be influenced by upcoming increases in renewable generation.

The costs include: program administration costs, storage hardware costs, storage insurance and device operations and maintenance. The hardware is the major cost.

The results from the SCT are graphically represented in Figure 3-11. A list of the value streams considered in the utility-scale storage program is detailed in Table 3-10. The value streams were mapped to the SCT for the BCA, as this is the preferred benefit-cost analysis test per New York DPS.

Figure 3-11. Present Value Benefits and Costs of SCT – Utility-Scale Storage Program



	Benefits	Costs
Incremental T&D and DSP Costs	$-	$4,238,539
Added O&M	$-	$1,568,924
Program Administration Costs	$-	$356,603
Avoided Distribution Capacity Infrastructure	$2,919,588	$-
Avoided Ancillary Services	$1,765,251	$-
Avoided Transmission Capacity Infrastructure	$614,995	$-
Avoided Generation Capacity Cost (AGCC)	$1,018,178	$-
Total	$6,318,012	$6,164,066

Table 3-10. Benefits and Cost Details – Utility-Scale Storage Program

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
1	Distribution Deferral	Calculate capital recovery factor for conventional utility asset based on project cost, lifespan, and cost of capital. Calculate the cost of each year of life and assign this value to each year the storage resource is required for deferral. Assume the full capacity of the resource is available for this use case as it is under utility control.	$2,919,588	
2	Transmission Deferral	Use the same methodology as the DLM tariff to calculate the per kW value of peak load reduction. For LSRV areas, this is increased by 50%. Apply a coincidence factor between distribution and transmission peak.	$614,995	
3	Avoided Generation Capacity Cost	While not participating directly in the wholesale capacity markets, the device will be under utility control and expected coincide highly with transmission peak. Reduction in peak multiplied by general input for levelized avoided capacity cost in each year.	$1,018,178	

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
4	Frequency Regulation Market Revenues	While the battery is reserved for the primary use case during the summer, it is anticipated to be used to provide frequency regulation for NYISO. Calculate as last year's frequency price[31] during non-summer months times the size of the battery.	$1,765,251	
5	Program Administration Costs	Program Administration Costs include 0.5 FTEs in 2019-2020 and 1 FTE in 2021 as program support. Beyond 2022, program support is assumed to be absorbed by PSEG Long Island's existing operations.		$356,603
6	Hardware Cost	Navigant energy storage hardware cost forecasts including battery, inverter, software and control, balance of plant and installation and integration, as well as a reserve and contingency added.		$4,238,539
7	Added O&M	Annual 2% of total hardware costs for battery operations and maintenance, and 0.5% of total hardware costs for insurance.		$1,568,924
	Total Benefits		**$6,318,012**	
	Total Costs			**$6,164,066**
	SCT Ratio			**1.02**

3.3.3 Budget Request

PSEG Long Island's budget request is summarized in Table 3-11. Many of these costs are annual through the entire life of the project; they have been shifted to this four-year budget to ensure project solvency. PSEG Long Island expects that this program would require 0.5 FTEs in 2019-2020 and 1 FTE in 2021 as program support for the duration of the program.

Table 3-11. Program Budget – Utility-Scale Storage Program

Component	2019	2020	2021	2022	4-Yr Total
Capital Costs	$-	$-	$2,456,892	$2,456,892	**$4,913,784**
O&M Costs	$392,500	$395,275	$196,267	$106,821	**$1,090,863**

3.4 Advanced Storage: Behind-the-Meter Energy Storage with Solar

The residential energy storage program is a 10-year tariff incentive program proposed by PSEG Long Island to meet the following goals:

1. Provide PSEG Long Island controlled load modification tariff in constrained LSRV areas to alleviate overloading conditions.
2. Accelerate the residential storage market to engage suppliers, installers, and third-party aggregators. Utilize the expiring Investment Tax Credit (when installed with new or existing solar panels) while it is available.

[31] Scaled by inflation but not accounting for any large trends like increasing renewable penetration.

3. Drive increased engagement with PSEG Long Island customers, drive energy literacy and increase satisfaction scores.
4. Support residential energy storage growth to contribute to meeting state energy goals while allowing all aggregators to participate.

To launch this program, PSEG Long Island is requesting a 4-year budget (2019-2022) of $586,985 to cover incentive and program marketing costs. The total projected program cost NPV is $3,347,421, with $4,328,180 in projected societal benefits, yielding a SCT ratio of 1.29.

3.4.1 Program Description

PSEG Long Island proposes to implement an innovative, open solicitation program opportunity for third party aggregators to install residential batteries paired with new or existing solar for PSEG Long Island customers. The goal of the pilot is to catalyze the local availability of energy storage for the commercial and residential market while providing load relief, especially in those defined areas of the grid where peak demand needs are most critical. The program plans to utilize a tariff-based incentive for verifiable reductions in customer load, coordinated through third-party aggregators, who sign participation agreements with PSEG Long Island. The program will be device and supplier agnostic to allow full market participation. A $60/kW per year incentive for demonstrated load reduction across eight designated LSRV areas where the grid is closer to its limits.

Table 3-12. Key Program Inputs – BTM Storage with Solar

Input	Value	Unit	Source
Project Cost – LSRV Incentive	$60	$/kW-year	PSEG Long Island
Total Projected Customers Enrolled	720	Customer	PSEG Long Island
Average Load Reduction per Customer	4.8	kW	PSEG Long Island

Through a modified version of existing direct load control tariffs, PSEG Long Island will offer a payment to third party aggregators that will allow PSEG Long Island to remotely control customers' energy storage systems to reduce load during called events. The third-party aggregator will have an agreement in place with PSEG Long Island, and with the customer, that authorizes terms and conditions of participation in the program. While PSEG Long Island will pay the rebates to the third-party aggregator, it is expected that customers will also receive a rebate or cost-savings, either through a portion of the rebate from PSEG Long Island transferred to them, and/or a higher upfront discount from the aggregator for the battery installation.

PSEG Long Island is not dictating the ultimate incentive design to the customer, and this provides open space for the market to innovate on solutions that achieve maximum participation. The direct load control tariffs are structured to offer payments each year for measured and verifiable reductions in electric demand by a certain level of kilowatts, no more than a few times per year when the system is at or near its operating peak.

In order to promote market stability, the program will lock in the capacity price for a 10-year arrangement, with payment based on average resource load reduction across all event calls in that year multiplied by the incentive rate, for the participating third-party aggregator partnering with PSEG Long Island. Contrary to existing direct load control tariff, this program would use explicit metering on the battery inverters rather

than a baseline comparison, leading to a more accurate accounting of customer participation. The tariff would also be amended to allow resources less than 50kW to open the program to residential and small commercial installations.

Finally, the incentive payment would be directed through the third-party storage provider/aggregator, with a portion of the savings passed on to the customer through a lower overall cost to install the battery and/or some other incentive compensation scheme that is negotiated directly between the aggregator and the customer.

3.4.1.1 System Size and Site Selection

The program would be device and supplier agnostic, with the level of load participation up to the customer. A more reliability-focused customer could reserve more of their battery capacity for their own backup supply, while a more economically-minded customer could open all capacity to utility control. Even in the conservative case, the program calls only on a handful of days through the year leaving the full capacity available for customer backup in most cases.

As a customer program, the tariff would not select specific sites, but would direct investment to grid beneficial areas by providing the incentive in the LSRV areas. Enrollment in the program is not directly determined, but the projected participation given the available tariff and tax incentives is shown in Table 3-13. The demand reduction values are based on a requirement of two hours of peak reduction. In aggregate, the forecasted total storage capacity would be 7,600 kW.[32]

Table 3-13. Forecasted Cumulative Participation and Savings – BTM Storage with Solar

Year	LSRV Participants	LSRV Demand Reduction (kW)
2019	90	360
2020	240	960
2021	540	2,640
2022	720	3,648

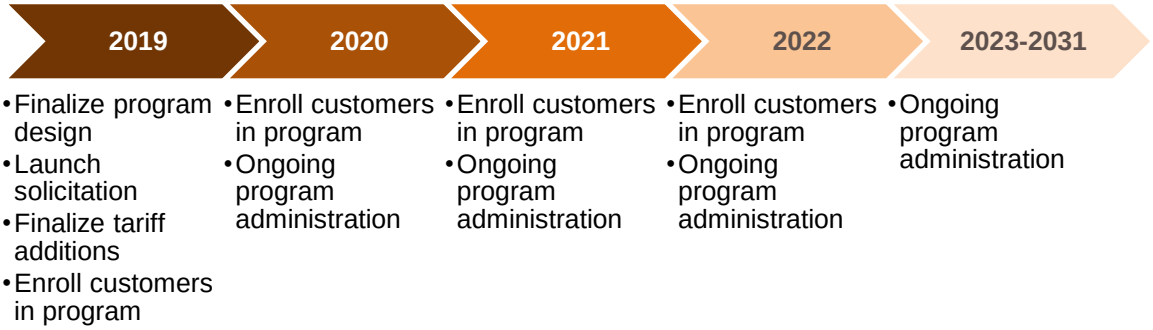
The major drivers for the participation forecast are the sun setting of the Investment Tax Credit (ITC) and the introduction of VDER Phase 2, which is expected to provide opportunity for residential storage owners to derive value from their battery assets. In order to receive the ITC, the battery must be installed alongside a new or existing renewable energy source such as rooftop PV. A federal 30% tax credit on the system's installed costs for qualifying renewable energy technologies was first implemented with the Energy Policy Act of 2005. Current policy allows for 30% ITC through 2019 (construction must begin before January 1, 2020), [2] 26% in 2020, 22% in 2021. After 2022, the ITC remains 10% for commercial customers, but ends for residential customers. While VDER Phase 1 is not applicable to residential energy storage plus solar, it is anticipated that VDER Phase 2 will be, provided additional value streams and improving the business case for customers.

[32] Based on LG Chem RESU10 battery specifications

3.4.1.2 Schedule

Figure 3-12 provides an estimated timeline for the rollout of the program that will include a modified tariff offer such that contracts can be in place by summer 2019. The incentive payments locked in to the 10-year agreement can be modified each year by PSEG Long Island, as it negotiates new annual terms and conditions on a forward going basis for new projects as presented by the aggregators. The value to the utility for a particular location can be updated based on changing assessments of grid needs and of likelihood of customer adoption. This cycle of the program anticipates enrolling customers through 2022, with the last 10-year terms finishing in 2031.

Figure 3-12. Program Timeline – BTM Storage with Solar



3.4.1.3 Goals/Drivers/Rationale

A number of recent developments justify this battery storage with solar program. While Long Island has historically been the statewide leader in deployment of DER, particularly solar PV, the LIPA tariff only allowed for energy storage to be interconnected as of January 1, 2018, and only under the condition that it be paired with an eligible DER technology.

In addition, the legislature passed a bill in 2017 that tasked NYSERDA with working with the utilities (including LIPA) to create an energy storage U2.0 Roadmap in support of Governor Cuomo's stated goal[33] of deploying 1,500 MW of energy storage by 2025. With over 40,000 residential solar PV systems already interconnected on Long Island, there is great potential for new or existing solar PV to be paired with energy storage at the residential level.

This program projects to contribute 7.6 MW to the Governor's goal for Long Island. Furthermore, the goal of obtaining 50% of New York's electricity from renewable sources by 2030 is driving significant projected offshore wind projects that will increase the value of flexible energy storage resources, like the batteries proposed in this program, on Long Island.

Finally, while Phase 1 of the VDER does not apply to residential customers, early indications are that energy storage systems paired with solar PV help to increase the Value Stack under VDER beyond that of retail rates, potentially offering a favorable payback. It is anticipated that Phase 2 of VDER, which is set to begin on January 1, 2020, will also apply to new residential interconnection applications, and may prove to be an additional value stream for energy storage.

[33] 2018 State of the State Address (https://www.ny.gov/programs/2018-state-state-address

3.4.2 Customer Engagement Plan

The customer engagement approach for the Battery Storage program will be a contractor driven strategy. The objective is to work with the major contractors in this space to encourage residential sales of battery storage to complement solar metering installations. This program is aimed at driving new residential customer adoption of battery storage units. PSEG Long Island will partner with equipment manufacturers and contractors to provide them will customer leads and collateral material to support and drive customer participation.

The utility will conduct targeted direct mail outreach to potential Battery Storage prospects to drive interest and generate contractor leads. PSEG Long Island support is aimed at allowing the participating contractor community to inform, educate and motivate customers during the sales engagement process. PSEG Long Island will also provide support for this program by developing marketing collateral and obtaining and developing customer testimonials.

The customer engagement plan will be strategic in its outreach to a specific segment of the current customer population and identify those participants who might have a propensity to install battery storage along-side a new solar installation. The engagement plan will include but not be limited to the following components:

- Direct mail: Target a direct mail solicitation to a portion of our residential customer base identified through data analysis as having a higher likelihood of program participation. Leads generated will be provided to participating contractors for customer follow-up and sale.
- Website: A landing page will be developed to provide interested customers a resource to learn more about the Battery Storage program, program FAQs and how to get started.
- Collateral: Collateral will be created for both the contractor partners and PSEG Long Island internal customer service reps to assist in addressing customer inquiries and answering questions. Flyers will be created to highlight the program requirements, benefits and address most commonly asked questions.

3.4.3 Discussion of Costs and Benefits

The value streams were mapped to the SCT for the BCA, as this is the preferred benefit-cost analysis test per New York DPS.

PSEG Long Island's proposed Residential Energy Storage with Solar program has a SCT benefit-to-cost ratio of 1.29. The benefits include: Avoided Generation Capacity Cost, Avoided Distribution Capacity Cost, and Avoided Transmission Capacity Cost. Avoided Distribution Capacity Cost is the largest benefit stream.

The costs include: Program Administration Costs and Participant Incentive Costs. Participant Incentive Costs account for the incentive paid to the third-party aggregator and passed on to the customer in the form of a reduced cost of storage device.

The results from the SCT are graphically represented in Figure 3-13 with details in Table 3-14.

Figure 3-13. Present Value Benefits and Costs of SCT – BTM Storage plus Solar

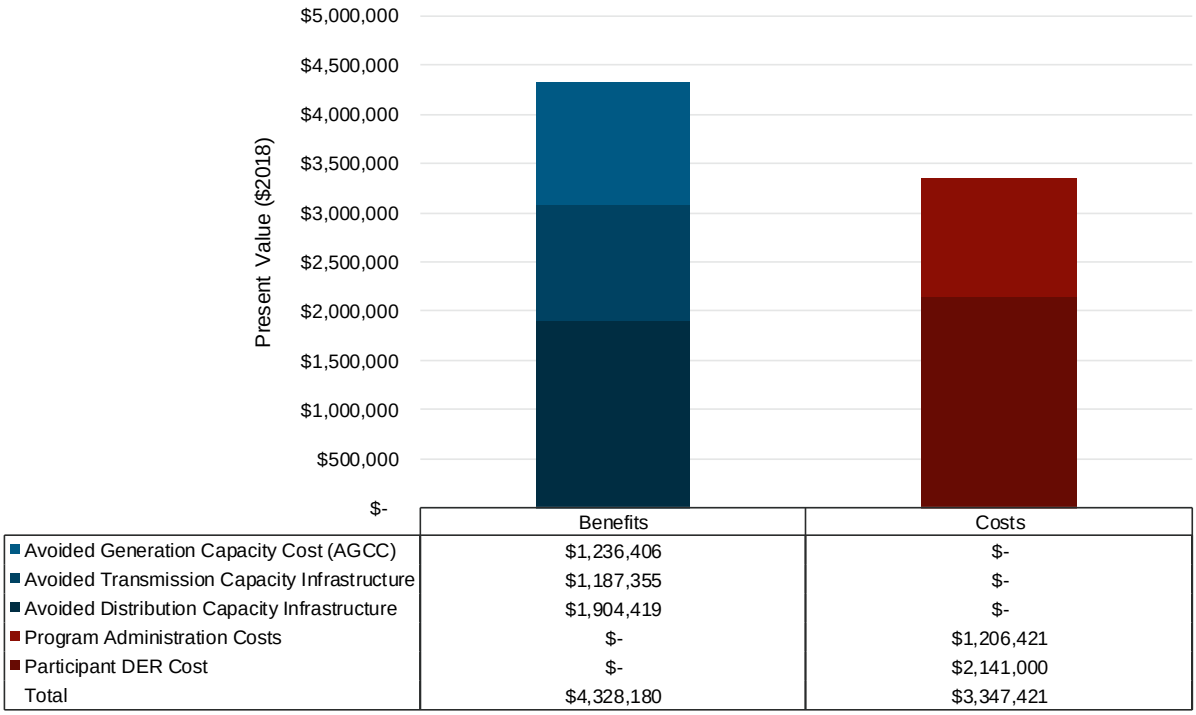


Table 3-14. Benefits and Cost Details – BTM Storage plus Solar

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
1	Avoided Distribution Asset Costs	Use the same methodology as the DLM tariff to calculate the per kW value of peak load reduction.	$1,904,419	
2	Avoided Generation Capacity Cost	Based off of PSEG Long Island Capacity price forecast and estimated peak coincidence factor between program call to reduce during distribution peak and generation peak.	$1,236,406	
3	Avoided Transmission Asset Cost	Use the same methodology as the DLM tariff to calculate the per kW value of peak load reduction. For LSRV areas, this is increased by 50%. Apply a coincidence factor between distribution and transmission peak.	$1,187,355	
4	Program Administration Costs	Based on employee needs to administer program and an initial marketing budget.		$1,206,421
5	Participant DER Cost	Based on current level of ITC, cost of device, and cost of equivalent backup power		$2,141,000
	Total Benefits		**$4,328,180**	
	Total Costs			**$3,347,421**
	SCT Ratio			**1.29**

3.4.4 Budget Request

The program budget request is summarized in Table 3-15. PSEG Long Island expects that this program would require one half of a full-time employee as program support for program management for the duration of the program.

Table 3-15. Project Budget – BTM Storage plus Solar

Component	2019	2020	2021	2022	4-Yr Total
Capital Costs	$-	$-	$-	$-	**$-**
O&M Costs	$192,500	$195,275	$98,133	$101,077	**$586,985**
Fuel and Purchased Power (Incentives)	$21,600	$57,600	$158,400	$218,880	**$456,480**

3.5 Electrifying Transportation: Electric Vehicle Program

The EV Program proposed by PSEG Long Island addresses the following key goals:

- Enhancing the penetration of EVs in Long Island;
- Aligning PSEG Long Island's EV customer adoption strategy with New York REV Objectives of reducing GHG emissions;
- Empowering customers while animating the EV charging infrastructure market; and
- Deploying smart EV charging systems that have the capability to help PSEG balance grid demands, peak capacity periods, and improve the overall system load factor.

The EV Program consists of five components: Outreach and Marketing; Fleet Vehicle Purchase; Commercial Workplace Charging Program; Residential Smart Charging Program; and Public Direct Current Fast Charging (DCFC) Program. The last three components are focused on the benefits that managed charging brings to the overall electricity system.

Since the Utility 2.0 2017 Annual Update Filing, the Fleet Vehicle Purchase has been completed, the Commercial Workplace Charging Program has been extended, and the Residential Smart Charging Program and the Public DCFC Program have been added.

PSEG Long Island requests a 4-year program budget (2019-2022) of $20.5 million to cover equipment rebates, participation incentives, and administration costs. From a societal perspective, the total projected costs associated with the program are $58.9 million and total projected benefits are $75.9 million, yielding a SCT ratio of 1.29.

3.5.1 Program Description

3.5.1.1 Outreach and Marketing

The EV website development phase has been completed. EV technology and information is now readily available to all customers on the PSEG Long Island website at https://www.psegliny.com/page.cfm/EV. The website provides information on plug-in EVs, EV charging equipment, EV charging station locations

throughout Long Island, and benefits available to EV owners. The general website went live in early 2017. The EV Workplace Charging webpage went live in mid-2017.

Ongoing outreach and marketing activities will continue throughout the duration of the EV program. These activities include the development of two one-page documents with a goal of changing or modifying charging behaviors to off-peak using information and incentives:

- **EV Residential Incentive Document.** The first document will be a summary of the PSEG Long Island EV residential incentive programs available to customers and will encourage them to enroll in the program. This document will be located at the point of purchase and at car dealerships.
- **EV Charging Behavior Document.** The second document will encourage new EV owners to set their onboard car timers to charge in the off-peak hours as that behavior will reduce impacts to the electric grid. PSEG Long Island also anticipates the development of off-peak incentives that could reduce the cost of charging.

On PSEG Long Island's homepage, the carousel is used to promote the current BMW i3 bulk purchase discount through July 31, 2018. Finally, PSEG Long Island is currently working with NYSERDA to promote an EV drive event over the summer of 2018 at a commercial customer site that will be determined in the coming weeks.

3.5.1.2 Fleet Vehicle Purchase

The purchase of fleet EVs has been completed. PSEG Long Island's Transportation department completed the purchase of electric plug-in light duty passenger vehicles and associated charging stations in 2018. The vehicles will be utilized by meter readers and will be located at various division offices throughout PSEG Long Island's service territory. The vehicles are intended to be wrapped and branded in a theme supporting EV adoption throughout PSEG Long Island's service territory. PSEG Long Island does not intend to purchase any additional fleet EVs throughout the 2019-2022 period.

PSEG Long Island's Transportation department completed the purchase of 8 Chevy Bolt electric plug-in light duty passenger vehicles in March 2018. The vehicles were delivered in June 2018. Final selection and design of the associated charging stations is being coordinated by facilities to coincide with the arrival of the vehicles. The vehicles will be utilized by PSEG Long Island Meter Services and will be located at Hicksville, Brentwood, and Riverhead division offices. The vehicles will be wrapped and branded in a theme supporting EV adoption throughout PSEG Long Island's service territory. PSEG Long Island does not intend to purchase any additional fleet EVs throughout the 2019-2022 period.

3.5.1.3 Commercial Workplace Charging Program

PSEG Long Island launched the Commercial Workplace Charging Program at the end of 2017. As of May 2018, the program had rebated $40,000 for 20 charging ports. 12 additional charging ports were pre-approved and pending installation. This would reach a total $72,000 in rebates and 32 ports out of a goal of 50 for 2018. PSEG Long Island is actively engaging with over 25 additional major account leads. The program market intervention includes the following key features:

- **EV Charger Rebates.** Customers receive a rebate of the lesser of either 80% of the cost of the invoiced value of the EV charging equipment, or $4,000 per port, up to 10 ports per customer, for a three-year term. The rebate is currently paid in three installments:
    - 60% rebate payment once the equipment is purchased, installed and operational;
    - 10% rebate payment following collection of Year 1 usage data;

- 10% rebate payment following collection of Year 2 usage data.

- **Approved Equipment.** Program-eligible equipment have been selected from a list of UL approved Level 2 commercial chargers. The customer has six months to install the charger(s) following approval of their application.
- **Usage Data Collection.** The customer must provide PSEG Long Island with access to their charging data via a web portal and / or API site for data collection. The customer receives the performance payment installments in Year 2 and Year 3 upon PSEG Long Island's receipt of the granular annual usage data for analysis and program monitoring of each workplace charging location. The data collected provides insight into the local behavioral usage of EV workplace charging for use in continuous improvement of program offerings over time.

The initial program was limited to 100 EV charging ports. PSEG Long Island intends to extend the program and its offerings to an additional 1,700 ports over 2019-2022, per Table 3-16. The original program was initiated in 2017.

Table 3-16. Number of EV Charging Ports Included in the Commercial Workplace Charging Program

Program Phase	2019	2020	2021	2022	Total
Original Program	34	13	4	0	**100**[1]
Extended Program	100	400	800	400	**1,700**

1. The total of 100 ports is calculated by summing the 2019-2022 numbers provided in the above table (51 ports), and adding the 49 ports originally planned for 2018.

3.5.1.4 Residential Smart Charging Program

PSEG Long Island intends to launch a new Residential Smart Charging Program in 2019. The program has two market intervention features: EV charger rebates, and behavioral incentives.

- **EV Charger Rebates.** The residential EV charger rebate component consists of a rebate of 80% of the cost of the invoiced value of the EV charging equipment, not to exceed $500 per port, up to 1 port per customer. Program-eligible equipment will be selected from a list of UL approved Level 2 residential chargers only. The customer will have six months to install the chargers once the application is approved. The program is designed for 11,763 ports over 2019-2022, per Table 3-17.

Table 3-17. Number of EV Charging Ports Included in the Residential Smart Charging Program

Program Phase	2019	2020	2021	2022	Total
Smart Charging Program	968	1,525	3,354	5,916	**11,763**

- **Behavioral Incentive**. The behavioral incentive component consists of a rewards program providing behavioral and financial incentives for residential customers to change their EV charging pattern. The behavioral incentives include providing participants with feedback on their behavior compared to previous months and to other EV owners. Participants will receive data that is not currently provided by their vehicles. Customers will gain a deeper understanding about how EV range is impacted by operating conditions. They will be rewarded with badges for socially-

positive behavior, such as eco-driving and off-peak charging, and a social norming feature ranking with other participants. The financial incentives consist of a $0.02 per kWh incentive when the EV is charged during off-peak hours. The program objective is to incentivize the EV owner to charge at off-peak times, when the grid has an over-capacity of electricity. The third-party vendor will verify compliance and provide incentives directly to the participants. PSEG Long Island is currently conducting a vendor selection process to choose the administrator of this program component and expects to announce the successful bidder in the coming months. PSEG Long Island is initially proposing the program for 2019-2020. Following market developments, it will consider developing future incentives for promoting off-peak charging, e.g., via new tariff rates and / or vehicle manufacturer collaborative offerings.

3.5.1.5 Public Direct Current Fast Charging Program

PSEG Long Island intends to provide financial incentives to public DCFC port operators. It will consist of an innovative pricing proposal for DCFC, attached as Appendix D.

3.5.1.6 Goals, Drivers, and Rationale

PSEG Long Island believes the electrification of transportation has the potential to provide significant societal benefits to the utility's customers and the environment. PSEG Long Island's strategy for EVs[34] has the following key goals:

- Enhancing the penetration of EVs in Long Island.
- Aligning PSEG Long Island's EV customer adoption strategy with NY REV Objectives of reducing GHG emissions.
- Empowering customers while animating the EV charging infrastructure market.
- Deploying smart EV charging systems that have the capability to help PSEG Long Island balance grid demands, peak capacity periods, and improve the overall system load factor.

PSEG Long Island will pursue these goals by leveraging existing market trends and strategically engaging with the EV marketplace such that the growth of EVs is a net-positive for the utility and society. The strategy is currently the product of three key drivers: (1) need for direct market information; (2) growing EV adoption on Long Island; and (3) coordination with other market actors.

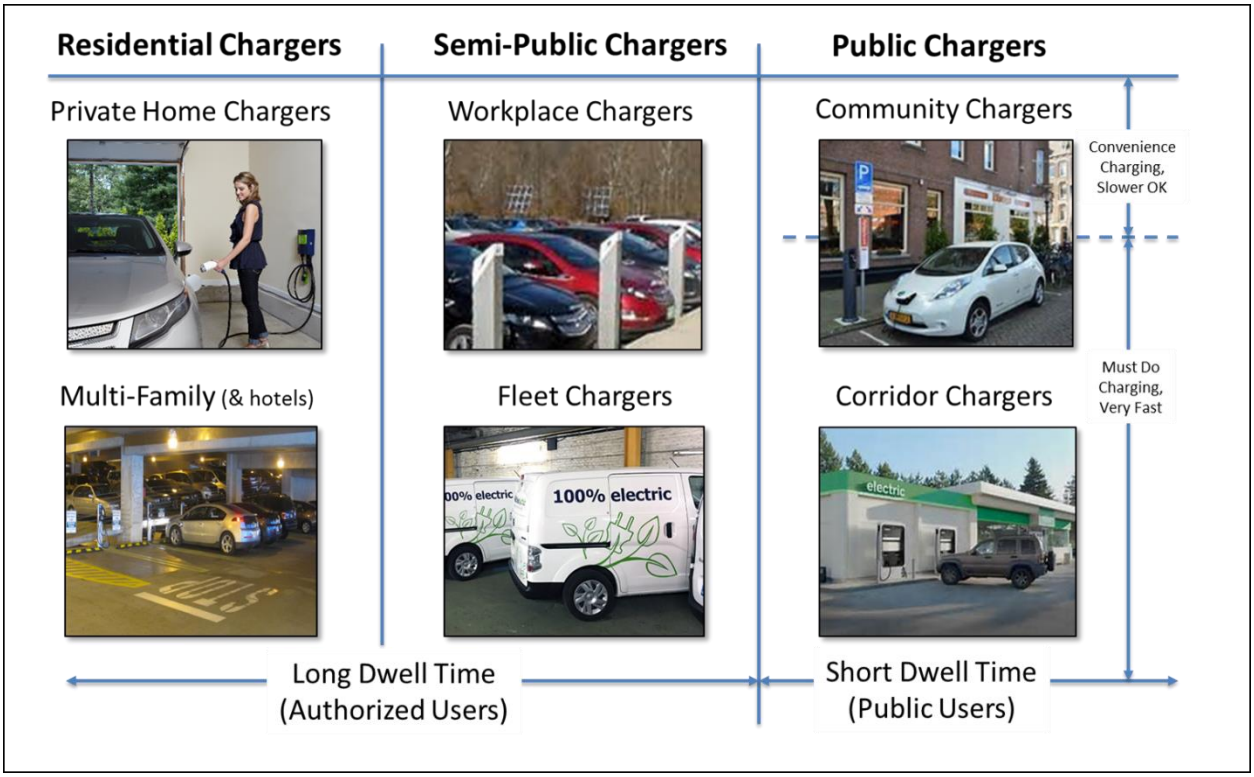
PSEG Long Island has commissioned studies recently that provide direct market information on the potential areas where chargers will first be deployed and the charging profiles that are likely to occur at such locations.[35] These insights have and will continue to inform PSEG Long Island's EV charging program adoption planning estimates. A successful EV market intervention proven in other US

[34] This category includes both PHEVs and BEVs.

[35] PSEG Long Island commissioned Gabel Associates a study entitled "Electric Vehicles on Long Island, Costs and Benefits, The Opportunities and Potential Impact of Widespread Vehicle Electrification on Long Island". The report is expected to be publicly available by Q3 2018.

jurisdictions[36] has been to offer customers financial assistance for the installation of smart EV chargers. PSEG Long Island demonstrated a similar intervention in the workplace setting throughout 2018 with major account customers and through this filing looks to expand that intervention into the residential market with smart chargers. The rationale for expansion lies within the broader context of the New York market within which Long Island figures prominently from an EV perspective, accounting for a large share of vehicle adoption, but only a fraction of the non-residential charging stations in New York State.

Figure 3-14. EV Charging Infrastructure Segmentation by Location Type and Usage



Source: Gabel Associates

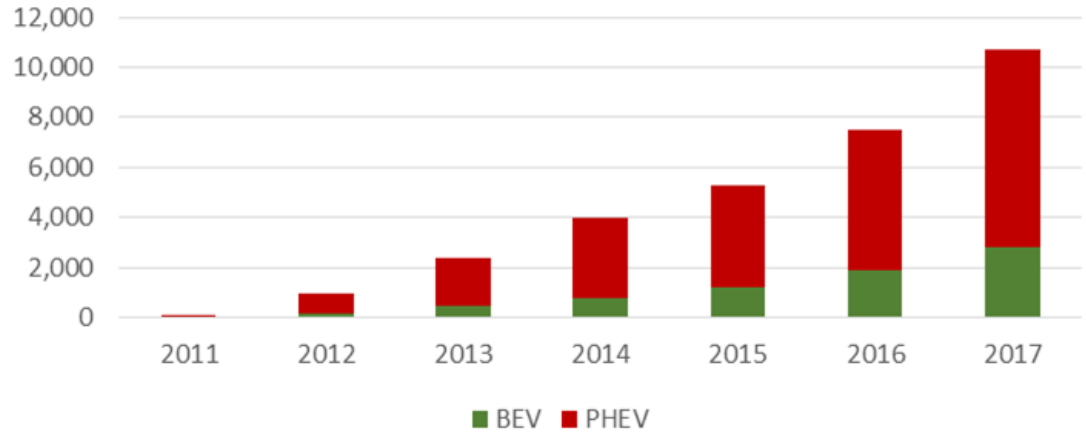
Growing adoption of EVs is another key driver for PSEG Long Island's EV strategy. With nearly 10,000 EVs on the road as of year-end 2017, the Long Island region has the highest level of EV adoption in New York State. The number of EVs registered on Long Island represents approximately 40% of EVs registered in New York State. The ratio of EVs to charging stations is approximately 12:1 in New York State and 40:1 on Long Island. Currently, there are approximately 175 public and private commercial charging stations on Long Island, with approximately 150 Level 2 chargers and 25 Level 3 DCFC ports.[37] LIPA and PSEG Long Island have the unique opportunity to develop Long Island as a leader in EV deployment of smart EV charging systems across residential and commercial customer accounts. The high EV, yet low charger, penetration on Long Island provides an optimal market to advance adoption of

[36] Example programs include Xcel Energy's Smart Charger pilot program (http://www.startribune.com/xcel-rolling-out-pilot-program-for-charging-of-electric-vehicles-at-home/479584193/), Pacific Gas & Electric's Electric Vehicle Smart Charging Pilot (http://www.pgecurrents.com/wp-content/uploads/2017/06/PGE-BMW-iChargeForward-Final-Report.pdf), Toronto Hydro's Residential Smart Charging Pilot (https://www.fleetcarma.com/resources/chargeto/), and Seattle City Light's Public DCFC Pilot and Residential Charging Pilot (https://www.psrc.org/sites/default/files/rtoc201709-pres-evpubliccharging.pdf)

[37] Source: NY DPS Letter to LIPA, December 14th, 2017, Matter No. 14-01299: In the Matter of PSEG Long Island Utility 2.0 Long Range Plan; Recommendations Regarding PSEG Long Island Annual Update, page 11.

smart EV charging systems. Smart chargers are of interest to utilities over noncommunicating chargers due to their capability to support managed charging and load shedding during system peak load conditions, offering incremental grid and societal benefits. To that end, the New York DPS issued an advisory letter in December 2017 that broadly supported PSEG Long Island's EV program objectives to deploy an even more aggressive and comprehensive EV program.[38]

Figure 3-15. Cumulative Number of EV Registration in Long Island Territory as of December 30, 2017



Source: Gabel Associates

Finally, coordination with market actors including state agencies, authorities, and automakers to advance EV adoption and NY REV objectives is the third key driver for the strategy. Key coordination partners for the program include:

- **State Agencies**. New York Power Authority (NYPA) oversees the Charge NY program in coordination with NYSERDA and the New York State Department of Environmental Conservation (DEC).[39] PSEG Long Island regularly coordinates with these agencies on approaches to advance the EV market in New York State.
    - Charge NY has a goal of 30,000-40,000 EVs on the road in New York State by 2018. Installation targets include over 2,500 additional public and workplace charging stations statewide, and 3,000 personal EV charging stations by the end of 2018.
    - DEC offers municipalities 80% of the cost of EV charger installation, up to $8,000 per port for Level 2 chargers or up to $32,000 per charging mounting pedestal for DCFC.[40]
- **State Government**. New York State currently offers a tax credit of 50%, up to $5,000, for public and workplace charging stations.[41] It is also the recipient of $127 million in funding from the Environmental Mitigation Trust for charging infrastructure[42]. Developing outreach and marketing materials that present available incentives and expected infrastructure spending in a clear and

[38] Source: NY DPS Letter to LIPA, December 14th, 2017, Matter No. 14-01299: In the Matter of PSEG Long Island Utility 2.0 Long Range Plan; Recommendations Regarding PSEG Long Island Annual Update, page 11.

[39] Source: https://www.nypa.gov/innovation/programs/chargeny. NYPA offers financing and discounted charging stations to municipal customers, and is working with the NYS Thruway to install Level 3 stations at Thruway rest stops.

[40] Source: http://www.dec.ny.gov/energy/109181.html

[41] Source: https://www.nyserda.ny.gov/Researchers-and-Policymakers/Electric-Vehicles/Support-and-Discounts

[42] Source: https://ag.ny.gov/feature/volkswagen-emissions-investigation

compelling fashion will be critical to enhancing PSEG Long Island customer awareness of the value proposition EVs present to vehicle owners.

- **Automakers.** New York is a Zero Emission Vehicle (ZEV) mandate state[43] targeting 844,000 ZEVs by 2025.[44] For PSEG Long Island this means that coordination with automakers on model availability, quantity, and sales channel coordination will be critical to the success the program's outreach and marketing efforts as well as infrastructure and fleet conversion objectives.

3.5.2 Customer Engagement Plan

The communication strategy being deployed on the EV Program is to a two-fold approach which seeks to balance communications around raising general public awareness while also working with outside partners and organization to fund their communications outreach and impact. As this specific market starts to grow over the next 2-3 years, the engagement strategy will also ramp up its investment and outreach.

Customer awareness around the EV market is low given the current market saturation for EVs on Long Island. The communications plan seeks to start by building awareness early and then move to more aggressive program promotion.

The company has begun efforts to raise customer awareness by offering a rebate for discounted Workplace Charging station program to large commercial customers while also rolling out a fleet of 8 PSEG Long Island branded pool EVs in 2018. During the last 12 months, the company has also partnered with electric car manufacturers Nissan and BMW in the promotion of the Nissan Leaf and BMW i3 EVs.

This engagement plan is designed to raise customer awareness while reaching out to partners in this space such as local car dealerships and clean transportation advocacy groups.

The customer engagement plan will include but not be limited to the following components:

- In-Bill Communication: Bill inserts targeting the 1.1 million Residential and Business customers will be used to raise customer awareness around the subject of EVs on Long Island.
- Email: This channel will be used to reach out to the company's database of over 500,000 combined Residential and Business customer email accounts.
- Direct mail: As a means of educating and encouraging early adopters to investigate and potentially purchase EVs; direct mail efforts will be targeted to customers who are environmentally minded or seen as early adopters of technology.
- Partnerships:
    - Dealerships will play an important role in educating and motivating customers investigating EVs. The engagement plan will provide these partners with informational collateral on the market, utility offers and FAQs. Dealers will be encouraged to share this information with their customers to increase their understanding and make the customer buying decision easier.

[43] Source: https://www.zevstates.us/

[44] Source: http://drivingzev.com/zev-state/new-york

    - The engagement strategy will also seek out associations and advocacy groups as a means of getting the word out. PSEG Long Island will look to leverage these groups through the use of communications seed money or event sponsorship funding.

- Website: Customer communications will also reference the web site where appropriate as a resource for customers to learn more information. The website will offer program overview information as well as a FAQs section, links to other informational websites and any applicable program offers.
- Collateral:
    - Collateral around the EV program will consist of dealership/customer brochures highlighting a program overview, customer benefits, some FAQs, and our website information. As components of the EV program come to market, such as a TOU pricing rate, collateral will be created to address, inform and motivate customer behavior.
    - Focus group research will also be conducted to get a pulse of the customer as the market develops, customer feedback will be used to modify messaging, channel selection, program offerings as required.

3.5.3 Discussion of Costs and Benefits

The SCT offers a benefit-to-cost ratio of 1.29. The benefits and costs of vehicle fuel switching were developed in line with the study conducted by Gabel Associates, published by PSEG Long Island in May 2018. Adjustments were made to the BCA Handbook methodology, in line with adjustments made for EV programs in other US jurisdictions.[45] The adjustments made to BCA Handbook's initial guidelines are in italics in the table and consist of adding two value streams to the BCA: Customer O&M Savings (item #6), counted as a benefit; and Increased Energy Emissions (item #13), counted as a cost.

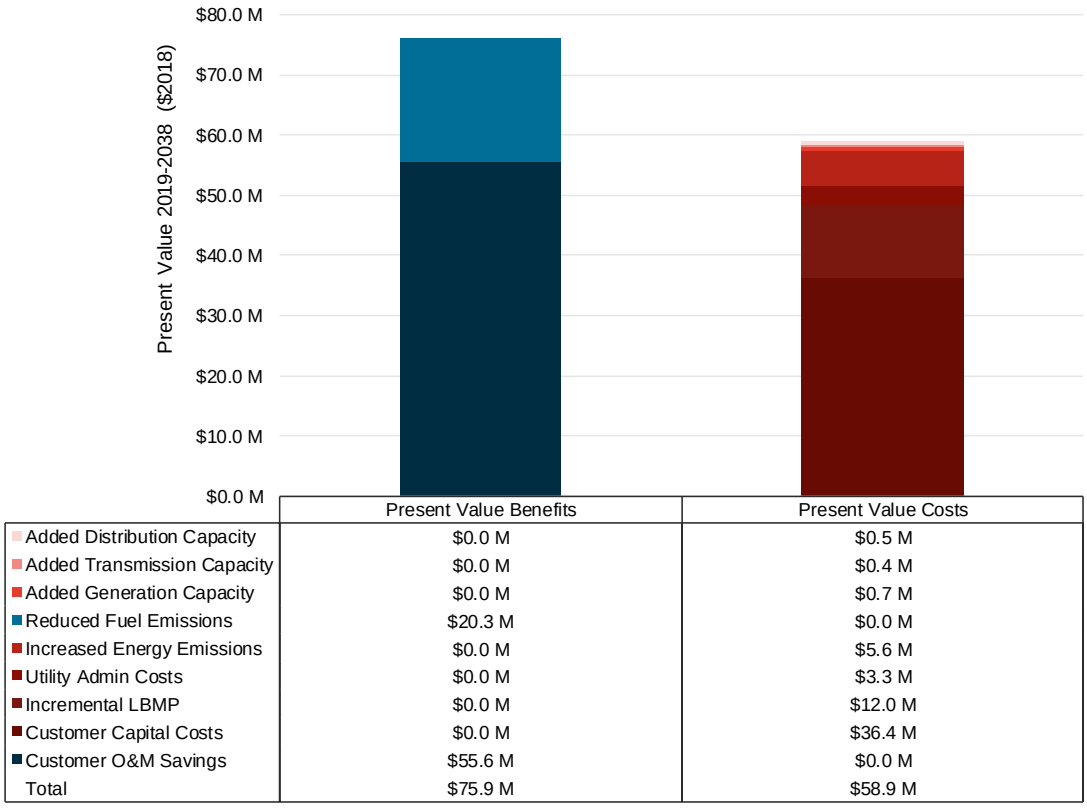
The methodology used in this analysis is a preliminary approach absent a formally approved statewide BCA methodology for EV programs in New York State. Notably, the approach does not include a primary research-supported rationale estimating the potential impact of the market interventions on commercial or residential customer willingness to adopt an EV over an internal combustion engine (ICE) vehicle.

PSEG Long Island expects NYSERDA to release official BCA guidelines for EV programs by early July 2018. After NYSERDA releases the guidelines for EV programs, future filings will leverage that methodology in place of the preliminary approach used in this filing. The official NYSERDA BCA guidelines may treat these and other values differently, rendering treatment of all values in this analysis subject to change following the release of the NYSERDA guidelines.

The results from the BCA for the SCT can be found in Figure 3-16 with additional details in Table 3-18.

[45] See pages 79-80 and 103 of report (http://edocs.puc.state.or.us/efdocs/HAA/haa144052.pdf) by Portland General Electric, Oregon. See page 54 of report (http://www.caletc.com/wp-content/uploads/2016/08/CalETC_TEA_Phase_2_Final_10-23-14.pdf) and page 56 of report (http://www.caletc.com/wp-content/uploads/2016/09/California-Transportation-Electrification-Assessment-Phase-3-Part-A.pdf) by California Electric Transportation Coalition, California.

