EXHIBIT JC-2

BEFORE THE
NEW JERSEY BOARD OF PUBLIC UTILITIES

In The Matter Of The Verified Petition Of
Jersey Central Power & Light Company
For Approval Of An
Advanced Metering Infrastructure (AMI) Program
(JCP&L AMI)

BPU Docket No. _____

Direct Testimony
Of
John C. Ahr

On Behalf Of
Jersey Central Power & Light Company

August 27, 2020

DIRECT TESTIMONY OF JOHN C. AHR ON BEHALF OF JERSEY CENTRAL POWER & LIGHT COMPANY

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is John C. Ahr. My business address is 800 Cabin Hill Drive, Greensburg, PA 15601.

Q. Please identify your employer and describe your current position.

A. I am employed by FirstEnergy Service Company, which is a direct subsidiary of FirstEnergy Corp. ("FirstEnergy"), the parent company of Jersey Central Power & Light Company ("JCP&L" or "Company") as Advisor, Regulatory Compliance - Smart Meter.

Q. How long have you worked for FirstEnergy Service Company?

A. I have worked for over thirty-six years with subsidiaries of FirstEnergy or its predecessor companies, working in a variety of positions in the engineering, operations, customer services, transmission, customer support, energy efficiency and the emerging technologies areas of FirstEnergy or its predecessor companies.

Q. How long have you been employed in your current position?

A. I have been employed in my current position since 2018 and its precursor position since 2012.

Q. Please describe your relevant educational background and relevant work experience.

A. I am a graduate of The Pennsylvania State University with a Bachelor of Science Degree in Electrical Engineering. I have also earned a master's degree in business administration from the University of Pittsburgh. I began work with FirstEnergy or its predecessor companies in 1984 as an Engineer in the distribution planning area and was promoted to the Supervisor of Transmission & Distribution Operations in 1992. I subsequently held a number of management positions until I was promoted to Director of System Operations

in 1999. Other positions I have held include Director of Energy Procurement; Director of Meter Reading and Collections; Senior Consultant; Manager, Customer Support and Manager, Regulatory Compliance – Smart Meter.

Q. Please describe your duties and responsibilities as Advisor, Regulatory Compliance – Smart Meter.

A. As Advisor, Regulatory Compliance – Smart Meter, I am responsible for regulatory compliance associated with all FirstEnergy smart meter projects, including all filings and resulting regulatory processes associated with plan implementation and approval. Within my role, I provide leadership, expert guidance, management and subject matter expertise for the smart meter projects and coordinate smart meter developments among the FirstEnergy operating companies. I also serve as the smart meter subject matter expert and represent the smart meter projects and FirstEnergy's operating companies on regulatory matters. I assist in preparing for regulatory proceedings regarding smart meters; and manage external consultants related to the smart meter project. My qualifications are further described in Attachment A hereto.

Q. Have you previously testified in Board of Public Utilities ("BPU" or "Board") proceedings?

A. No, I have not. However, I have testified before the Pennsylvania Public Utility Commission in the 2009 Petition of West Penn Power Company d/b/a Allegheny Power for Expedited Approval of its Smart Meter Technology Procurement and Installation Plan. I have also provided testimony before the West Virginia Public Service Commission in 2009 in a General Investigation into the Smart Grid standards set forth in the Energy

Independence and Security Act of 2007 and I have provided testimony before the Maryland Public Service Commission in an adjustment of fuel rate case in 1999.

Q. What is the purpose of your direct testimony?

A. My testimony addresses JCP&L's proposed Advanced Metering Infrastructure Program ("JCP&L AMI Program" or "Program"). I will describe the following aspects of the proposed JCP&L Advanced Metering Infrastructure Plan ("AMI Plan", "Plan" or "Business Case"): (1) the proposed AMI Solution (i.e., the major components of the AMI installation); (2) the deployment schedule, (3) customer opt-out provisions, (4) the costs of the Plan, (5) the benefits of the Plan and the cost benefit analysis, (6) Reporting and Metrics, and (7) the Customer Communications Plan. I am the sponsor of the Company's AMI Plan, attached hereto as Attachment B, which constitutes the Company's proposed engineering plan, incudes its Cost Benefit Analysis ("CBA") for the implementation of AMI, and provides a Customer Communications Plan in an Appendix. My testimony, including the Attachments, describes the JCP&L AMI Plan, time frame for deployment, opt-out provisions, estimated costs, the benefits and savings to be generated by the AMI Plan, plan for educating customers regarding the installation, functionality and customer benefits of AMI, and reporting and metrics. Regarding benefits, my testimony will describe aspects of the AMI Plan that address the BPU's July 25, 2018 Storm Order in Docket No. EO18030255 and clean energy goals, including as set forth in the State's 2019 Energy Master Plan: Pathway to 2050 ("EMP" or "Energy Master Plan").