Figure 3-16. Present Value Benefits and Costs of SCT – EV Program



	Present Value Benefits	Present Value Costs
Added Distribution Capacity	$0.0 M	$0.5 M
Added Transmission Capacity	$0.0 M	$0.4 M
Added Generation Capacity	$0.0 M	$0.7 M
Reduced Fuel Emissions	$20.3 M	$0.0 M
Increased Energy Emissions	$0.0 M	$5.6 M
Utility Admin Costs	$0.0 M	$3.3 M
Incremental LBMP	$0.0 M	$12.0 M
Customer Capital Costs	$0.0 M	$36.4 M
Customer O&M Savings	$55.6 M	$0.0 M
Total	$75.9 M	$58.9 M

Table 3-18. Benefits and Cost Details – EV Program

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
1	Added Generation Capacity	Additional generation capacity required for EV managed charging vs. non-managed baseline: *Additional peak capacity (3,100-3,700 kW-year over 2019-2022) multiplied by marginal capacity cost for generation ($49-65 per kW-year over 2019-2022)*		$713,324
2	Added Transmission Capacity	Additional transmission capacity required for EV managed charging vs. non-managed baseline: *Additional peak capacity (3,100-3,700 kW-year over 2019-2022) multiplied by marginal capacity cost for transmission ($29-34 per kW-year over 2019-2022)*		$397,703
3	Added Distribution Capacity	Additional transmission capacity required for EV managed charging vs. non-managed baseline: *Additional peak capacity (3,100-3,700 kW-year over 2019-2022) multiplied by marginal capacity cost for distribution ($36-44 per kW-year over 2019-2022)*		$496,518

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
4	Additional Electricity Sales	Additional retail electricity sales from EV charging: *Additional EV charging electricity volumes (13,000-160,000 MWh / year over 2019-2022) multiplied by PSEG Long Island's average retail electricity rates ($204-222 / MWh)*	$56,590,756	
5	Incremental Wholesale Energy Purchases	Additional wholesale energy purchases based on NYISO's locational based marginal pricing (LBMP): *Additional EV charging electricity volumes (13,000-160,000 MWh / year over 2019-2022) multiplied by marginal wholesale energy costs ($41-$48 / MWh)*		$11,971,949
6	Customer O&M Savings	EV operating expense savings (fuel + maintenance costs): *Fuel and maintenance expense savings per vehicle ($340-440 / vehicle / year) multiplied by expected number of EVs on the road (11,000-75,000 over 2019-2022)*	$55,563,529	
7	Customer Capital Costs	EVSE costs (equipment + installation costs): *Equipment and installation costs per EV charger ($2,000 / residential charger, $10,000 / workplace charger) multiplied by expected number of EV chargers deployed in program (1,000-6,000 residential chargers over 2019-2022, 130-800 workplace chargers over 2019-2022)*		$36,395,663
8	Incentives from Aggregator to Customer	Behavioral EV charging incentives: *Smart charging vendor incentive per electricity consumption unit ($0.02 per kWh) multiplied by EV charging consumption (3,650 kWh per EV per year) multiplied by fraction of charging during off-peak hours (80%) multiplied by expected cumulative number of EV chargers deployed in program (1,000-12,000 over 2019-2022)*		$3,754,489
9	Incentives from Utility to Customer	EV charger rebates: *EV charger installation rebates ($500 per residential port, $4,000 per workplace port) multiplied by expected number of EV chargers installed (12,000 residential ports in total over 2019-2022, 1,800 workplace ports in total over 2019-2022)*		$11,457,417
10	Utility O&M Costs	*No utility-side make ready upgrade costs required*		$0
11	Utility Capital Costs	*No utility-side make ready upgrade costs required, no utility fleet EV purchasing costs expected*		$0

#	Value Stream	Calculation Methodology	Benefits (NPV)	Costs (NPV)
12	Utility Admin Costs	Vendor admin costs (smart charging vendor program) + utility admin costs (marketing + other program costs): *Smart charging vendor program costs ($2.83m over 2019-2022) + marketing and outreach costs ($0.58m over 2019-2022) + other program costs ($0.05m over 2019-2022)*		$3,300,704
13	Increased Energy Emissions	Increased emissions (CO2 + SOx + NOx) from additional electricity *Increased CO2 emissions calculated from additional EV charging electricity volumes (13,000-160,000 MWh / year over 2019-2022) multiplied by avoided carbon cost adder ($21-24 / MWh over 2019-2022)* *Increased SOx + NOx emissions already embedded in wholesale electricity prices and therefore not monetized per the BCA Handbook*		$5,620,265
14	Reduced Fuel Emissions	Reduced emissions (CO2 + SOx + NOx) from removing ICE vehicles from the road: *Reduced CO2 emissions calculated from additional number of EVs on the road[46] (11,000-75,000 over 2019-2022) multiplied by average vehicle mileage (11,000 miles / year) divided by fuel efficiency (38-41 miles / gallon over 2019-2022) multiplied by CO2 fuel emissions intensity (0.008-0.009 tons CO2 / gallon over 2019-2022) multiplied by social cost of CO2 ($40-44 / ton CO2 over 2019-2022)* *Reduced SOx + NOx emissions calculated using the same approach as for CO2*	$20,332,247	
	Total Benefits		**$75,895,776**	
	Total Costs			**$58,896,126**
	SCT Ratio			**1.29**

[46] This methodology assumes that a scrappage rate was used in the EV adoption forecast developed by Gabel Associates.

3.5.4 Budget Request

PSEG Long Island requests approval on budget as summarized in Table 3-19. PSEG Long Island is not forecasting any additional FTEs for this project.

Table 3-19. EV Program Budget

Component	2019	2020	2021	2022	4-Yr Total
Capital Costs[47]	$222,646	$256,433	$258,799	$239,011	**$976,889**
O&M Costs	**$2,970,152**	**$5,407,091**	**$6,218,867**	**$5,882,143**	**$20,478,253**

[47] These capital costs are based on added peak load due to electric vehicles valued at PSEG Long Island's system average cost of T&D capacity. These values are high level estimates that are not tied to a specific investment.

4. Evolving to the Distributed System Platform

In its Order Adopting Distributed System Implementation Plan Guidance,[48] DPS described the need to develop a more transactional, distributed electric grid that meets the demands of the modern economy including improvements in system efficiency, resilience, and air emissions reductions. The DPS envisioned a transition from the historic model of a unidirectional electric system serving inelastic demand to a dynamic grid that encompasses both sides of the utility meter and relies increasingly on distributed resources and dynamic load management.

To guide this transition of the utility model, DPS defined a set of functions of the modern utility that are called, collectively, DSP. DSP functions combine utility planning and operations with the enabling of markets.[49] The DSIP is the vehicle by which improved planning and operations are to be defined and implemented by the New York IOUs.[50] While PSEG Long Island was not required to comply with the DSIP Order on the same timeline as New York IOUs, and is not proposing to develop and file a DSIP in 2019, the utility does intend to pursue the integral elements of Commission guidance and current REV best practices. The utility has already undertaken activities and demonstration projects as part of this journey. This section highlights some of these efforts and details plans to accelerate down the path to becoming the DSP.

PSEG Long Island proposes formalizing and better coordinating its DSP efforts going forward through the creation of a UoF Team (as described in Section 2.3.5), which will continue to work toward development of DSIP-like projects for PSEG Long Island, increasing cross-organizational alignment, and undertaking DER and market focused demonstration and learning projects that are more REV focused. To further support the UoF Team PSEG Long Island proposes to join the New York Joint Utilities. These past efforts and future plans are detailed as follows:

- **Past and Current Efforts That Help Enable DSP Capabilities:** Highlights elements of PSEG Long Island's past and ongoing projects and efforts that have already started to contribute to the path toward DSP capabilities.
- **DSP-Enabling Studies and Initiatives:** Describes initial proposed efforts to be undertaken by the UoF Team, together with the Data Analytics initiatives, which will begin or continue to develop: an enhanced DER interconnection process (IOAP), a more granular locational cost methodology per the VDER proceedings, and an NWS planning and analysis tool will evaluate NWS and DER portfolio cost-effectiveness to facilitate the selection of appropriate solutions for targeted system needs.
- **Joint Utilities of New York membership:** PSEG Long Island intends to join the Joint Utilities of New York as a full member in 2018. By so doing, PSEG Long Island will have insight and increasing familiarity with the best practices and latest thinking regarding DSP, such as DER hosting capacity, DG interconnection, data sharing and VDER.

[48] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Regulatory Policy Framework and Implementation Plan*, February 26, 2015.
[49] Ibid.
[50] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Distributed System Implementation Plan Guidance*, April 20, 2016 and "Guidance for 2018 DSIP Updates," DPS Staff White Paper, April 26, 2018.

The efforts and plans detailed in these subsections below show PSEG Long Island's commitment to the concepts of REV as well as plans to accelerate and formalize these efforts.

4.1 Past and Current Efforts That Help Enable Distributed System Platform Capabilities

PSEG Long Island has undertaken several efforts to develop capabilities and incorporate learnings necessary for building DSP functionality. Notable efforts in this regard are described below.

4.1.1 The Long Island Smart Energy Corridor Project

LIPA teamed with Stony Brook University (Stony Brook or SBU) and Farmingdale State College (Farmingdale or FSC) to create and demonstrate a Smart Energy Corridor.[51] The project, located along the Route 110 business corridor on Long Island, demonstrated the integration of a suite of smart grid technologies from substations to end-use loads. This demonstration project lasted from 2010 through 2015, when the final report[52] was issued.

These elements included:

- AMI installed at approximately 2,550 customer locations, 1,620 of which were residential.
- AMI technology integrated with the distribution system
- Advanced substation automation technology implementation
- Demonstrated how customers and utilities can work together to give residential, industrial, and commercial customers more information and choices enabling them to:
    - Reduce their energy costs
    - Reduce peak demand
    - Increase the utility's ability to identify and respond to outages on an expedited basis

This project successfully demonstrated elements that required organizational learning, experimentation, and engagement with customers, all of which will be important in moving toward DSP functionality.

4.1.2 Distribution System Enhancements to Add Intelligence

PSEG Long Island continuously seeks to upgrade the distribution system to enhance its resiliency and reliability to make the system more efficient, and position it to handle a higher penetration of DER in the future. Notable ongoing and planned projects[53] related to distribution include:

- **DSCADA upgrade initiative:** is a replacement upgrade of the existing Distribution Automation system which monitors and controls feeder devices such as Automatic Sectionalizing Units and Capacitor Banks. The DSCADA upgrade includes integration with a GIS-based network model for improved displays and situational awareness.

[51] This project was partially funded by the US DOE as part of the Smart Grid Demonstration Project (SGDP) grant program, under the DOE Award no: DE-OE0000220.

[52] The full project report can be found at https://www.smartgrid.gov/files/DE-OE0000220-Final-Report-04-27-15.pdf.

[53] Note that these projects are *not* part of the Utility 2.0 funding request.

- **Advanced Distribution Management System (ADMS) implementation** is a real-time operating system that can provide such functionality as Distribution Power Flow, VVO CVR, and Fault Location. It also includes Distributed Energy Resource Management System (DERMS), which will enable real-time management of DER connected to the distribution system. Implementation of ADMS is planned following completion of the DSCADA project.
- **Addition of DERMS functionality:** This functionality will build on the ADMS, adding key capabilities to enable safe operation of a higher penetration of DER, including solar PV, EVs and battery storage; it will also allow more effective interconnection of DER.
- **Distribution reliability:** The Federal Emergency Management Agency Reliability Project[54] will improve customer reliability by reducing the number of customers affected by outages through enhancements to the distribution system. The project is also considering adding voltage and current measuring points during installation, which would increase monitoring and measurements to provide additional precision for the CVR and VVO analyses. This will be important for DER visibility and planning activities.
- **Distribution efficiency/VVO/CVR:** VVO and CVR reduction are being tested within the Super Savers Program, described in Section 3. Currently, some capacitor bank controls are being replaced, which is a step toward more complete VVO rollout. This functionality would be enhanced by AMI, which would allow more granular control of voltage levels to increase system efficiency. It is possible that this effort could also install additional sensors that would improve system visibility, operation, and safety as DER penetration grows. PSEG Long Island is using this study to understand the potential for broader deployment of VVO/CVR, which could yield tremendous customer benefits from more efficient system operation.

4.1.3 Smart Wires Project

The Smart Wires Project uses PowerLine Guardian solution that represent a quickly deployable, scalable, and reusable alternative to traditional wired approaches. This technology helps push power flow to alternate lines with greater free capacity. The approach provides a customer-friendly and much less expensive solution to avoid construction in sensitive areas, demonstrating a commitment to customers. Given the uncertain nature of future network needs, Smart Wires' devices are a robust investment capable of mitigating near-term constraints while providing long-term flexibility (https://www.smartwires.com/guardian/).

This innovative technology will mitigate thermal constraints on the Lake Success – Whiteside 69 kV overhead circuit path, providing an opportunity to defer or avoid the traditional alternatives to circuit reconductoring and the associated pole replacements.

4.2 Distributed System Platform-Enabling Studies and Initiatives

PSEG Long Island has identified three immediate and high value initiatives where the UoF can provide support based on its areas of focus. These projects will develop procedures to streamline DER interconnection, a locational value tool to support VDER rates, and an NWS planning tool.

[54] This project will storm-harden 1,025 miles of distribution mainline on 320 circuits and install 900 automatic sectionalizing unit – vipers (ASUVs) as three-phase current and voltage sensors, which are integral components of the switch; 388 normally open ASUVs and 510 normally closed ASUVs.

4.2.1 Interconnection Online Application Portal

The DER interconnection process is an important evaluation ensuring that new customer devices will not compromise the safety or functionality of the distribution grid. Depending on the size and type of the resource, it may be eligible for an expedited screening or require a detailed engineering study.

The objectives for this initiative reflect a growing need to efficiently adapt to the changing energy landscape. The integration of DER is an increasingly important component of grid planning and operations, as well as a major point of interaction between the customer and distribution utility. The goal of the IOAP enhancements is to ensure the timely and efficient processing of applications, documents and payments related to the interconnection of customer distributed generation. The major drivers for this initiative are the PSC Order[55] and desire to simplify and accelerate the interconnection process, rather than an explicit positive benefit-cost result. This program is consistent with the policies and goals set forth by REV, and helps PSEG meet the goals of 40% reduction in GHG emissions from 1990 and procurement of 50% renewables by 2030.

To more efficiently support the integration of DER, PSEG Long Island proposes to update its existing process for the submission and evaluation of interconnection requests. The online IOAP will allow customers to quickly and easily submit interconnection applications and provide process management solutions and application processing database to allow the Power Asset Management group to evaluate the requests more effectively.

4.2.1.1 Proposed Approach

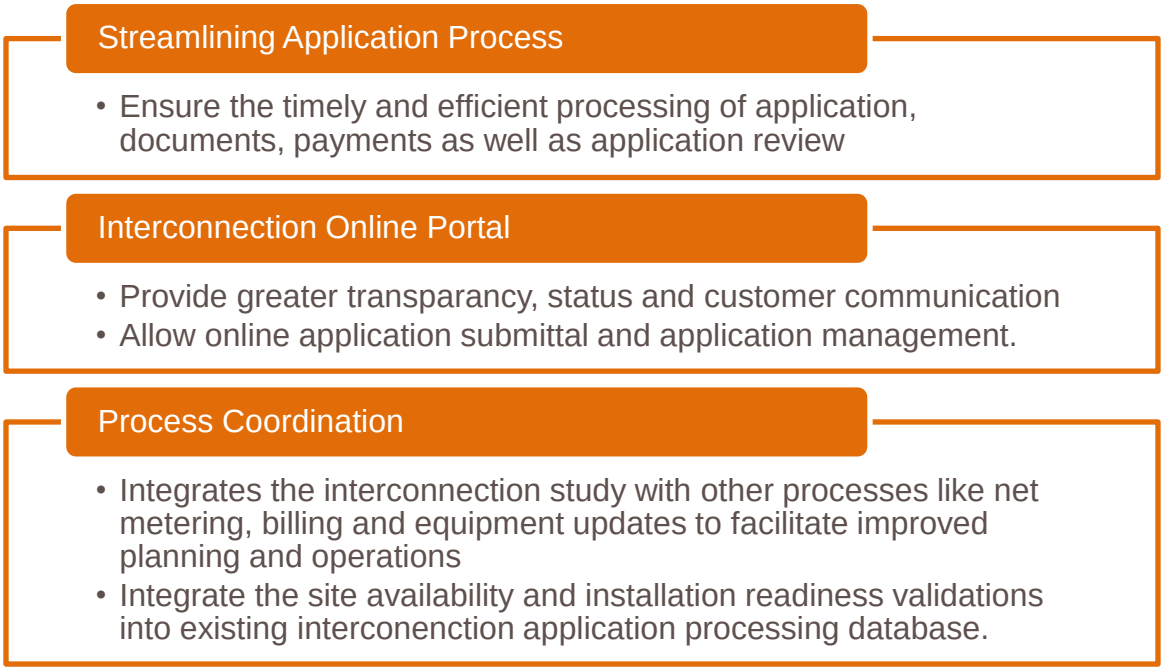
This requested IOAP initiative is an enhancement of the Phase I implementation of IOAP, which was completed in January 2017. This extension is expected to be completed by the end of 2019. This initiative will complete all remaining Phase I requirements as directed by the PSC[56] and set up a foundation for Phase II.

The proposed scope of work for 2018 is shown in Figure 4-1.

[55] "Proceeding on a Motion of the Commission in Regard to Reforming the Energy Vision," Case 14-M-0101 and *Order Adopting Regulatory Policy Framework and Implementation Plan*, February 26, 2015.

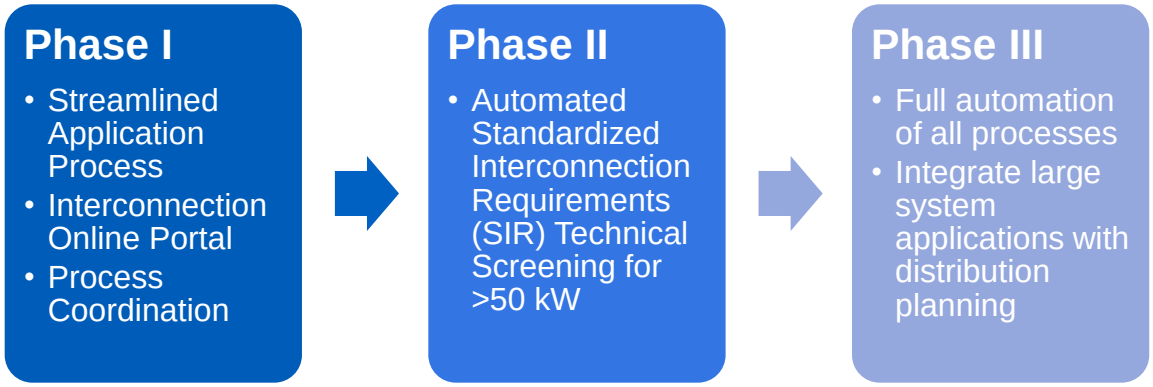
[56] Ibid.

Figure 4-1. Phase II Preparation Initiative Scope



Coordination of scope between Phase I and future Phase II and III initiatives follow below in Figure 4-2.

Figure 4-2. Coordination with Future Phases



This initiative will complete all Phase I requirements in a no regrets fashion and provide a foundation for upcoming Phase II improvements without committing to expensive technical review automation until a full analysis of impacted systems can be performed. This aligns with the IOAP strategy at the other New York utilities. As part of this process, PSEG Long Island will also consider appointing a Distributed Generation Ombudsman, as suggested by the DPS in its December 14, 2017 guidance,[57] would be beneficial to the program.

[57] "Recommendations Regarding PSEG Long Island Annual Update," Matter No. 14-01299: In the Matter of PSEG-LI Utility 2.0 Long Range Plan, December 14, 2017.

4.2.1.2 Cost

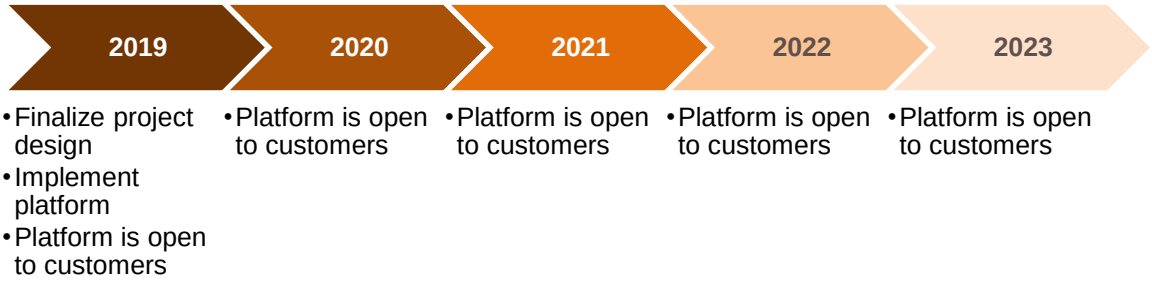
Multiple vendors were solicited to support this platform, comparing functionality and price to determine the optimal solution to pursue.

To launch this program, PSEG Long Island is requesting a 5-year budget (2019-2023) of $4,876,000 to cover the online portal and workflow, document, and reporting modules, as well as ongoing annual expenses for vendor software license and support costs.

4.2.1.3 Timeline

Figure 4-3 provides an estimated timeline for the rollout of IOAP initiative. PSEG Long Island anticipates a quick beginning to the initiative in early 2019, building on existing Phase I work. The initiative is expected to be fully implemented by the end of 2019, with ongoing support for the platform continuing for the duration of the IOAP. Operations and maintenance costs for additional Phase II and III functionality may be changed.

Figure 4-3. Program Timeline – Interconnection Online Application Portal



4.2.1.4 Comparison to U2.0 2017 Smart Grid Interconnection Portal Proposal

The Smart Grid Interconnection Portal was included in the U2.0 2017 filing but was not approved due to excessive cost and unclear divisions of scope between Phase I and later technical automation advancements in Phases II and III. The 2017 filing examined a comprehensive approach the technical challenges of the interconnection process, but was determined to be prohibitively complex and expensive to automate at this point. The fully automated technical screening requires improvements to and integration with several utility data systems and tools that are outside the scope of this initiative. An initial implementation of the Customer Portal was finished in January 2017.

This 2018 filing focuses on enhancements to this portal; streamlining the application process itself and providing closer communication with customers while allowing the planning engineers to focus their efforts on the technical analysis. This current effort focuses on starting implementation of Phase II, and presents a significantly lower cost relative to the previous filing as shown in Figure 4-4.

Figure 4-4. U2.0 2017 vs. 2018 IOAP Proposed Costs Comparison

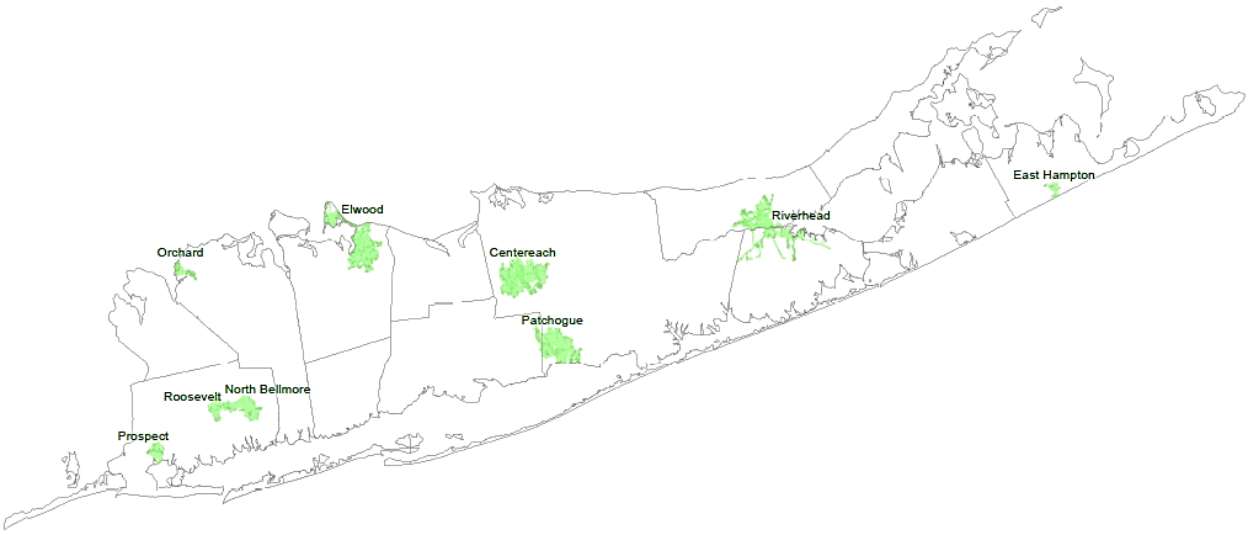


4.2.2 Locational Value Study

In the near term, PSEG Long Island is striving to meet regulatory requirements under the PSC's VDER order. This order requests a work plan and timeline for developing locationally granular prices to reflect the value DER additions will have on the utility's distribution system.

While PSEG Long Island currently complies with the Phase One Implementation Order[58] through its initial tariff filing, it needs to accomplish the vision presented in that Order, and further align itself with the approach taken by other New York State IOUs. PSEG Long Island's approach to the LSRV compensates DER by their gross kilowatt capability if they are within an eligible area requiring locational relief (known as a *load pocket*). Across the service territory, there are eight identified load pockets where DER would qualify for the LSRV payment.

Figure 4-5. Eight designated *load pockets* in PSEG Long Island service territory



[58] "Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program." Case 15-E-0751 and *Order on New Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters*, March 9, 2017.

The LSRV compensation rate has been set at 50% of the demand relief value. While the current approach incentivizes potential DER solutions, it does not align their actual output/capability with the exact demand need.[59]

The next step toward building internal capacity to effectively plan, analyze, and provide incentives through VDER is to encourage customer-initiated deployment of DER technologies. In addition, to address acute needs not being met by the rate of DER installations, PSEG Long Island needs to develop a locational focus on costs and benefits and tools and processes to evaluate potential NWS to offset and defer T&D system upgrades as necessary considering temporal and locational specific details.

This effort will begin in early 2019, with the intention of completing by December 2019, and is intended to address the following issues:

- The current LSRV methodology does not precisely align and incentivize the circuit-level or zone-level challenges with the performance characteristics of the technologies available for LSRV (such as solar PV, EVs, AMI, smart thermostats, energy storage, etc.).
    - Specifically, the load shape and infrastructure upgrade challenges associated with each load pocket.
- A granular approach and location study of load information vis-a-vis T&D system limitations would provide PSEG Long Island with more precise information needed to incentivize DER solutions and evaluation potential of NWS projects.
- Zone-specific LSRV pricing that aligns compensation with the actual system benefit of DER solutions will send a market signal to third-party service and technology providers to target specific zones of immediate and more acute needs. This will channel specific technologies, services, and solutions that address the immediate concerns of each zone.
    - Third parties will understand where each DER and NWS will provide the most value and will also benefit from rebalanced LSRV pricing.
    - It is expected under a future rate design and filing under VDER rates (Section 2.3.4.1, the effective LSRV for a specific DER solution—depending on specific performance characteristics and alignment with system relief needs—will vary based on system location as compared to the approach adopted today.

Locational Study Steps: PSEG Long Island proposes to meet these needs through a detailed locational analysis, which would be conducted during 2019 and then be operationalized into the distribution planning process going forward. This Analysis of would initially leverage a 3- to 5-year horizon, and would likely consist of the following steps:

- **Actively participate with Joint Utilities Group:** The investor-owned utilities in New York State have formed a group known as the “Joint Utilities (‘JU’)”. As part of their efforts to comply with all

[59] By comparison, Con Edison adopted a similar overall compensation metric; however, it identifies projected or actual (if available) contribution to the system relief during hours of need. For example, certain circuits peak during the same hours in which solar achieves its maximum output, while others peak later in the evening. The difference in load profiles is captured through the estimation of what contribution (as a function of its capacity value) the DER resource would be able to make. If a DER resource is perfectly dispatchable on-demand, it would receive 100% of the proposed compensation. If a DER resource is variable (such as with renewable energy), its contribution and corresponding compensation is adjusted. In the case of ConEd, 47% of a solar PV system’s nameplate rating is effectively compensated for those circuits that peak between the hours of 11 a.m. to 3 p.m.

of the various REV initiatives, they have formed a technical committee and a policy committee. These committees have retained expert consultants to support their work. The JU have made substantial progress with the development of a BCA Guidebook and methodologies for establishing locational prices on the distribution grid. PSEG Long Island will request funding to join the JU so that we have access to all of the latest thinking and resources, and to help standardize our approach to developing locational prices.

- **Analyze Current Capital Plan Drivers:** This activity will leverage the most recent distribution capital plan, and will perform an analysis to understand and categorize the investment drivers behind the plan. Investment drivers may be organized by key criteria, e.g., reliability, load growth, aging infrastructure, equipment problems. The analysis will consider the granular, circuit level, load forecasts as well as the planning criteria that have led to the investment plan. This will result in a system-wide ranked list of investment needs by type and year for all substations and circuits. The goal is for this list to be solution agnostic, that is, it will identify projected system needs without assuming how they must be met. This activity will require significant interaction with the Planning department to help perform the initial assessment and analysis. The effort will take advantage of any available system details as well as on the ground knowledge and expertise from department personnel.
- **Forecast DER with Granular, Bottom-Up Methodology:** In parallel, the study will develop several DER (e.g., PV, EV, demand response, energy efficiency, CHP, fuel cell) penetration forecast scenarios, using a granular, bottom-up approach. These scenarios will allow probabilistic analysis of distribution system impacts by location (substation and circuit). Likely system impacts will be examined on capacity needs, e.g., in the case of thermal violations or modified load growth. But these scenarios can also allow examination of other needs such as for voltage or frequency support. As part of this analysis, it may be useful to develop several levels of geographic granularity to be used in locational planning (e.g., single circuit, distribution substation, transmission substation, whole system). A key question that other utilities have wrestled with in developing such forecasts is how much of the DER penetration is organic, baseline growth vs. how much is incentivized by the utility or by other state policies (e.g., NYSERDA programs, etc.) The analysis will develop review a methodology for assigning and allocating this forecast at the circuit level.
- **Develop Locational Values Map:** The two analyses above will be used to develop locational values, leveraging the scenario and uncertainty analysis along with values established by the BCA Handbook methodology and the VDER proceeding. Through this process, the analysis will develop rebalanced LSRV pricing. The outcome may leverage discrete buckets of need (e.g., levels 1 through 5 with specific $/kW-yr. assigned to each). These values can then be used in assessing Non-Wires Solutions to meet local system needs. Of course, other criteria, such as reliability, risk, etc., will also be required to make the best investment decisions. The locational values Map can be presented on the appropriate web pages for use by developers and other 3rd parties to help make decisions about providing resources at various locations.
- **Make the Analysis Methodology Repeatable**: This effort will turn the above steps into a repeatable process that can be used at PSEG Long Island on an annual basis.

After the methodology is established, the framework is further developed and the locational cost of service studies are completed, the UoF department will maintain and support this locational value process.

4.2.3 Non-Wires Solutions Planning Process

PSEG Long Island will need to effectively and efficiently evaluate the cost effectiveness of NWS. These solutions could be offered in response to market solicitations or could be under consideration as part of a portfolio of DER to address system needs given temporal and locational considerations. The NWS Planning tool will evaluate NWS and DER portfolio cost-effectiveness to facilitate the selection of appropriate solutions for targeted system needs. PSEG Long Island would begin the effort to define and develop this tool in early 2019 and intends to complete development during 2019 with overall objectives to achieve the following:

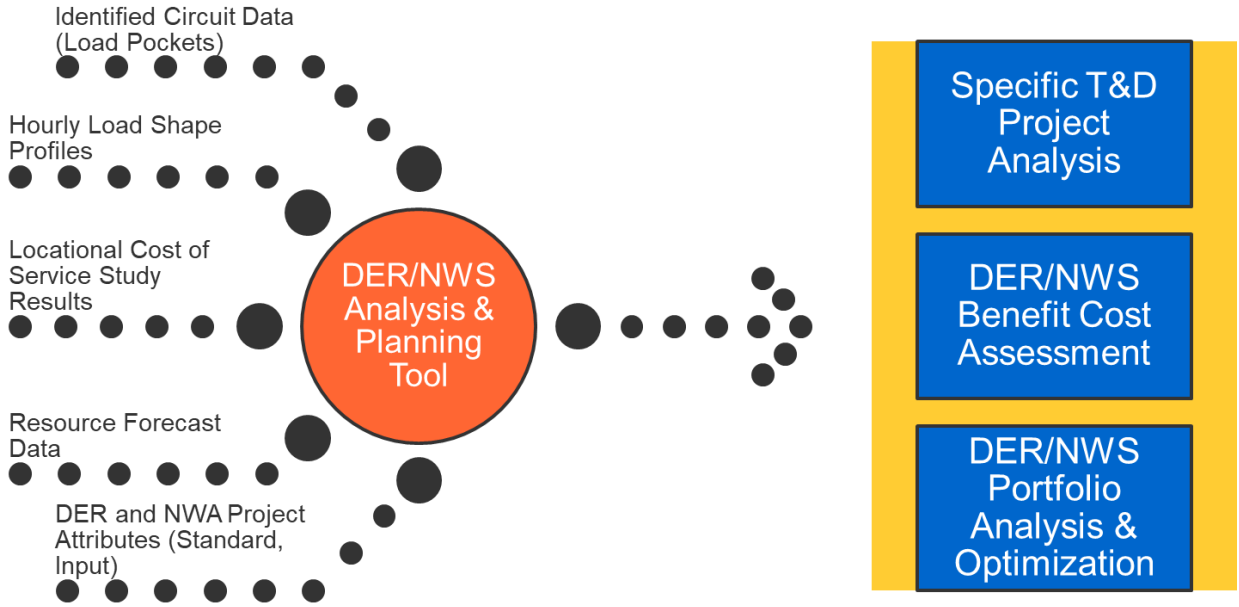
- Improve the transparency of grid planning and investment decision-making.
- Enable the consideration and evaluation of a range of grid investment alternatives and solutions, seeking those that present the highest benefit to cost ratio and least risk.
- Motivate and enable customer participation in grid planning to seek BTM solutions that offset grid investments.
- Properly align the compensation of DER eligible for LSRV to avoid the potential for cross-subsidization and to channel economic benefits to ratepayers.

To that end, a comprehensive tool that captures, organizes, integrates, and analyzes the data prepared by the UoF group will be needed to derive the desired outputs. Leveraging locational value study data on circuit level, the tool will process the inputs to better inform decision-making for targeted system needs determined by PSEG Long Island.

The tool will also more comprehensively analyze and compute system benefits derived from the performance parameters of a given DER system, as compared to its costs. The tool will help analyze the performance and capability of certain NWS projects to address circuit-level loading, on an hourly basis, to assess whether such NWS projects would address specific locational needs and help offset required distribution or transmission investments.

To appropriately make the determination, inputs from across the PSEG Long Island organization, as organized and maintained by the UoF department, will need to be captured. Figure 4-6 outlines specified inputs and outputs of the planning tool.

Figure 4-6. Inputs and Outputs of the NWS Planning Tool



Off-the-shelf solutions similar to this tool may exist but they are likely to require extensive customization to adapt to both the New York regulatory environment under VDER and to properly align the inputs with the outputs.

Key capabilities of the NWS Planning tool could include:

- Uses cost test protocols outlined in the NY BCA Order.
- Allows analyst to define custom cost test definitions for PSEG Long Island specific analysis.
- Establishes measure penetration levels based upon customer demographic profiles.
- Estimates savings contributions based upon system need durations, frequency of need, and other econometric input factors.
- Can handle avoided costs, retail rates, and load shape profiles at various levels of granularity (hourly, monthly, seasonal, annual, on/off-peak).
- Handles a range of measures, programs, sectors, program periods and savings types (electric energy/demand, emissions, etc.).
- Evaluates cost effectiveness at annual, bi-annual, quarterly or monthly intervals
- Presents results based on planned input assumptions (incentives, administrative costs, participation, etc.) can be compared against those derived from actual values after NWS program implementation is finalized.
- Generates daily load shape profiles by day type (peak day, weekday, weekend/holiday) for baseline consumption, NWS consumption, and the resulting savings, if hourly load shapes are available.
- Provides cost effectiveness metrics at the measure, program, sector, portfolio, end use or building type level, including combinations of these levels of granularity.

- Contains sensitivity and scenario analysis capability to identify key assumptions and largest leverage points.
- Provides histograms of top-saving measures, scatter plots to view savings versus costs, and supply curves.
- Contains the ability to import input data from an Excel spreadsheet for portability, version control, and scenario analysis.
- Enables all summary results and intermediate calculations to be immediately available in tabular or graphical form and to be quickly exported to Excel.

It is estimated that a $500K budget will be needed for development of the toolset.

4.3 Distributed System Platform Funding Requirements

Table 4-1 summarizes the funding requests for the DSP-related functions described above.

Table 4-1. DSP Funding Requirements

Cost Type	Investment Category	4-Year Total	2019	2020	2021	2022
Capital Costs	IOAP Interconnection	**$2.3**	$2.3	-	-	-
	Locational Value Study	**$1.0**	$1.0	-	-	-
	NWA Planning & Analysis Tool	**-**	-	-	-	-
	Total Capital Costs	**$3.3**	**$3.3**	**-**	**-**	**-**
O&M Costs	IOAP Interconnection	**$2.3**	$1.2	$0.3	$0.3	$0.3
	Locational Value Study	**$2.1**	$0.5	$0.5	$0.5	$0.5
	NWA Planning & Analysis Tool	**$0.5**	-	-	$0.5	-
	Total O&M Costs	**$4.8**	**$1.7**	**$0.9**	**$1.4**	**$0.9**

5. Budgets and Funding Objectives

This section summarizes the capital, O&M, and F&PP funding requirements for the AMI business case, the DER projects' business cases, and the DSP investments. The rate impact analysis is also summarized.

5.1 Budget Request Summaries

Table 5-1 summarizes the capital funding requirements as a summation over 4 years (2019-2022).

Table 5-1. Capital Funding Requirements for 2019-2022 ($M)

	PSEG Long Island Utility 2.0 Initiatives, Projects and Programs	Added CAPEX ($M)	Reduced CAPEX ($M)	Net CAPEX ($M)
Empowering Customers	AMI Technology and Systems (Core)	$196.3	-	$196.3
	Program Implementation Support (Core)	$8.0	-	$8.0
	Customer Experience (Enabled)	$7.8	-	$7.8
	Rate Modernization (Enabled)	$9.5	($0.9)	$8.6
	Analytics and UoF (Enabled)	$6.7	-	$6.7
	Outage Management (Enabled)	$1.0	-	$1.0
	Revenue Protection (Enabled)	$1.1	-	$1.1
	Subtotal	**$230.3**	**($0.9)**	**$229.4**
Exploring Offerings	Super Savers	-	($2.8)	($2.8)
	Grid Storage	$4.9	($0.7)	$4.2
	BTM Storage with Solar	-	($0.8)	($0.8)
	EV Program	$1.0	-	$1.0
	Subtotal	**$5.9**	**($4.4)**	**$1.5**
Evolving to the DSP	IOAP Interconnection	$2.3	-	$2.3
	Locational Value Study	$1.0	-	$1.0
	NWS Planning & Analysis Tool	-	-	-
	Subtotal	**$3.3**	**-**	**$3.3**
	All Utility 2.0 Roadmap	**$239.4**	**($5.3)**	**$234.2**

Table 5-2 summarizes the O&M funding requirements as a summation over four years (2019-2022).

Table 5-2. O&M Funding Requirements for 2019-2022 ($M)

	PSEG Long Island Utility 2.0 Initiatives, Projects and Programs	Added OPEX ($M)	Reduced OPEX ($M)	Net OPEX ($M)
Empowering Customers	AMI Technology and Systems (Core)	$7.5	($38.3)	($30.8)
	Program Implementation Support (Core)	$1.0	-	$1.0
	Customer Experience (Enabled)	$16.4	-	$16.4
	Rate Modernization (Enabled)	$18.0	-	$18.0
	Analytics and UoF (Enabled)	$6.3	-	$6.3
	Outage Management (Enabled)	$0.5	($10.4)	($9.8)
	Revenue Protection (Enabled)	-	-	-
	Subtotal	**$49.7**	**($48.7)**	**$1.0**
Exploring Offerings	Super Savers	$3.0	-	$3.0
	Grid Storage	$1.1	-	$1.1
	BTM Storage with Solar	$0.6	-	$0.6
	EV Program	$20.5	-	$20.5
	Subtotal	**$25.1**	**-**	**$25.1**
Evolving to the DSP	IOAP Interconnection	$2.3	-	$2.3
	Locational Value Study	$2.1	-	$2.1
	NWS Planning & Analysis Tool	$0.5	-	$0.5
	Subtotal	**$4.8**	**-**	**$4.8**
	All Utility 2.0 Roadmap	**$79.7**	**($48.7)**	**$31.0**

Table 5-3 summarizes the fuel and purchase power funding requirements as a summation over four years (2019-2022).

Table 5-3. Fuel and Purchase Power Funding Requirements for 2019-2022 ($M)

	PSEG Long Island Utility 2.0 Initiatives, Projects and Programs	Added F&PP ($M)	Reduced F&PP ($M)	Net F&PP ($M)
Empowering Customers	AMI Technology and Systems (Core)	-	-	-
	Program Implementation Support (Core)	-	-	-
	Customer Experience (Enabled)	-	-	-
	Rate Modernization (Enabled)	-	-	-
	Analytics and UoF (Enabled)	-	-	-
	Outage Management (Enabled)	-	-	-
	Revenue Protection (Enabled)	-	-	-
	Subtotal	**-**	**-**	**-**
Exploring Offerings	Super Savers	$0.1	-	$0.1
	Grid Storage	-	-	-
	BTM Storage with Solar	$0.5	-	$0.5
	EV Program	-	-	-
	Subtotal	**$0.5**	**-**	**$0.5**
Evolving to the DSP	IOAP Interconnection	-	-	-
	Locational Value Study	-	-	-
	NWS Planning & Analysis Tool	-	-	-
	Subtotal	**-**	**-**	**-**
	All Utility 2.0 Roadmap	**$0.5**	**-**	**$0.5**

Note: the values in the table may not add up due to rounding.

5.2 Rate Impact Analysis

The proposed Utility 2.0 program will provide Long Island with foundational AMI functionality and enabling capabilities and innovative offerings all while lowering ratepayer bills over the next 20 years. The downward pressure on rates is primarily due to operational efficiencies from the automation of meter reading, enhanced revenue protection and prospective revenues from electric vehicles.

The collective programs, initiatives, and projects included in this filing will result in lower average customer bills starting in 2021 and onward. Figure 5-1 shows the monthly impacts on an average residential bill of $150 per month due to the net capital, O&M, fuel & purchase power, and revenue cash flows associated with the U2.0 investments. An average residential customer bill will increase by $0.63 per month in 2019 to pay for the initial expenditures required to ramp up the deployment of AMI and other innovative offerings. By 2020, PSEG Long Island begins to see reductions in operating expenses and

increased revenue due to AMI-enabled revenue protection and electric vehicles[60]. From 2021 through 2038, steadily increasing cost savings and additional revenue lead to significantly reduced monthly customer bills going forward.

Figure 5-1. Residential Customer Bill Impacts due to Utility 2.0 Investments

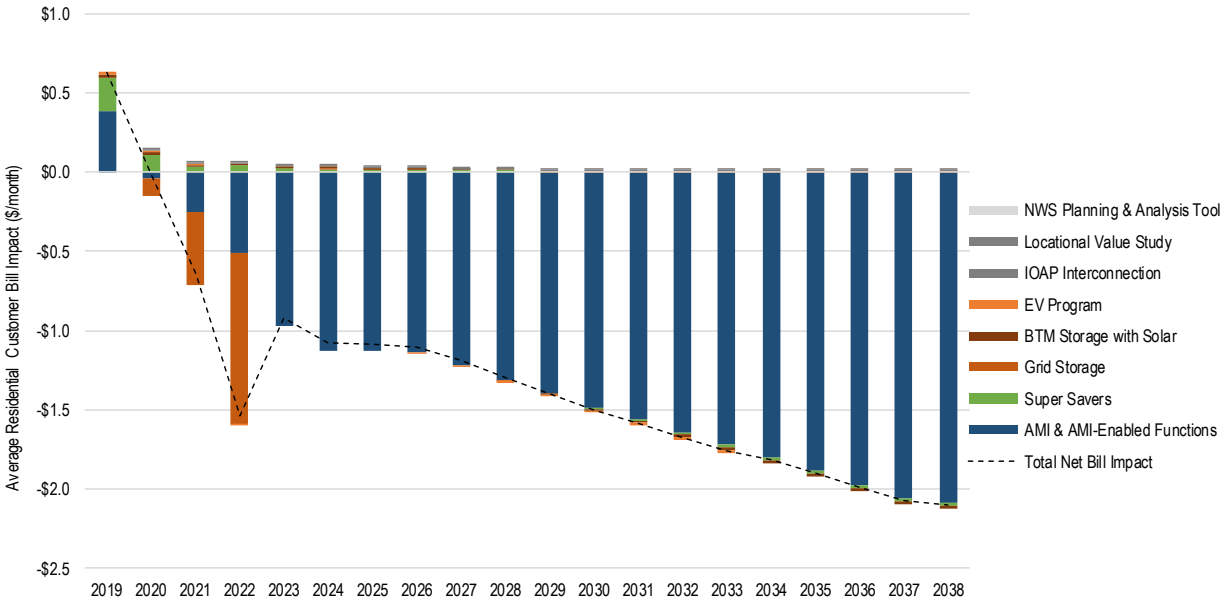


Table 5-4 and Table 5-5 present the estimated rate impact on residential and commercial customers, respectively, due to the net capital, O&M, and F&PP funding requirements and revenue impacts for each program, initiative and project included in this filing.