Q. How is the remainder of your testimony organized?

A. Following this introduction, my testimony is organized as follows:

II. EXECUTIVE SUMMARY

Q. Please summarize the proposed JCP&L AMI Plan.

A. On February 19, 2020, the Board issued its Decision and Order in BPU Docket No. ER16060534 ("AMI Filing Order").[1] The AMI Filing Order directed JCP&L to file a petition "for AMI implementation."

Before issuing the AMI filing directive, the AMI Filing Order summarized prior reports by the Board and its consultants. For example, the AMI Filing Order referenced the findings in the "AMI Gold Standards Report" by Navigant Consulting, Inc. (filed November 6, 2019) (§3.2) that AMI may reduce labor costs, provide voltage optimization,

[1] *In the Matter of the Petition of Rockland Electric Company for Approval Of an Advanced Metering Program; and For Other Relief,* BPU Docket No. ER16060524, Decision and Order (February 19, 2020).

detect outages, increase the opportunity for data collection, provide faster service restoration,[2] improve billing accuracy, detect theft and enhance energy efficiency. Based on that Report, the Board found that "AMI has the potential to benefit the distribution system, streamline and modernize utility operations, provide an enhanced customer experience, and benefit the environment." (AMI Filing Order, p. 2).

In its AMI Filing Order, the Board also referenced the Energy Master Plan (§5.3.1, p. 184), which provides:

> AMI is a foundational component of a modernized electric distribution grid and uses an integrated system of smart meters, communications networks, and data management systems to enable two-way communications between utilities and customers. Statewide AMI installation is a prerequisite of many additional clean energy objectives as laid out in this EMP. Potential benefits include realization of potential gains in efficiencies and cost savings, accelerated service restoration during outages, better environmental outcomes, lower operations and maintenance costs, better demand-side customer engagement, and alternative rate designs.

(AMI Filing Order at 3). The AMI Filing Order found that AMI is a means to achieve a number of the goals as set forth in the EMP. (AMI Filing Order at 3)

The JCP&L AMI Plan is filed in compliance with the Board's AMI Filing Order and supports achievement of many of the goals raised by the Board. In the JCP&L AMI Plan, the Company proposes to accelerate electric distribution infrastructure investment in smart meters and other AMI-related electric distribution infrastructure.

JCP&L seeks Board approval to undertake a three-year deployment of smart meters and AMI infrastructure that is expected to commence on January 1, 2023 plus a two-year final engineering phase along with certain pre-deployment activities. The proposed AMI

[2] Previously, following the March 2018 Nor'easter storms, the Board issued a July 25, 2018 Order ("2018 Storm Order") which adopted a Staff recommendation New Jersey EDCs "submit a plan and cost benefit analysis for the implementation of AMI that should "focus on the use and benefits of AMI for the purpose of reducing customer outages and outage durations during a major storm event." Order Accepting Staff's Report Requiring Utilities to Implement Recommendations, BPU Docket No. EO18030255 (July 25, 2018) ("2018 Storm Order"), at p. 13.

Plan would result in accelerated investment by the Company of $418 million through the completion of the one-year pre-deployment period and three-year deployment period and $732 million on a nominal dollar basis in total over the twenty-year study period.

The Company proposes to install an AMI system architecture consisting of a number of components (the "AMI Solution") that is based on the smart meter solution developed and deployed by JCP&L's sister companies in Pennsylvania, adjusted for any advancements in technology. The same architecture is also being used by JCP&L's sister companies in Ohio. JCP&L's AMI Solution includes approximately 1.15 million AMI smart meters (forming a mesh network for communication between meters and other field area network devices), a secure communications network, a head end consisting of a collection engine, a field network director, a meter data management system and other core processes. The AMI Solution has the functionality to work in conjunction with home area networks installed in customers' homes.

The Business Case provided in Attachment B, which also constitutes an engineering report, details the proposed AMI Solution, deployment timing, cost estimates, benefits description and quantification, benefit to cost ratios, reporting and metrics, and other information. The Company will provide semi-annual status reports to Board Staff and Rate Counsel addressing various metrics regarding AMI installation and functionality.

The AMI Plan's accelerated AMI investments will produce benefits for the Company's customers, its electric distribution system, and the State. The AMI Plan will make JCP&L's distribution system more resilient in the face of outages (*i.e.*, by shortening the duration of outages) during both storm and blue-sky events. Customers will benefit from the ability to manage and reduce their energy consumption based on interval usage

information provided by smart meters and from the resulting reduction in system peak demand. Similarly, smart meters will allow customers to benefit from time varying rates ("TVR") that may be offered by third party suppliers by shifting their usage to lower cost periods and reducing their electric bills. The reduction in consumption and use of TVR will also reduce peak demand and carbon emissions. The Company will realize operational benefits by reducing the meter reading function and reducing back office and call center costs due to a reduction from customer billing and meter reading inquiries.

The Company's cost benefit analysis estimated operational, customer and societal benefits from the proposed AMI Plan of $1.358 billion on a cumulative, nominal dollar basis, compared to estimated costs of $732 million (including capital and expense) during the twenty-year study period, or a nominal benefit to cost ratio of 1.85:1. Further, the JCP&L AMI Plan will benefit the economy of the State by generating construction jobs and will support sustained economic growth by using smart technology that will result in a more reliable and resilient electric distribution system, which will enhance the State's ability to attract and retain commercial and industrial investment.

As described in the testimony of my colleague, Carol Pittavino, the Company proposes annual rate filings for recovery of investments in the Plan through a separate tariff Rider providing AMI adjustment charges.

III. JCP&L's ELECTRIC DISTRIBUTION SYSTEM

Q. Please describe JCP&L's electric distribution system.

A. The Company provides electric distribution service to over 1.14 million residential, commercial and industrial customers, representing approximately 25% of the metered electric customers in New Jersey. Accordingly, the AMI Plan, which proposes to address

all customers in its service territory, will require the installation of approximately 1.15 million smart meters**.** The customer base is 88% residential, 11% commercial and 1% industrial. JCP&L also owns, operates and maintains 326 substations, and 1,174 primary distribution circuits. The Company operates and maintains over 35,000 conductor miles (more than 19,000 circuit miles) of primary distribution circuits.

Q. Please describe the service territory in which the electric distribution system is located.

A. The Company's service territory is vast and diverse in terms of terrain. The territory encompasses 3,300 square miles, covering approximately 43% of New Jersey's land mass, in all or parts of thirteen counties and 236 municipalities (or about 45% of all New Jersey municipalities). The territory includes two distinct regions of New Jersey: the Northern Region and the Central Region. Each region is comprised of one continuous geographical region however, the regions themselves do not border each other but are separated by a portion of another utility's service territory. The Northern Region features a wide variety of contrasts which includes the heavily-forested and mountainous Northwestern portion of New Jersey. The Central Region in the central coastal portion of the State and features a wide variety of demographic and geographic contrasts. The western portion of the territory has farmland communities while the eastern portion is home to Jersey Shore communities, including cities such as Asbury Park and Long Branch.

Q. Please describe the impact of multiple major weather events since 2011 on the Company's system.

A. Three significant weather events occurred over the course of 2011 and 2012, each causing a substantial amount of damage to the distribution system in the JCP&L service territory.

The first, Hurricane Irene, made landfall near Atlantic City, New Jersey as a Category I Hurricane in the early morning hours of Sunday, August 28, 2011. Hurricane Irene left approximately 780,000 of JCP&L's 1.1 million customers without power for some period of time and caused damage to parts of 88% of JCP&L's circuits. A second major snowstorm (the "October Snowstorm") began to impact the JCP&L service territory on October 29, 2011. The three to nineteen inches of snow from the October Snowstorm caused outages to almost 450,000 of JCP&L's customers. The third storm, Superstorm Sandy, proved to be one of the most destructive storms to ever hit the east coast of the United States. New Jersey took a direct hit from Sandy during October 29-30, 2012, affecting service to nearly all of JCP&L's 1.1 million customers. Further, a nor'easter (known as winter storm Athena) dumped more than a foot of heavy, wet snow on parts of central New Jersey on November 7, 2012, causing an additional 130,000 customer outages. Tree damage to overhead infrastructure was the primary cause of damage and outages in all of these storms.

Q. Following those weather events, did the Company undertake infrastructure investments to enhance the overall reliability of the utility's distribution system?