Table 5-4. Rate Impact as a Percentage of the Typical Residential Customer Bill

PSEG Long Island Utility 2.0 Program, Initiative or Project	2019	2020	2021	2022	2027	2032	2038
AMI & AMI-Enabled Functions	0.24%	-0.02%	-0.15%	-0.29%	-0.64%	-0.78%	-0.87%
Super Savers	0.13%	0.07%	0.02%	0.02%	0.01%	-0.01%	-0.01%
Grid Storage	0.00%	-0.07%	-0.28%	-0.63%	0.00%	0.00%	0.00%
BTM Storage with Solar	0.01%	0.01%	0.01%	0.01%	0.00%	-0.01%	-0.01%
EV Program	0.01%	0.01%	0.00%	0.00%	0.00%	-0.01%	0.00%
IOAP Interconnection	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Locational Value Study	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NWS Planning & Analysis Tool	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total	**0.39%**	**0.00%**	**-0.38%**	**-0.89%**	**-0.62%**	**-0.79%**	**-0.88%**

[60] During 2019-2022, the electric vehicle program will be in its planning phase, after which PSEG Long Island will consider developing future incentives such as new tariff rates for promoting off-peak charging. For this reason, the revenue impacts due to electric vehicles were not modeled beyond 2022.

Table 5-5. Rate Impact as a Percentage of the Typical Commercial Customer Bill

PSEG Long Island Utility 2.0 Program, Initiative or Project	2019	2020	2021	2022	2027	2032	2038
AMI & AMI-Enabled Functions	0.24%	-0.02%	-0.15%	-0.29%	-0.64%	-0.78%	-0.87%
Super Savers	0.03%	0.03%	0.02%	0.02%	0.01%	-0.01%	-0.01%
Grid Storage	0.06%	0.03%	-0.16%	-0.53%	0.00%	0.00%	0.00%
BTM Storage with Solar	0.00%	0.00%	0.00%	0.00%	0.00%	-0.01%	-0.01%
EV Program	0.01%	0.01%	0.01%	0.00%	0.00%	-0.01%	0.00%
IOAP Interconnection	0.08%	0.02%	0.03%	0.02%	0.00%	0.00%	0.00%
Locational Value Study	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
NWS Planning & Analysis Tool	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%
Total	**0.46%**	**0.11%**	**-0.19%**	**-0.74%**	**-0.60%**	**-0.76%**	**-0.85%**

APPENDIX A. PSEG Long Island AMI Customer Engagement Plan

A.1 Introduction

PSEG Long Island's customers want to be a part of the energy industry transformation and desire improved reliability, resiliency, and cost-effectiveness of the energy system and customer programs. In response to these needs and interests, PSEG Long Island seeks to modernize the customer experience by offering tools and rate options that encourage customers to proactively manage their energy use, lower their costs, or increase their use of distributed energy resources (DER).

To deliver these tools and options, PSEG Long Island proposes to deploy system-wide AMI that will leverage and expand upon its existing AMI investments and deployments. System-wide AMI will greatly expand the data available for analytics for these customer-facing offerings as well as enable enhanced grid operations including specific projects for outage management and revenue protection.

Ultimately, with system-wide AMI PSEG Long Island will be able to:

- **Engage and promote energy insights** to help our customers make smarter energy decisions.
- **Offer new rates enabling additional savings** for our customers.
- **Provide faster more convenient service** via remote AMI capabilities.
- **Respond faster for outage detection and restoration time** and timely customer communications via preferred channels.
- **Remote connect/disconnect customers** for move-in/out.
- **Perform near real-time reconnection** following payment after a disconnect for non-payment.
- **Differentiate and tailor customer service** to meet specific customer segment needs (leveraging analytics and customer engagement platforms).
- **Improve overall customer experience** with enhanced digital capabilities and streamlined processes.
- **Support third-party collaboration and partnerships** to enhance AMI-enabled customer benefits while supporting Reforming the Energy Vision (REV) goals.

Our Customer Engagement plan is driven by data gathered from:

1. Industry research, benchmarking, and lessons learned from peer utilities and working groups.
2. PSEG Long Island's own AMI deployment experience to date.
3. Customer research informing program design, communication preferences, understanding of current awareness and desires for future services, and customer engagement strategies and tactics.

As PSEG Long Island continues to make progress on AMI deployment and the relevant systems integration, the company will continue to assess additional opportunities and/or adjustments to current plans to engage customers, communities, and other stakeholders to help drive AMI-enabled benefits.

A.1.1 Customer Engagement Plan Overview

PSEG Long Island has reviewed all AMI-relevant orders as well as a few prior AMI filings both within state and outside of state to inform the AMI Customer Engagement plan. The topics addressed in the plan include the following:

- **Customer Lessons Learned from AMI Pilots (Section A.2)**. An overview of the pilots including the key feedback points from the pilot participants.
- **AMI Benchmarking and Research (Section A.3)**. A best practice scan on AMI deployment looking at other utilities' experiences.
- **AMI Customer Education Plan (Section A.4)**. A three-phased Customer Education Plan aimed at helping: facilitate AMI installation efforts; raise awareness of AMI-enabled benefits; promote the AMI-enabled benefits while increasing the overall engagement across all customer segments through targeted campaigns and channels of segment preference.
- **Customer Engagement Platform and Tools (Section A.5).** PSEG Long Island has already begun transition to an improved AMI-enabled customer engagement platform that includes more intuitive customer-facing functionality, and is assessing how to best differentiate experiences for business customers.
- **Green Button and Data Sharing (Section A.6).** Overview of the existing capabilities to share data with third parties including the Green Button Download My Data ® and the forward-looking plan to enhance the third-party data sharing and the detailed plan for Green Button Connect My Data ® implementation.
- **Rate Modernization Customer Engagement Plan (Section A.7).** PSEG Long Island's plans to roll out new rates and provide customers with a wide variety of options and tools to better manage electric usage and make cost-effective choices with increased convenience. This Section provides a detailed description of rate design approach, customer and industry research completed to inform PSEG Long Island's AMI-enabled rate design and benefits, how customers and stakeholder engagement will be executed, and how PSEG Long Island plans to conduct internal training and change management related to rate modernization effort.

Additional components that further support promotion, adoption, and realization of AMI-enabled customer benefits are included in the Utility 2.0 Long Range Plan filing document (i.e. projects related Outage Management, Data Analytics, and Utility 2.0 Projects and REV).

A.2 Customer Lesson Learned from AMI Pilots

Preceding this plan, PSEG Long Island customer outreach activities have been focused around the PSEG Long Island and Long Island Power Authority (LIPA) AMI-related pilots to date.

Specifically, over the course of AMI-related pilots deployed from 2010 to 2018, PSEG Long Island delivered in person presentations to several customer groups to educate and raise the level of awareness of AMI/smart grid and smart meters. Topics addressed at customer outreach presentations include:

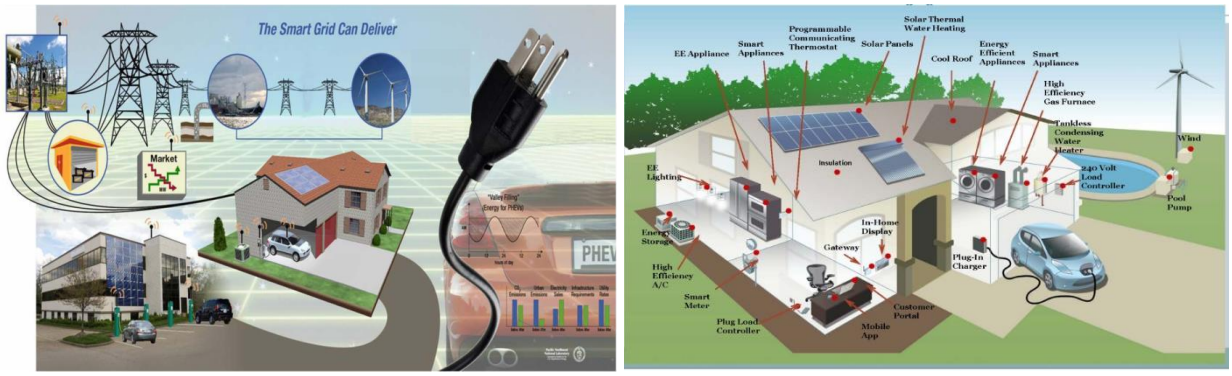
- Smart Grid and Smart Meter: What is it? How does it function?
- Benefits to customers and to PSEG Long Island.
- Concerns, including health, privacy, and security.
- PSEG Long Island's plans including pilots and full deployment.

- Rate options, including time of use (TOU) rates and how to shift energy usage.
- Web tool demonstration, including how to understand data.

The audience and the timing of these presentations were as follows:

1. Hauppauge Pilot Participants – April 2010
2. Bethpage Pilot Participants – April 2010
3. Route 110 Pilot Participants (Farmingdale College) – April 2014
4. Bellport Beach Property Association – November 2015
5. King Kullen Supermarket Executive Team – November 2015 (large key account)
6. Bellport Beach Property Association – October 2016 (large key account)
7. Town of Southampton employees – March 2018 (large key account)

Figure A-1. Sample Images Presented at Customer Outreach Presentations



Customer feedback from these educational sessions included the following:

- Appreciated information on how the smart meters work.
- Had a good understanding of PSEG Long Island's plans.
- Understood how to manage their electric usage through the tutorials on the web tool.
- Were better able to decide which rate best fits their lifestyle.
- Had a better understanding of the web tool and its functionality.
- Were better able to analyze meter data as it pertains to how and when energy is being used.
- Had a better understanding how energy efficiency measures affect usage and lower cost.
- Provided suggestions regarding increased functionality to current web tool.

PSEG Long Island has incorporated customer feedback from these sessions toward improving educational materials, forward-looking communication plans, and the web tool's functionality discussed below. PSEG Long Island's Marketing and Communications team provides ongoing support for inbound inquiries from customers and third parties (part of the utility's ongoing efforts to maintain communications and support in progress pilots).

A.3 Benchmarking and Research

In collaboration with other parties, PSEG Long Island preformed benchmarking and research activities in to two key areas of the forward-going implementation plan. The first is a best practice scan on AMI deployment looking at other utility experiences. The second is a rate modernization best-in-class review to expand knowledge of pricing plan options and avoid common impediments.

A.3.1 Collaboration

To ensure the successful implementation of AMI, the PSEG Long Island team actively collaborated with over 40 organizations consisting of regulatory partners and government agencies, leading electric utilities, vendors, trade allies, DER providers, customer advocacy groups, environmental advocacy groups, professional organizations, consultants, and other stakeholders (see Figure A-2). The collaboration effort spanned all areas of AMI planning and deployment, and those focused directly on rate modernization generated comprehensive lists of best practices and lessons learned through the experiences of various stakeholders.

Figure A-2. PSEG Long Island AMI Implementation Collaborators

Regulatory Partners	Electric Utility Partners	Industry Services	Market Actors / Trade Allies
• Department of Public Service (DPS) • LIPA	• Arizona Public Service (APS) • Baltimore Gas & Electric (BGE) • Consolidated Edison • Duke Energy • Florida Power & Light (FPL) • Pacific Gas & Electric • PSE&G • Sacramento Municipal Utility District (SMUD) • Salt River Project (SRP)	• E-Source • Illume Advising • JD Power • Gabel Associates • Lockheed Martin • Navigant	• GridXecial • Amazon • Diamond Concepts • Edgewise Energy • FleetCarma • Landis+Gyr • New York Battery and Energy Storage (NY-BEST) • PayGo • Siemens • Simple Energy • Tata Consultancy Services (TCS) • ThinkEco

A.3.2 AMI Implementation Customer Engagement Best Practices

PSEG Long Island has conducted a comprehensive industry scan of best practices based on other prominent and successful AMI deployments in North America, including those that are in progress and in close proximity (i.e., Con Edison). The focus of this scan was to understand what customer engagement approach gaps PSEG Long Island may have compared to other leading utilities related to:

- Customer engagement plans
- Website optimization (to support AMI deployment)

- Communication strategy
- Education plan
- Media plan
- Other stakeholders' engagement plans (elected officials, opinion leaders, advocacy groups, etc.)

The tables below highlight potential PSEG Long Island gaps for several of these topics. All identified gaps will be addressed to ensure that the PSEG Long Island customer engagement efforts are robust, comprehensive, and effective in driving awareness and engagement.

Table A-1. Customer Engagement and Website Optimization

	Leading Utilities	PSEG Long Island	Timeline to Close Gap
Smart meters benefits	Yes	Yes	
Customers concerns	Yes	Yes	
Opt-out policy	Yes	Yes	
Educational materials	Yes	–	Q3 2018
Customer Portal	Yes	–	Q4 2018
Mobile app	Yes	–	2019

Table A-2. Communication Strategy

	Leading Utilities	PSEG Long Island	Timeline to Close Gap
Multi-phased campaign	Yes	Yes	
Direct mail	Yes	Yes	
Local AMI outreach	Yes	–	Q4 2018
Variety of communication tools	Yes	–	Q3 2018
Employee Workshops	Yes	–	Q3/Q4 2018
Focus groups	Yes	–	Q3 2018, Q3 2019, Q3 2020, Q3 2021

Table A-3. Education Plan

	Leading Utilities	PSEG Long Island	Timeline to Close Gap
Multi-leveled training	Yes	Yes	
Variety of training sessions	Yes	Yes	
Employee on-site and offsite workshops	Yes	–	Q3/Q4 2018
Webinars	Yes	–	Q2 2019 and ongoing (quarterly)

	Leading Utilities	PSEG Long Island	Timeline to Close Gap
Videos, infographics, testimonials, brochures, and mailers	Yes	–	Q4 2018
Community outreach	Yes	–	Q4 2018

Table A-4. Media Plan

	Leading Utilities	PSEG Long Island	Timeline to Close Gap
Provide balanced AMI coverage	Yes	–	Q3 2018 and ongoing as needed
AMI research (regulatory news, educational publications, innovation and technology)	Yes	–	Q3 2018 and ongoing as needed

In addition to the scan, PSEG Long Island visited utilities to conduct in person lessons learned and knowledge-sharing workshops. One utility was a large southeast electric Investor Owned Utility (IOU) and the other, a large mid-west electric IOU. PSEG Long Island also interacted with other utilities' representatives at key industry conferences, such as DistribuTECH and Customer Service Week, collecting additional AMI deployment key takeaways. Lastly, PSEG Long Island is a member of the Landis+Gyr Exchange forum where the user group members receive in-depth training and regularly share case studies.

Table A-5 is a collection of key takeaways and lessons learned that PSEG Long Island has gathered from numerous benchmarking activities. PSEG Long Island is leveraging these lessons to inform its AMI program approach, feeding into the implementation plan presented in the Utility 2.0 Long Range Plan presented herein so that it is poised for success from start to finish along the roadmap.

Table A-5. Key Takeaways from Industry Benchmark on AMI Implementation Best Practices

AMI Program Aspect	Key Takeaways and Lessons Learned from other utilities	Will PSEG Long Island Implement?
Meter Data Management (MDM) and AMI	Robust AMI deployment plan, with meter installs and management, and mitigation plan to manage risks and address issues if/when they arise	Yes
Business Process Design	Define business processes identifying process and organizational impacts across the key tiers: Customer Operations, Information Technology (IT), and Engineering	Yes
Configuration Management	Ensure new capabilities are configured and designed to enable a seamless customer experience	Yes

AMI Program Aspect	Key Takeaways and Lessons Learned from other utilities	Will PSEG Long Island Implement?
Customer Operations Organization Restructure	Modified structure of the Call Center, billing, etc. Tracking all incoming AMI calls (prepared reports on the incoming calls, marked the reason of each AMI call). AMI Operational Group deployed with the following components: Customer advocacy for smart meters Legal department Marketing Communication/media group Call center Billing Voice of the Customer	Yes
Internal Change Management and Training	Ensure customer service representatives understand, have up-to date talking points, and are equipped with information. Community interaction at a minimum; articles in papers are recommended.	Yes
Customer Communications	Had a thorough internal communications plan, early adopter programs, ambassadors in the communities, hosted town halls, and provided in-depth customer service representative (CSR) training with an emphasis on customer benefits.	Yes
	Basic communication with the customers at the beginning of the deployment; as the number of complete installations grew the communications expanded:	Yes
	90 days before installation: Letter with general information (informing customers that the utility will be changing their meters, so they will be active and present in their neighborhood; broad timeframe applicable only to the specific ZIP/area).	Yes (PSEG Long Island is sending letter ~60 to 45 days prior to installation)
	Two weeks before installation: postcard reminding the customer about the upcoming installations, benefits the new smart meters offer.	Yes
	Post-installation letter informed customers about energy usage reports.	Yes

AMI Program Aspect	Key Takeaways and Lessons Learned from other utilities	Will PSEG Long Island Implement?
Opt-Out Communications and Process	At most utilities, customers had the option to opt-out; at the beginning stage of the deployment, the customers who decided to opt-out were put on the side; utility did not try to convince them to change their mind and continued with the deployment. The plan was to get back to those customers once the deployment was complete. This specific approach helped this utility to avoid unnecessary negative attention on the AMI rollout.	Yes
	You have a choice approach: 15,000 were initially postponed.	Yes
	Opt-out rates (at FPL): introduced by benchmarked utilities include a one-time $89.00 fee plus $13.00/month after. After the opt-out fee structure was instituted, 6,000 opt-outs remain today (as of May 7, 2018) out of 4.3 million AMI meters deployed (0.14%)	Yes Please refer to opt-out section of document for details on PSEG LI policy
Stakeholder Engagement	Command center for key stakeholders, activities documented, challenges managed.	Yes
	Established a configuration management board that was cross-functional, with governance and procedures upfront.	Yes

PSEG Long Island has taken into consideration above key takeaways and is addressing each one in the context of New York state applicable laws and regulations recognizing the need to adjust to the local conditions and specific customer segment needs.

A.4 Customer Education Plan

The communications strategy being employed by PSEG Long Island under Utility 2.0 is one of customer awareness, information, and engagement, which is reflected in the various approaches taken. Communication and outreach will be structured around the target audiences being addressed, which will also dictate the communication messages developed and communication channels leveraged. Communications around the rollout of customer smart meters will target the approximate 230,000 residential and 20,000 business customers engaged each year for the 4-year program (2019 thru 2022).

To that end, the plan provides for customized approaches to the various market segments including low-income customers, Spanish speakers, senior citizens, special needs, and digital vs. paper-based correspondence preference segment. The Customer Education Plan engages customers throughout the AMI implementation planning (in progress research and focus groups), installation, and post-installation processes by continuously checking and adjusting communication messages and channels based on customer preferences.

Appendix A. PSEG Long Island AMI Customer Engagement Plan

Through the implemented AMI, PSEG Long Island will provide customers with enhanced personalized benefits centered on control, choice and convenience. Customers will have the opportunity of participating in innovative rate programs and sharing data with third parties. The Customer Engagement Plan provides the foundation to prepare customers for installation and to take advantage of immediate AMI-enabled benefits and future benefits as new market opportunities are animated.

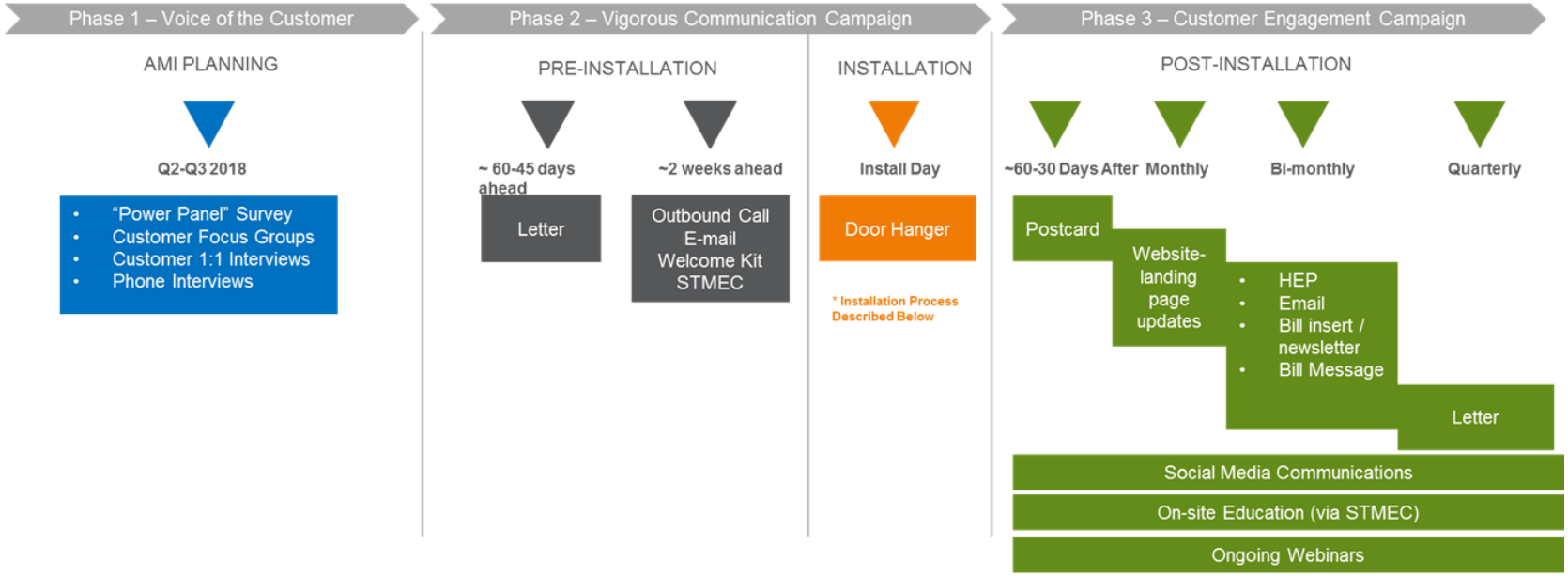
PSEG Long Island has developed a three-phase Customer Engagement Plan to support the AMI deployment including the rollout of subsequent customer-facing technology and tools.

Phase 1 – Voice of the Customer (Preparation and Development) – this phase has the objective of identifying customer communications preferences as related to the AMI deployment and subsequent engagement messaging, and the use of alerts and notifications that will be enabled by AMI. This phase is in progress and PSEG Long Island has received the first report from its third-party customer research and focus groups facilitator (recommendations from this report are included in

- Appendix 1).
- **Phase 2 - Vigorous Communication Campaign (Aware and Informed) –** the next phase of the Customer Education Campaign addresses the what and how PSEG Long Island plans to communicate to customers pre-installment and during the installment of AMI meters. Phase 2 will be executed in sync with the AMI [geographical] deployment plan.
- **Phase 3 – Customer Engagement Campaign (Engaged) -** The Customer Engagement Campaign phase starts once customers receive their smart meter and its main objective is to provide customers with information on the benefits and opportunities AMI has to offer. The campaign will be ongoing and will vary in messaging content and frequency by channel.

Figure A-3 shows the three-phased plan and the types of activities and communications sequence.

Figure A-3. Customer Education and Engagement Plan Timeline



PSEG Long Island has over 99% contact phone number coverage for the residential customer base. The pre-installation automated outbound call will be supplemented with the Welcome Kit. Email will also be sent to customers that have provided us with their email address.
The company has email contact information for approximately 40% of the residential customer base. Providing customers with letters, phone calls, and emails will produce high contact rates and ensure awareness and education is high.

Meter Installers will follow the process below:

1. Installers will knock on the door prior to meter change out.
2. If the customer is home, the installer will show his/her identification and advise they are changing out the meter to an AMI meter.
3. If the customer is not home, the installer will leave a door hanger and complete the meter change.
4. If the customer does not want an AMI meter installed, the installer will tag the account with an opt-out seal and sticker, and then move on to the next account.
5. If the customer has any questions the installers has the handout to address them (see Figure A-4).

6. If the premise is damaged during the installation process, there are funds in the AMI business case to cover damages to the customer's meter pan or other damage to the customer's premise. Part of the AMI meter installation process is for the installer to take a picture of completed installation to confirm that no damage occurred.

Figure A-4. Sample Smart Meter Post-Installation Handout



Note that the Welcome letter, the outbound dialer call, Welcome Kit and FAQ will provide information on what customers can look for to identify the Company personnel.

Table A-6 provides an "at-a-glance" view of customer communication and outreach efforts including timing of communications, channels used, message topics, customer segments addressed, and proposed metrics (note: metrics will be reported quarterly).

Table A-6. Communications Plan Summary and Proposed Metrics - Residential Customers

Timing	Channel	Message	Residential Customers				Metric Proposed
			Low Income	Spanish	Seniors	Life Support Equipment (LSE)	
Pre-Install (~60 to 45 days prior to install)	Letter	Your new meter is coming	√	√	√		Letters sent
Pre-Install (~60 to 45 days prior to install) for LSE customers	Letter	Your new meter is coming				√	Letters sent
Pre-install (~2 weeks prior to install)	Outbound Call	Reminder - we'll be there soon	√	√	√	√	Contact rate of campaign, opt-out requests
Pre-install (~2 weeks prior to install)	Email	Reminder - we'll be there soon	√	√	√	√	Open rate
Pre-install (~2 weeks prior to install)	Face-to-Face (STMEC)	Invitation to visit our STMEC	√	√	√	√	Visits to STMEC, opt-out requests
Pre-install (~2 weeks prior to install)	Welcome Kit	Getting the most from your meter	√	√	√	√	Welcome Kits delivered
Day of Installation	Door Hanger	We installed your meter	√	√	√	√	Door hangers delivered
First 30 days after installation	Outbound Call	Visit our website	√	√	√	√	Contact Rate, Visits to Website
First 30 days after installation	Welcome E-mail	Getting the most from your meter	√	√	√	√	Open Rate
First 30 days after installation	Welcome E-mail with video link	Welcome to AMI video	√	√	√	√	Open rate and Click through Rate
~60 days after installation	Postcard	Visit the portal, learn more about what your new meter	√	√	√	√	Post cards sent, Visits to Website
Quarterly Proactive Outreach (~60 days after installation and ongoing thru 2022)	Letter	Tools, offers, Updates on new functionality	√	√	√	√	Letters sent
~60 days after installation and ongoing, every other month	E-mail	Various AMI-related topics	√	√	√	√	Open rate and Click through Rate
~60 days after installation and ongoing, monthly	Social Media	Various AMI-related topics	√	√	√	√	Likes, Retweets
Monthly	Website (Home page)	Various AMI-related topics	√	√	√	√	Visits to Website
Quarterly (~60 days after installation and ongoing thru 2022)	Webinars	Various AMI-related topics	√	√	√	√	Number of Participants
~60 days after installation and ongoing, every other month	Bill Insert/Newsletter	Various AMI-related topics	√	√	√	√	Inserts delivered
~60 days after installation and ongoing, every other month	On Bill Message	Various AMI-related topics	√	√	√	√	Bill Messages Printed

Sections A.4.1 through A.4.3 provide more in-depth descriptions of the Customer Education Plan components.

A.4.1 Phase 1 – Voice of the Customer

PSEG Long Island is currently in the process of conducting a customer survey of the Power Panel, a new online community of 5,000 customers across Long Island, to gauge their expectations with respect to the AMI implementation.

The Power Panel is an online community that provides customers the opportunity to anonymously share their opinions and views about energy trends and issues as well as PSEG Long Island's services and programs. Participants are being (and have been) selected randomly. In order to join this online community, participants are asked to complete a quick registration process which includes a profiling questionnaire that includes gender, age, ethnicity, education level, total household income, current work status, type of home they currently live in, etc.

Additionally, approximately 300 customers will be surveyed via phone. The surveys will be conducted by a third-party vendor.

Customers will be asked about the preferred methods/channels of communication, frequency, information etc.

The online panel survey will be completed by the end of July 2018 and the telephone panel survey will be completed by the end of August 2018. Additional focus groups and/or other "Voice of the Customer" research will be conducted in Q4 2018. The findings from these efforts (online Power Panel and telephone survey) will be combined with the findings from customer focus groups conducted in May 2018 to further inform and refine customer engagement efforts.

To gauge awareness, preferred methods and frequency of communications, and education levels related to energy usage, energy efficiency, EVs, solar, and data privacy, PSEG Long Island is facilitating future workshops, focus groups, and customer research in each year of the roll out.

PSEG Long Island will use the results of the Phase 1 research to adjust current communication campaigns to be most effective for each customer segment. A detailed report with robust analysis of the findings will be shared with the collaborative members. PSEG Long Island is looking to establish a customer-centric format for each segment of the AMI implementation process covering areas such as:

- Preferred methods of communication: email, postcard, letters, social media, etc.
- AMI topics: energy usage/control, lowering bills, high bill alerts, etc.
- Timing of notifications: before, during, and post meter installation
- Method of notification: email, postcard, letter, telephone call, text message, etc.



This phase is in progress and PSEG Long Island has received the first report from its third-party customer research and focus groups facilitator (refer to

Appendix 1). This report will be used to make any needed adjustments to the Customer Engagement Plan.

A.4.2 Phase 2 – Vigorous Communication Campaign

In this document PSEG Long Island will provide all of the communication and educational tools currently available. Other items, which are currently in the developmental stage are scheduled to be completed between July and November 2018.

PSEG Long Island will adjust the final format of the AMI communications campaign based on the Phase 1 findings. Next, PSEG Long Island will conduct face-to-face meetings with customer advocacy groups, government officials and corporate affairs organizations to emphasize the following AMI benefits:

- **Energy usage and cost –** how smart meters and AMI technology enable customer control and more informed energy management decisions.
- **Energy usage data analysis** – how customers can access their smart meter data; accuracy and real-time aspects.
- **Safety, privacy, and security aspects.**
- **Deployment overview timeline.**
- **Streamlining of the meter reading process.**

Table A-7 summarizes the regional messaging campaign.

Table A-7. Regional Messaging Campaign

Channels	Audience	Educational Materials
- Welcome Letter - Post Card - Outbound Phone Call - Smart Technology Mobile Education Center (STMEC) - Bill Messages and Inserts - Local Media - Local and Community Leaders - Community Meetings and Events - PSEGLI Website - Emails - Social Media - Direct Mail	- Deployment area population - Residential - Commercial	- Infographics - FAQs (printed) - Deployment Overview (map) - Videos - Welcome kit (with Facts Sheet) - Website information and demonstrations

Educational materials listed above will be reviewed with customers (during Phase 1 described above) to ensure the subject matter is easy to understand, readable, and engaging. Customer feedback will be used to make revisions to outreach materials as needed.

The target will be to hold “community meetings and events” at least once per quarter, and conduct additional ones as needed in the areas where smart meters are being deployed. If there is a demand for

additional community meetings and events, more will be provided. Please note in the focus groups report (see

Appendix 1), that customer showed minimal interest in attending a community meeting or event.

Social Media and Traditional Media Plan

As part of PSEG Long Island's Educational and Outreach plan, the Company is developing a series of infographics and videos for use on the web, in social media, and in email communications. The messages will be included as part of the energy education campaign throughout the Phase 2 in each AMI deployment territory.

Media Engagement

Media is critical to the way we are able to communicate our messages around the filing of Utility 2.0. As such, a media engagement plan must be executed meticulously to ensure that the proper journalists are contacted and briefed on the features and benefits that AMI and smart grid will bring to PSEG Long Island customers.

Newsday
Embargoed briefings week before marketing material hits the community

- Meet with Newsday.

News 12, WCBS-TV, WABC-TV, WNBC-TV, WPIX-TV, WWOR-TV and WLNY-TV Channel 55
Prepare to schedule on camera stand-up the week Newsday article is released

- Overview piece with talking points on all new smart technology available to customers.
- Educational piece on how the smart meter works, possible energy saving benefits, etc.
- Prepare a video to direct media and customers for good visual depiction.

Press Release
Issue an overview of Utility 2.0 press release to community papers after filing is approved.

After overall initial outreach, issue a press release to specific community papers during installations.

Weeklies

- Pitch story to the editors of Nassau and Suffolk weekly papers. Many Long Island weekly papers are part of larger news groups.
    - *Nassau/Rockaway*
        - Anton Community Papers – 14 newspapers
        - Herald Community Papers – 11 newspapers
        - Queens Chronicle
        - Rockaway Wave
    - *Suffolk*
        - Times Beacon Record – 8 newspapers
        - Times Review – 3 newspapers
        - Press News Group – 2 newspapers
        - Independent News – 5 newspapers

- East Hampton Star

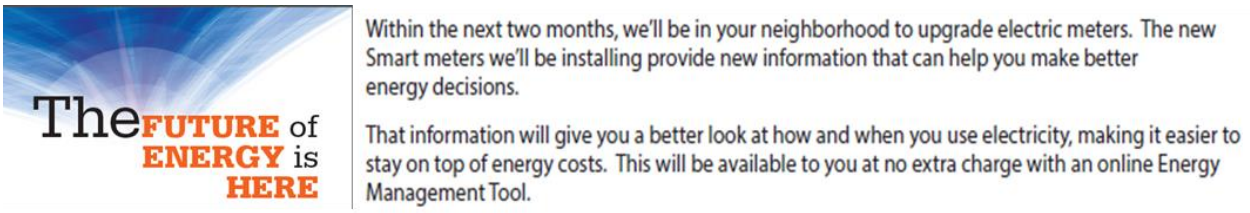
Additional Media

Follow up with additional, interested media as inquiries present themselves.

Social Media

With nearly 7,100 followers on Twitter and more than 51,000 likes on Facebook, PSEG Long Island proactively shares updates and news via social media (see Figure A-5). We will communicate with our customers via social media throughout the entire process. Through social media, we have a direct targeted link to our customers and can work to further develop our customers' awareness of the filing and the benefits they can expect through the installation of AMI meters. As the AMI rollout progresses, social media will be used to target installation communities.

Figure A-5. Sample Future Education Material via Social Media



Island-wide Communications

In addition to regional, geography-based messaging, PSEG Long Island will develop territory-wide communications that will span the duration of the AMI meter deployment including:

- Island-wide press release promoting the benefits of the smart grid and smart meters (greater control, choice, and convenience) and the new technologies and services it will provide.
- Newspaper advertorials (in island-wide publications) promoting the benefits of the smart grid and smart meters (greater control, choice, and convenience) and the new technologies and services it will provide.
- Newspaper stories (in island-wide publications) promoting the benefits of the smart grid and smart meters (greater control, choice, and convenience) and the new technologies and services it will provide.
- Social media postings, island-wide, promoting the benefits of the smart grid and smart meters (greater control, choice, and convenience) and the new technologies and services it will provide.
- TV commercials that will run island-wide, starting late Q1 2019, promoting the benefits of the smart grid and smart meters (greater control, choice, and convenience) and the new technologies and services it will provide.

Employee Communications

PSEG Long Island's employees are equally important to ensuring that our messages around the AMI rollout are positioned well within the community.

Communication Channels:

- Email to all employees – A message from PSEG Long Island's VP of Customer Service
- Outlook Online (Employee Newsletter)

- Update to company-wide intranet in Case You're Asked (for call center and employees in the field)
- Town Hall Meetings (employees are updated on the AMI installation progress)
- Outlook Magazine (Quarterly Magazine for the employees)

Figure A-6. Sample Current Installation Letter

PSEG Long Island
175 East Old Country Road
Hicksville, NY 11801

PSEG LONG ISLAND
We make things work for you.

Dear Customer,

Within the next two months, we'll be in your neighborhood to upgrade electric meters. The new Smart meters we'll be installing provide new information that can help you make better energy decisions.

That information will give you a better look at how and when you use electricity, making it easier to stay on top of energy costs. This will be available to you at no extra charge with an online Energy Management Tool.

Meter Installation

If the meter is outside, there's nothing you need to do. If we are unable to access the meter, we'll leave instructions about how to reach us and set up an appointment that's convenient for you. Installation is quick – just 10-15 minutes. Your power may be briefly interrupted during this time, so you may need to reset digital clocks and timers.

Meter Benefits

Smart meters are a key component to modernizing our energy grid. In addition to the benefits above, it will offer you:

Control
Smart meters will allow you to view your home's energy use data in near real time. In the future, you'll be able to receive usage alerts and other customized information.

Choice
Smart meters help manage renewable energy resources like solar power more efficiently. They may also help to facilitate greater access to renewable energy in the future.

Convenience
Smart meters allow for remote meter readings – no waiting for a meter reader and no estimated bills. That also means we'll have fewer vehicles on the road, reducing carbon emissions and air pollution. The meter can even alert us about power problems so that we can respond faster.

Smart meters are not only part of the future; there are about 70 million in use across the country today. For much more information about PSEG Long Island's Smart Meter program, please visit the ***"Electric Service & Rates"*** section of **www.psegliny.com** or call us at **1-800-490-0035**.

Sincerely,

PSEG Long Island

Figure A-7. Sample Smart Meter Tag (Door Hanger)



Smart Meter Opt-out Policy and Communications

PSEG Long Island's opt-out policy and process will be incorporated into the company's overall AMI messaging and communications plans to all customers. This will be included in the pre-install letter, which will identify the many benefits of AMI meters.

Residential customers billed on Service Classification 1 rates will be allowed to opt-out of smart meters by notifying PSEG Long Island. Customers on net metering (used for homes with solar power), time-of-use rate, retail choice program participants, and commercial customers may not opt-out (i.e. Rates 180, 380, 480, 481, 580, and 880)

1. **If a customer chooses to opt-out prior to the AMI meter installation:** The customer would be charged a recurring monthly fee of $9.19 starting January 1, 2023.
2. **If a customer chooses to opt-out after the AMI meter is installed:** The customer will be charged a one-time fee of $110.61 for the meter exchange at the time of the exchange. After that, starting January 1, 2023, the customer will be charged an additional recurring monthly fee of $9.19.

Customers who opt out of their AMI meter will have a solid-state, digital, non-communicating meter, installed in its place.

The opt-out communication will include information about steps customers can take if they would like to opt-out of receiving an AMI meter. The opt-out messaging will also include information about the opt-out fees which will go into effect January 1, 2023 once the full-scale deployment is complete at the end of 2022.

The opt-out communication campaign that is already in progress focuses on decreasing the number of customers that refuse to allow installation of residential smart meters by proactively alleviating typical concerns through awareness and education. For those customers who choose to opt-out even after reviewing the information with AMI project implementation representative, the opt-out process is explained.

The main goals of the opt-out communication are to educate customers and reduce opt-outs. Even though the communication will provide the customers with choice, it will reaffirm the benefits of smart meters, and include safety, security, and privacy facts.

Specific Customer Segments Communications

SMB (Small Medium Business) Communications
Small and Medium business customers will benefit from a communications approach that is similar to the residential market. This approach will also be multichannel and delivered in a similar pre-deployment, deployment and post deployment fashion.

Much of the messaging around meter installation, timing, meter benefits, awareness and educational information, FAQs, etc. will be similar to residential messaging. However, some program attributes, product, service and efficiency information will be tailored to the SMB audience.

The channels leveraged (see Table A-8) will include print, digital, video, voice as well as in-bill communications like inserts and bill messaging.

In addition, our Business Customer Advocates will be leveraged to make on-site visits to the SMB community as an additional touchpoint in the roll out of meters to this segment. The advocates who target, downtown business main-street areas will provide business customers with printed information on the program and be available to answer customer questions and provide guidance while on-site.

Large Commercial/Industrial Customers (Rate 285 Meters)
99.9% of large Commercial and Industrial (CI) customers already have smart meters installed in their facilities. Outreach to these customers has occurred through interaction with their dedicated Managed Account Executive (MAE).

MAEs are available to work with their customers to provide them personal assistance and guidance with respect to the new meters, FAQs, and support in using the current Customer Portal and the new features for business customers when they become available in 2019.

The interactions with our largest customers will focus on the use of a new business web portal. This tool will provide our largest electric users the information needed to efficiently and effectively power their facilities. MAEs will be trained in its use prior to its availability to customers.

Table A-8. Communication Plan with Tracking Metrics - Business Customers

Timing	Channel	Message	Business Customers		Metric Proposed
			Large Accounts	Small/Medium	
Pre-Install (~60 to 45 days prior to install)	Letter	Your new meter is coming	N/A	√	Letters sent
Pre-install (~2 weeks prior to install)	Outbound Call	Reminder - we'll be there soon	N/A	√	Contact rate of campaign, opt-out
Pre-install (~2 weeks prior to install)	Email	Reminder - we'll be there soon	N/A	√	Open rate
Pre-install and ongoing	Face-to-Face (Business Customer Advocates)	Provide onsite support to SMB customers	N/A	√	Visits
Pre-install (~2 weeks prior to install)	Face-to-Face (STMEC)	Invitation to visit our STMEC	N/A	√	Visits to STMEC, opt-out requests
Pre-install (~2 weeks prior to install)	Welcome Kit	Getting the most from your meter	N/A	√	Welcome Kits delivered
Day of Installation	Door Hanger	We installed your meter	N/A	√	Door hangers delivered
First 30 days after installation	Outbound Call	Visit our website	N/A	√	Contact Rate, Visits to Website
First 30 days after installation	Welcome E-mail	Getting the most from your meter	N/A	√	Open Rate
First 30 days after installation	Welcome E-mail with video link	Welcome to AMI video	N/A	√	Open rate and Click through Rate
~60 days after installation	Postcard	Visit the portal, learn more about what your	N/A	√	Post cards sent, Visits to Website
Quarterly Proactive Outreach (~60 days after installation and ongoing thru 2022)	Letter	tools, offers, Updates on new functionality	√	√	Letters sent
~60 days after installation and ongoing, every other month	E-mail	Various AMI-related topics	√	√	Open rate and Click through Rate
~60 days after installation and ongoing, monthly	Social Media	Various AMI-related topics	√	√	Likes, Retweets
Monthly	Website (Home page)	Various AMI-related topics	√	√	Visits to Website
~60 days after installation and ongoing, every other month	Bill Insert/Newsletter	Various AMI-related topics	√	√	Inserts delivered
Quarterly (~60 days after installation and ongoing thru 2022)	Webinars	Various AMI-related topics	√	√	Number of Participants
~60 days after installation and ongoing, every other month	On Bill Message	Various AMI-related topics	√	√	Bill Messages Printed

Low-Income Segment Outreach

PSEG Long Island's low-income customers will enjoy the many advantages that AMI affords by empowering them with technology to manage their consumption and utility costs, better reliability and outage response, and numerous environmental benefits. Engagement with low-income customers will focus on Advocacy, Education and Outreach by utilizing current partnerships with Health and Human Service agencies to promote and educate about the AMI meter deployment and its conveniences. Additional avenues of outreach are currently being explored, e.g. school systems, area hospitals, etc. to expand the educational footprint. PSEG Long Island will continue to support the low-income population with energy efficiency, promotion of current household assistance rate program and any new rates that may enable savings for those customers. Education and training will also include customer utilization of the Customer Portal tools to assist them with managing and understanding their usage.

The deployment of AMI meters in low-income residences will ensure that these customers whose utility bills are paid directly by the Department of Social Services receive accurate bills and timely payments. A required component of direct utility payments program is ability to bill based on actual meter readings which the AMI enables.

All messaging and information provided will be consistent with the overall PSEG Long Island customer engagement efforts.

Spanish and Other Languages Segment
PSEG Long Island will produce the following customer engagement collateral and materials in Spanish:

- Welcome letter
- Welcome kit
- Outbound reminder phone call
- Door Hanger
- Leave Behind Fact Sheet (provided by installer)
- FAQ's
- Website
- On-bill messages
- Emails

Also, there will be AMI trained CSR's at the PSEG Long Island call center who are fluent in Spanish and able to address any questions or concerns customer may have.

To address the needs of customers who speak a foreign language other than Spanish, the PSEG Long Island call center utilizes a vendor to provide phone interpretation services for callers who do not utilize English or Spanish as their first language. This service allows a call center representative to conference in an interpreter during a live phone call. This vendor supports TTY/TDD communication along with Limited English Proficiency (LEP) callers from over 200 different languages. To date, this service has been used to provide service to PSEG Long Island customers in 82 different languages. This service will be available throughout the duration of the AMI smart meter deployment.

In addition to printed materials and phone support, PSEG Long Island will provide face-to-face support to the Spanish speaking community via the Smart Technology Mobile Education Center (STMEC). PSEG will staff the STMEC with subject matter experts fluent in Spanish.

Seniors Segment
PSEG Long Island will produce the following customer engagement collateral and materials in large print to support the senior citizen community and other visually impaired customers:

- Welcome letter
- Welcome kit
- Door Hanger
- Leave Behind Fact Sheet (provided by installer)
- FAQ's
- On-bill messages

In addition to printed engagement materials, PSEG Long Island will provide quarterly face-to-face information sessions at senior communities via the STMEC.

Life Support Equipment (LSE) Customer Segment
We contact the LSE customer prior to changing the meter (in person at their residence). If an outage is required to change the customer's meter and the customer is unable to sustain the outage (timed at approximately 15 minutes), PSEG Long Island will make accommodation to change the meter at a different time.

We will be enhancing our current communications to LSE customers to include messaging stating this prior to installation. In addition, the deployment of AMI meters for LSE customers will follow the normal AMI deployment schedule including:

- Pre-Install (~60 to 45 days prior to install): Welcome Letter
- Pre-install (~2 weeks prior to install): Outbound Call Reminder - we'll be there soon
- Pre-install (~2 weeks prior to install): STMEC
- Day of Installation: Door Hanger - we will knock on the door to confirm LSE customer.

CSRs Training and Interaction Channels Activities

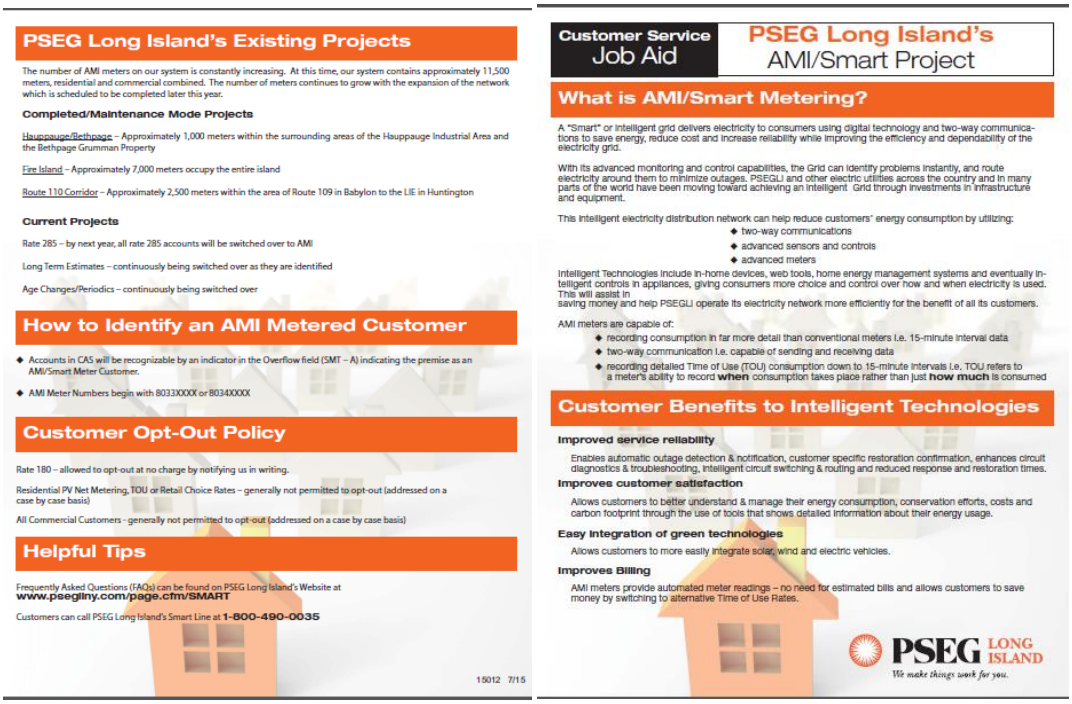
The following is a list of what the PSEG Long Island call center has implemented to support ongoing AMI capabilities and related customer inquiries:

- A direct phone number has been set up (1-800-490-0035) for AMI customers to use. There are 25 CSRs trained and skilled to answer these direct calls. By end of Q3 2018, 100% of CSRs will be AMI trained.
- Team leads and supervisors have been given an in-depth training on AMI. This training will be rolled out to the rest of the call center in the Summer 2018.
- All CSRs have been trained to use a database to schedule AMI appointments for AMI opt-ins.
- Web Queue call center representatives have been trained on how to walk customers through the Customer Portal on My Account and troubleshoot technical issues that may occur when customers attempt to view their information.
- The Business Queue call center representatives have received additional training and information for how AMI can impact commercial customers.

There is also a dedicated representative handling AMI-related inquires via non-voice channels (email, correspondence, social media, etc.).

Smart Grid and Smart Meter FAQs are currently posted on PSEG Long Island's website (https://www.psegliny.com/myaccount/serviceandrates/smartmeter) and this information will be enhanced through adjustment of content and infographics to align messaging and communications as part of the 2018/2019 AMI communications plan (again, based on feedback gathered from Phase 1 efforts).

Figure A-8. Sample Customer Service Job Aid (see full-sized image in Appendix 2)



PSEG Long Island's Existing Projects

The number of AMI meters on our system is constantly increasing. At this time, our system contains approximately 11,500 meters, residential and commercial combined. The number of meters continues to grow with the expansion of the network which is scheduled to be completed later this year.

Completed/Maintenance Mode Projects

Hauppauge/Bethpage – Approximately 1,000 meters within the surrounding areas of the Hauppauge Industrial Area and the Bethpage Grumman Property

Fire Island – Approximately 7,000 meters occupy the entire island

Route 110 Corridor – Approximately 2,500 meters within the area of Route 109 in Babylon to the LIE in Huntington

Current Projects

Rate 285 – by next year, all rate 285 accounts will be switched over to AMI

Long Term Estimates – continuously being switched over as they are identified

Age Changes/Periodics – continuously being switched over

How to Identify an AMI Metered Customer

- Accounts in CAS will be recognizable by an indicator in the Overflow field (SMT – A) indicating the premise as an AMI/Smart Meter Customer.
- AMI Meter Numbers begin with 8033XXXX or 8034XXXX

Customer Opt-Out Policy

Rate 180 – allowed to opt-out at no charge by notifying us in writing.

Residential PV Net Metering, TOU or Retail Choice Rates – generally not permitted to opt-out (addressed on a case by case basis)

All Commercial Customers - generally not permitted to opt-out (addressed on a case by case basis)

Helpful Tips

Frequently Asked Questions (FAQs) can be found on PSEG Long Island's Website at www.psegliny.com/page.cfm/SMART

Customers can call PSEG Long Island's Smart Line at 1-800-490-0035

15012 7/15

Customer Service Job Aid

PSEG Long Island's AMI/Smart Project

What is AMI/Smart Metering?

A "Smart" or intelligent grid delivers electricity to consumers using digital technology and two-way communications to save energy, reduce cost and increase reliability while improving the efficiency and dependability of the electricity grid.

With its advanced monitoring and control capabilities, the Grid can identify problems instantly, and route electricity around them to minimize outages. PSEGLI and other electric utilities across the country and in many parts of the world have been moving toward achieving an intelligent Grid through investments in infrastructure and equipment.

This intelligent electricity distribution network can help reduce customers' energy consumption by utilizing:

- two-way communications
- advanced sensors and controls
- advanced meters

Intelligent Technologies include in-home devices, web tools, home energy management systems and eventually intelligent controls in appliances, giving consumers more choice and control over how and when electricity is used. This will assist in saving money and help PSEGLI operate its electricity network more efficiently for the benefit of all its customers.

AMI meters are capable of:

- recording consumption in far more detail than conventional meters i.e. 15-minute interval data
- two-way communication i.e. capable of sending and receiving data
- recording detailed Time of Use (TOU) consumption down to 15-minute intervals i.e. TOU refers to a meter's ability to record **when** consumption takes place rather than just **how much** is consumed

Customer Benefits to Intelligent Technologies

Improved service reliability

Enables automatic outage detection & notification, customer specific restoration confirmation, enhances circuit diagnostics & troubleshooting, intelligent circuit switching & routing and reduced response and restoration times.

Improves customer satisfaction

Allows customers to better understand & manage their energy consumption, conservation efforts, costs and carbon footprint through the use of tools that shows detailed information about their energy usage.

Easy integration of green technologies

Allows customers to more easily integrate solar, wind and electric vehicles.

Improves Billing

AMI meters provide automated meter readings – no need for estimated bills and allows customers to save money by switching to alternative Time of Use Rates.

PSEG LONG ISLAND
We make things work for you.

Table A-9 summarizes the non-adopter concern response campaign.

Table A-9. Non-Adopter Response Campaign

Channels	Audience	Educational Materials
- Call Center (inbound) - Phone Calls (outbound) - STMEC - Letters - Community Meetings and Events - PSEGLI Website	- Non-adopters	- Call center talking points - Scientific references and papers - Videos on PSEGLI website

Elected Officials Engagement Plan

In addition to customer and media outreach efforts above, PSEG Long Island External Affairs is planning to continue to engage elected officials and community leaders in its service territory and following the AMI deployment geographically. Below is the summary of the forward-looking activities:

- External Affairs staff will provide notice to municipal leadership as part of its ongoing outreach efforts
- Messaging to external stakeholders will support and align with all customer-facing materials. Communications to date have mirrored PSEG Long Island corporate communications materials available on the web located at: https://www.psegliny.com/page.cfm/SMART. Specifically, External Affairs team members will be equipped with an "AMI Playbook" that will contain the latest information regarding:

  - Frequently Asked Questions
  - Green Button Connect and how it works
  - Opt-out policies and procedures (including estimated opt-out fees)
  - New rates being developed and how they benefit customers
  - Improvement in outage management and response enabled by AMI capabilities

- State, county, town and village officials will continue to be briefed. Efforts will also be made to engage with local municipal associations such as the Nassau and Suffolk Village Officials Associations to further support outreach efforts. Additionally, notification will be provided via phone or email generally 2-4 weeks prior to AMI installations to town and/or village officials based on scheduled implementation. Information about AMI will again be offered as well as information for any resident who chooses to opt-out of this program.
- External Affairs will continue to address any issues or concerns raised directly with the inquiring elected or appointed officials whose relationships PSEG Long Island External Affairs manage. By continuing to communicate customer benefits associated with the project, PSEG Long Island expects to minimize non-adopters.
- Elected officials within the North Bellmore Super Savers Program, currently underway, have been briefed already and the reaction has been positive toward the overall program.
- Discussions have also taken place with officials in the Patchogue area, who will see the next phase of PSEG Long Island's Super Savers Program. Feedback has also been favorable thus far.

In summary, PSEG Long Island has prepared a comprehensive customer and stakeholder engagement plan and will continue to gauge feedback and adjust communications as necessary as progression through the proposed phases occurs.

Table A-10 summarizes the engagement efforts for involving local and community leaders, delivering region-specific messaging, and responding to concerns from non-adopters.

Table A-10. Local Community Leaders Support Campaign

Involve Local and Community Leadership	Deliver Regional Messaging	Respond to Non-Adopter Concerns
Involve the Local and Community Leaders in the deployment areas	Deliver messages to customers within the deployment areas to foster an awareness of smart meter benefits and address typical concerns	Prepare PSEG Long Island and its call center representatives to respond with current science and industry knowledge

Table A-11 summarizes the local and community activities.

Table A-11. Local Community Activities

Channels	Audience	Educational Materials
- Meetings - E-mails - Phone Calls	- Public Officals - Community Leaders	- Infographics - FAQs (printed) - Deployment Overview (map) - Customized Engagement Tools Demo

A.4.3 Phase 3 – Customer Engagement Campaign

The Customer Engagement Campaign starts once customers receive their smart meter and its main objective is to provide customers with an ongoing stream of engaging content, using their preferred channels, to ensure that customers continue to engage and participate in the benefits and opportunities AMI has to offer.

AMI-enabled customers will begin to benefit from the enhanced customer-facing tools and tips, and new alerts and notifications. These capabilities ultimately help customers better manage their energy costs and have more convenient interactions with PSEG Long Island.

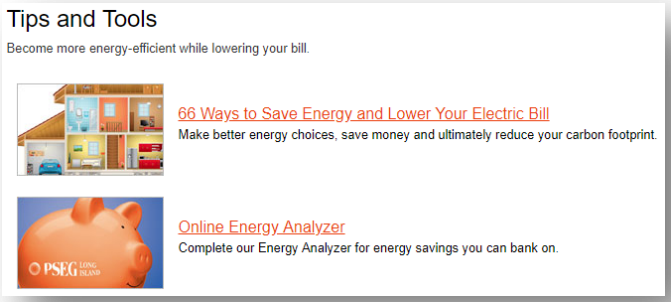


Figure A-9 provides an overview of the range of communication activities and methods in this phase of customer engagement.

Figure A-9. Customer Engagement Campaign Activities

Theme/Messages	Communication Channels	Target Customer Segments	Education Material/Tools
• Smart meter benefits available to customers • Smart meter FAQs • Instructions on how to take advantage of smart meter benefits • Instructions on how to take advantage of third-party opportunities • Timeline for the launch of additional smart meters services	• Direct mail (letters, postcards) • Email • Social media • Electronic tools: web, alerts/text messages • Videos • On- Bill mesagging • Bill Inserts • Outbound Phone Calls • In Person Info Session and Demos via the Smart Technology Mobile Energy Center (STMEC) • Newsletters • PSEGLI Website • Brochures • PSEGLI Blog • Webinars	• Residential • Business • Seniors • Low-income • Spanish and other Languages • LSE	• Smart meter benefits (fact sheets) • Customized education via Customer Portal • Customized information on energy usage • Education video (smart meters, website, energy reports) • STMEC demonstrating AMI-enabled capabilities, RF test demo, smart plugs, smart thermostat, etc.

Specific Communication Touchpoints (Available to Residential and Business Customers)

- Email communications, for customers the utility has an email address for, will be used to communicate bi-monthly to customers on educational/informational topics, program offers, energy tools, etc. as a means for keeping customers engaged during their first year of meter installation.
- Residential customers already have access to view their personalized Home Energy Management (HEM) information via the Customer Portal. HEM provides customers with information on their energy usage, how their energy use compares to similar homes in their area and customized tips to help them manage their electric use. Customers can educate themselves on their energy use, challenge themselves by setting custom saving plans and goals, and see how they are performing against similar type homes in their neighborhood in a gamification type of comparison.
- Business customers already have access to their AMI data and energy usage via the Customer Portal.
- A quarterly direct mail letter is scheduled to provide customers more detailed information about the Customer Portal, ways to maximize their savings, rate choices, and to encourage customers to complete their online home assessments.
- Leverage the customer's in-bill experience; through bill inserts and on-bill messaging to provide information at the point of bill engagement and provide additional avenues to accessing additional information online.
- Social media will be used to discuss various topics and provide customers information within the geographical location of customer installations. This will include updates to the PSEG blog, social media posts on the company's social platforms (Facebook, Instagram, Twitter, public website).

- The public website will provide a landing page where customers can reach out to learn more information about the project and get answers to frequently asked questions, including a map of the areas scheduled to receive meter upgrades.
- Quarterly webinars available to all customers will provide an opportunity to interact with AMI experts and have walk-throughs of the Customer Portal features and functions.

Collateral in the form of physical and electronic brochures, flyers, emails and videos, bill inserts and messages, web content, door hangers, etc. will be created with messaging geared to the applicable customer market. Customer research scheduled during the course of the project will be used to guide, modify, or develop customer messaging in an ongoing effort to improve communications and customer engagement.

Additional focus groups and customer research will be conducted in mid-2019 and each year thereafter to ensure that communication and outreach efforts are effective and to make changes to plans, as needed over time, to ensure that the Voice of the Customer is central to our communication and engagement efforts.

Additional Customer Outreach – Spotlight on Smart Technologies Mobile Education Center (STMEC)

In addition to the communications discussed above, PSEG Long Island will utilize a STMEC which will be moved throughout the Long Island communities over the course of AMI deployment.

Figure A-10. Illustrative STMEC



- STMEC will represent a home containing all luxuries – full kitchen (energy efficiency appliances – big and small), family room (TV, gaming system), home office (computer, printer), air conditioning and heat, programmable thermostat, smart plugs, etc.
- STMEC will also have Solar Photovoltaic (PV) panel installed and an Electric Vehicle (EV) charging station, as well as a smart meter.
- Customers will be able to walk through the STMEC and upon entering will be presented with an introductory video about smart grid and smart meters, the Customer Portal tools, and expectations for the tour.
- The tour will include a demonstration of the web tool with live data coming from the smart meter and other electronic devices in home.
- Customers will also be able to see the measurement of the RF signal coming from the smart meter demonstrating no harmful effect

- The STMEC will be up and running by Q2 2019.

See A.11.1 Appendix 4 for an illustrative representation of the STMEC floor plan.

There are several approaches that will be used to notify customers in advance of the STMEC location. As the meter installation schedule is developed, customers will be made aware of where the STMEC will be by:

1. **Welcome letter** – will announce smart meters are coming and to be on the lookout for our STMEC in your area.
2. **Outbound phone-calls** will be utilized to alert customers of their upcoming AMI meter installation will also include STMEC information.
3. **Signage** – we will look to work with local major retailers or community centers such as Home Depot, Lowes, schools, libraries, special events, etc. to hang signage/banners at location in advance of the STMEC visit.
4. **Welcome kit** – will include information on the STMEC.
5. **Social media** – will promote locations of the STMEC.
6. **Website map** – this map will show timing of smart meter deployment for the current year and will indicate PSEG Long Island deployment progress for each quarter. It will also indicate the areas where the STMEC will be visiting.

PSEG Long Island plans to use the STMEC for employee education and awareness as well.

A.5 Customer Engagement Platforms and Tools

With 9% of AMI meters already deployed enabling various TOU rate pilots, PSEG Long Island implemented AMI-enabled Customer Portal capabilities. The Customer Portal provides energy usage data and supporting tools and tips to PSEG Long Island customers. Approximately 3% of AMI-enabled customers are currently using this AMI-enabled web tool. This usage is expected to grow as the focused marketing and promotional campaign is executed in support of the full-scale AMI rollout and the Customer Portal and mobile tools are improved.

PSEG Long Island will transition to a more holistic, AMI-enabled customer engagement platform that includes more intuitive customer-facing functionality, differentiated experiences for business customers, and a better overall end-to-end process and systems integration. AMI data can then be leveraged to enable customer-centric capabilities like next best action, personalized alerts, content, and notifications, rewards programs, and targeted web marketing. In addition, these platforms offer utility-facing applications that enable Account Management, Sales, and Marketing teams to effectively target customers to increase program participation and revenue while reducing costs.

The following are some of the key features of the Customer Portal:

- Provide customers with a simple, intuitive method to view their current and historical AMI meter usage, in tabular and graphical forms.
- Provide customers with ability to download usage data in various forms, including the Green Button format.
- Provide the ability to overlay additional data in graphical format, including weather, price, and bill cost data.

- Use an analytics engine that leverages AMI usage data to provide the customer with insights and energy savings tips as well as a personalized action plan to conserve energy and reduce expenditures.
- Automatically disaggregate energy usage to help customers understand what is driving their usage patterns and determine how their energy is being used.
- Provide customers with proactive alerts associated with projected billing, home energy use, and customized thresholds set by customers (energy use or projected costs).
- Allow customers to schedule the delivery of energy usage reports on an ongoing basis.

The Portal and associated marketing efforts will drive AMI customer benefits.

A.5.1 Customer Portal and Customer Preference Capabilities

The descriptions and images in this section capture PSEG Long Island's current residential customer-facing capabilities and provide an illustration of the forward-looking enhancements. The presentation of this level of granular data on the Portal is made possible by AMI technology and is an example of PSEG Long Island's progress in sharing the benefits of AMI with its customers.

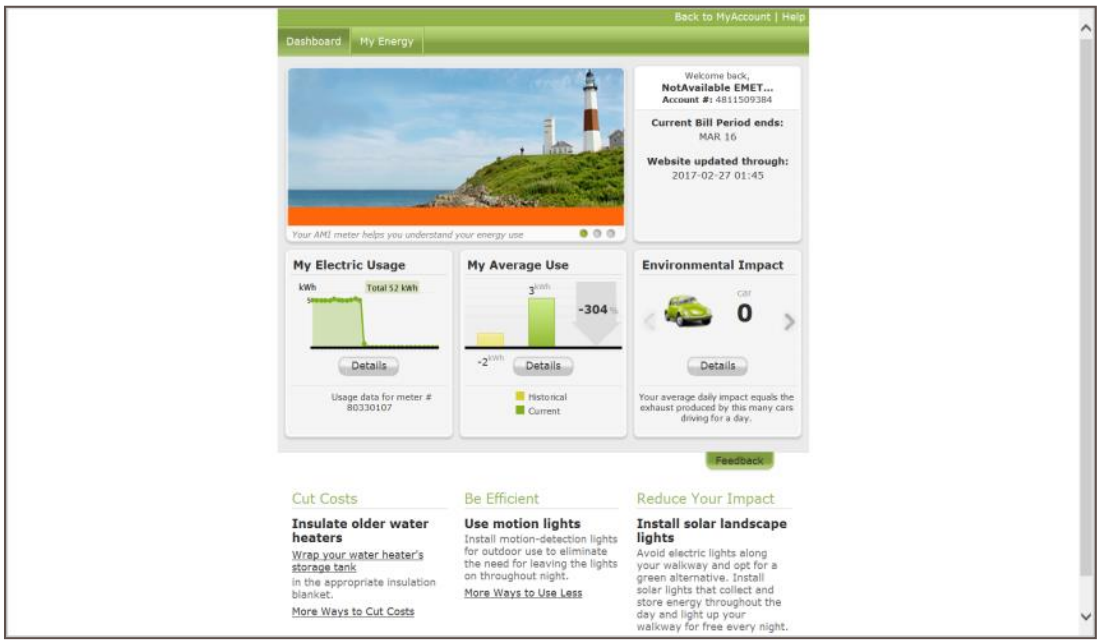
Customer Portal

Existing AMI-enabled customers have access to the Customer Portal, which hosts a tools Dashboard and the My Energy page. In the Dashboard, customers can see:

- Account information.
- When the current bill period ends.
- Last time the dashboard was updated.
- Last few days of electric usage.
- The difference in the average usage compared to previous billing period (month) or the period of choice.
- Environmental impact/carbon footprint.

The Dashboard highlights key information in a simple interface, allowing customers to track various items that may be important to them, such as bill status and energy usage.

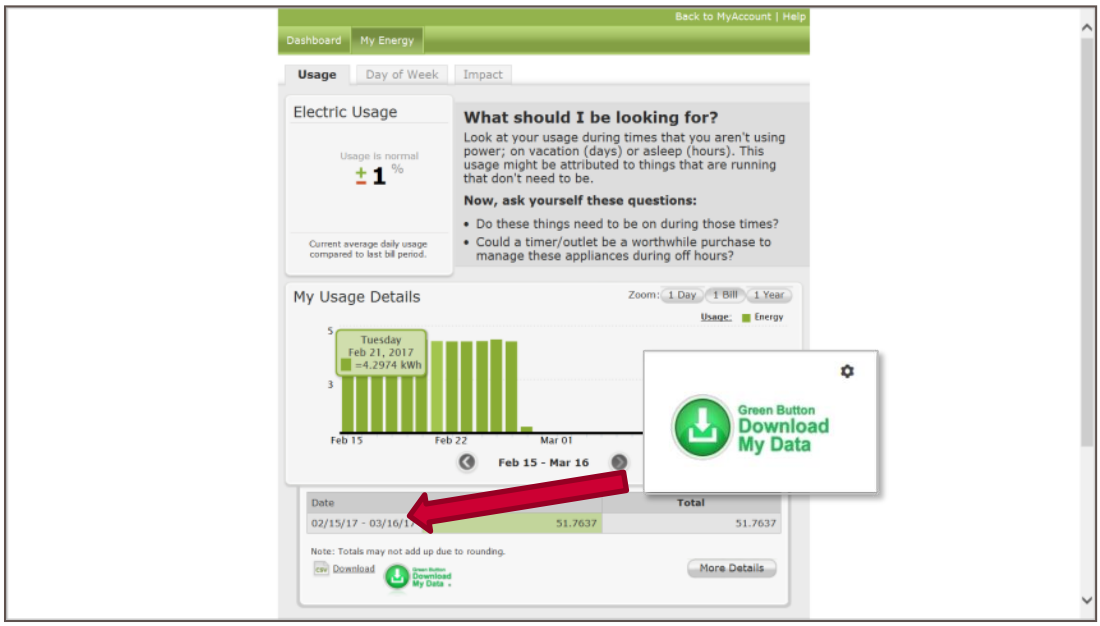
Figure A-11. Customer Portal – Dashboard



Customers can also provide feedback directly from this page via a web form that creates an email communication to the program administrator.

The Customer Portal provides usage data for each day in the billing period. Here, customers can view details in 15-minute intervals as well as day, bill (month), or year. Customers can utilize this level of detail to understand where and when they use the most energy.

Figure A-12. Customer Portal – My Energy



Further capabilities on the My Energy page include usage comparisons (current usage vs. historic) and the percentage change indicator, which informs usage pattern consistency/changes. The Customer's Environmental Impact view provides data on the environmental impact due to the customer's usage levels, presented in pounds of carbon.

Home Energy Management Tool

Leveraging industry-leading residential behavioral demand-side management, and home energy efficiency evaluation platforms, PSEG Long Island is already providing its customers with easy-to-use, interactive tools to save energy and money and proposes to integrate that tool with its AMI systems.

The suite provides customers with an energy usage dashboard and allows customers to set up a savings plan and checklist and intake more granular customer premise information to enhance personalized savings tips.

Figure A-13. Home Energy Management (HEM) Dashboard



The Home Energy Analyzer offers customers the ability to get personalized recommendations to make their home more energy efficient via a 5-minute home characterization intake web form. Customers can then either email the Home Energy Analyzer Report or simply generate and download it directly from the webpage.

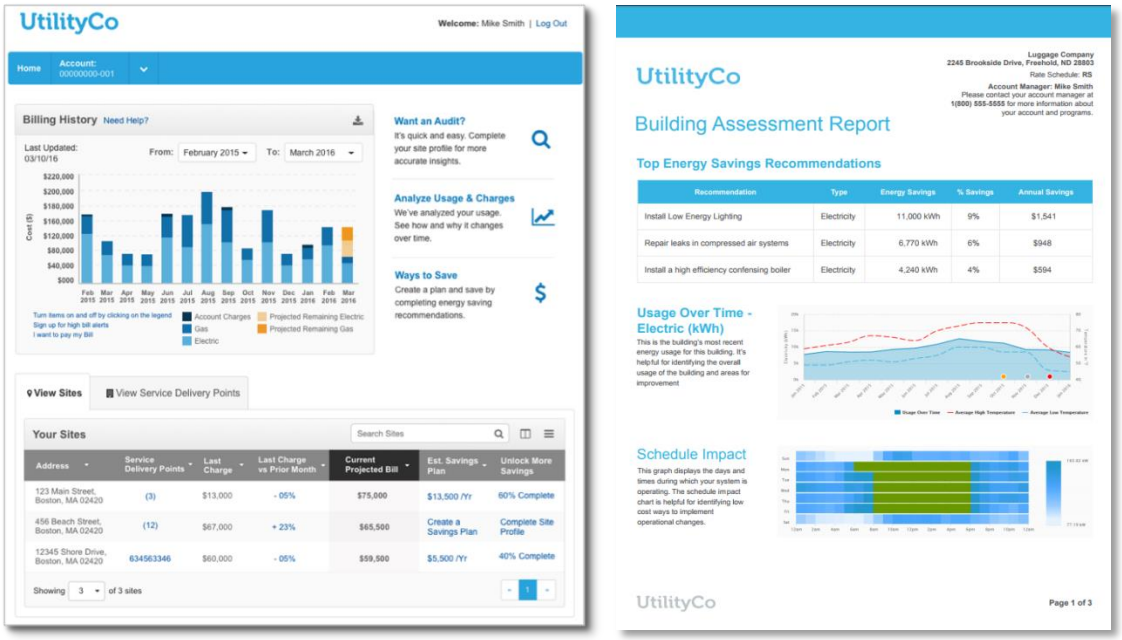
See A.10 Appendix 3 for additional details on platform.

Customer Portal Enhancements for Business Customers

PSEG Long Island is also planning to enhance existing Customer Portal capabilities for business customers to help them maximize AMI-enabled benefits. Customer-facing applications will enable PSEG Long Island to better engage business customers with personalized energy insights through web, mobile, email, and telephone channels. The targeted platform's utility-facing applications enable Account Management, Sales, and Marketing teams to effectively target customers to increase program participation and revenue while reducing service costs. PSEG Long Island is looking for demonstrated

case studies with utilities technically validating its analytics and its ability to improve efficiency sales cycles and conversion rates with its software.

Figure A-14.Customer Portal Enhancements for Business Customers (illustrative only)



The types of tools and capabilities enabled by AMI that will be included in the Customer Portal for business customers include:

- **Usability/Accessibility/Widgets:** Charts and graphs that can be embedded into the My Account experience and provide direct links to key customer insights.
- **Configurable User Interface (UI)/Content Management System:** A web experience that aligns with PSEG Long Island branding elements and promotes energy education and new products/services through configurable content windows.
- **Multi-Site Graphing Capabilities:** Allow users with multiple service delivery points at a single site and/or multiple sites to view, download, and compare cost and usage data for all fuel types and all portfolios, sites, and service delivery points.
- **Advanced Graphing Capabilities:** Weather, operations, disaggregation, and other advanced charts.
- **Usage and Cost Graphing Capabilities:** Numerous cost and usage graphing options, with immediate data download from web.
- **Benchmarking with Similar Sites:** Compares energy intensity of the site with the energy intensity of similar businesses.
- **Energy Savings Tips:** Displays business-specific recommendations in one location; recommendations can be directly connected to relevant PSEG Long Island products and services through pre-deployment mapping.
- **Savings Plan:** Allows creation of savings plans and targets for each customer; user actions can trigger PSEG Long Island staff to proactively reach out to interested customers.

- **Find My Best Rate:** Finds the best available rate plan based on customer eligibility and historical usage.
- **Rate Scenario Analysis:** A rate simulator to help customers understand how changes in energy consumption habits will affect their rate eligibility and energy costs.
- **Solar Net Energy Meter Presentment:** Provides numerous options to present customers with the amount of energy purchased, the amount of energy generated on-premise from solar, and the net energy consumed.
- **Multi-Site Budgeting and Forecasting:** Enables customers with multiple accounts to compare site costs, understand aggregated cost and project costs across their portfolio, and includes custom groupings and other budgeting tools.
- **High Usage and Cost Alerts:** Customers can receive notifications for high usage and cost alerts between billing cycles (helping with budget and cost management) and set thresholds for the alerts based on preferences.
- **Monthly/Weekly Energy Reports:** Configurable reports for customer access.
- **Building Assessment Report:** Standard reports with full business energy summary for customer download.

A.6 Future Green Button and Data Sharing

A.6.1 Future Customer Data Access

To continue to modernize the customer experience and enable additional customer-facing features, PSEG Long Island has begun replacing its Meter Data Management System (MDMS). The utility will replace the relevant Customer Portal components leveraging the same eco-system solution which will streamline systems integration and simplify subsequent platform upgrades. This project was approved under the Utility 2.0 2017 filing.

Going forward, the Green Button Download will be available from the Usage page as illustrated in Figure A-15.

Figure A-15. Future Green Button Download Access



PSEG Long Island is planning to implement the Green Button Connect feature. The current timeline for the implementation is as follows:

- Requirements finalization workshop – October 2018.
- High level design: edit existing design document – November 2018.
- Detailed/architecture design – February 2019.
- Iterative development with PSEG Long Island feedback – March/April 2019.
- User acceptance testing – May 2019.
- Production release – June 2019.

After the release, customers will be able to easily navigate between all their accounts.

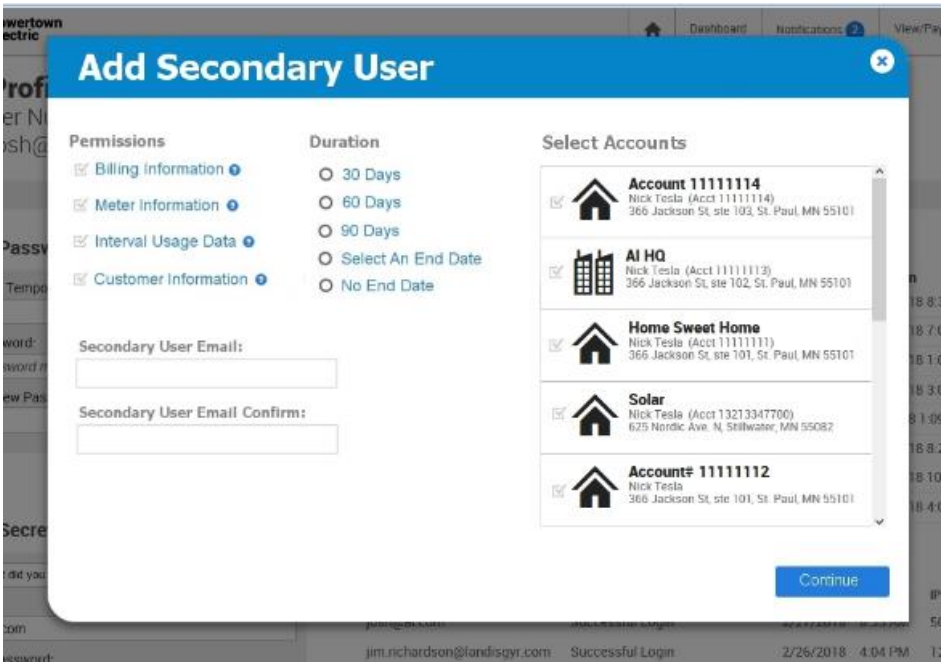
A.6.2 Green Button Download and Other Data Sharing Options

Today, AMI-enabled customers can download their data from any screen into a CSV format, or the federally regulated Green Button. This functionality allows customers to share their data with third parties.

For third-party access to AMI data, PSEG Long Island's current process requires a letter of authorization from the customer to be provided to the PSEG Long Island Data team. The Data team receives data requests from energy service companies (ESCOs), DER vendors, and energy management consultants. The customer AMI data is provided within 5 business days in Excel format; PSEG Long Island can also create a single sign-on for third-party vendors for multiple customers in the current Customer Portal.

It is worth noting that PSEG Long Island took customer and DER vendor feedback on the complexity of using the Green Button data format and implemented more user-friendly options with additional upcoming enhancements (see Figure A-16).

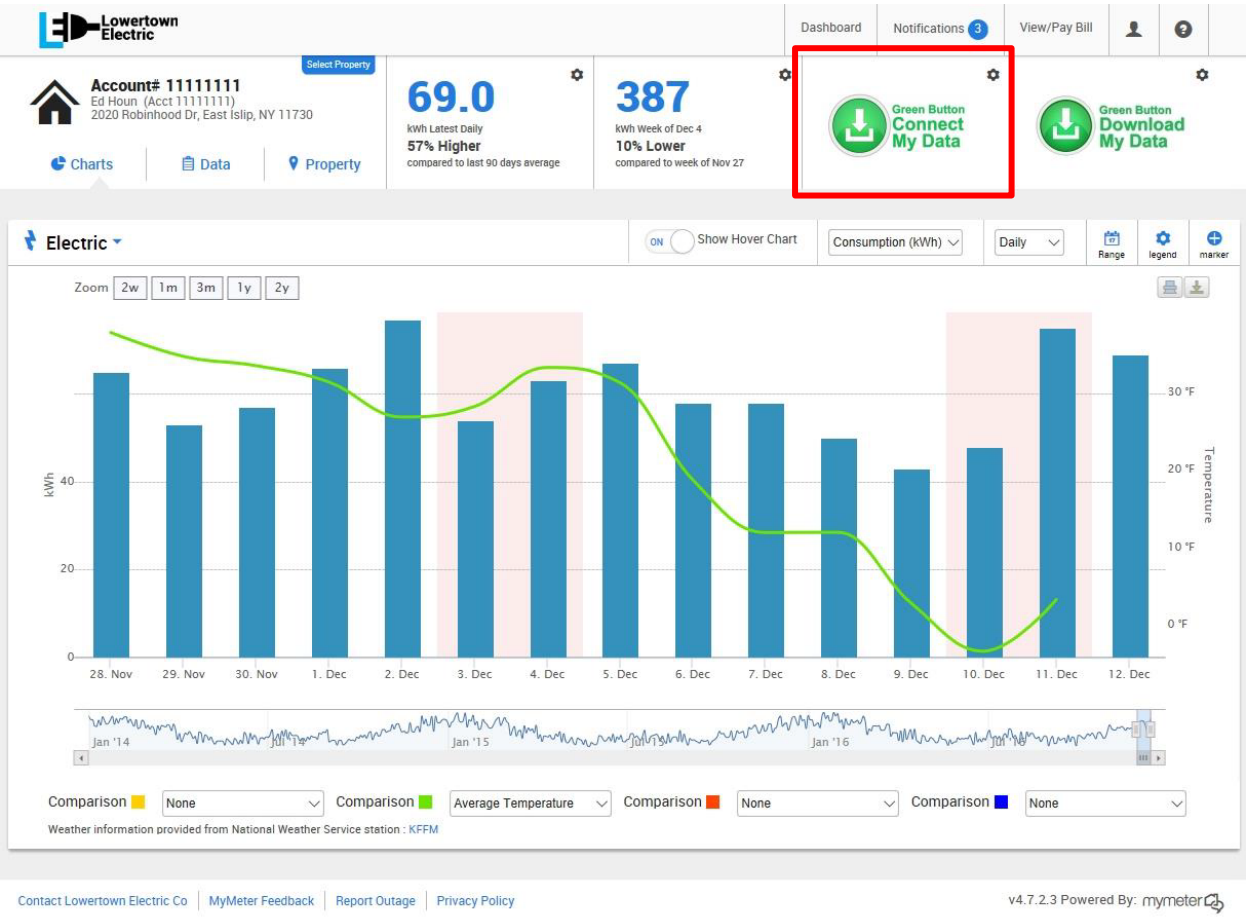
Figure A-16. Customer Portal – Future Third-Party Access Solution



A.6.3 Green Button Connect

To initiate sharing their Green Button data to a registered third-party provider, customers will be required to register their account and log in to the SmartData Connect application. This can be a unique menu item or widget content similar to the existing “Download My Data” functionality. Figure A-17 shows the future Customer Portal webpage where customers will be able to access their usage data and both Green Button functions.

Figure A-17. Future Green Button Connect and Energy Usage Webpage

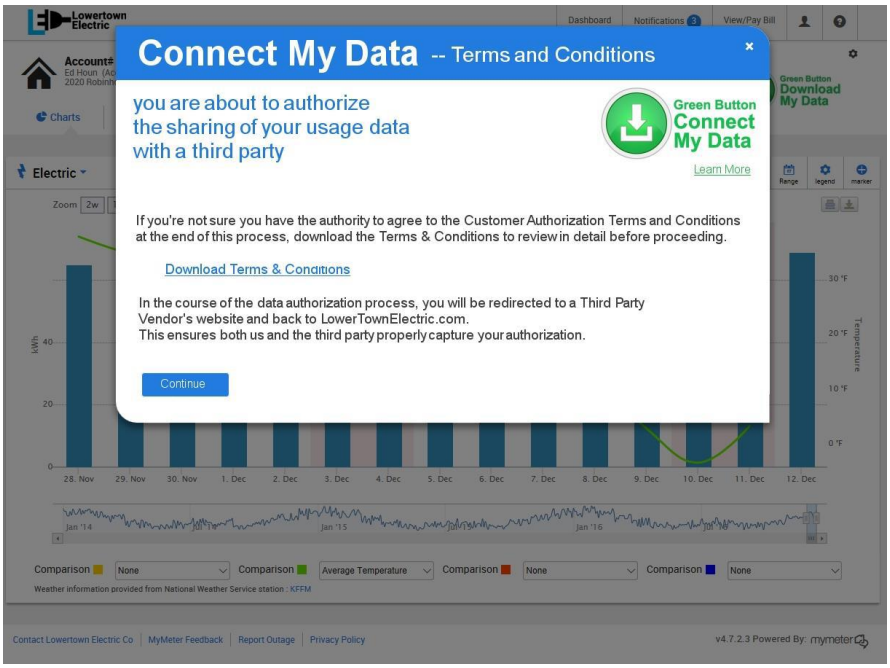


Upon selecting the Connect My Data widget link, or accessing the “Connect My Data” from the drop-down menu, customer will be presented with a setup wizard experience using a series of “overlays” which pulls in content into customer’s Dashboard. The purpose of the overlays is to provide customer education and help step them through a series of guiding questions.

Below steps outline how customers will access and use the Green Button Connect (Connect My Data process):

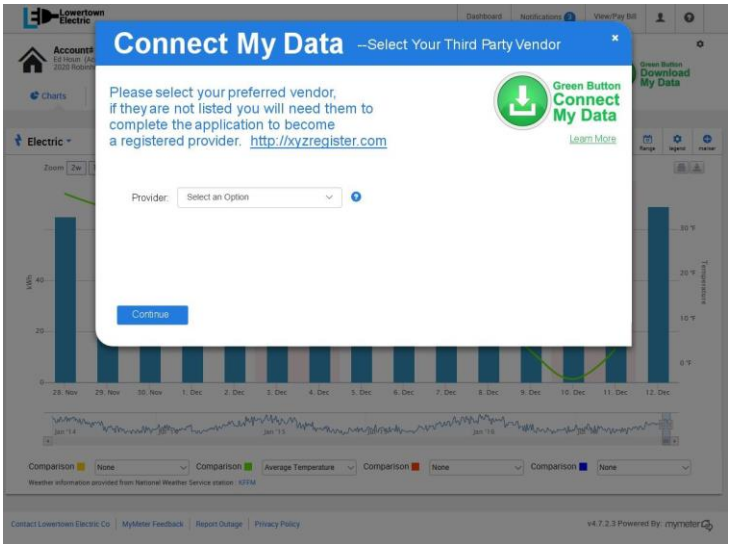
1. In the first step, as illustrated in Figure A-18, customer will be prompted to review data sharing terms and conditions (as defined by PSEG Long Island privacy policy).