A. Yes. In the years following those major storm events, the Company made capital investments in many areas of its service territory to enhance the reliability of its service. From 2013 through 2017, JCP&L made capital investments in the distribution system totaling approximately $975 million. In addition, on December 17, 2017, the Company proposed an infrastructure investment program called "JCP&L Reliability Plus" to enhance distribution system reliability and resiliency. The Board on May 8, 2019 issued a Final Decision and Order Approving Stipulation, BPU Docket No. EO18070728 providing for

investment of up to $97 million for ten projects involving: Overhead Circuit Reliability and Resiliency, Substation Reliability Enhancement, and Distribution Automation over a 19-month period.

Q. Has JCP&L continued to experience significant storm activity in its service territory?

A. Yes, it has. In March of 2018, nor'easters Riley, Quinn, and Toby and other storms demonstrated that JCP&L's system will continue to be subjected to major storm events. On March 2, 2018, Winter Storm Riley's combination of devastating wind and heavy wet snow caused many trees and limbs to break causing tremendous damage to JCP&L's distribution system. As JCP&L continued with the restoration efforts from Winter Storm Riley, a second winter storm, Quinn, moved into the service territory the morning of March 7, 2018 and brought high winds and additional wet, heavy snow. Winter storms Riley and Quinn caused power outages that affected more than 526,000 of JCP&L's 1.1 million customers. As with the other major storms I have already discussed, tree damage to overhead infrastructure was the primary cause of damage and outages. Approximately one week after JCP&L finished power restoration from Winter Storms Riley and Quinn, Winter Storm Toby hit on March 21, 2018 with high winds and significant snowfall. This storm event caused approximately 70,836 outages effecting the Company's customers. Following these storms, the Board issued its 2018 Storm Order discussed above.

The State of New Jersey, including the Company's service territory, continues to experience severe storm events causing outages, including most recently Tropical Storm Isaias.

As discussed in my testimony below, the proposed AMI Plan should further enhance reliability and resiliency in both such major weather events as well as under more typical operating conditions.

IV. JCP&L's AMI SOLUTION

Q. Please describe the proposed AMI Solution.

A. The Proposed AMI Solution consists of a number of smart meter technology components, as follows:

Smart Meters – An AMI smart meter is an advanced meter capable of measuring and recording usage data in time differentiated registers. Smart meters provide two-way communication between the utility and the meter to record and transmit interval usage data. Smart meters also provide data and functionality to address power quality issues.

Field Area Network – The Field Area Network ("FAN") provides the network connectivity to the smart meters. The smart meters form a radio frequency ("RF") mesh network based on the transmitting frequency of the smart meters.

Range Extender – A Range Extender ("RE") is a device that operates as an additional RF node and builds density or extends the perimeter of the existing RF mesh network. A RE can improve read rates and RF connectivity in geographic areas where network coverage is not optimal. The RE receives data from devices within the smart meter mesh network and transmits it to other devices within the network. The RE is designed to work in suboptimal communication areas.

Connected Grid Router – The Connected Grid Router ("CGR") is a ruggedized communications router optimized for use in smart meter field area network applications. The modular CGR is a pole-top device that serves as the collection device for local smart

meter networks. The CGR is the collection point between the RF mesh network (or FAN) and the wide area network described below.

Wide Area Network – The Wide Area Network ("WAN") is a geographically dispersed communications network that provides the network connectivity of the FAN to the utility's operations center using a service provider's public backhaul network.

Head End System – A Head End System ("HES") or Collection Engine is a software application that receives the stream of meter data brought back to the utility by an AMI system. The HES makes the data available for other systems and is responsible for supporting the integrity of the control of the AMI system. The HES supports the communication between the smart meters over the FAN and provides the interface between upstream applications, such as the Meter Data Management System and the FAN. The HES maintains information concerning the FAN but does not store any customer usage data. All data storage is done by upstream software such as a Meter Data Management System, referenced below.

Field Network Director – The Field Network Director ("FND") is a communications network management platform that manages a multi-service network and security infrastructure and helps utilities transform their smart metering operations with unified network management. It works in conjunction with the Head End System and is the system that facilitates firmware updates to the meters and CGRs.

Meter Data Management System – A meter data management system ("MDMS") is a system to which the collected data is delivered. The MDMS processes raw meter data with validate, edit and estimate ("VEE") algorithms for utilization in upstream corporate systems such as customer relationship management systems ("CRM"), advanced

distribution management systems ("ADMS"), outage management systems ("OMS"), and workforce management systems ("WMS").