Figure A-18. Connect My Data Terms and Conditions Pop-up Screen



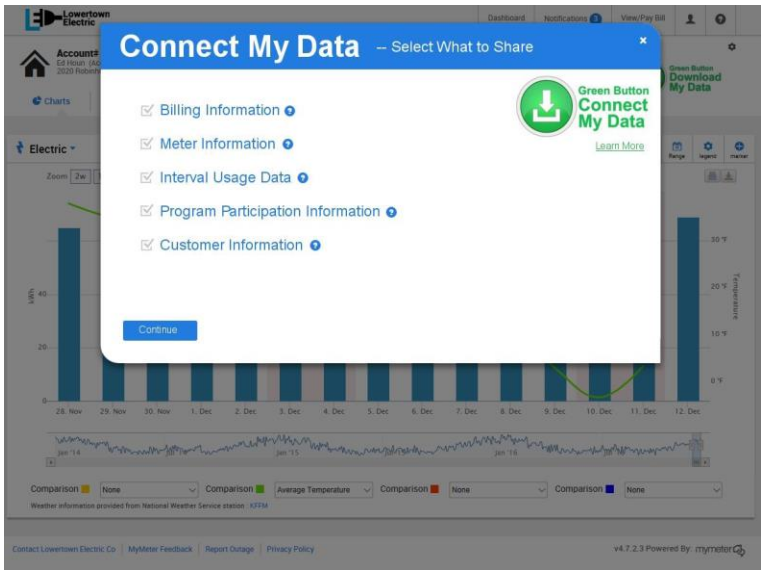
2. Next, customer will be able to select from a list of registered providers with which to connect their data. Additional content can be added to educate and instruct users on steps they can take if their preferred provider is not listed (see Figure A-19).

Figure A-19. Registered Providers Drop-down List



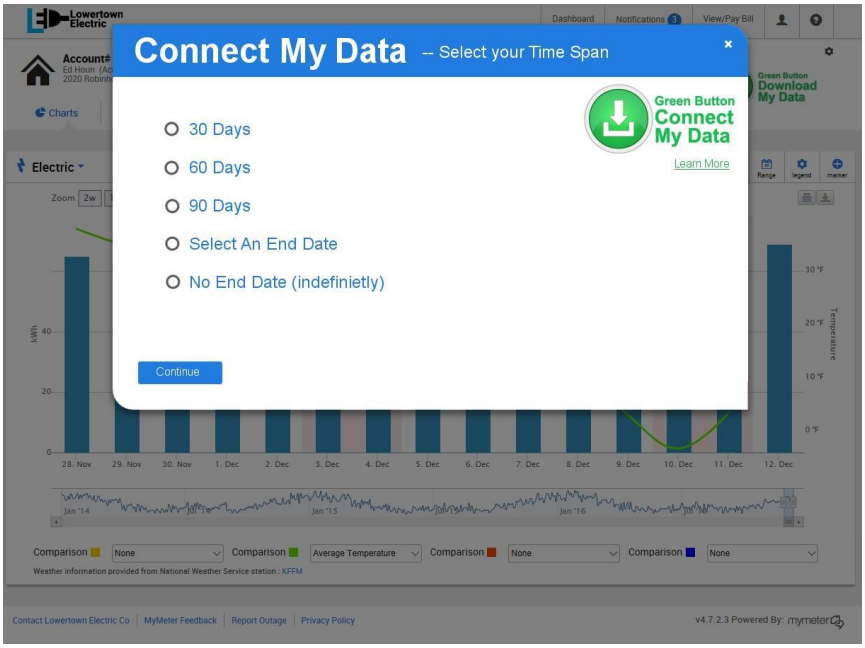
3. After selecting their application provider, customer will be able to select specific data elements that they would like to share (see Figure A-20)

Figure A-20. Connect My Data - Selection of Data Types



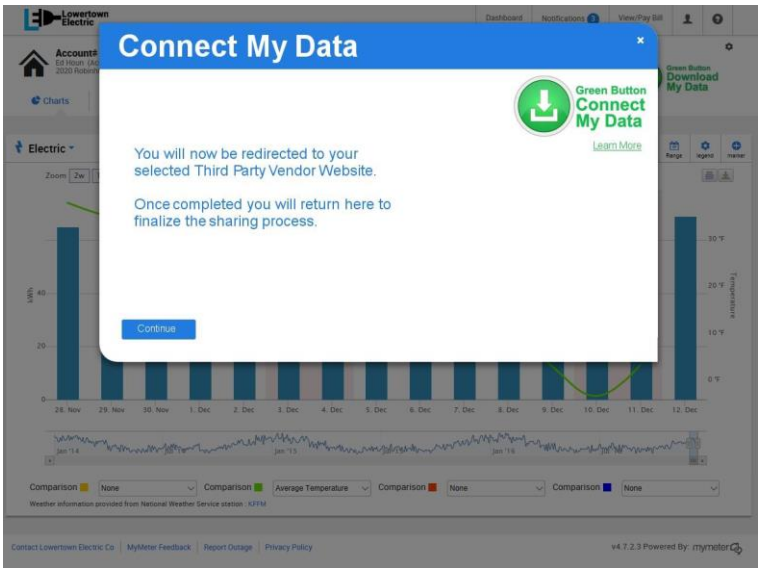
4. Customer will then have a choice of historical time periods for which they would like to share the corresponding energy usage data with the application provider. Figure A-21 illustrates what customers will see on the time period selection pop-up screen:

Figure A-21. Illustrative Connect My Data Time Period Selection Screen



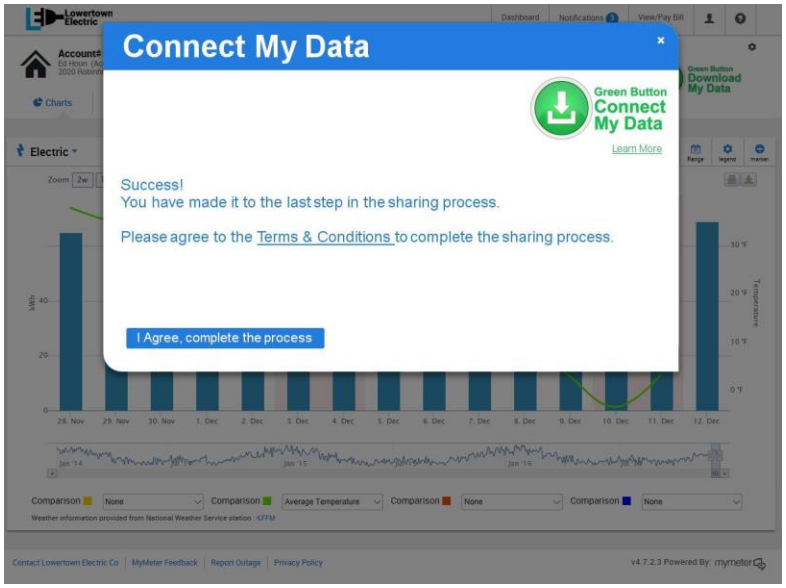
5. After completing the time period selection process, customer will be redirected to the third-party application provider website to complete any additional data sharing requirements:

Figure A-22. Connect My Data Redirect Pop-up



6. Once all the data sharing requirements have been completed, customer will once again be prompted to review the terms and conditions before completing the process:

Figure A-23. Connect My Data Final Step



Once the Connect My Data Wizard process is complete, data will be transferred to the third party via automated web services and in accordance with the settings provided by the customer.

Third-Party Application Provider Registration

Utility administrators will have the ability to restrict the list of third-party application providers that will have access to customer data. To be listed, providers will be required to register and apply to become approved providers available via the Customer Portal.

The registration process will be facilitated by the SmartData Connect portal. Links will be made available allowing providers to navigate to the registration site via other web pages on the PSEG Long Island website.

A.7 Rate Modernization Customer Engagement Plan

A.7.1 Rate Modernization Overview

Under the Rate Modernization initiative, PSEG Long Island's objective is to align itself with New York State REV goals, offering customers rate options that are simple to understand, easy to compare, and that meet the utility's current and future needs. The AMI Smart Meter initiative enables the functionality required to modernize PSEG Long Island's rates and provide customers with a wide variety of options and tools to control electric usage and make cost-effective choices with increased convenience.

The U2.0 Rate Modernization Roadmap (Figure A-25) supports a deliberate and measured approach that allows PSEG Long Island to test and gauge customer acceptance, adoption, and engagement with new rates.

To this end, PSEG Long Island's vision for new rates is to offer customers the following:

- Customer-centric options for obtaining and using energy.
- Easy to understand and easy to adopt rate options.
- Diverse options that reflect the needs of segments.
- Design rate options that allow customers to save money.
- Support of DER.
- Societal benefits such as green energy or low-income programs.
- Personalized tools and solutions that enable effective control and management of energy usage.
- Modernized information system solutions.
- Gadget friendly applications and money- and time-saving features (directed at early adopters and tech-savvy users).
- Easy integration with other technologies and services.
- Means for secure information to be provided to market players.

An important aspect of the Rate Modernization initiative is the design's simplicity—customers can easily understand the effects of rate adoption on their bills, including a clear line-of-sight as to whether it provides them with cost savings or other benefits.

PSEG Long Island's proposed Rate Modernization programs provide the approach for engaging customers to improve customer experience and reduce peak demand to flatten the demand curve. Modernized and sophisticated rates, along with robust customer engagement and home automation systems, also support broader New York State REV goals.

Rate Design Research

To understand lessons learned by other utilities and to use that insight to benefit their Rate Modernization project, PSEG Long Island conducted a best-in-class review of industry research papers as well as in-depth interviews with five peer utilities of similar size, scope, and urban topology. Because many peer utilities have already implemented sophisticated rate designs, PSEG Long Island is in a strong position to leverage those lessons learned for the benefit of its customers.

Rate modernization research specifically focused on four key areas:

1. Customer engagement
2. Innovative rate design
3. Data sharing, home automation, and demand response
4. Cost savings and peak load reduction

Prior to launching the best-in-class research effort, PSEG Long Island considered the selection of peer utilities that would provide the optimal array of experiences to support its effort. Characteristics such as number of meters, customer characteristics, urban/mixed typology, geographic distribution, and status of AMI deployment were all considered. The following peer utilities were contacted as part of this study, which was conducted from February to March 2018: Arizona Public Service (APS), Duke Energy, Pacific Gas & Electric (PG&E), Sacramento Municipal Utility District (SMUD), and Salt River Project (SRP).

This benchmarking exercise had several objectives:

- Gather data from peers on practices contributing to rate pricing plan success.
- Highlight impediments and lessons learned.
- Apply findings to PSEG Long Island's plan to leverage experience of others to improve all phases of the project.
- Establish a peer utility group to act as an ongoing resource throughout the project lifecycle.

Further, the best-in-class research was guided by the desire to develop rate structures that incorporate the principles adopted by the Public Service Commission in the Track Two Order:[61]

Table A-12. Lessons Learned from Best-in-Class Research on Rate Design

Lesson	Description
Cost Causation	Rates should reflect cost causation, including embedded costs as well as long-run marginal and future costs. Fixed charges should only be used to recover costs that do not vary with demand or energy usage.
Encourage Outcomes	Rates should encourage desired market and policy outcomes including energy efficiency and peak load reduction, improved grid resilience and flexibility, and reduced environmental impacts in a technology-neutral manner.
Policy Transparency	Incentives should be explicit and transparent and should support state policy goals.

[61] CASE 14-M-0101 – ORDER ADOPTING A RATEMAKING AND UTILITY REVENUE MODEL POLICY FRAMEWORK Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. APPENDIX A, Issued and Effective: May 19, 2016

Lesson	Description
Decision-Making	Rates should encourage economically efficient and market-enabled decision-making, for both operations and new investments, in a technology-neutral manner.
Fair Value	Customers should pay the utility fair value for services provided by grid connection, and the utility should pay customers fair value for services provided by the customer.
Customer-Orientation	The customer experience should be practical, understandable, and promote customer choice.
Stability	Customer bills should be relatively stable even if underlying rates include dynamic and sophisticated price signals.
Access	Customers with low- and moderate incomes or who may be vulnerable to losing service for other reasons should have access to energy efficiency and other mechanisms that ensure they have electricity at an affordable cost
Gradualism	Changes to the rate design formulas and rate design calibrations should not cause large abrupt increases in customer bills or delivery rate impacts.

Lessons Learned

Customer-Centric Design
Creating successful alternative rate structures requires the incorporation of local Voice of the Customer research. Local research is critical to designing rates that meet the needs of each individual utility's unique customer segments. Not every alternative is right for all customers. Segmentation research enables utilities to understand the lifestyles that would most often adopt each alternative pricing structure as well as identifying customers who would not benefit from each of the rate options.

The "*Case Study: Salt River Project – The Persistence of Consumer Choice*"[62] includes top lessons learned by SRP:

- Make programs voluntary. Make the process easy and pleasant— nothing onerous—and let customers out of the programs if they change their minds at any point.
- Offer pricing programs that help people develop new daily habits and routines that fit their schedules, and that can be communicated visually.

Using message and creative concept testing ensures the right language is used to simply and clearly communicate the benefits of each rate and which customers should adopt the rate. Additionally, research is needed to ensure customers have the information they need after signing up for a new plan to change their behaviors and optimize their experience on the new rate.

Develop Agile Approaches
Establish project management and financial planning processes that are designed to discover and incorporate new insights as the market evolves and customer opinions change over time.

- Utilize pilots and a measured, phased approach to rate plan rollout.

[62] *Case Study: Salt River Project – The Persistence of Customer Choice*, DOE, June 2012, Judith Schwartz

    - Use a small group of customers to pilot rate plans. This ensures that the approach and tools/technology work well and are refined before a full rollout to the customer base.
    - Successful municipal utilities have used the pilot approach very effectively:
        - SRP follows this approach consistently with each new rate plan – they pilot or test the rate plan and approach with a small group of customers before proceeding.
        - SMUD used that pilot approach with their "Smart Pricing Option" (SPO) pilot to test the 4-7 p.m. Peak rate.
        - SMUD also used a slow, phased approach over 5 years to roll out their TOU rate.

- Actively pursue Customer Education and Engagement.
    - New and unfamiliar rate structures and features can lead to customer and market confusion resulting in resistance and low adoption of rates.
    - Proactive customer outreach programs that use a wide variety of communication channels are effective in addressing and eliminating customer confusion and explaining sophisticated TOU offerings in terms that are easy to understand. Well-designed programs that are explained in plain language can help utilities motivate customers to sign up and stay enrolled.
- Be prepared for shifting markets and conditions as customers adopt new rates and change energy usage patterns.
    - SMUD's successful SPO Pilot using a 4-7 pm peak rate lowered demand in the peak period. Customers shifted their peak demand relatively quickly, however a new peak arose beginning at 7 pm. SMUD analyzed the new load pattern and rolled out a 5-8 pm Peak rate to address the new peak demand time.

Design for Savings
Customer rates should be designed to offer clear, easy to understand cost savings that will attract customers into plans that reduce demand during peak times.

- SRP designed residential rates that attracted customers to one of the two TOU rates (EZ-3, TOU) by generating between 5.5% - 6% annual savings compared to the Basic rate.
- SMUD priced their standard or fixed rate on average 4% higher than their TOU rate.

Reward Peak Demand Reduction
Set peak to super off-peak pricing ratios at a 3 or 4:1 ratio. Establish rates to motivate customers to change behaviors and shift demand away from peak periods and into off-peak or super off-peak periods.

- Xcel Minnesota researched and used best practices to design their new residential TOU rate. The widely-endorsed Minnesota rate was largely designed by Strategen Consulting Sr. Director Lon Huber. "The price ratios were informed by best practices across the U.S." he said.
- As shown in TOU studies detailed in another appendix of Xcel's filing, a less than 2:1 peak-to-off-peak price ratio produces only a 6% average reduction in peak demand. A 4:1 peak-to-off-peak price ratio produces an average 15% reduction in peak demand.

Communicate Environmental Benefits
Data from the E Source Residential Customer Insights Center indicates that saving money is still the primary motivation for utility customers of all ages, but the 18–34 age group in particular shows more

interest than other age groups in protecting the environment. Motivating these customers to protect the environment could be an important strategy for marketing TOU rates. The following utilities are among those that focus on the environmental benefits in addition to the potential savings:

- NV Energy points out customers are creating an environmental benefit by joining the TOU rate.
- Time of Use Electricity Pricing: *Savings When They Matter (PDF)* from the Environmental Defense Fund describes the environmental benefits of choosing TOU pricing in California, noting the potential reductions in power plant emissions and improvements in local air quality.
- Residential Time-of-Day Rate from SMUD explains how shifting electricity use to off-peak times prevents the need for the utility to purchase energy from "more expensive and less environmentally friendly sources."
- Portland General Electric offers Green Future options that have attracted a community of more than 150,000 PGE participants who support local, renewable power. Green Future products include:
    - Green Source is a rider that adds $0.008 per kWh to the Basic Service price to cover the cost of providing all a customer's electricity from renewable energy. The impact averages about $6 more per month.
    - Clean Wind allows a customer to contribute $2.50 per 200 kWh block toward electricity generated by Northwest wind power. A portion of the purchase goes toward developing new renewable resources in Oregon and a portion goes to purchase new wind power from the Northwest. Customers may purchase as many blocks as they like.
    - Green Future Solar which features 2,935 1 kW "blocks" of solar energy available for residential and business customers from a local solar project in Willamina, Oregon.
    - Habitat Support is an "add on" rider. When a customer signs up for Green Source, Clean Wind or Green Future SolarSM, they can also add Habitat Support. The additional monthly fee of $2.50 goes directly to The Nature Conservancy and is dedicated to restoration of local fish habitat.

Provide Personalized Information

Generic education and awareness information is important to pique a customer's interest in a new rate program. However, for customers to make the decision to change rates requires providing clear and specific information how these rates can benefit their lifestyle, including how and when they consume electricity for their specific account. Tools that utilities deploy for residential TOU rates include on-bill information, online rate comparison tools, and end-of-period assessments.

The "Case Study: SRP – The Persistence of Consumer Choice"[63] noted: *Help people choose the programs that are right for them by asking simple questions that reflect their living situations and concerns. A combination of interactive tools for preliminary research, secure account-specific rate comparisons, and support from customer service will allow customers to determine the "best rate" for their residence and allow the utility to achieve broad adoption and persistent participation.*

- **On-Bill Information**
    - Toronto Hydro includes a small TOU comparison table on the bill.

[63] *Case Study: Salt River Project – The Persistence of Customer Choice*, DOE, June 2012, Judith Schwartz

- **Online Rate Comparison Tools**
    - Peak Usage Demand Calculator from APS gives customers an idea of how much peak demand their premises generally use and how changing rate plans might affect their energy costs.
    - TOU Rates from Madison Gas and Electric Co. (MGE) includes a "Benefit Worksheet" that provides individualized guidance on whether TOU rates are a good fit for a customer.
    - TOU Calculator from Portland General Electric calculates potential savings for customers based on hypothetical usage patterns.
    - Residential Rate Comparison from Southern California Edison helps customers compare their available rate options, including TOU rates.
- **CSR Tools**
    - SMUD utilizes analytics services to empower CSRs with a modeling capability. CSRs can model customer's historic usage on an alternative rate plan, including walking through the "what if scenarios" and modeling those behavior changes in real-time with the customer. Providing this in-depth energy consulting significantly increases the chances of adoption and retention.
- **Rate Comparison Reports**
    - Personalized rate comparison reports can be proactively mailed or emailed to customers. SMUD has worked with their platform provider to identify 13 different customers segments, each with unique personalized rate comparisons and different segmented messages on the report to address customer's unique needs and communication styles.

Provide Simple Clear Choices
While customers prefer an option, providing too many can produce "choice paralysis" and reduce satisfaction. Research by Sheena Iyengar and Mark Lepper from Columbia University discovered these impacts on shopping and the results of too many choices.

In 2017 E-Source conducted ethnographic research nationwide regarding electric rate design and verified the importance decision simplicity. Utilities need to make it easy for customers to gather and understand choices. Designing user-friendly rates and providing simple choices that fit our customer's lifestyles while making the benefits clear for each customer is critical. Providing only 3 or 4 meaningful different options leads to greater rates of adoption. Guiding and advising customers to the best choice for their specific electric usage and lifestyle is optimal.

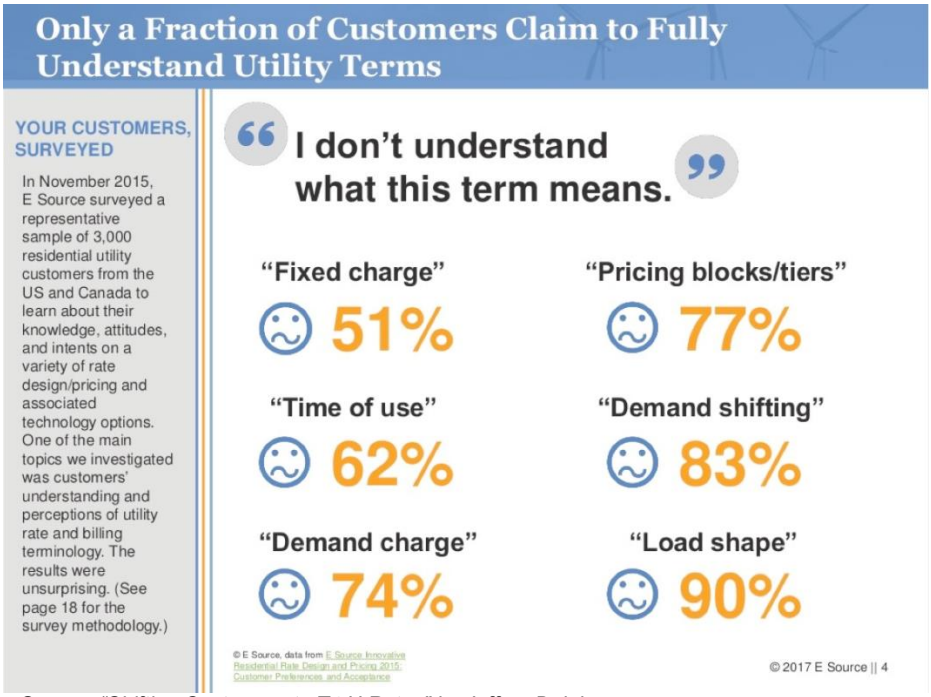
Pitfalls to Avoid

"Evidence shows that well-designed rates can have significant impact, but also that poorly designed rates can have a negligible impact (which may ultimately be counterproductive)," researchers noted.

Make TOU Easy to Understand
More than a quarter of the residential customers surveyed for the E Source *Innovative Residential Rate Design and Pricing: Customer Preferences and Acceptance* study reported having a poor understanding of their utility bill—and a whopping 62 percent say they do not understand the term "TOU".

- Using a long peak time in a TOU rate does not allow customers to shift their energy usage to lower off-peak times.

- Using a low peak to off-peak ratio in a TOU rate does not provide incentive to change customer behavior.
- Providing too many similar rate design choices to customer is confusing.
- Providing unclear, difficult to understand rate descriptions is confusing to customers.
- Many customers struggle to understand the billing terms that utilities use to communicate with customers about TOU rates, such as “time of use”, “pricing tier,” and “demand shifting.”



Source: “Shifting Customers to TOU Rates” by Jeffrey Daigle

Avoid Customer Confusion

In addition to offering too many choices, utilities need find simple clear pricing plan names instead of vague or confusing labels that don’t clearly communicate what type of rate the plan represents. One good example of utility offering simple clear choices for TOU rates comes from SRP. They have two TOU rate plans, one with a short 3-hour peak (EZ-3) and the other labeled TOU with a longer peak window. The choices are clear and easily understood by the customers.

Figure A-24. SRP TOU Rates



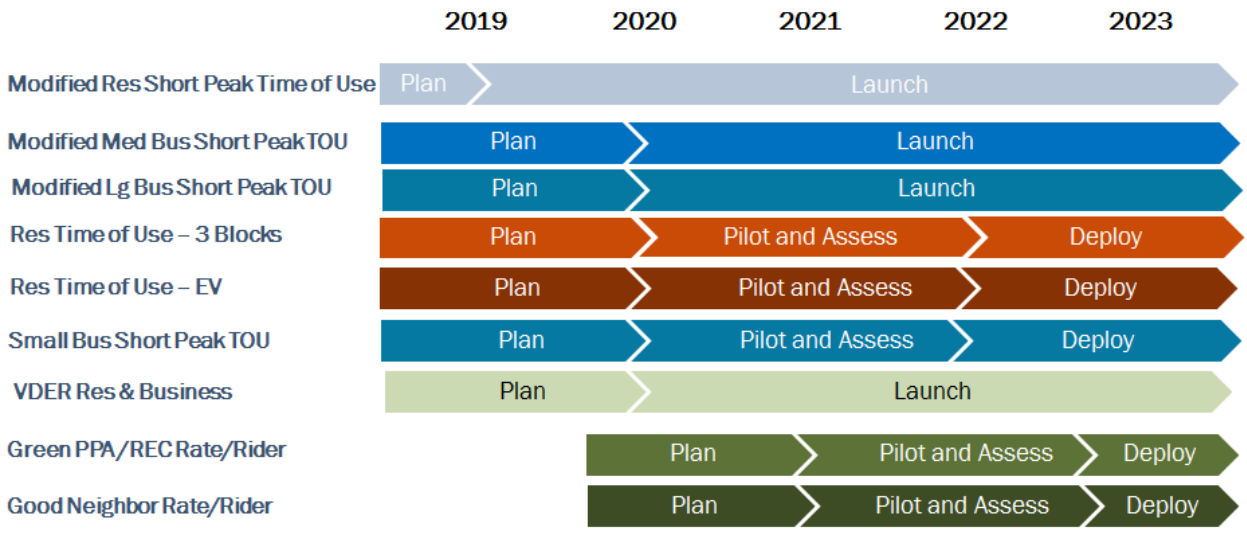
Do Not Ignore Change Management Impacts

During on-site visits with both SRP and SMUD, customer operations directors stated that one of the most significant lessons learned was in internal training and change management. When customers call about rate options, the discussions were often in-depth and lengthy. This additional impact to staffing wasn't initially accounted for. Additionally, providing the proper tools to CSRs, such as a rate comparison calculator and developing clear simple ways for explaining complex rates were needed. Providing this personalized customer information along with easy to access reference materials that could be shared with customers helped shorten conversations.

PSEG Long Island - Rate Modernization Deployment Plan (Summary)

PSEG Long Island drafted the 5-year U2.0 Roadmap in Figure A-25 based on industry analysis and early high-level customer feedback. The series of phases, each broken down into stages for planning and development, piloting and assessment, targeted launch, and full deployment for each new rate implemented a method for measuring new pricing options that was successful for other customer-centric best-in-class utilities.

Figure A-25. Roadmap for Measuring Newly Implemented Rates



PSEG Long Island researched industry best practices and leading-edge technological advances to consider a wide variety of rate options and to avoid pursuing paths that create customer dissatisfaction or undesirable changes in customer behavior. Rate structures and customer engagement options were reviewed against the New York State REV objectives and other needs such as, reducing peak load, flattening demand curves, and offering opportunities for customers to save money.

Detailed description of new rate options on the roadmap can be found in Section 2.3.4.1 Proposed Rate Structures of the AMI business plan as well as more detail on the creation and development plan for each new rate option below.

A.7.2 Rate Opt-In Strategy

Opt-out programs have been piloted with some success at utilities such as SMUD. Prior to electing an opt-out strategy, SMUD had a widely communicated and successful voluntary opt-in pricing option for TOU for a long time period.

Like SMUD, PSEG Long Island will begin the launch of TOU and other pricing plan opportunities as voluntary opt-in programs. As these programs become widely known and successful voluntary enrollment is achieved, PSEG Long Island will then evaluate and potentially experiment with select opt-out strategies.

A.7.3 Rate Pilot Plan

PSEG Long Island plans to implement a set of residential and business rates, beginning with a pilot stage that includes comprehensive analyses, evaluation of enabling technologies, and customer research. The utility will consult regularly with LIPA and Department of Public Service staff regarding any material changes in the piloted rates that result from these activities.

The goal of the rate pilots is to identify how innovative rate structures can engage customers to actively change behaviors, reduce peak demand, flatten the load curve, and implement new demand automation technologies in a cost-effective manner. Industry research identified a wide variety of pilots and testing mechanisms for sophisticated TOU and time variant pricing structures. To this end, PSEG Long Island sought advice from industry experts and reviewed customer experience and customer satisfaction results for rates and riders designed for mandatory hourly pricing, critical peak pricing, variable peak pricing, TOU, green renewable, battery storage/EV, and others (see Section 2.3.4.1 Proposed Rate Structures).

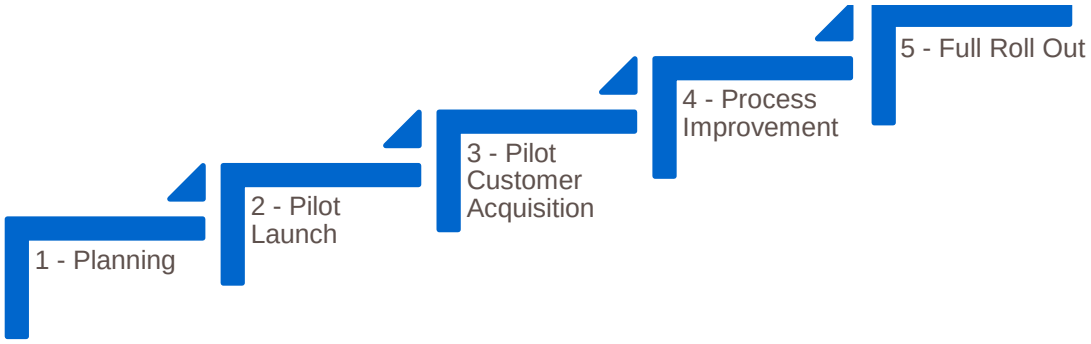
Pilots are not intended to repeat scientific analyses already conducted by other utilities; they will use the best practices and lessons learned to inform our rate design. Utilizing this research and experiences of other utilities, combined with local customer research, PSEG Long Island will optimize the initial rate design and customer engagement. Pilots with a targeted number of customers will be used for PSEG Long Island to ensure systems, training, communication, and rate design function optimally prior to release to a larger audience. Customer research will be conducted before, during and after the pilot and adjustments will be made to the program, communication, and engagement tools based on the Voice of the Customer feedback.

Significant evidence exists to support the observation that optional pricing plan adoption such as those listed leads to improved customer satisfaction and customer experience.

Previous rate pilots conducted with PSEG Long Island have led to the recommendations in this plan. These lessons learned include proposals for TOU rates to shorten the peak timeframe, to increase customer saving potential (by including both delivery and power supply components), to provide better tools to compare rate options, and to provide more engaging information regarding consumption for each time-period. New pilots will be planned comprehensively to include the elements described above in the Customer Engagement Plan.

The stages described in Figure A-26 are designed to move quickly and efficiently through five phases in step sequence:

Figure A-26. Five Phases for Rate Pilot Release



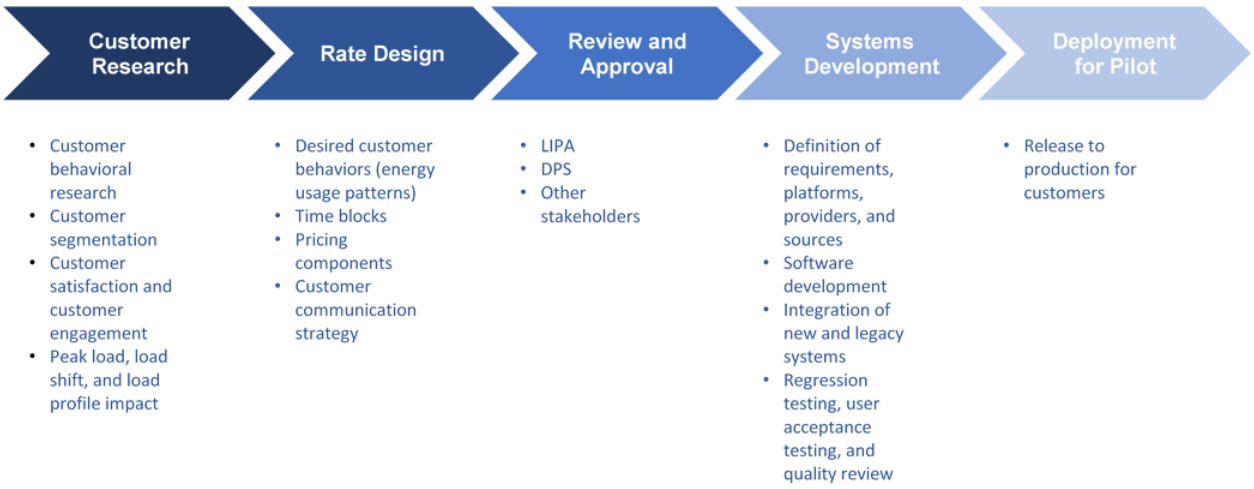
A.7.4 Rate Development Process Flow

Planning - Designing Rate Sets & System Requirements

Designing and implementing a successful rate is a complex, multi-step endeavor:

- The process requires research, analysis, collaboration, and forecast modeling before a rate or set of rates can be fully defined and IT requirements developed.
- Once rates are approved by LIPA and recommended by the Department of Public Service (DPS), detailed system requirements are developed and the level of effort projected.
- Project management and IT system development teams then design cost-effective and efficient software solutions that integrate with all new and legacy systems, platforms, and databases.
- When development and testing are complete, the new features can be deployed to customers in the live production environment.

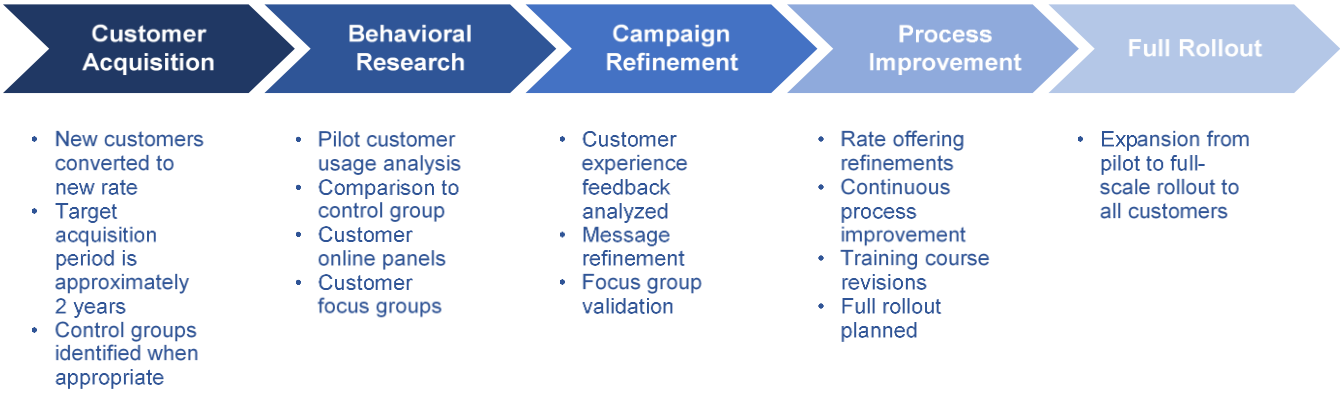
Figure A-27. Deployment of Rate Pilot Process



Pilot Launch, Customer Acquisition & Full-Scale Rollout Planning

Following the release of the new rates in the pilot, customer reactions and feedback are reviewed intensely and continuous process improvement projects undertaken to address any performance shortfalls or inefficiencies. Processes are refined and improved, employees are trained and coached for optimal performance, and additional systems enhancements are released in preparation for full-scale rollout to all eligible customers.

Figure A-28. Full-Scale Rollout of New Rates Process



PSEG Long Island has a detailed plan for customer enrollment. Figure A-29 provides a forecast by rate structure through 2030. This represents the projected levels of customer enrollment across all programs, and the customer engagement budget for rate modernization is structured accordingly.

Figure A-29. Customer Deployment Forecast

Rate Structure	Parameter	Units	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Res TOU - 3 Blocks	Res TOU Rate Deployment	%of res cust	0.0%	0.5%	1.0%	2.6%	4.1%	5.7%	7.2%	8.8%	10.3%	11.9%	13.4%	15.0%
	Res TOU Enrolled Customers	# customers	0	5,087	10,205	26,156	42,200	58,338	74,569	90,893	107,311	123,823	140,430	157,132
Res TOU - EV	Res TOU Rate Deployment	%of res cust	0.00%	0.120%	0.27%	0.6%	1.2%	1.7%	2.3%	2.9%	3.5%	4.0%	4.6%	5.2%
	Res TOU Enrolled Customers	# customers	0	1,223	2,748	6,102	12,018	17,969	23,954	29,973	36,027	42,116	48,240	54,399
VDER Res and Business	Res VDER Rate Deployment	%of res cust	0.00%	0.43%	0.8%	1.1%	1.3%	1.5%	1.7%	1.8%	2.0%	2.12%	2.2%	2.36%
	Small Com VDER Rate Deployment	%of com cust	0.00%	0.05%	0.08%	0.12%	0.14%	0.17%	0.18%	0.20%	0.22%	0.23%	0.24%	0.26%
	Large Com VDER Rate Deployment	%of com cust	0.00%	0.11%	0.19%	0.27%	0.33%	0.38%	0.42%	0.46%	0.49%	0.53%	0.56%	0.59%
	Res VDER Rate Enrolled Customers	# customers	0	4,409	7,838	10,900	13,349	15,554	17,392	19,107	20,700	22,047	23,402	24,764
	SB VDER Rate Enrolled Customers	# customers	0	23	41	57	70	81	90	99	107	114	121	128
	LB VDER Rate Enrolled Customers	# customers	0	68	121	168	206	240	268	294	318	339	360	381
Small Business Short Peak TOU	SB Short Peak TOU Rate Deployment	%of com cust	0.0%	0.5%	1.0%	2.6%	4.1%	5.7%	7.2%	8.8%	10.3%	11.9%	13.4%	15.0%
	SB Short Peak TOU Enrolled Customers	# customers	0	241	485	1,243	2,007	2,776	3,551	4,331	5,116	5,907	6,703	7,505
Green Rate (PPA + REC)	Res Green Rate Deployment	%of res cust	0.0%	0.0%	0.10%	0.2%	0.4%	0.6%	0.8%	1.0%	1.2%	1.4%	1.6%	1.8%
	Com Green Rate Deployment	%of com cust	0.0%	0.0%	0.10%	0.2%	0.4%	0.6%	0.8%	1.0%	1.2%	1.4%	1.6%	1.8%
	Res Green Rate Enrolled Customers	# customers	0	0	1,020	2,047	4,106	6,177	8,260	10,355	12,462	14,581	16,712	18,856
	SB Green Rate Enrolled Customers	# customers	0	0	48	97	195	294	393	493	594	696	798	901
	LB Green Rate Enrolled Customers	# customers	0	0	63	126	254	382	511	641	771	903	1,036	1,169
Large Business Short Peak TOU	LB Short Peak TOU Rate Deployment	%of com cust	0.0%	0.0%	0.0%	0.5%	1.0%	2.6%	4.1%	5.7%	7.2%	8.8%	10.3%	11.9%
	LB Short Peak TOU Enrolled Customers	# customers	0	0	0	316	634	1,625	2,624	3,630	4,643	5,662	6,689	7,724

A.7.5 PSEG Long Island Customer Experience & Early Research Findings

PSEG Long Island's Voice of the Customer research has been used to enhance numerous programs, processes, and services from the customer standpoint. These positive changes in the customer experience are reflected in increased satisfaction scores across the board, both in transactional and perception surveys.

Over the last 4 years, PSEG Long Island is the most improved large electric utility nationwide based on the JD Power Electric Utility Residential Customer Satisfaction Study. Year-to-date in the 2018 survey, PSEG Long Island is no longer the lowest rated utility in the East Large brand peer set. While many experiences have improved significantly, as reflected in surveys and customer focus group conversations, price of service and lack of pricing options trail significantly behind PSEG Long Island's peer set. Over 30% of PSEG Long Island customers are still dissatisfied with pricing and price options.[64]

To achieve its goal to become a customer-centric, top quartile company, PSEG Long Island must be able to provide meaningful customer-centric pricing options. Currently, 94% of residential customers are on the basic rate plan, with options only for special classes of customers such as low income or electric heat and hot water. Rate structures do not incentivize customers to alter behaviors to minimize system costs, which contributes to higher rates. Small business customers are in the same position, while medium and large businesses have an older version of time-varying rates. The foundational technology is not adequate to support modern, cost-effective, diverse rates.

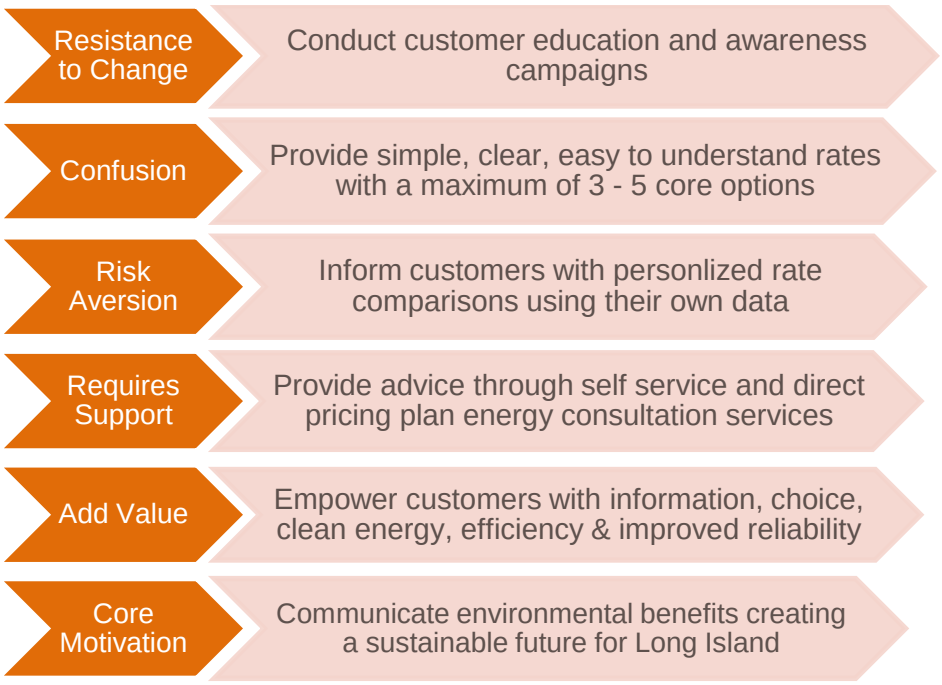
PSEG Long Island conducted initial research to understand its customers' needs around pricing and Rate Modernization. In addition to obtaining and reviewing an extensive collection of secondary research, the utility held several focus groups in March and June 2017 around pricing and rate innovation to understand customer emotional responses and needs in relation to current and future pricing options.

This early research and the initial results of customer interviews being conducted this year by ILLUME Advising[65] highlight common concerns and ways for PSEG Long Island to fulfill customer requirements related to the adoption of new pricing plans:

[64] JD Power "2018 Electric Utility Residential Customer Satisfaction Study" YTD

[65] ILLUME Advising provides research and consulting services that leverage emerging technology, empathy-focused research, and data analytics to deliver customer-centric program design strategies. ILLUME has conducted extensive customer research for the California Public Utilities Commission (CPUC) and utilities such as PG&E, Consumers Energy, DTE Energy, Georgia Power, Xcel Energy, Pepco, National Grid, and MASS SAVE programs.

Figure A-30. Customer Experience Early Research Findings



Combining lessons learned from its past AMI deployment experience and those gathered from the implementation best practices benchmarking, rate design best-in-class, and Voice of the Customer research, PSEG Long Island has developed tools and built a solid foundation from which to start along the U2.0 Roadmap leading to full AMI rollout.

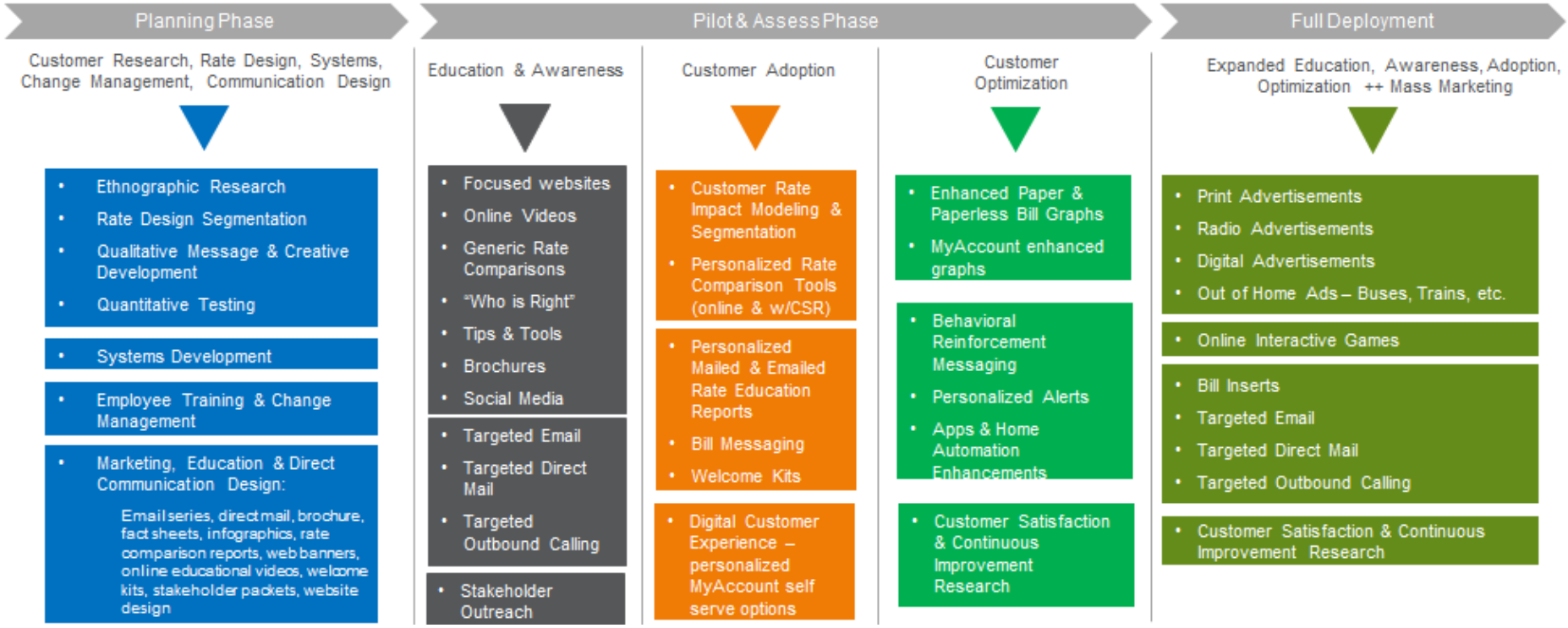
A.7.6 Rate Modernization Customer Engagement Plan

Specific attention will be focused on engaging customers regarding Rate Modernization, and how it can expand the benefits customers receive from AMI. As specific rates are developed, approved and activated, the customer engagement approach will be consistent in its execution. Research and segmentation will be used to identify those customer segments within the overall customer base that show a propensity to participate in a rate or characteristics that would benefit from enrollment.

Customer outreach will be conducted through targeted email, social, direct mail and organization or community based outreach. The exact communication channels selected may be dictated by the communication preference or capabilities of the target audience. Messaging will be driven from segmentation research and could include customer testimonials, benefit summary and include enrollment incentives which has proven successful in other enrollment programs such as paperless billing. Education and reinforcement is critical to retention.

Six key areas have been identified for engaging and attracting customers to adopt new, unfamiliar and sophisticated rates including Customer Research, Customer Education & Awareness, Customer Adoption, and Customer Optimization (supported by Internal Training and Change Management) as well as Stakeholder and Community Group Involvement.

Figure A-31. Rate Modernization Customer Engagement Plan



Customer Research

Customer Research is required to design customer-centric rates that provide meaningful solutions, engage customers successfully, and result in behavior change. Extensive research focused on each individual rate and its target audience is required. PSEG Long Island is committed to considering and incorporating feedback and opinions documented through Voice of the Customer research. Key research for the successful rollout of pilots and full-scale launches include segmentation and ethnographic studies, online panels, focus groups and individual interviews to validate customer-centric rate designs that provide meaningful solutions that engage customers.

- **Ethnographic Behavioral & Rate Design Research:** PSEG Long Island has begun research to gather specific and actionable recommendations to drive the strategic direction of newly designed rate offers and service bundles. This exploratory and immersive ethnographic study will examine customer's wants, needs, attitudes, and potential receptivity to rate innovation and the supporting products and services that may be required to ensure their ongoing satisfaction. This research will also provide high-level insights into how to begin crafting messaging that will resonate specifically with Long Islanders and enable PSEG Long Island's customers to feel engaged as partners in innovation.
- **Rate Design Customer Segmentation Studies:** PSEG Long Island will conduct consumer tests that provide an experimental approach to determining customer preferences. Customers will be able to select their ideal rate package through a series of rate selection experiences to reveal the drivers to customer rate preferences. Along with attitudinal data collection and integration of customer demographics and engagement profiles, targeted segments will be identified for each rate option evaluated.
- **Focus Group & Customer Interview Message Testing:** Drawing on the insights generated in the ethnographic and segmentation studies, focus groups will be used to hone the communication strategy, test messaging, and creative themes to be used in presenting potential rate plans to key PSEG segments.
- **Quantitative Message Testing:** Once the communication strategy and key messages are tested qualitatively, PSEG Long Island will conduct a quantitative test to identify the best messages for each segment of the population within the service territory.
- **Customer Satisfaction & Continuous Improvement Research:** Once rates have been launched in the market, both during pilots and throughout a phased deployment, additional research is needed to understand customer's experiences with the rate design, the communication process, messaging, and other behavioral support provided by PSEG Long Island. This research is critical to understand the customer impacts of a program and continuously evolve and optimize design and delivery.

Customer Education & Awareness

Customer Education and Awareness is necessary to inform customers about the new rate opportunities and develop interest in learning about the best fit for their lifestyle. A wide variety of channels are planned to educate and inform customers about new rate opportunities and develop interest in learning about the best fit for their lifestyle using a diverse multichannel education and awareness campaign, including:

- **Focused website pages –** microsites dedicated to learning more about each rate option
- **Online educational videos –** fun visually engaging online introduction to each rate option
- **Online generic rate comparisons –** average customer rate comparisons on the web

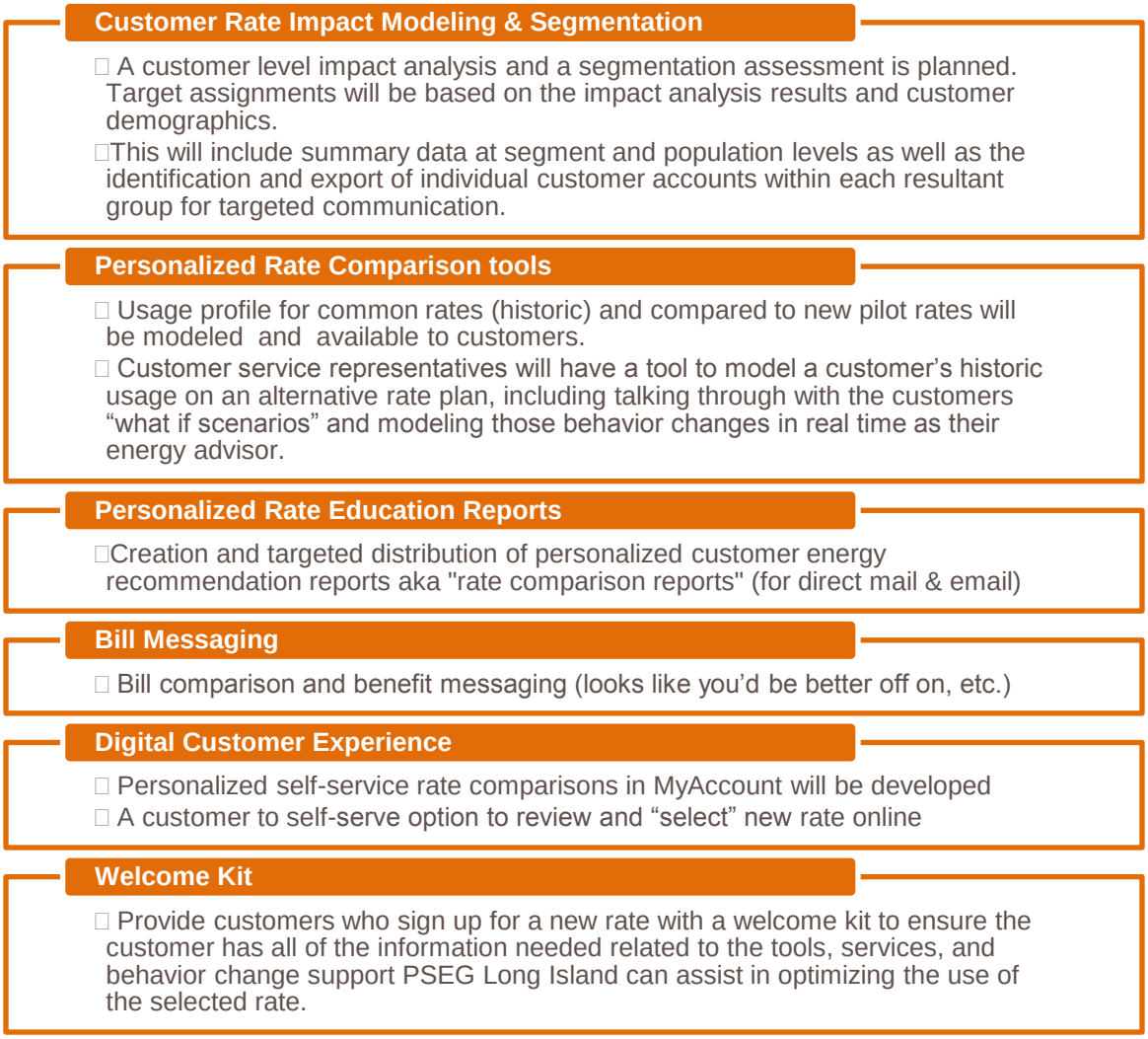
- **"Who is Right" for Each Program –** clear guidance for the right lifestyle for each rate
- **Tips & Tools –** information on how to maximize benefits and shift usage on each rate
- **Infographics –** simple easy to understand graphical representation of information
- **Fact Sheets –** basic core information about each rate
- **Brochures –** additional information for customer centers, fairs, and other events
- **Social Media –** Online sweepstakes offers for TOU, EV, Green and Good Neighbor pilot acquisition
    - Share on Facebook and Twitter
    - YouTube videos, (views and shares)
    - Facebook Live Q&A
    - You Asked, We Answered
    - Gamification – (SMUD style - Attack of the Phantom Appliances)
    - Customer Testimonials
- **Targeted email and direct mail –** targeted communication to customers likely to adopt
- **Digital Advertising –** Targeted informational and educational campaigns designed to reach customers through online websites (desktop, tablet and smartphone)
- **Targeted Outbound Calling –** targeted communication to customers likely to adopt
- **Full Launch Advertising & Marketing –** after pilot concludes, a multichannel approach to informing and engaging the larger customer base for the larger more broadly adopted rates, such as TOU, will include a variety of print, radio, out of home (bus and train) advertisements.

Customer Adoption

Customer Adoption is dependent upon access to information about each customer's personalized energy consumption. Changing rates can have a major impact on the customer experience. Customers need to know that the choice is right for them using their personal history, home facts, and lifestyles and then to move forward with the selection of a new pricing plan.

The steps below will be taken to lower the impact by educating customers on their rate options and helping them make the right choice using their personal history, home facts, and lifestyles.

Figure A-32. Rate Modernization Customer Adoption Components



Customer Optimization: Tools and Outreach

Customer Optimization will begin once a customer chooses to opt-in to a new rate. PSEG Long Island will issue proactive, personalized information, tools and communications to assist each customer in achieving their desired results (shifting load, avoiding costs, reducing overall usage and/or monthly bills) and feel good about the choice they made (contributions toward a green energy future, trees saved, carbon emissions reduced).

Once a customer has selected the new rate additional proactive personalized information, tools, and messaging are needed to maximize benefits and improve the customer experience.

- **Paper & Paperless Bill Graphs**
    - Develop enhanced on-bill graphs and charts to display time block data (e.g. peak, off-peak, super-off-peak) in addition to current supply and delivery data

- **My Account Enhanced Graphs**
    - Enhance/revise usage graphs to display stacked bars for TOU time block data and break down chart to display TOU time block data along with Supply and Delivery.
    - Mobile device access and iOS/Android apps will offer customers tips about saving money or reducing peak energy usage based on customer usage history.
- **Behavioral reinforcement messages**
    - Add benefit messaging to bills, home energy management reports and alerts
- **Alerts supporting behavior**
    - Update MyAlerts to offer text, email and smartphone alert reminders and notifications for TOU and Value of Distributed Energy Resources (VDER) rates to assist customers in changing behaviors to minimize Peak rate usage.
    - Alerts should be sent when approaching peak periods and/or after accumulating a specified level of usage and trending to exceeding those limits in high cost time blocks.
- **Apps & Home Automation**
    - iOS/Android apps – Data display, trending, gaming, social media sharing. Presentation and sharing of data and infographics through social media platforms like Facebook, Twitter, Instagram and Snapchat
    - Amazon Echo Integration

Stakeholder & Community Group Involvement

Long Island residents and businesses have many interests that are served by local governments, special interest groups, and other community based organizations. These groups provide an important source for feedback as well as engaging their membership base in new programs and services PSEG Long Island delivers. For each new rate option being delivered, the utility's engagement plan will include outreach and coordination with the relevant stakeholders and community groups. These stakeholders will be identified and materials developed during the planning phase for each new rate option (See Rate Deployment Plan in Section 2.3.4.2).

Stakeholder and Community Group Involvement programs will be active through the Community Partnership Program, Energy Efficiency and Renewables, Corporate Communications, External Affairs and other departments. Stakeholders and community groups will receive updates and information packets explaining new rates and how they benefit customers and the community. PSEG Long Island is planning to coordinate with the relevant stakeholders and community groups and developing stakeholder information packages, delivering presentations, and providing handouts or other meaningful materials.

Segmentation research of the customer base for each specific rate design will identify customer lifestyles and thereby key stakeholder or community groups can be identified to target for involvement. Characteristics of rate design such as a green or electric vehicle rate will help identify stakeholder or community group to engage. Environmental groups such as the Sierra Club, Citizen's Campaign for the Environment, The Long Island Pine Barren Association and others could be solicited to help leverage their influence among local leaders in addition to their members. The creation of collateral that they can share with members and other influencers highlighting the environmental benefits of customer electric rate options could provide some added value to their membership.

Low Income & Special Protection Outreach

PSEG Long Island's low-income customers will enjoy the many advantages that the new rates can provide to manage their consumption and utility costs as well as the numerous environmental benefits. Engagement with low income customers will focus on Advocacy, Education and Outreach by utilizing current partnerships with Health and Human Service agencies to promote and educate about the benefits of new rates. Additional avenues of outreach are currently being explored (i.e. school systems, area hospitals, etc.) to expand our educational footprint.

PSEG Long Island will continue to support the low-income population with energy efficiency, promotion of current household assistance rate program and any new rates that may afford savings for those customers. Education and training will also include customer utilization of the Customer Portal tools to assist them with managing and understanding their usage.

Currently PSEG Long Island communicates with low income customers through our promotion of financial assistance programs several times a year. These segments are provided information through bill inserts, in-bill newsletters, and direct mail on topics such as United Way's Project Warmth programs, our Residential Energy Assistance Program and Household Assistance Rate.

PSEG Long Island publishes a letter each year to our special protection customers (elderly, sight or hearing impaired) on how to stay safe and how to report an outage in a storm. Some of these touchpoints can be leveraged to make these groups aware of their rate options in the event we have a rate that will specifically benefit this segment.

All messaging and information provided will be consistent with the overall PSEG Long Island customer engagement efforts. The rate segmentation research will incorporate a suite of demographic, psychographic, program participation, energy usage lifestyles and other data modeling to identify key groups of customers to engage in each new rate option and the most important information to communicate to those customer groups.

Internal Training & Change Management

Top quartile electric utilities that promote choice in pricing options recognize the critical importance of internal training as well as the significant impacts of these meaningful customer conversations and consultations on their customer operations centers.

The successful utilities have planned for these impacts by adapting their internal organizational structures, providing sufficient education and awareness to all employees companywide, as well as providing specialized tools and training to their customer service, collections, distribution design, billing, quality assurance and other revenue operations employees.

Internal training and Change Management programs will be utilized to effectively share the objectives, features, processes and procedures necessary to implement each new rate and to have meaningful personalized conversations with customers as an energy advisor.

A.8 Appendix 1

Below are the key findings and recommendations that resulted from the customer focus groups conducted in May 2018. These key findings and recommendations will be considered and used to refine/improve customer engagement and education efforts going forward.

A.8.1 Key Findings (as per Focus Group Facilitator)

1. There was little awareness or knowledge of smart meters and their capabilities among the research participants.
2. Once smart meters were described to the participants, there was a range of responses from strong interest, primarily among younger respondents, to a more moderate response and then clear indifference, more likely among older participants. But, with no cost and no action required by the customer, it may be hard to generate a lot of interest or enthusiasm about the smart meters.
3. At the same time, putting emphasis on smart meters as something completely new adds an impression of complexity to something that participants thought used to be simple and should continue to be simple, which may cause some initial resistance.
4. The major concerns for participants were what costs would be associated with the new meters, how can the smart meters help save money and are they mandatory. Participants had several different opportunities to raise questions and each time the main focus was the same. There were other issues that came up, but to a lesser extent.
    a. Safety concerns were minimal, only 3 of the 46 mentioned questions about electromagnetic fields (EMF) waves. Two of the three were in a focus group and did not elicit much discussion at all.
    b. There were some security and privacy issues. What information would be collected? Would it be transferred over the customer's Wi-Fi or phone line? Could the information be hacked? How accurate will the data be?
5. In terms of communications, the letter was seen as the most effective way to notify customers of upcoming installation. Other vehicles and channels were seen as useful depending on the need and information to be communicated. The following table recaps channels and vehicles with participant interest indicated in the comments section.

Table A-13 Communication Channels and Vehicles with Comments on Participant Interest

Communication Channel	Comments
Letter	Primary vehicle for notifying customers of upcoming installation - works for nearly all participants
Email	Preferred medium for some. Especially useful as follow up because it can contain links to other content - videos, FAQs, reviews
Website and dedicated web page	Critical piece of communication mix. Must have direct link off the home page to all information about smart meters. Additionally the smart meter page should have its own distinct, simple URL which can be used in promotional efforts and company communications.
"Live Chat"	Suggested by a number of participants as a way to provide information quickly.
Brochure/manual	Mixed level of interest. Can provide as download off website. Hard copy could be offered to customers at time of installation. If can be condensed to one page, it can be on the back of the installation letter.
My Account	In addition to customer specific information should include links to smart meter page for easy access to answers.
Phone number to call	Split in interest, primarily along age lines. If provide a phone number, it is important to be able to reach a person who can answer questions about smart meters specifically.
Bill Insert	realtively low interst in bill inserts. Participants said they were unlikely to pay much attention to the inserts.
Texts	Some participants prefer to be contacted by text when there is something important to communicate quickly (e.g. installation will be tomorrow).
Social Media	A channel to provide information and resources on smart meters as a supplement to other efforts.
Email address to send questions	No one was interested to send questions to an email address; want information more quickly.
Video	Useful vehicle for overview and how to; can reside on website, with links sent through email.
Community Meeting	Virtually no interst in attending a community meeting.
Educational Trailer	About half of participants showed interest in an educational trailer.
Advertising media	Minimal discussion of use. Could be mediums for videos.

6. The Smart Meter benefits that resonated most strongly with customers were automatic notification of outages, no estimated bills, and to a lesser extent being able to monitor electricity usage more specifically.
7. With respect to monitoring usage, however, there was confusion in terms of the level of detail that would be available – usage by specific appliance? time of day? something else?
8. There were definite differences in perceptions about smart technology and smart meters among younger and older participants. The table below gives a snapshot of those differences:

Table A-14 Perceptions on Smart Technology and Smart Meters among Younger and Older Participants

Smart Meters	Under 55 Years Old	Over 55 Years Old
Comfort level with "Smart Enabled" technology in the home	HIGH	LOW/MEDIUM
Current awareness of Smart Meters	LOW	LOW/MEDIUM
Awareness of Smart Meters from PSEG Long Island	LOW	LOW
Resistance to Smart Meters installation on basis of safety	LOW	LOW
Comprehension of Smart Meters usefulness from the info given	MEDIUM	LOW/MEDIUM
Desire to investigate benefits from Smart Meters	LOW/MEDIUM	MEDIUM/HIGH
Perceived barriers to fully realize benefits from Smart Meters	LOW	MEDIUM/HIGH
Confidence in ability to utilize Smart Meter benefits	MEDIUM/HIGH	LOW
Increase positive feelings toward PSEG Long Island with addition of Smart Meters	MEDIUM/HIGH	LOW/MEDIUM

9. Most understand and accept that smart technology is the way things are now.
10. There is some innate suspicion as to why PSEG Long Island is investing in this technology. Many asked “what’s in it for them?”

A.8.2 Recommendations (as per Focus Group Facilitator)

- The move to smart meters is a major initiative for PSEG Long Island, as a company. It changes the way usage information is gathered. It is a significant investment in technology. It opens up opportunities for a variety of billing options. It can provide improved customer service. For customers on the other hand, at this point in time, nothing need change for them whether they have a regular or smart meter, with the possible exception of eliminating estimated bills.
- Our read is that since it is early in the process of the roll out, customers are generally unaware that smart meters are coming, what the benefits of smart meters are, and how smart meters will affect them personally. It is an opportunity for PSEG Long Island to be proactive in educating its customers.
- Developing a comprehensive plan that promotes smart meters, how customers can benefit, and how it is being rolled out **AT NO COST** to customers to provide better understanding and potentially better control of energy costs can feed into the larger energy efficiency initiative and help push up JD Power scores. Benefits that resonate across all customer segments include automatic outage reporting and elimination of estimated bills. Better energy management appeals to a narrower group; cost savings generates wider appeal.
- The focus of the plan needs to be benefits to customers. But along with presenting the new opportunities that smart meters open up, it is important to reassure those who may be intimidated by the concept of a “smart” meter that no change in customer behavior is required. Information is there for those who want to access it, but not using it will not affect one’s access to electricity.

- While it is still early in the rollout, PSEG Long Island can test different communications strategies to see which best resonate with consumers.
- The website can be a valuable resource for customers, but it must be easy to find the relevant information on the site. It is recommended that there be a dedicated URL for smart meters and that the site contain: Pictures of the meters, a description and possible video of the installation process (to reassure customers who do not know what to expect), animated explanatory video about smart meters, description of how to access usage information through My Account, an explanation of what information is available and how it can be useful, and testimonials and reviews from customers who have smart meters.
- Continue using the letter to notify of upcoming installations, incorporating the recommendations included in the body of this report (see page 20). Supplement it with emails that contain information and links to the website.
- When the trailer is ready, mount a full-bore Public Relations (PR) campaign to promote it. And be sure to publicize where it will be through internal and external resources. Also use email and texts to invite people to visit it when it is in their neighborhood. Bring it to schools.
- Develop videos that can reside on the website and their links can be sent through email.
- Provide safety information on the website but do not emphasize it.
- Explore ways to “gamify” the online energy management tool to increase interest in using it.

A.8.3 Customer Focus Groups' Participants Demographic Information

The AMI focus groups were hosted by the third-party facilitator at I.C. International Corp in Hicksville, New York. There were two sessions for group discussions (8-10 participants in each session) conducted on May 21 and one-on one interviews completed on May 24 and May 29. The total number of customers participating in the sessions was 46 (all participants are identified in the table below). The focus groups were led by Marketsmith, and PSEG Long Island representatives as well as LIPA and DPS observed each session. The duration time for each focus group was 120 minutes and the one-on one interviews were completed in 50 minutes (each). The main objective of each session was to determine the current level of awareness and knowledge of smart grid and smart meters, and what and how they would like to learn more on these topics.

Participants were recruited from ICI's database and reflected a mix of ages, incomes, gender, counties:

Table A-15 Customer Focus Groups' Participants Demographic Mix

Total	Age			County		Gender		Education		HH Income		Ethnicity	
	27-34	35-54	55-74	Nassau	Suffolk	Male	Female	HSG/ some col	College grad +	<$100K	>$100K	Non white	White/ Caucasian
46	7	20	19	27	19	19	27	12	34	32	14	11	35

A.8.4 Customer Focus Groups' Participants List with Demographic Data

DAY	NAME	AGE	COUNTY	TOWN	ZIP	PAYING ELECTRIC BILL	SMART METER FROM PSEG	OWN/ RENT	GENDER	KIDS	HOW MANY	EDUCATION	HHI	RACE	WORK
Monday May 21	Frank C	55-74	Nassau	Massapequa	11758	Primary Responsibility	No	Own	Male	No		Graduated from high school	> $100,000 - $174,999	White/ Caucasian	Self-employed
Monday May 21	Glenn G	55-74	Nassau	East Williston	11596	Primary Responsibility	No	Own	Male	Yes	2	Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Kathleen K	55-74	Suffolk	Ronkonkoma	11779	Primary Responsibility	No	Own	Female	No		Some college	$30,000 - $49,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Marianne Y	55-74	Nassau	Great Neck	11024	Primary Responsibility	No	Own	Female	Yes	1	Some college	> $75,000 - $99,999	Asian	Self-employed
Monday May 21	Marie F	55-74	Nassau	Albertson	11507	Primary Responsibility	No	Own	Female	No		Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Part time
Monday May 21	Mary G	55-74	Suffolk	Lake Grove	11755	Share Responsibility With Equal Say	No	Own	Female	No		Graduated from college	> $50,000 - $74,999	White/ Caucasian	A homemaker or stay at home parent
Monday May 21	Michelle C	55-74	Nassau	Old Bethpage	11804	Primary Responsibility	No	Own	Female	Yes	2	Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Perry F	55-74	Suffolk	Nesconset	11767	Primary Responsibility	No	Own	Male	Yes	2	Graduated from college	> $100,000 - $174,999	White/ Caucasian	Self-employed
Monday May 21	Sharon G	55-74	Suffolk	West Babylon	11704	Primary Responsibility	No	Own	Female	No		Graduated from high school	$30,000 - $49,999	Black/ African American	Employed for wages - Full time
Monday May 21	Beth H	35-54	Suffolk	Smithtown	11787	Primary Responsibility	No	Own	Female	Yes	2	Graduated from college	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Carissa E	27-34	Suffolk	Mastic Beach	11951	Primary Responsibility	No	Own	Female	Yes	1	Graduated from college	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Caryn J	35-54	Suffolk	Melville	11747	Primary Responsibility	No	Own	Female	Yes	2	Graduated from college	> $75,000 - $99,999	White/ Caucasian	home maker/ stay at home
Monday May 21	Joanna R	27-34	Suffolk	Port Jefferson Station	11776	Primary Responsibility	No	Own	Female	No		Post graduate degree	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Joshua D	27-34	Nassau	Massapequa	11758	Primary Responsibility	No	Own	Male	Yes	2	Some college	> $50,000 - $74,999	Black/ African American	Self-employed
Monday May 21	Sean S	35-54	Suffolk	Commack	11725	Primary Responsibility	No	Own	Male	Yes	1	Graduated from college	$100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Monday May 21	Steven K	35-54	Nassau	Plainview	11803	Primary Responsibility	No	Own	Male	Yes	2	Graduated from college	Over $175,000	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Joseph R	55-74	Suffolk	Amityville	11701	Primary Responsibility	No	Own	Male	Yes	1	Graduated from college	Over $175,000	Hispanic/Latino	Employed for wages - Full time
Thursday, May 24	Joseph S	55-74	Nassau	Jericho	11753	Share Responsibility With Equal Say	No	Rent	Male	No		Graduated from college	> $50,000 - $74,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Mara R	55-74	Nassau	Levittown	11756	Share Responsibility With Equal Say	No	Own	Female	Yes	1	Graduated from college	$30,000 - $49,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Maria S	35-54	Suffolk	Commack	11725	Share Responsibility With Equal Say	No	Own	Female	Yes	2	Post graduate degree	> $75,000 - $99,999	White/ Caucasian	Unemployed and looking
Thursday, May 24	Richard L	35-54	Nassau	Massapequa	11758	Primary Responsibility	No	Own	Male	Yes	2	Graduated from college	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Scott G	35-54	Suffolk	Port Jefferson	11777	Share Responsibility With Equal Say	No	Own	Male	No		Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Jim K	55-74	Suffolk	Port Jefferson	11777	Share Responsibility With Equal Say	No	Rent	Male	No		Post graduate degree	$30,000 - $49,999	White/ Caucasian	Employed for wages - Part time
Thursday, May 24	Lauren G	27-34	Nassau	Bethpage	11714	Primary Responsibility	No	Rent	Female	No		Graduated from college	$30,000 - $49,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Louisa H	27-34	Suffolk	Deer park	11729	Primary Responsibility	No	Rent	Female	Yes	1	Graduated from high school	$30,000 - $49,999	Black/ African American	Employed for wages - Full time
Thursday, May 24	Maria R	35-54	Nassau	Levittown	11756	Share Responsibility With Equal Say	No	Rent	Female	Yes	1	Some college	> $75,000 - $99,999	Hispanic/Latino	A homemaker or stay at home parent
Thursday, May 24	Peter A	35-54	Nassau	Locust Valley	11560	Primary Responsibility	No	Own	Male	No		Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Sonia B	55-74	Nassau	westbury	11590	Primary Responsibility	No	Own	Female	Yes	1	Graduated from college	> $75,000 - $99,999	Hispanic/Latino	Employed for wages - Full time
Thursday, May 24	Frank C	35-54	Nassau	Old Bethpage	11804	Share Responsibility With Equal Say	No	Own	Male	Yes	3	Graduated from college	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	George P	35-54	Nassau	Levittown	11756	Primary Responsibility	No	Own	Male	Yes	1	Graduated from college	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Nancy N	35-54	Nassau	Mineola	11501	Primary Responsibility	No	Own	Female	Yes	3	Graduated from college	$30,000 - $49,999	White/ Caucasian	Employed for wages - Full time
Thursday, May 24	Richard B	35-54	Nassau	Hempstead	11550	Share	No	Own	Male	No		Some college	$30,000 - $49,999	Black/ African American	Employed for wages - Full time
Thursday, May 24	Susan M	55-74	Nassau	Hicksville	11801	Share Responsibility With Equal Say	No	Own	Female	No		Graduated from high school	$30,000 - $49,999	White/ Caucasian	Retired
Thursday, May 24	Zakhia G	35-54	Suffolk	Wyandanch	11798	Primary Responsibility	No	Own	Female	No		Post graduate degree	> $50,000 - $74,999	Black/ African American	Employed for wages - Full time
Tuesday, May 29	Adrienne G	35-54	Nassau	Seaford	11783	Primary Responsibility	No	Own	Female	Yes	2	Graduated from college	> $75,000 - $99,999	Black/ African American	Employed for wages - Part time
Tuesday, May 29	Carmelo M	35-54	Nassau	Old Bethpage	11804	Share	No	Own	Male	Yes	3	High school Graduate	Over $175,000	White/ Caucasian	Employed for wages - Full time
Tuesday, May 29	Jennifer M	35-54	Suffolk	Islip terrace	11752	Share Responsibility With Equal Say	No	Own	Female	Yes	1	Post graduate degree	$30,000 - $49,999	White/ Caucasian	Employed for wages - Full time
Tuesday, May 29	Melanie D	27-34	Suffolk	Lake grove	11755	Primary Responsibility	No	Own	Female	No		Graduated from college	> $75,000 - $99,999	White/ Caucasian	Employed for wages - Full time
Tuesday, May 29	Ned S	55-74	Nassau	Westbury	11590	Share Responsibility With Equal Say	No	Own	Male	No		Graduated from college	> $50,000 - $74,999	White/ Caucasian	Self-employed
Tuesday, May 29	Sharon D	55-74	Nassau	plainview	11803	Primary Responsibility	No	Own	Female	Yes	3	Post graduate degree	$30,000 - $49,999	White/ Caucasian	Self-employed
Tuesday, May 29	Denise B	35-54	Nassau	Levittown	11756	Share Responsibility With Equal Say	No	Own	Female	Yes	2	Graduated from high school	$30,000 - $49,999	White/ Caucasian	Employed for wages - Part time
Tuesday, May 29	Ellen R	35-54	Nassau	Old Bethpage	11804	Primary Responsibility	No	Own	Female	Yes	1	Graduated from college	> $100,000 - $174,999	White/ Caucasian	Self-employed
Tuesday, May 29	Hector L	55-74	Suffolk	Bay Shore	11706	Share Responsibility With Equal Say	No	Own	Male	Yes	2	Graduated from high school	$30,000 - $49,999	Hispanic/Latino	Retired
Tuesday, May 29	Marc M	35-54	Suffolk	Commack	11725	Primary Responsibility	No	Own	Male	Yes	1	Post graduate degree	> $100,000 - $174,999	White/ Caucasian	Employed for wages - Full time
Tuesday, May 29	Stephanie M	55-74	Nassau	Roslyn Heights	11577	Primary Responsibility	No	Own	Female	No		Graduated from college	$30,000 - $49,999	White/ Caucasian	Unemployed and looking
Tuesday, May 29	Whitney G	27-34	Nassau	East Norwich	11732	Primary Responsibility	No	Rent	Female	No		Post graduate degree	$30,000 - $49,999	White/Caucasian	Employed for wages - Full time

A.9 Appendix 2

A.9.1 Customer Service Current Job Aid Page 1

Customer Service
Job Aid

PSEG Long Island's AMI/Smart Project

What is AMI/Smart Metering?

A "Smart" or intelligent grid delivers electricity to consumers using digital technology and two-way communications to save energy, reduce cost and increase reliability while improving the efficiency and dependability of the electricity grid.

With its advanced monitoring and control capabilities, the Grid can identify problems instantly, and route electricity around them to minimize outages. PSEGLI and other electric utilities across the country and in many parts of the world have been moving toward achieving an intelligent Grid through investments in infrastructure and equipment.

This intelligent electricity distribution network can help reduce customers' energy consumption by utilizing:

- two-way communications
- advanced sensors and controls
- advanced meters

Intelligent Technologies include in-home devices, web tools, home energy management systems and eventually intelligent controls in appliances, giving consumers more choice and control over how and when electricity is used. This will assist in saving money and help PSEGLI operate its electricity network more efficiently for the benefit of all its customers.

AMI meters are capable of:

- recording consumption in far more detail than conventional meters i.e. 15-minute interval data
- two-way communication i.e. capable of sending and receiving data
- recording detailed Time of Use (TOU) consumption down to 15-minute intervals i.e. TOU refers to a meter's ability to record **when** consumption takes place rather than just **how much** is consumed

Customer Benefits to Intelligent Technologies

Improved service reliability

Enables automatic outage detection & notification, customer specific restoration confirmation, enhances circuit diagnostics & troubleshooting, intelligent circuit switching & routing and reduced response and restoration times.

Improves customer satisfaction

Allows customers to better understand & manage their energy consumption, conservation efforts, costs and carbon footprint through the use of tools that shows detailed information about their energy usage.

Easy integration of green technologies

Allows customers to more easily integrate solar, wind and electric vehicles.

Improves Billing

AMI meters provide automated meter readings – no need for estimated bills and allows customers to save money by switching to alternative Time of Use Rates.

PSEG LONG ISLAND
We make things work for you.

A.9.2 Customer Service Current Job Aid Page 2

PSEG Long Island's Existing Projects

The number of AMI meters on our system is constantly increasing. At this time, our system contains approximately 11,500 meters, residential and commercial combined. The number of meters continues to grow with the expansion of the network which is scheduled to be completed later this year.

Completed/Maintenance Mode Projects

Hauppauge/Bethpage – Approximately 1,000 meters within the surrounding areas of the Hauppauge Industrial Area and the Bethpage Grumman Property

Fire Island – Approximately 7,000 meters occupy the entire island

Route 110 Corridor – Approximately 2,500 meters within the area of Route 109 in Babylon to the LIE in Huntington

Current Projects

Rate 285 – by next year, all rate 285 accounts will be switched over to AMI

Long Term Estimates – continuously being switched over as they are identified

Age Changes/Periodics – continuously being switched over

How to Identify an AMI Metered Customer

- Accounts in CAS will be recognizable by an indicator in the Overflow field (SMT – A) indicating the premise as an AMI/Smart Meter Customer.
- AMI Meter Numbers begin with 8033XXXX or 8034XXXX

Customer Opt-Out Policy

Rate 180 – allowed to opt-out at no charge by notifying us in writing.

Residential PV Net Metering, TOU or Retail Choice Rates – generally not permitted to opt-out (addressed on a case by case basis)

All Commercial Customers - generally not permitted to opt-out (addressed on a case by case basis)

Helpful Tips

Frequently Asked Questions (FAQs) can be found on PSEG Long Island's Website at
www.psegliny.com/page.cfm/SMART

Customers can call PSEG Long Island's Smart Line at **1-800-490-0035**

15012 7/15

A.10 Appendix 3

A.10.1 Home Energy Management Tool

Home Energy Management Customer Engagement Platform - Below images represent existing PSEG Long Island's home energy management customer engagement platform that will continue to be part of the customer-facing tools eco-system. Customers are provided with the energy usage dashboard, ability to set up a savings plan with a corresponding checklist. This platform also has an ability to intake more granular customer premise information to enhance personalized savings tips.

Figure A-33. Home Energy Management Dashboard



Figure A-34. Energy Use Overview

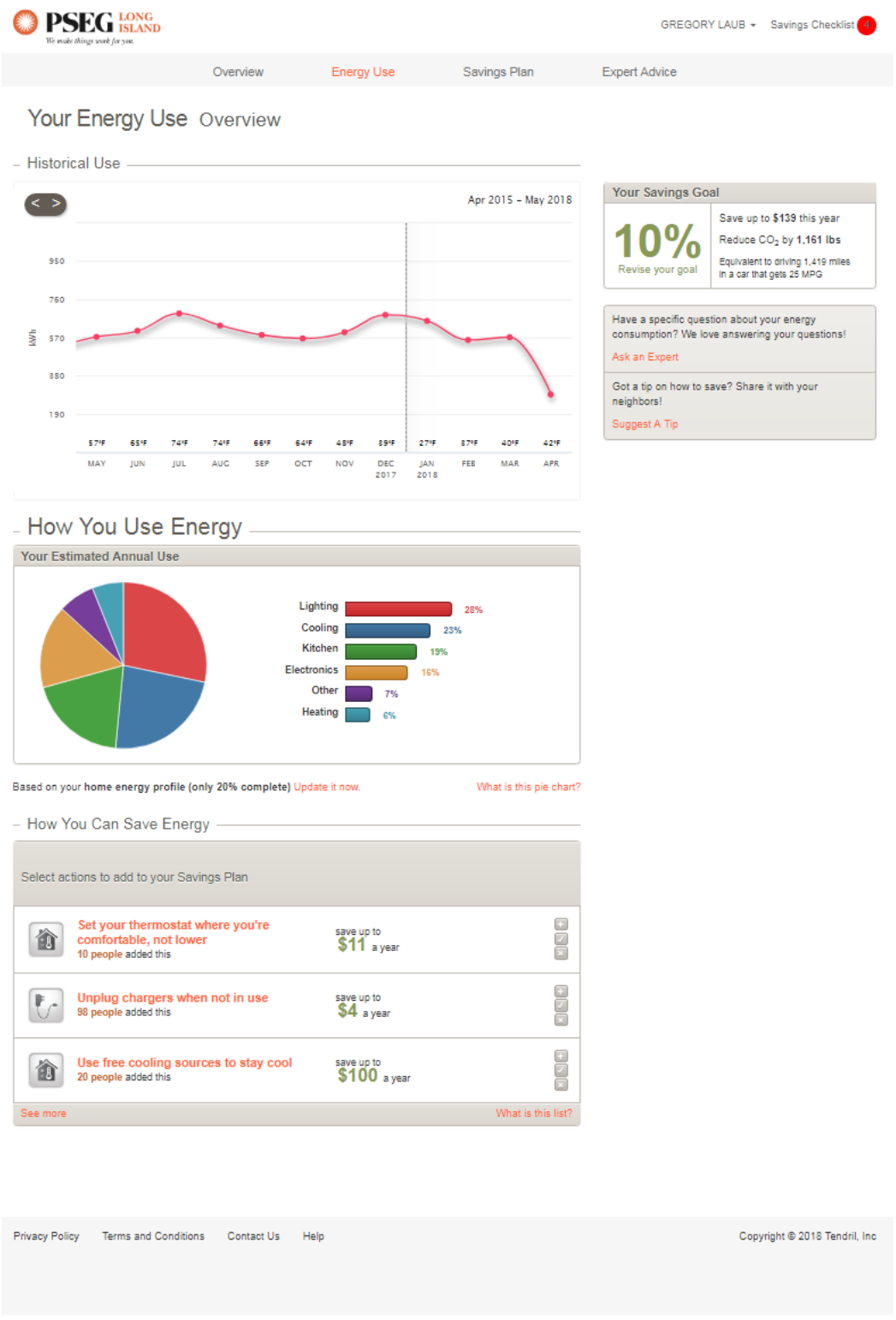


Figure A-35. Savings Plan

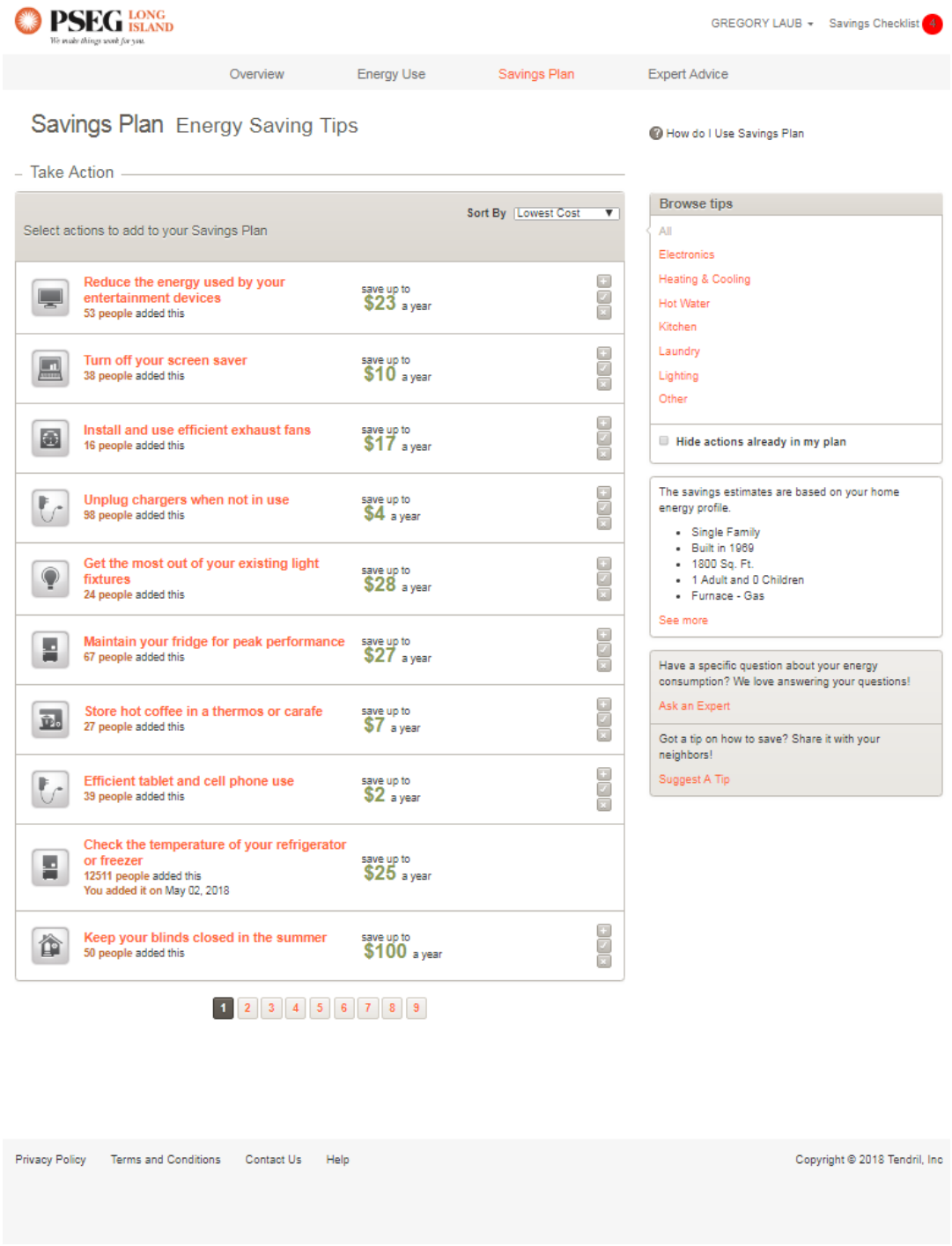


Figure A-36. Expert Advice

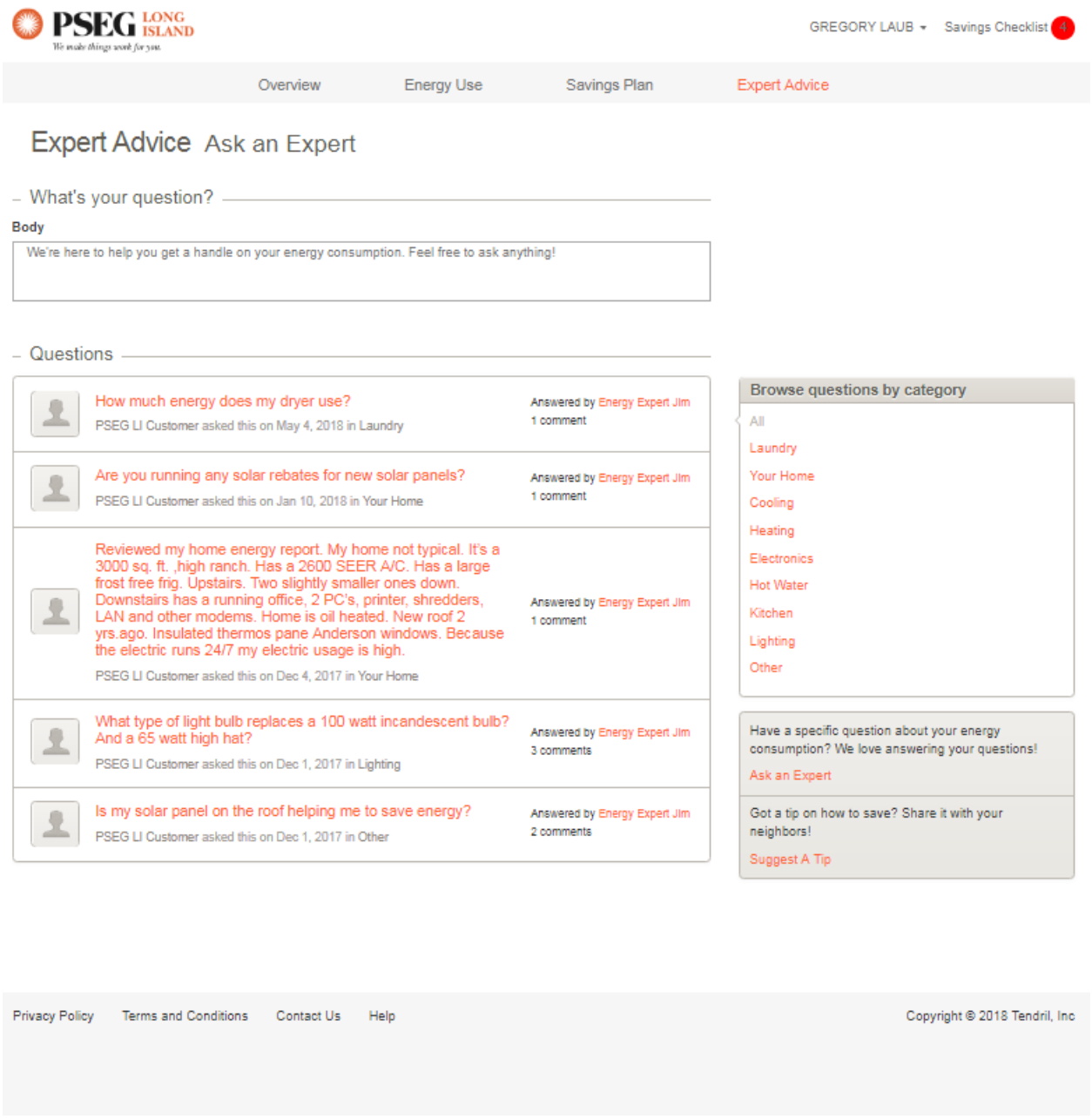


Figure A-37. Savings Checklist

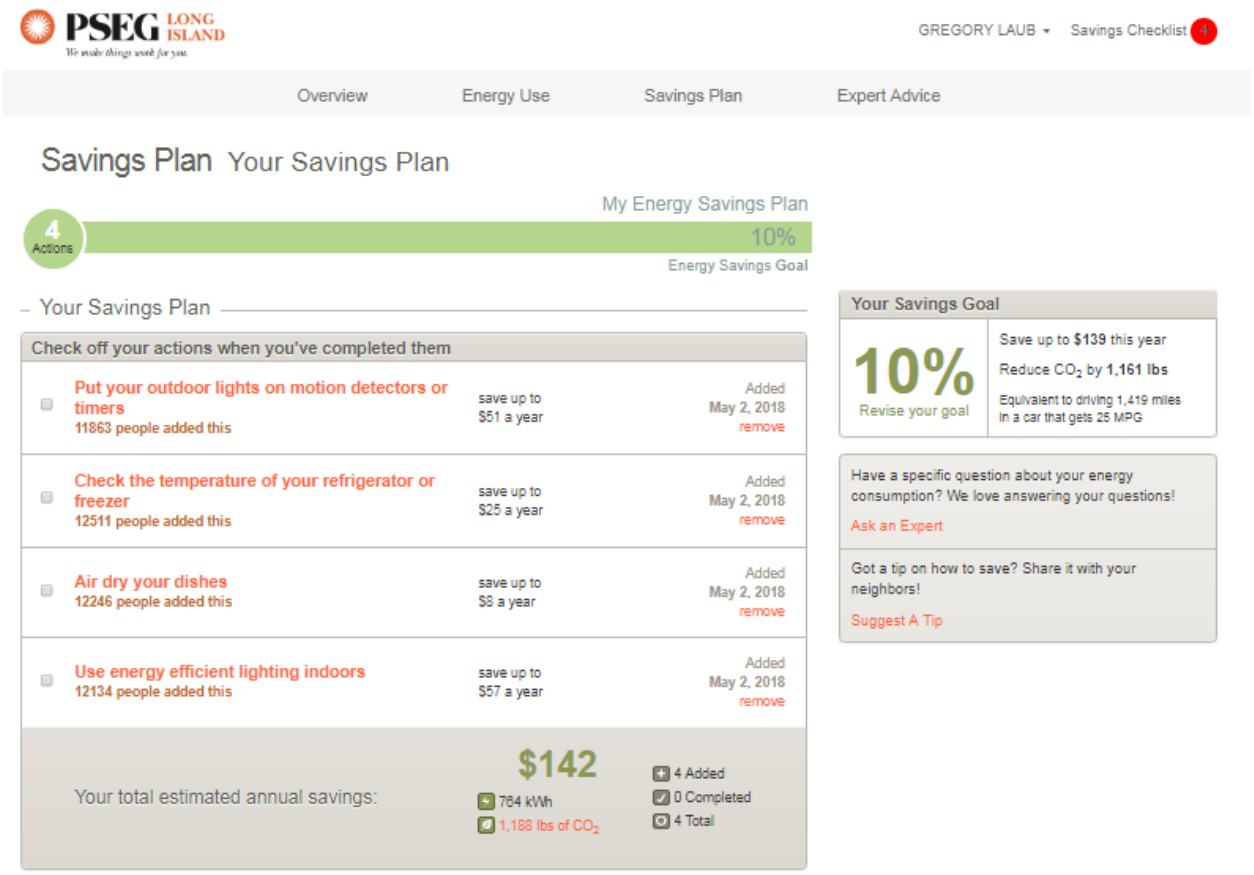
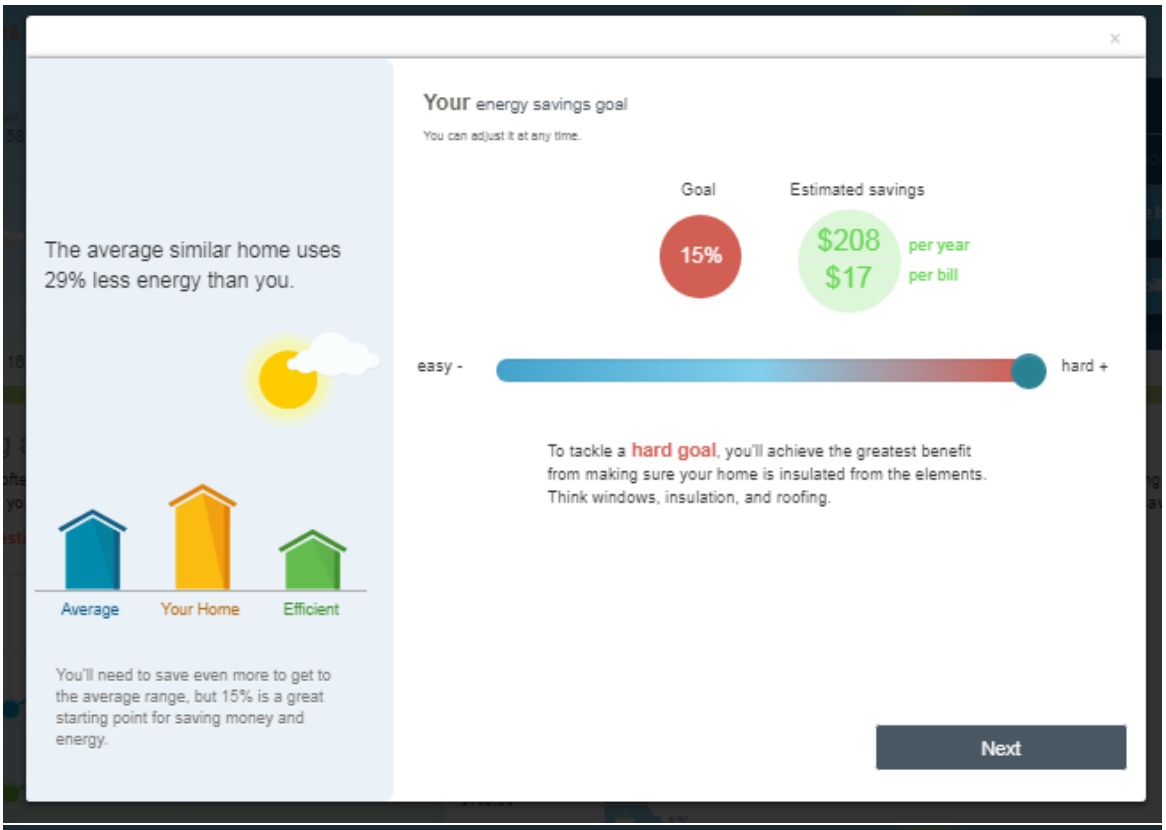


Figure A-38. Setting a Savings Goal



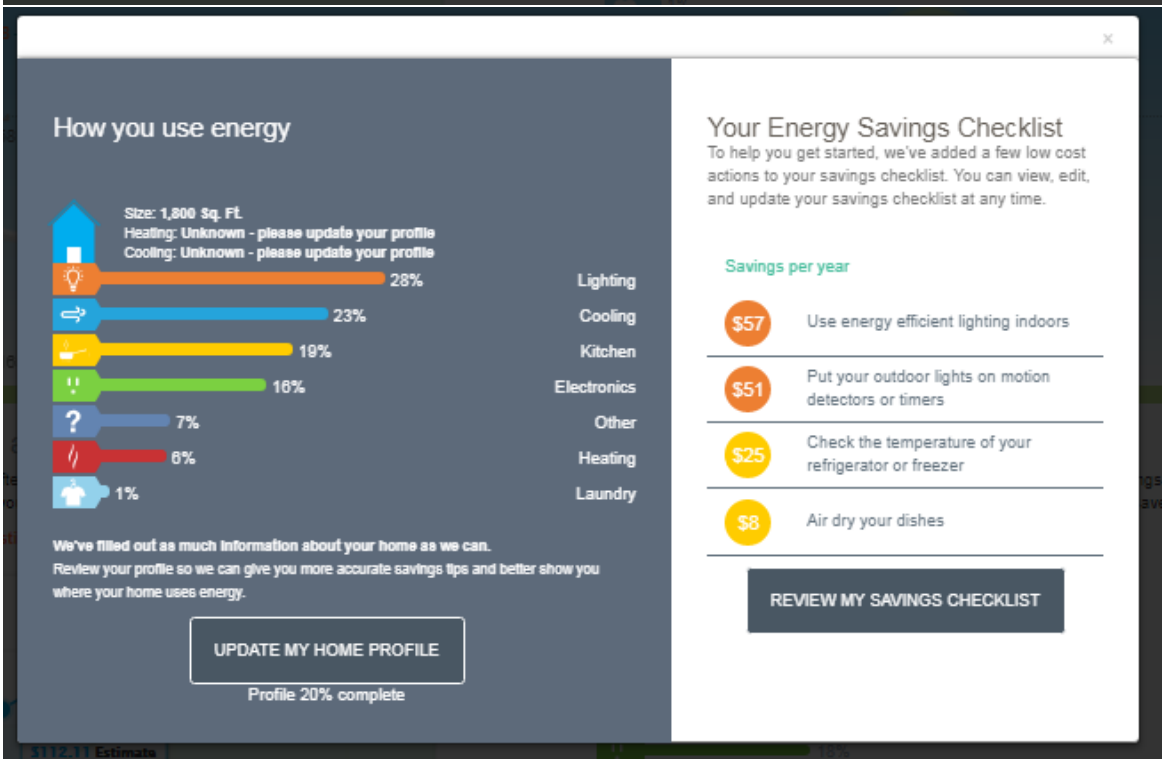
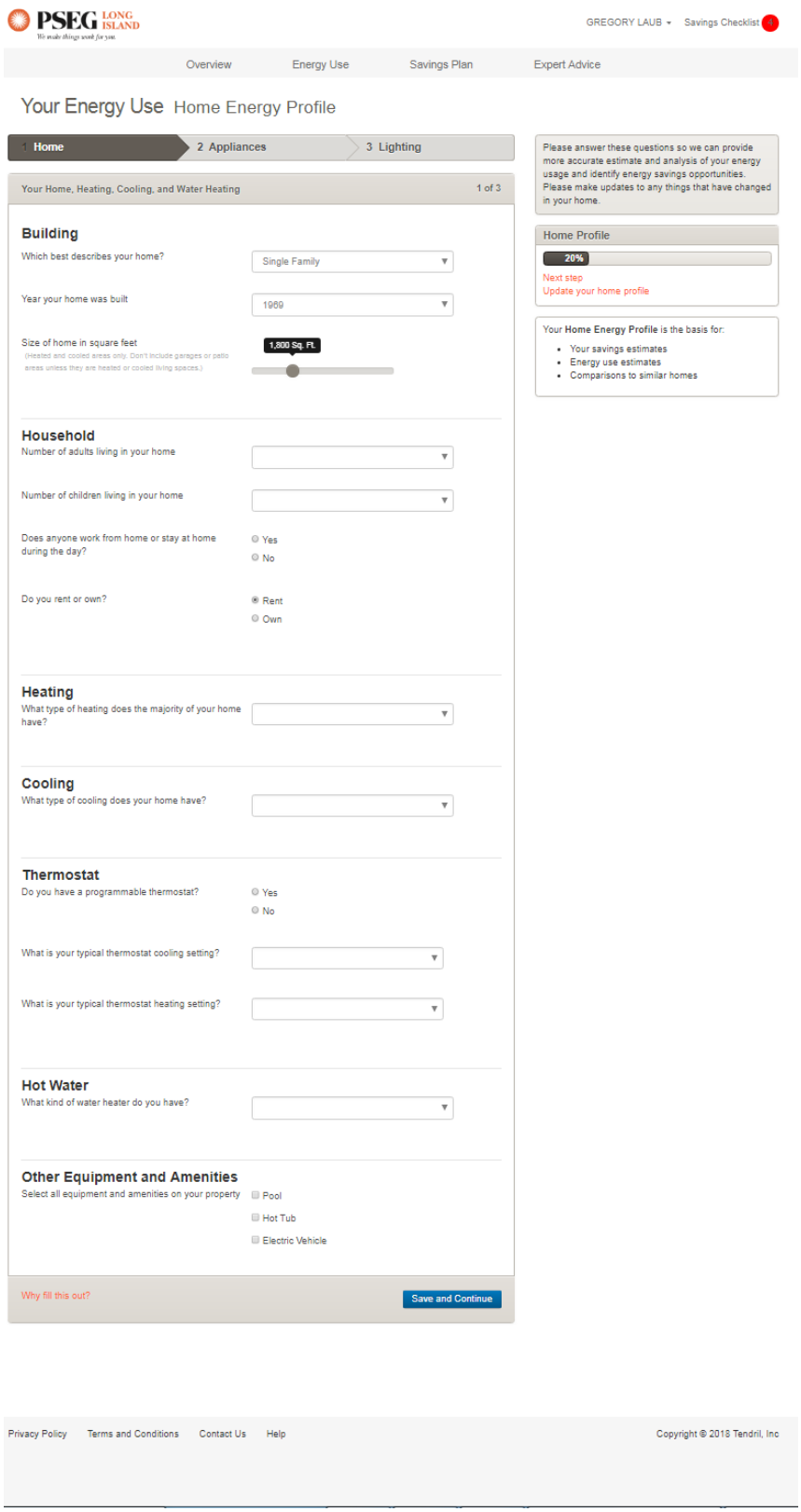
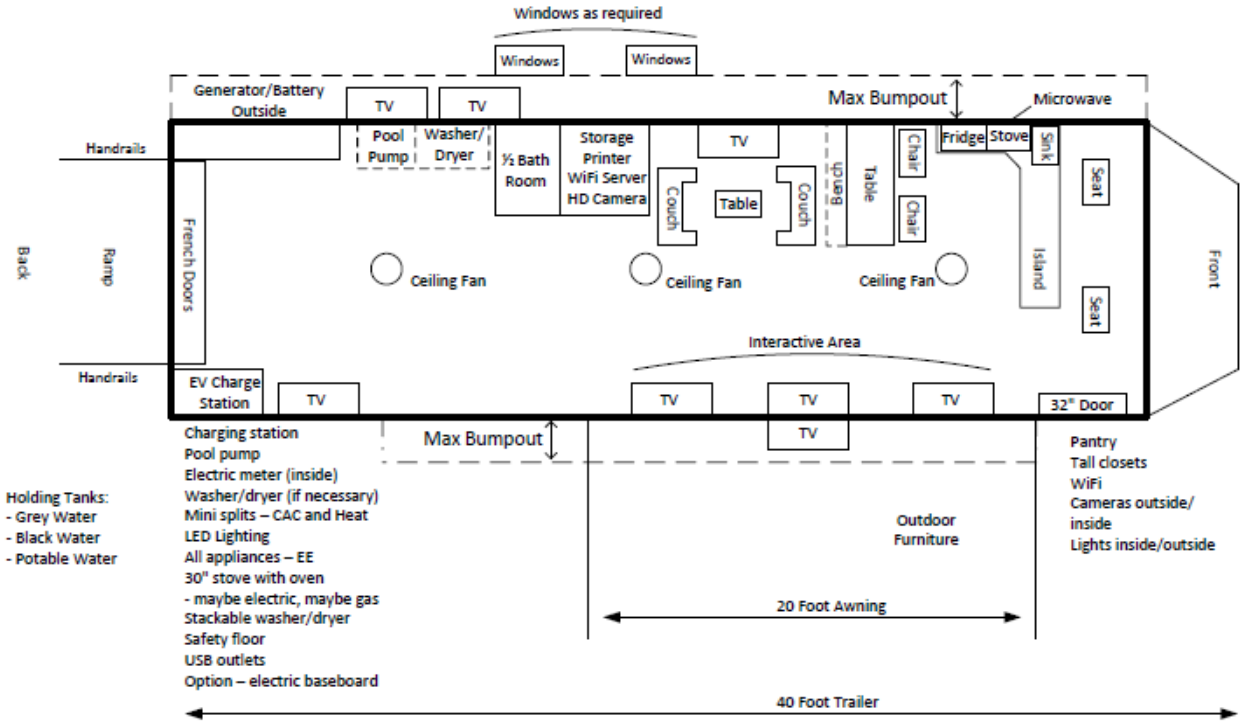


Figure A-39. Home Profile Update



A.11 Appendix 4

A.11.1 STMEC Floor Plan



APPENDIX B. Customer Portal Screenshots

PSEG Long Island is planning to enhance existing Customer Portal capabilities and help customers maximize AMI-enabled benefits.

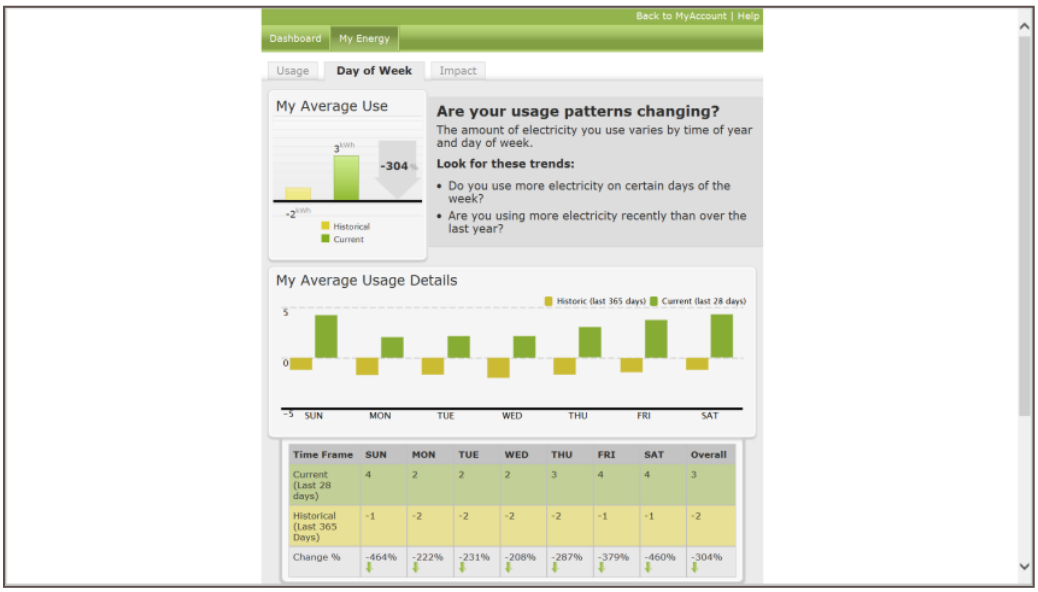
Customers can see 15-min interval data for each day.

Figure B-1. Usage Interval Data Drill-down Capability (Current Customer Portal)



PSEG Long Island also provides customers with usage comparisons – current usage (last 28 days) vs. historic usage (last 365 days) and the percentage change indicator which informs usage pattern consistency / changes.

Figure B-2. Usage Pattern Customer Insight



Customer's Environmental Impact due to their usage levels is presented in pounds of carbon with similar drill down and view options.

Figure B-3. Environmental Impact Customer Insight



To continue to modernize the customer experience and enable additional customer-facing features, PSEG Long Island has begun replacing its MDMS and will replace the relevant Customer Portal components leveraging Landis+Gyr eco-system and streamlining systems integration. This initiative was approved under Utility 2.0, 2017 filing. Below figures illustrate new design / features.

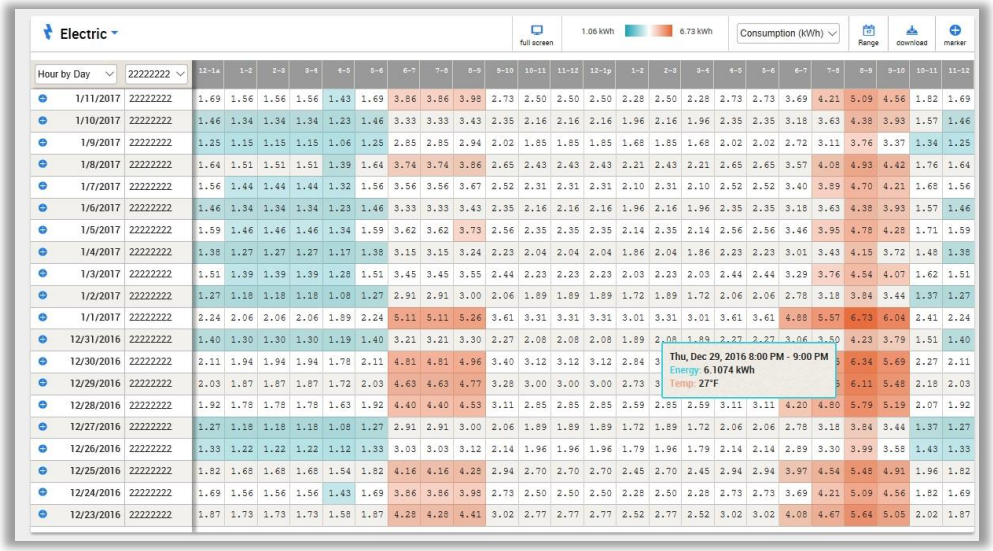
Usage data comparison – customers will be able to choose multiple comparison overlay options against their actual usage.

Figure B-4. Future Illustrative of Usage Data Comparison



Usage data Heat Maps – customers will be able to see energy usage heat map hour by day with temperature overlay as illustrated below.

Figure B-5. Future Usage Heat Map – Hour by Day



Appendix B. Customer Portal Screenshots

Customers with Net Metering and Community Solar (or other DG source) will be able to see their usage data with weather data overlay.

Figure B-6. Future Net Metering Usage with Weather Overlay



The Green Button Download will be available from the Usage page the Heat Map page as illustrated below.

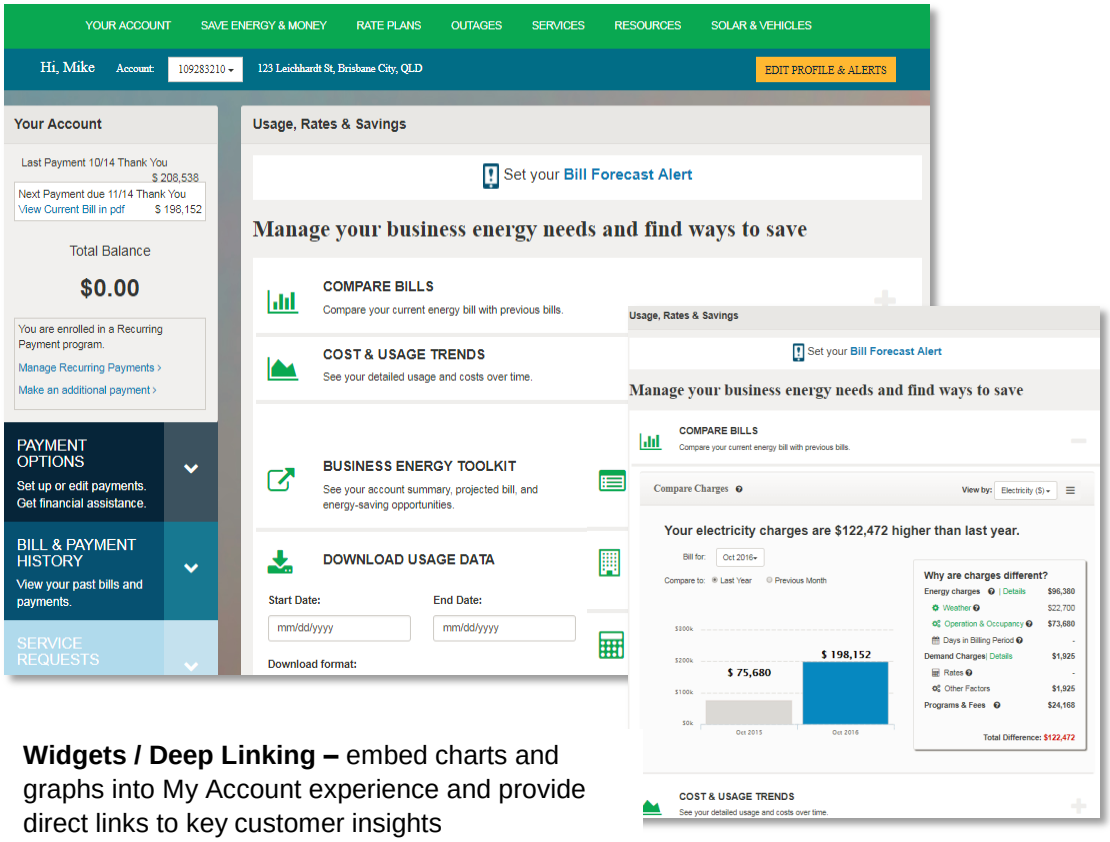
Figure B-7. Future Green Button Download Access



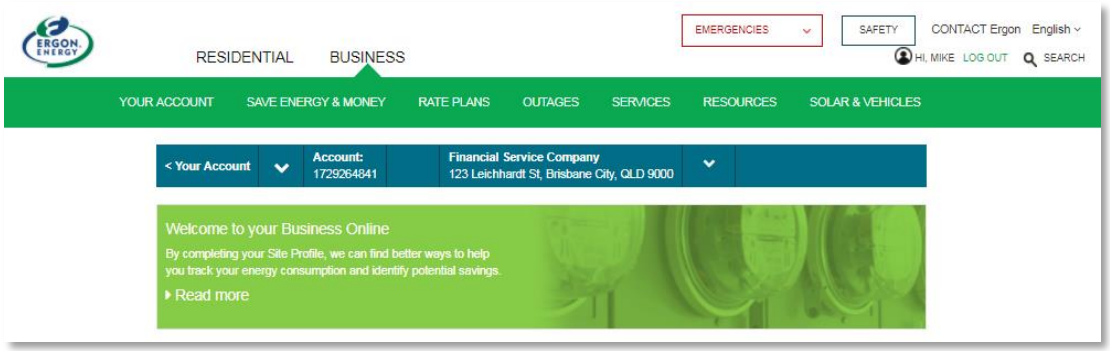
Customer Portal Enhancements for Business Customers - Customer Experience, Usability, Accessibility. Below charts and graphs are illustrative and provide a representative concept view of what PSEG Long Island is looking to implement for the business segment.

Customer-facing widgets can be embedded into My Account experience and provide direct links to key customer insights.

Figure B-8. Customer-facing Widgets and Deep Linking with Utility Back End Systems

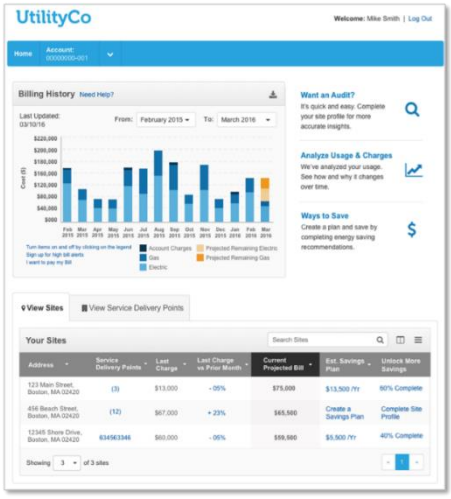


Widgets / Deep Linking – embed charts and graphs into My Account experience and provide direct links to key customer insights

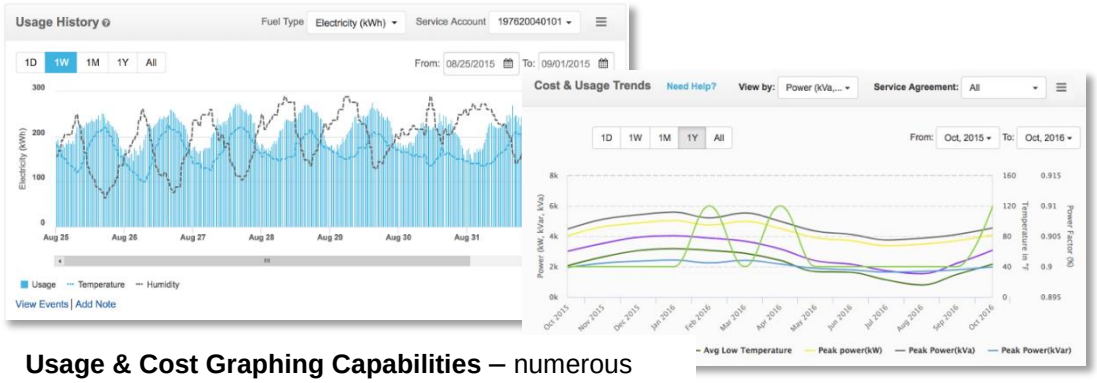


Configurable User Interface/Content Management System – design web experience that aligns with PSEG Long Island branding elements, and promote energy education and new products / services through configurable content windows.

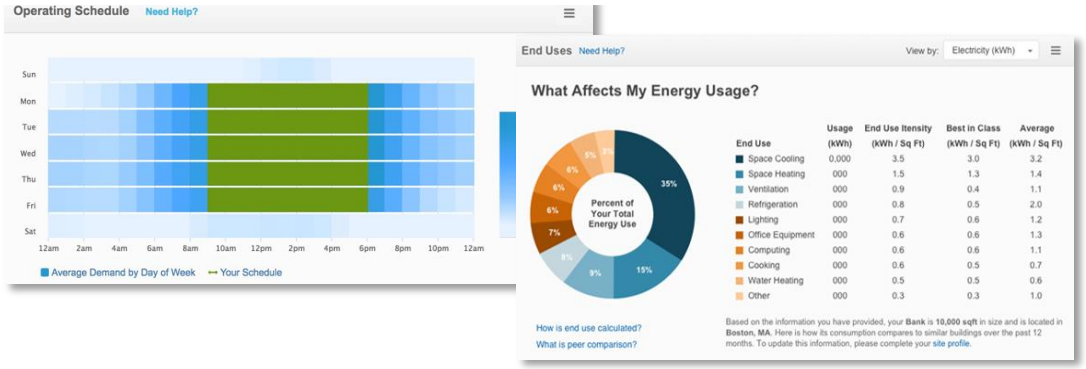
Figure B-9. Graphing Capabilities



Multi-Site Graphing Capabilities – allows users with multiple Service Delivery Points at a single site and/or multiple sites to view, download, and compare cost and usage data for all fuel types and all Portfolios, Sites, and Service Delivery Points



Usage & Cost Graphing Capabilities – numerous cost and usage graphing options, with data immediate data download from web experience

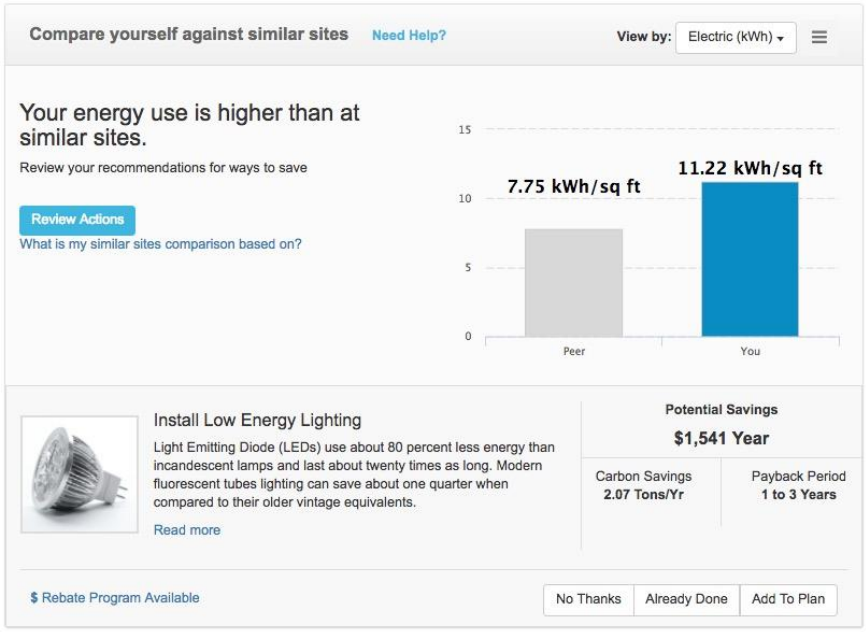


Advanced Graphing Capabilities – weather, operations, disaggregation and other advanced charts

Benchmarking

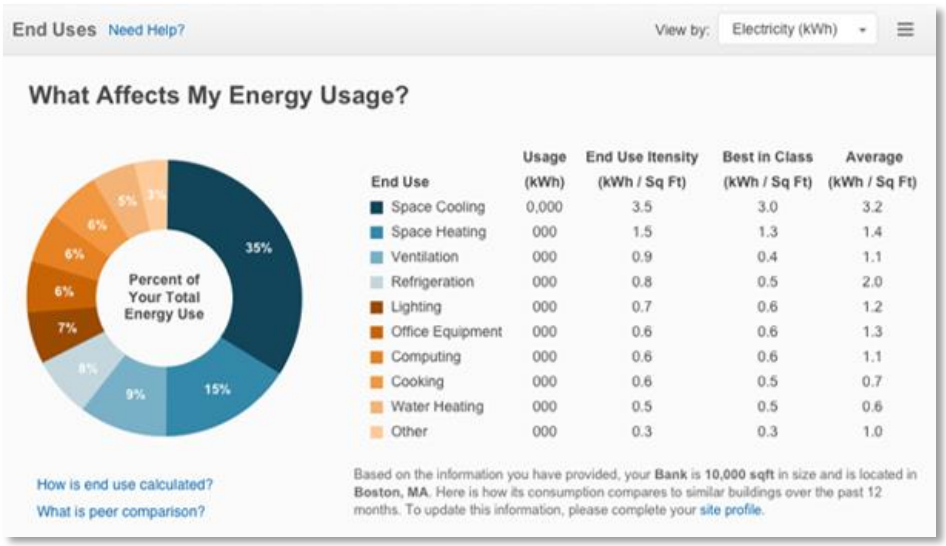
Benchmarking with Similar Sites - compares energy intensity of the site with the energy intensity of similar businesses based on electric consumption of peer businesses.

Figure B-10. Benchmarking with Similar Sites



End-Use Disaggregation (with Benchmarking) – provides comparisons of the site's end use intensity to that of the average peer and the best-in-class peer (top 10%).

Figure B-11. End-Use Disaggregation

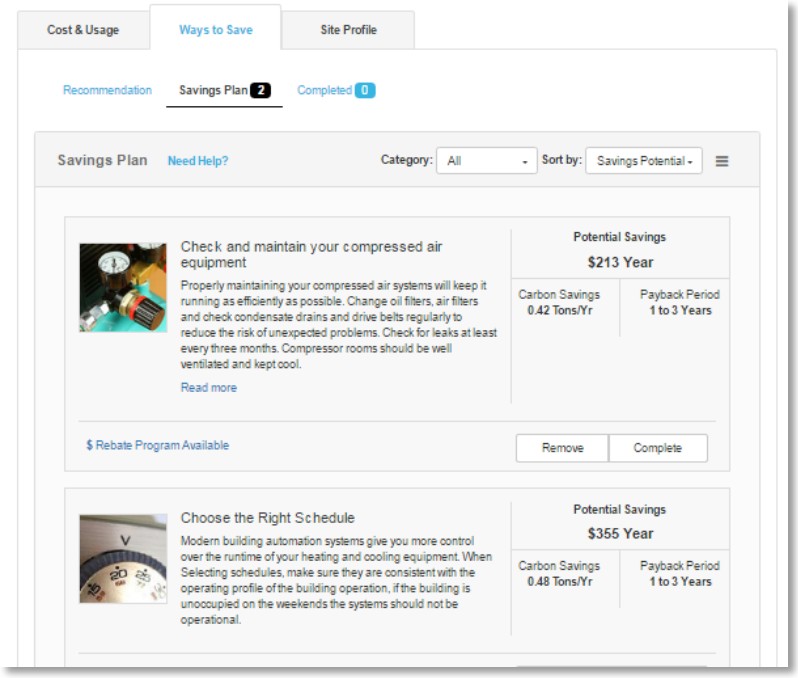


Energy Saving Tips

Energy Savings Tips - Displays business-specific recommendations in one location. Customers can download a specific customer in a .pdf file.

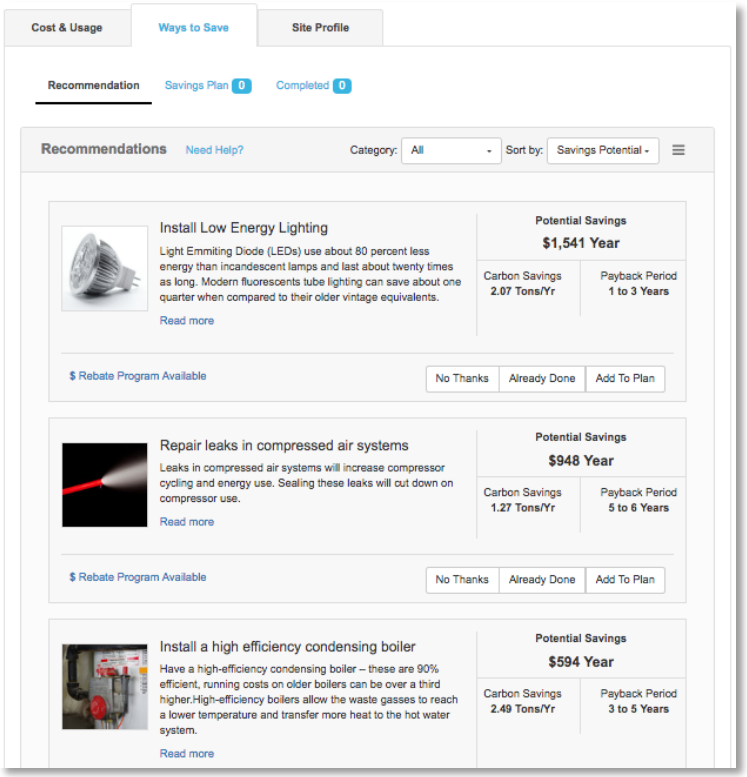
In addition, recommendations can be directly connected to relevant PSEG Long Island products and services through pre-deployment mapping

Figure B-12. Customer Portal for Business Customers – Energy Saving Tips



Savings Plan – allows creation of a savings plans and savings target for each customer within the user experience. User actions can trigger PSEG Long Island staff to proactively reach out to interested customers.

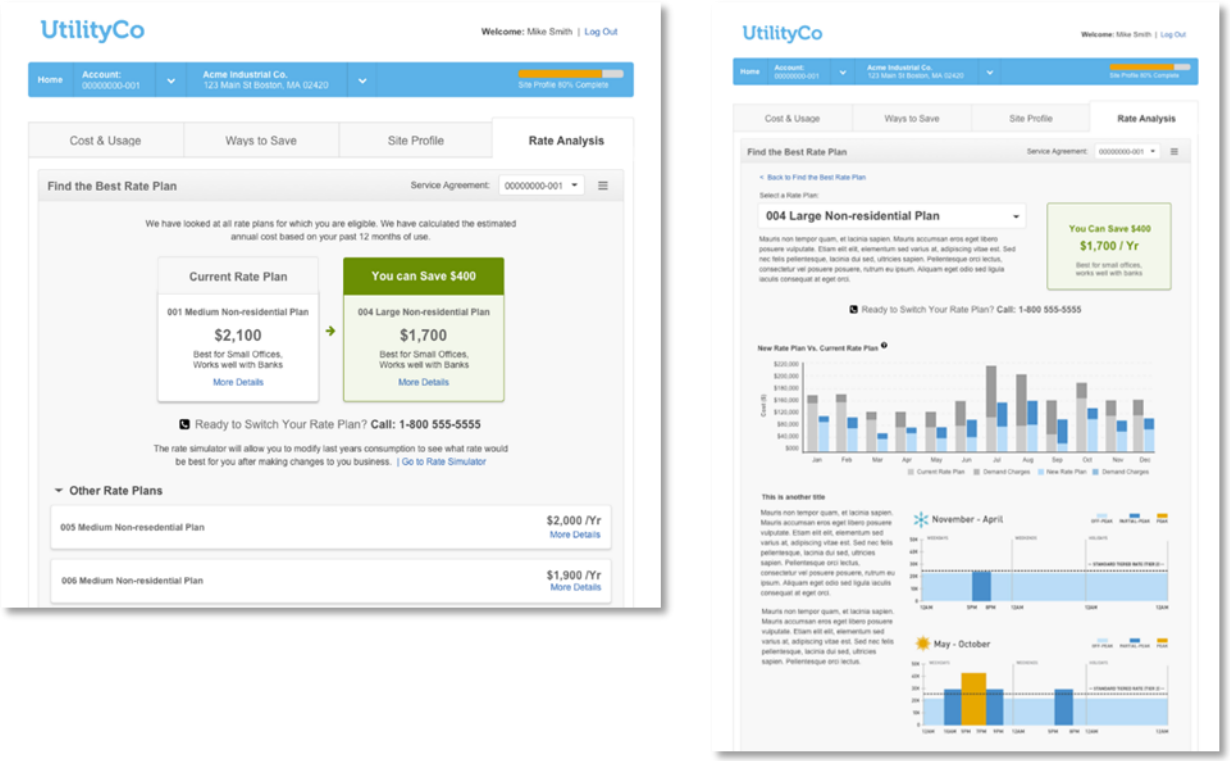
Figure B-13. Customer Portal for Business Customers – Savings Plan



Rate Optimization

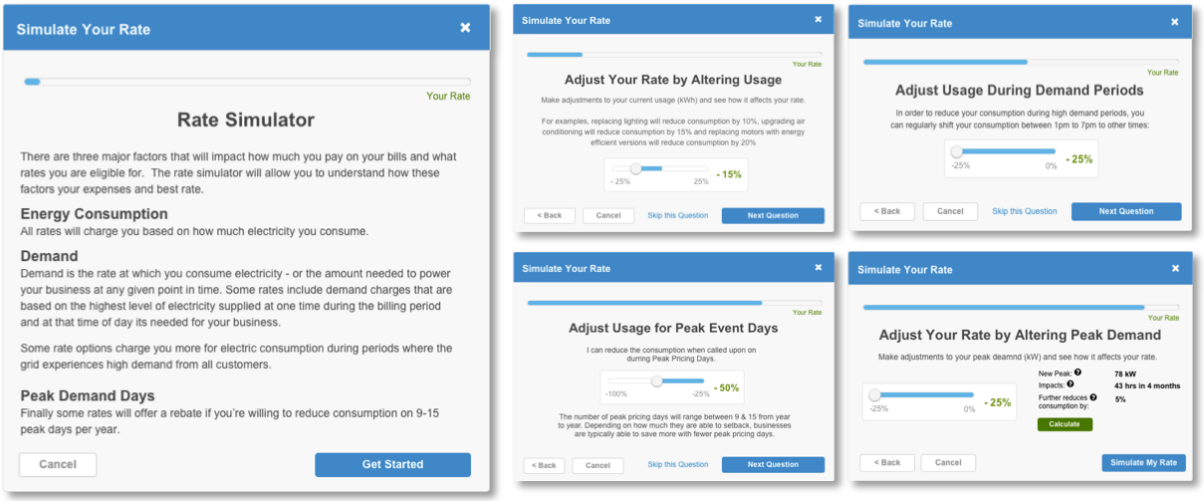
Rate Scenario Analysis – Rate simulator to help customers understand how *changes* in energy consumption habits will impact their Rate eligibility and energy costs.

Figure B-14. Customer Portal for Business Customers - Rate Optimization



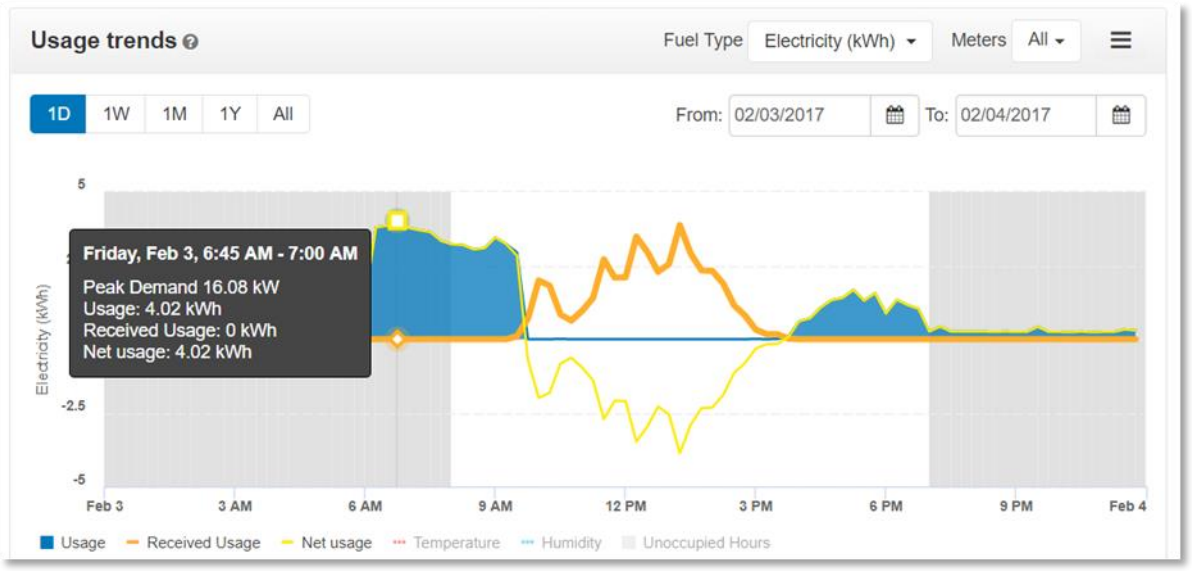
Find My Best Rate - find the best available rate plan based on customer eligibility and historical usage.

Figure B-15. Customer Portal for Business Customers – Rate Simulator



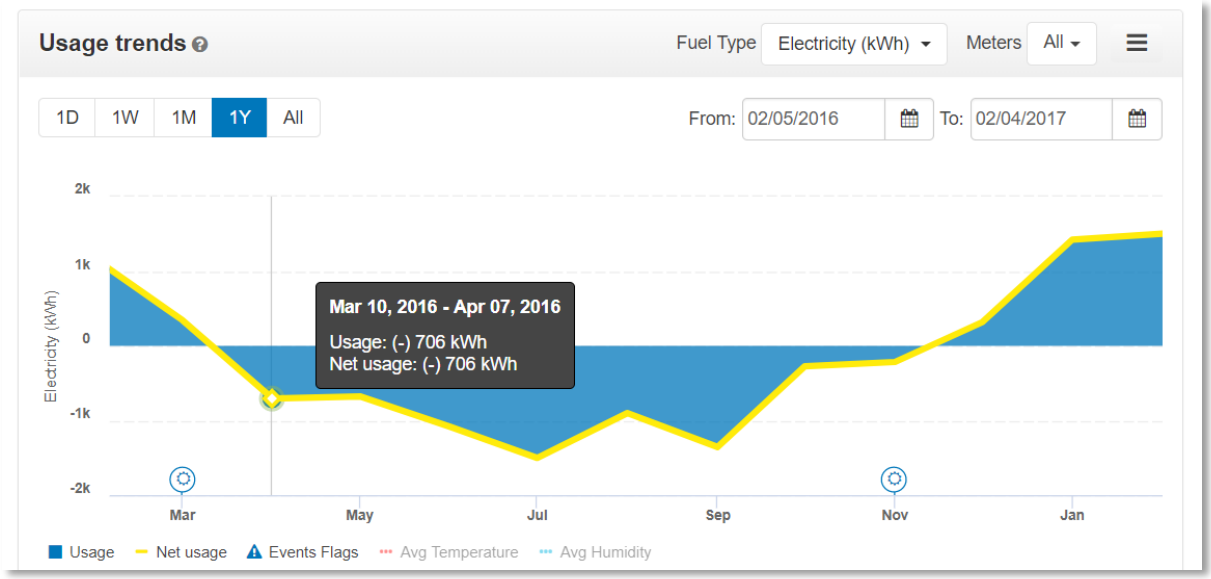
Business Solar

Figure B-16. Customer Portal for Business Customers – Business Solar



Solar Net Energy Meter Presentment – Provides numerous options to present customers with the amount of energy purchased, the amount of energy generated on premise from solar and the net energy consumed.

Figure B-17. Customer Portal for Business Customers – Solar Net Energy Meter

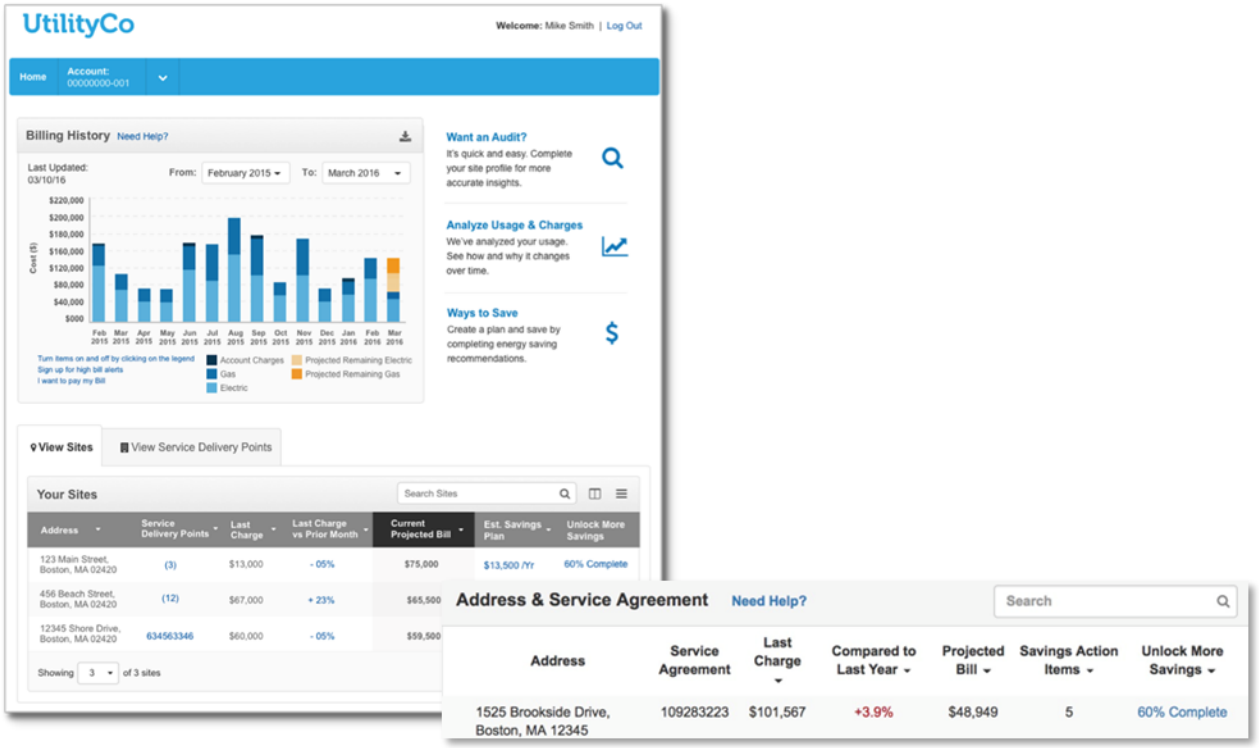


Budgeting for Businesses

Multi-Site Budgeting & Forecasting – Enables customers with multiple accounts to compare site costs, understand aggregated cost, and project costs across their portfolio.

Includes custom groupings and other budgeting tools.

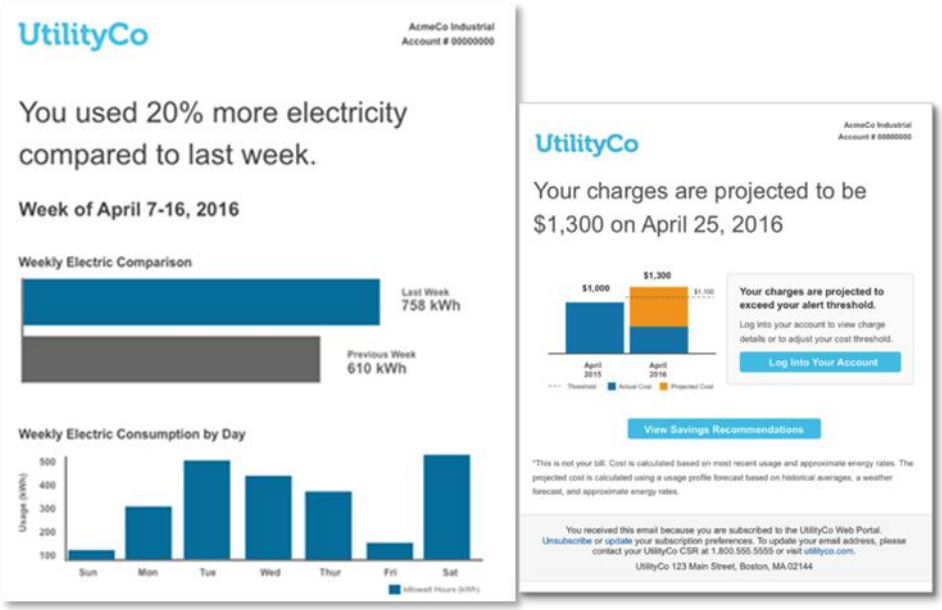
Figure B-18. Customer Portal for Business Customers - Multi-Site Budgeting & Forecasting



High Usage and Cost Alerts – Customers can receive notifications for high usage and cost alerts between billing cycles, helping with budget and cost management.

Customers can set thresholds for the alerts based on preferences.

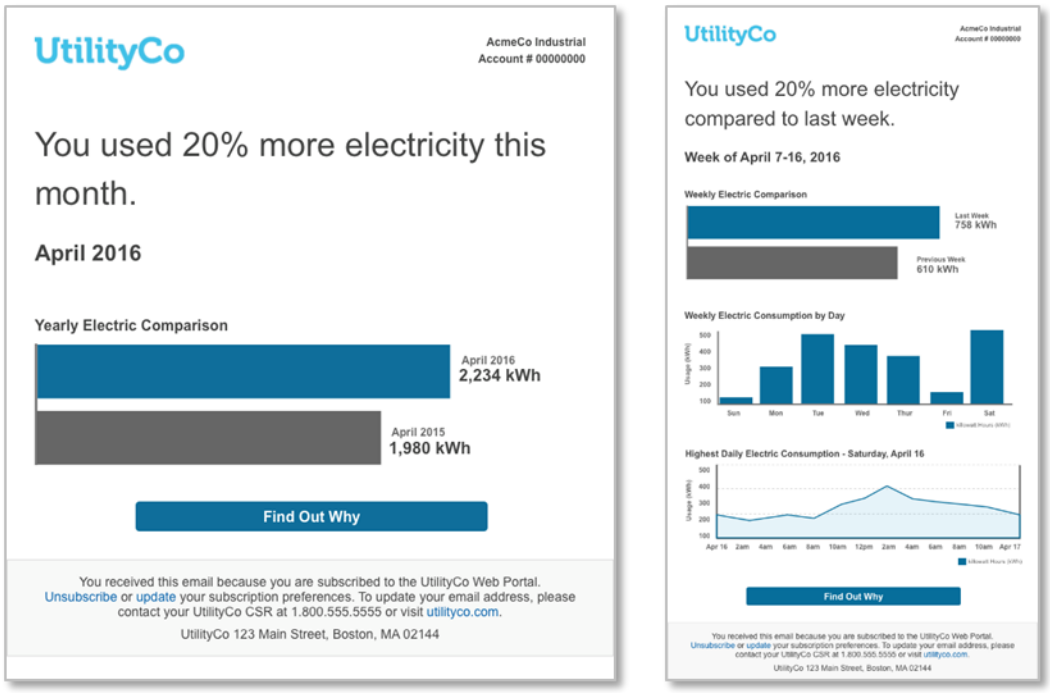
Figure B-19. Customer Portal for Business Customers - High Usage and Cost Alerts



Energy Reports

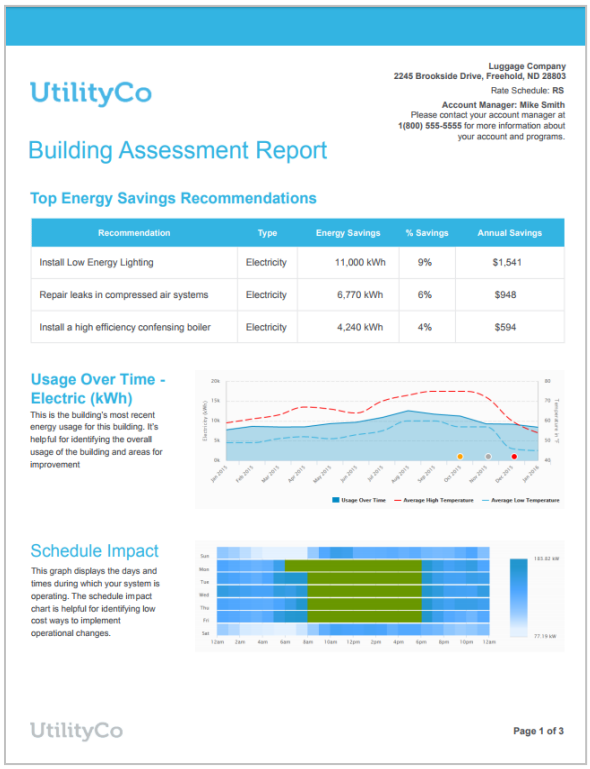
Monthly / Weekly Energy Reports – Configurable reports for customer access

Figure B-20. Customer Portal for Business Customers - Monthly and Weekly Energy Reports



Building Assessment Report – Standard report with full business energy summary for customer download

Figure B-21. Customer Portal for Business Customers - Assessment Report



UtilityCo

Luggage Company
2245 Brookside Drive, Freehold, ND 28803
Rate Schedule: RS
Account Manager: Mike Smith
Please contact your account manager at 1(800) 555-5555 for more information about your account and programs.

Building Assessment Report

Top Energy Savings Recommendations

Recommendation	Type	Energy Savings	% Savings	Annual Savings
Install Low Energy Lighting	Electricity	11,000 kWh	9%	$1,541
Repair leaks in compressed air systems	Electricity	6,770 kWh	6%	$948
Install a high efficiency confensing boiler	Electricity	4,240 kWh	4%	$594

Usage Over Time - Electric (kWh)

This is the building's most recent energy usage for this building. It's helpful for identifying the overall usage of the building and areas for improvement

Schedule Impact

This graph displays the days and times during which your system is operating. The schedule impact chart is helpful for identifying low cost ways to implement operational changes.

UtilityCo

Page 1 of 3

APPENDIX C. AMI and AMI-Enabled Functions Benefit-Cost Analysis Details

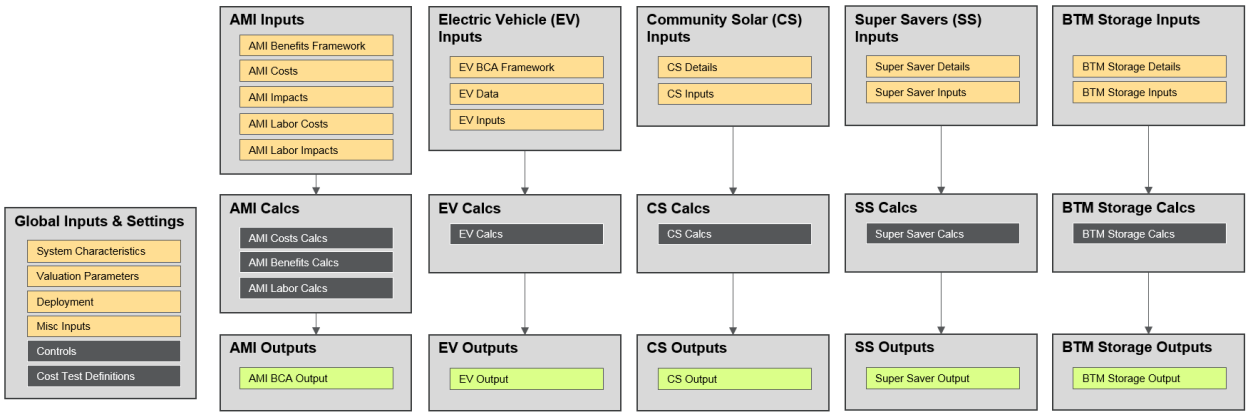
C.1 Benefit-Cost Analysis Model Design

This section summarizes the BCA model structure, methodology, and value definitions.

C.1.1 Benefit-Cost Analysis Model Structure

Figure C-1 provides an overview of the structure of the BCA model. The model has numerous modules (i.e., an AMI module and modules for each DER project). Each module is split by inputs, calculations, and outputs. The model also has global settings and controls that span across all modules.

Figure C-1. BCA Model Structure



C.1.2 Benefit-Cost Analysis Methodology

The team applied NY DPS's BCA Framework to calculate the benefits and costs from the SCT, UCT, and RIM test perspectives. Table C-1 summarizes this overall framework by cost test, where value streams labeled as a benefit are counted in the numerator of the benefit-cost ratio, cost streams are counted in the denominator, transfer streams are counted in both the numerator and denominator, and N/A streams are not included in the calculation.

Table C-1. Cost Test Definitions

Benefit or Cost Stream	SCT	UCT	RIM
Avoided Generation Capacity Cost (AGCC)	Benefit	Benefit	Benefit
Avoided Energy (LBMP)	Benefit	Benefit	Benefit
Avoided Transmission Capacity Infrastructure	Benefit	Benefit	Benefit
Avoided Transmission Losses	Benefit	Benefit	Benefit
Avoided Ancillary Services	N/A	Benefit	Benefit
Wholesale Market Price Impacts	N/A	Benefit	Benefit
Avoided Distribution Capacity Infrastructure	Benefit	Benefit	Benefit

Benefit or Cost Stream	SCT	UCT	RIM
Avoided O&M	Benefit	Benefit	Benefit
Avoided Distribution Losses	Benefit	Benefit	Benefit
Avoided Restoration Costs	Benefit	Benefit	Benefit
Avoided Outage Costs	Benefit	N/A	N/A
Net Avoided CO2	Benefit	N/A	N/A
Net Avoided SO2 and NOx	Benefit	N/A	N/A
Avoided Water Impacts	Benefit	N/A	N/A
Avoided Land Impacts	Benefit	N/A	N/A
Net Non-Energy Benefits	Benefit	N/A	N/A
Gained Utility Revenue	N/A	N/A	Benefit
Program Administration Costs	Cost	Cost	Cost
Added O&M	Cost	Cost	Cost
Utility Incentives	Transfer	Cost	Cost
Added Ancillary Service Costs	Cost	Cost	Cost
Incremental T&D and DSP Costs	Cost	Cost	Cost
Meters & Installation Costs	Cost	Cost	Cost
Communications Network Equip and Installation	Cost	Cost	Cost
Platform and Ongoing IT Operations	Cost	Cost	Cost
PM and Ongoing Business Operations	Cost	Cost	Cost
Participant DER Cost	Cost	N/A	N/A
Lost Utility Revenue	N/A	N/A	Cost
Shareholder Incentives	N/A	Cost	Cost
Net Non-Energy Costs	Cost	N/A	N/A

Navigant made some minor modifications to the original DPS BCA Framework to help add clarity to the model:

- Gained Utility Revenue was added as a benefit stream under the RIM test to capture the effect of increased revenue from the AMI-enabled revenue protection function.
- Added O&M was added as a cost stream under all tests to capture the effect of increased FTE requirements for the various initiatives, projects and programs described in this report.
- Utility Incentives were broken out as its own cost category to provide clarity on the DER project analyses. This value stream was originally assumed to be embedded in the Program Administrative Costs category.
- Four cost categories (i.e., Meters & Installation Costs, Communications Network Equip and Installation, Platform and Ongoing IT Operations, and PM and Ongoing Business Operations) were added to provide increased granularity to the cost model. Without these categories, it is unclear how to map various capital and O&M expenditures associated with AMI and AMI-enabled functions.

C.1.3 Benefit and Cost Definitions

Table C-2 provides the definitions of each benefit stream considered in this filing's business cases.

Table C-2. Benefit Stream Definitions

Benefit Stream	Definition
Avoided Generation Capacity Cost (AGCC)	Avoided generation capacity costs associated with a reduction in bulk system-coincident peak demand.
Avoided Energy (LBMP)	Avoided wholesale energy costs associated with a reduction in energy purchases at the wholesale level.
Avoided Transmission Capacity Infrastructure	Avoided infrastructure costs associated with a reduction in transmission system-coincident peak demand.
Avoided Transmission Losses	Avoided energy and capacity costs associated with reduction in the transmission system loss factor.
Avoided Ancillary Services	Avoided costs associated with a reduction in ancillary services requirements.
Wholesale Market Price Impacts	Benefit associated with downward pressure on energy and capacity prices due to energy and peak load reductions, respectively.
Avoided Distribution Capacity Infrastructure	Avoided infrastructure costs associated with a reduction in distribution system-coincident peak demand.
Avoided O&M	Benefit associated with reduced utility operations and maintenance costs.
Avoided Distribution Losses	Avoided energy and capacity costs associated with reduction in the distribution system loss factor.
Avoided Restoration Costs	Reduced restoration costs borne by the utility associated with restoring power during outages in a more efficient manner or avoiding outages events.
Avoided Outage Costs	Benefit to customers due to a reduction in the frequency and/or duration of outages.
Net Avoided CO2	Benefit to society associated with reduced carbon emissions due to reductions in wholesale energy or reduced direct emissions from gasoline vehicles and DER.
Net Avoided SO2 and NOx	Benefit to society associated with reduced sulfur oxide and nitrogen oxide pollutant emissions due to reduced direct emissions from gasoline vehicles and DER.
Avoided Water Impacts	Qualitative benefit associated with reducing water consumption.
Avoided Land Impacts	Qualitative benefit associated with reducing water consumption.
Net Non-Energy Benefits	Qualitative benefit associated with non-energy benefits such as customer satisfaction.
Gained Utility Revenue	Increase in utility revenue due to increased sales (e.g., from EVs) or revenue protection (e.g., theft detection)

Table C-3 provides the definitions cost streams considered in this filing's business cases.

Table C-3. Cost Stream Definitions

Cost Stream	Definition
Program Administration Costs	Costs borne by the utility to administer initiatives and projects. This cost category is generally applicable to the DER projects.
Added O&M	Costs associated with added utility operations and maintenance costs (i.e., added FTEs).
Utility Incentives	Incentives paid from the utility to customers.
Added Ancillary Service Costs	Costs associated with DER causing additional ancillary service costs onto the system.
Incremental T&D and DSP Costs	Costs of building additional T&D infrastructure and enabling DSP capabilities.
Meters & Installation Costs	Costs associated with AMI meters material and installation.
Communications Network Equip and Installation	Costs associated with the material and installation of the communications network.
Platform and Ongoing IT Operations	Costs associated with platform and ongoing IT operations.
PM and Ongoing Business Operations	Costs associated with project management (e.g., PMO) and ongoing business operations including customer engagement and marketing.
Participant DER Cost	Equipment and participation costs borne by DER providers/customers.
Lost Utility Revenue	Reduced revenue to the utility (i.e., bill savings).
Shareholder Incentives	Annual costs to ratepayers of utility shareholder incentives.
Net Non-Energy Costs	Qualitative assessment of non-energy costs.

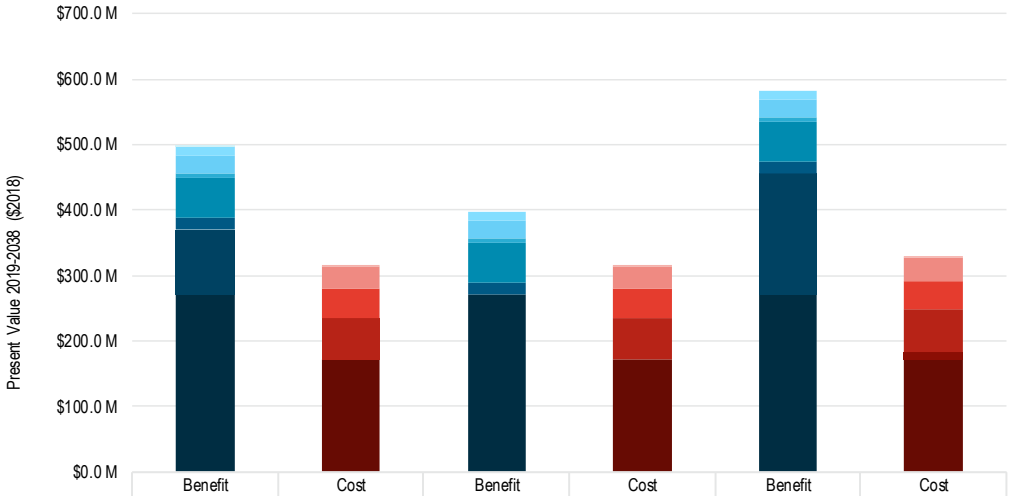
C.1.4 Benefit-Cost Analysis Model

The BCA model used to generate the results presented in this report is written in Microsoft Excel. The model is proprietary to Navigant but will be available to parties with standing in the regulatory proceeding with addition of a non-disclosure agreement (NDA). This file contains the detailed modeling assumptions and pointers to relevant source documentation and attachments.

C.2 Benefit-Cost Analysis Detailed Results

Figure C-2 shows the present value of benefits and costs over the analysis period (2019-2038).

Figure C-2. 20-Year Present Values of Benefits and Costs by Cost Test



	SCT		UCT		RIM	
	Benefit	Cost	Benefit	Cost	Benefit	Cost
Net Avoided CO2	$1.8 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M
Avoided Transmission Capacity Infrastructure	$13.7 M	$0.0 M	$13.7 M	$0.0 M	$13.7 M	$0.0 M
Avoided Generation Capacity Cost (AGCC)	$27.1 M	$0.0 M	$27.1 M	$0.0 M	$27.1 M	$0.0 M
Avoided Energy (LBMP)	$6.7 M	$0.0 M	$6.7 M	$0.0 M	$6.7 M	$0.0 M
Avoided Restoration Costs	$60.7 M	$0.0 M	$60.7 M	$0.0 M	$60.7 M	$0.0 M
Avoided Distribution Capacity Infrastructure	$17.7 M	$0.0 M	$17.7 M	$0.0 M	$17.7 M	$0.0 M
Avoided Outage Costs	$97.9 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M
Gained Utility Revenue	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$184.5 M	$0.0 M
Avoided O&M	$271.9 M	$0.0 M	$271.9 M	$0.0 M	$271.9 M	$0.0 M
Communications Network Equip and Installation	$0.0 M	$1.1 M	$0.0 M	$1.1 M	$0.0 M	$1.1 M
PM and Ongoing Business Operations	$0.0 M	$34.2 M	$0.0 M	$34.2 M	$0.0 M	$34.2 M
Added O&M	$0.0 M	$44.7 M	$0.0 M	$44.7 M	$0.0 M	$44.7 M
Platform and Ongoing IT Operations	$0.0 M	$64.5 M	$0.0 M	$64.5 M	$0.0 M	$64.5 M
Lost Utility Revenue	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$12.4 M
Meters & Installation Costs	$0.0 M	$170.7 M	$0.0 M	$170.7 M	$0.0 M	$170.7 M

APPENDIX D. Addressing Early Market Needs For Public Charging Infrastructure



gabel associates

Addressing Early Market Needs For Public Charging Infrastructure

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RELEASE 1.0

APRIL 25, 2018

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Introduction

Mainstream adoption of Plug-In Electric Vehicles (EVs) brings a diverse portfolio of benefits, including economic savings for ratepayers and EV owners, and significant reductions of CO_2 and other emissions that directly affect public health. EV adoption is beginning to grow, but significant consumer barriers remain. One of the most important obstacles is buyer concern about range anxiety – the perceived risk of being stranded with a discharged battery while on the road. Although most drivers will charge their vehicles at home most of the time, consumers need to see enough public charging facilities in place to address their charging needs while on the road before they would seriously consider purchase of an electric vehicle.

The range anxiety barrier is therefore deeply rooted in the current scarcity of fast public charging infrastructure, and improving the availability of those facilities is a primary strategy for addressing this dominant consumer concern. Development of those facilities through efforts by the competitive market, based on private capital, has proven to be challenging. These structural issues are endemic to early market conditions, and they restrict public fast charging market development[1]. These issues are often exacerbated by current electricity cost structures, especially electricity demand charges that directly impact charger operating costs. An early market development solution is needed to address the full breadth of structural issues that currently restrict public charging infrastructure development. This document summarize the conditions that make organic development of the public charging market difficult, and outlines a new method for addressing electricity rate-design issues that can support this embryonic market effectively.

The Challenge

As noted in the introduction, the essential need is for widespread deployment of a critical mass of fast, convenient charging infrastructure BEFORE consumers will begin adopting EVs in large numbers. This requirement creates conditions under which **early public charger installations suffer from low utilization**. That means the business case for public fast charging is extremely challenging – in fact, almost impossible to achieve in all but the most heavily used locations (or where significant grants or similar incentives are available). This is a STRUCTURAL problem with early market conditions – the market needs the infrastructure BEFORE natural utilization is high enough to justify the necessary investment. As a result, public charging investment is not sufficient to addresses consumer concerns about range anxiety, and installations are only being targeted where they are easy and profitable, not necessarily where they are needed. The challenge is not financing public charging long term, but how to support the market during its embryonic period, seeding investment so as to encourage sustainable long term growth.

[1] This analysis focuses exclusively on DC Fast Charging, which would require 50KW equipment today, moving quickly to 150KW as the design standard. Advanced installations are already being planned for 350KW. The general issues and solutions contemplated in this analysis, however, may be applicable to rate-related issues for lower power solutions as well, especially workplace or fleet charging applications.

This essential utilization challenge during the early market development phase can be amplified by electricity costs than include demand charges. These fast charging installations are high power but (in the early phases) low energy. Typical commercial tariffs include KW-driven demand charges that are allocated across a small number of dispensed kwhrs. As a result, the effective cost of power is very high, forcing the charging station owner/operator to charge a very high per-kwhr rate for vehicle charging. Many EV market development advocates are therefore interested in restructuring electricity costs for this particular application to eliminate the perceived "demand charge penalty".

It is important to note that the essential problem is low utilization during early market conditions when vehicle population is small, as exacerbated by demand-charge driven electricity costs. But even if demand charges were eliminated entirely, the more fundamental early-stage utilization challenge remains – especially if the goal is achieving the levels of geographic distribution needed to eliminate range anxiety barriers. In addition, developing a solution that addresses the unique needs of high powered public EV charging through more general "demand charge reform" (as it is often proposed) has broader regulatory implications, and raises concerns about how the real costs associated with power-related costs are recovered. **A more general solution that deals with the early stage low-utilization challenge is needed, while also addressing demand-charge impacts without introducing potentially disruptive rate design issues more broadly.**

A Solution – A Self-Regulating Incentive:

The following proposed program design provides financial support to public charging owner/operators in proportion to their need, and addresses both the fundamental low utilization issue, as well as the impact of demand charges on operating costs. The program works as follows:

1. A program is established for any owner/operator of an EV charging facility available for public use. Standards may be established – such as a focus on high power charging or open access requirements – to maximize public benefit of the incentive provided.

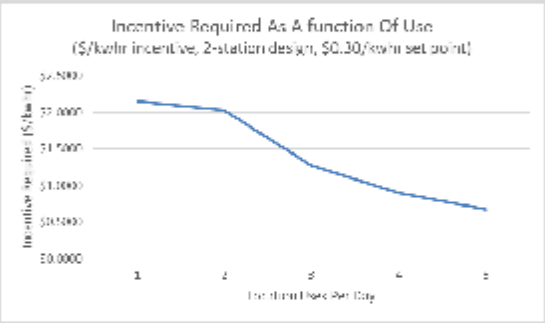
2. The program will establish a "set point", which is the effective cost of electricity to be carried by owner/operators of public charging facilities. This set point can be set at any level (on a $/kwhr basis) consistent with policy goals, but a typical benchmark is related to ensuring that public EV charging is no more expensive than fueling with gasoline.

3. The public charging facility will be installed and operated under an EXISTING commercial tariff, and will be billed monthly as per usual practice. New service, with a dedicated meter, may be required to allow direct metering of electricity delivered for public charging. The owner/operator pays their utility bill as usual.

4. Each month (or any other period), the utility will compute the difference between the actual effective cost of power (as billed) and the set point. The difference will be reimbursed as an off-bill incentive (i.e. a payment or other benefit distributed directly). Effective cost of power for each period is based on total dollars (including flat service fees, kwhr-driven costs, and kw-driven costs, for both supply and distribution) divided by kwhrs-delivered. For example, if the

effective cost of power in a given period is $0.95/kwhr, and the set point is $0.30/kwhr, the incentive is paid at $0.65/kwhr for the kwhrs delivered during the period. This incentive can be provided for a set time (e.g. five years), or until a certain utilization level is achieved, with the facility reverting to standard billing (without an incentive) thereafter.

5. **The incentive paid each period will naturally decline as utilization increases.** As the number of uses per day increases, more kwhrs are delivered, which dilutes the per-kwhr recovery of capital investment and demand charges. At some level of utilization, the incentive required naturally reduces to zero. As a result, the program delivers exactly what the market needs (as defined by the set point), no more and no less, and naturally declines over time in proportion to increased utilization as the EV population grows. The following chart, illustrates how the incentive reduces as uses-per-day grows for (based on tariff analysis for a utility in New Jersey as an example).



6. The mechanics of the program are simple and easy to implement. No tariff changes or billing enhancement are needed, although if desired the off-bill mechanism could be transitioned to a bill-credit mechanism in the future if desired. This may not be needed, however, since the need for the incentive should decline as the EV population increases and utilization goes up.

7. For some locations, however, utilization may remain low and the incentive may be required longer term. Some remote locations may never achieve the minimization use-threshold required to be attractive economically, but those locations are needed nonetheless to ensure the geographic coverage needed to address consumer range anxiety concerns. Longer term incentive support, where needed, can be justified since these are assets for public use and it enables a broader societal benefit related to widespread EV adoption.

8. Given the simplicity of the overall structure, the primary design challenge is to establish the set point. The set point can be based on pro-forma analysis of overall public charging economics and desired $/kwhr targets charged to the end consumer (e.g. similar to gasoline), and may provide an incentive level BEYOND what is needed to simply dilute demand charges if desired. In this way, the proposed program provides a more general solution to the early stage market development challenges of public charging infrastructure. Different set points may be

established for different types of facilities – for example, the set point analysis could account for a premium to be paid for higher power charging sessions (i.e. premium rather than regular, electrically speaking), or preferred locations (e.g. serving EV owners in multi-family settings, low income drivers, or near zones of desired economic development, etc).

Benefits Of This Approach:

The proposed program is envisioned as a tool specifically designed to address early market conditions in a form that evolves based on market need gracefully over time. This design offers several advantages:

1. Doesn't require new tariff or billing system changes.
2. Can be used to respond to more general early-phase economic challenges with public charging, beyond just responding to cost pressures resulting from demand charges.
3. Doesn't raise any fundamental rate-design questions, or open broader regulatory issues.
4. Provides only the level of incentive needed (as compared with the set point), and naturally self-regulates the incentive level based on actual asset utilization. The self-regulation mechanism implicitly accounts for a wide variety of complicated factors that could impact the degree of incentive needed for a particular project through the simple set point construct.
5. The level of incentive naturally declines over time, and could go to zero when utilization thresholds are achieved. Conversely, the incentive may be retained longer term at more remote locations that suffer from persistent low use despite being needed to ensure geographic coverage.
6. The incentive itself is recovered through rates, but is being used to support assets for use by the general public, to encourage EV market adoption that has broader societal value. This is the "best and highest" use of rate-recovered incentives.
7. The operating mechanics of the program are simple, and the primary design consideration is determining the set point. Set point can be responsive to a wide variety of policy goals, and can be used to encourage preferred scenarios (low income, multi-family, peak-time congestion, etc).
8. The program can be amended over time by adjusting the set point (for new applicants) based on learning and evolving market conditions. Meanwhile, the owner/operators benefit from a high level of economic certainty, with reductions in utilization-related risk, which encourages the use of private capital for infrastructure development.
9. Although conceived primarily in support of high power public chargers (where the demand charge impact is particularly severe), similar concepts could be applied to low power chargers as well, especially those that aggregate behind a customer meter with potential demand charge implications (L2 chargers in workplace or fleet applications, for example). This single program framework can therefore be used to meet a variety of segment needs, with the only variable being the set point in each application.
10. Eligibility requirements can be established that maximize public benefit for those projects that receive the incentive.

APPENDIX E. Acronyms and Abbreviations

ADMS	Advanced Distribution Management System
AGCC	Avoided Generation Capacity Cost
AMI	Advanced Metering Infrastructure
BCA	Benefit-cost Analysis
BEV	Battery Electric Vehicle
BTM	Behind the Meter
CAPEX	Capital Expenditure
CASPM	California Standard Practice Manual
CES	Clean Energy Standard
C&I	Commercial & Industrial
CHP	Combined Heat and Power
CIA	Confidentiality, Integrity, and Availability
CISO	Chief Information Security Office
CMV	Contact Making Voltmeter
CO_2	Carbon Dioxide
CoE	Center of Excellence
CPP	Critical Peak Pricing
CPUC	California Public Utilities Commissions
CSR	Customer Service Representatives
CVR	Conservation Voltage Reduction
DCFC	Direct Current Fast Charging
DEC	New York State Department of Environmental Conservation
DER	Distributed Energy Resources
DERMS	Distributed Energy Resources Management System
DOE	US Department of Energy
DPS	Department of Public Service
DSCADA	Distribution Supervisory Control and Data Acquisition
DSIP	Distributed System Implementation Plan
DSP	Distributed System Platform
EPA	US Environmental Protection Agency
EV	Electric Vehicle
F&PP	Fuel and Purchase Power
FAQ	Frequently Asked Question
FIT	Feed-in-tariff
FTE	Full-time Equivalent
GHG	Greenhouse gas
HER	Home Energy Report
IBEW	International Brotherhood of Electrical Workers
ICE	Internal Combustion Engine
IoT	Internet of Things
IOU	Investor-owned utility
IT	Information Technology
ITC	Investment Tax Credit
IOAP	Interconnection Online Application Portal
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hour
LBMP	Locational Based Marginal Pricing
LIPA	Long Island Power Authority
LIRR	Long Island Rail Road
LSRV	Locational System Relief Value

M&V	Measurement and Verification
MHz	Megahertz
MDMS	Meter Data Management System
MW	Megawatt
MWh	Megawatt-hour
NDA	Non-Disclosure Agreement
NERC-CIP	North American Electric Reliability Corporation Critical Infrastructure Protection
NIST	National Institute of Standards and Technology
NISTIR	National Institute of Standards and Technology Interagency Report
NPV	Net Present Value
NWS	Non-wires Solution
NYISO	New York Independent System Operator
NYPA	New York Power Authority
NYSERDA	New York State Energy Research and Development Authority
O&M	Operations and Maintenance
OMS	Outage Management System
OPEX	Operating Expenditure
OSA	Operations Services Agreement
PEV	Plug-in Electric Vehicle
PHEV	Plug-in Hybrid Electric Vehicle
PIA	Privacy Impact Assessment
PII	Personally Identifiable Information
PMO	Program Management Office
PPA	Power Purchase Agreement
PSC	Public Service Commission
PV	Photovoltaic
REC	Renewable Energy Credit
REV	Reforming the Energy Vision
RF	Radio Frequency
RIM	Rate Impact Measure
SCT	Societal Cost Test
SRP	Salt River Project
T&D	Transmission and Distribution
TLM	Transformer Load Monitoring
TOU	Time of Use
UCT	Utility Cost Test
UoF	Utility of the Future
US	United States
VDER	Value of Distributed Energy Resources
VEE	Validation, Estimation and Editing
VVO	Volt/VAR Optimization
ZEV	Zero Emission Vehicle