Core Enterprise Systems – A utility's core application processes impacted by an AMI installation fall into five major groups and that will have to be enhanced to accommodate the AMI solution: Billing, Revenue, and Settlement Operations-Related Systems; Meter Data Collection Systems; Meter Management Systems; Customer Contact Systems; and ADMS.

In addition, although not part of the AMI Solution to be installed by the Company, a customer's Home Area Network ("HAN") is a network contained within a customer's home or business that connects a customer's qualified energy monitoring device to a smart meter. This connection allows the customer to observe near real-time energy usage through the energy monitoring device. The HAN is outside the utility's demarcation point of the smart meter technology system and qualified energy monitoring devices will be available to customers from third party providers.

Q. Does the proposed AMI Solution integrate an Advanced Distribution Management System ("ADMS")?

A. Yes. The Company proposes to implement an ADMS, which is a software platform that not only includes the full capabilities of a traditional OMS, but also integrates supervisory control and data acquisition ("SCADA") information from various substation and circuit locations into one centralized software system and manages the distribution grid in real-time through advanced system modeling and control. In addition, JCP&L's current OMS will be replaced as the OMS replacement is part of an overall ADMS implementation.

ADMS is projected to be fully operational by mid-2022 and fully integrated with AMI in 2023.

With regard to AMI, the ADMS will integrate service status and voltage information from the AMI technology to assist with distribution grid optimization, earlier outage detection, and timely service restoration following an outage event. It is also expected that integrated AMI data with an ADMS platform will enhance outage communications with customers. The ADMS provides the distribution system operators with a complete view of operational conditions of the system down to the meter, once advanced smart meters are installed. It will enable advanced, real-time analysis and decision-making for optimized response in the event of power outages. The ADMS also provides the platform for future grid modernization investments, such as distribution automation, and supports the future integration of power flows from distributed energy resources on the distribution system.

Q. Does the proposed AMI Solution require accelerated investment?

A. Yes, it does. The Company has proposed the AMI Plan, including its investment in the AMI Solution, as a result of the requirement of the Board's mandate in the AMI Filing Order; it was not an otherwise planned expenditure during the installation period proposed here. The AMI Plan requires the Company to undertake capital investment and incur operational and maintenance ("O&M") expense that are incremental to the Company's normal operations.

Q. Does the proposed AMI Solution enhance safety, reliability and resiliency and further the Board's clean energy goals?

A. Yes. As explained in more detail in the benefits section below, reliability and resiliency are enhanced because AMI technology expedites the detection of individual customer outages and reduces the duration of outages occurring during both storms and normal operating conditions. By reducing the number of truck rolls and in-person customer visits by crews and technicians to address service outages, service connections and other actions, the AMI Plan also enhances employee safety. The AMI Solution supports the Board's green energy goals by, among other things: reducing energy consumption and bills through the provision of granular information and by enabling time varying rates for customers; reducing carbon emissions; allowing the Company to better forecast and plan for Distributed Energy Resource ("DER") related demand and output; and allowing the Company to identify distribution circuit peaks which will be more critical as electric vehicles and solar technologies impact load profiles.

Q. Is the Company's proposed AMI Solution consistent with clean energy equity?

A. Yes. The Board considers AMI to be a "foundational" technology that will facilitate its clean energy goals. To that end, the Company will install smart meters to all its residential customers, including low income customers, such that all customer segments will be provided this foundational technology and have the ability to benefit from it through the opportunity to reduce electric consumption and, thus, lower their overall electric bill. Leveraging interval data made available from AMI metering to create Time Varying Rates in the future for all customer classes supports the EMP strategy to maximize energy efficiency and conservation and reduce peak demand by giving appropriate price-signals to incent consumers to change consumption patterns aligned with this strategy. In addition, as the JCP&L AMI deployment plan is being formed, JCP&L will look for opportunities

to engage minority-, women- and veteran-owned businesses as part of our deployment process.

Q. Has the Company included in its AMI Program filing an engineering report identifying the components of the AMI Plan, cost estimates, in-service dates, and benefits of the Plan?

A. Yes. The AMI Plan attached as Appendix B to my testimony constitutes the engineering report for the filing. Among other things, the Business Case identifies all the equipment and software components of the proposed AMI Solution, provides a schedule for placing advanced smart meters in-service, provides a cost estimate identifying all capital and O&M costs, identifies program benefits, includes a cost-benefit analysis, and sets forth reporting metrics.

V. THE AMI DEPLOYMENT PLAN

Q. **Please describe the Company's AMI deployment plan including the time period over which the deployment of advanced AMI meters and other equipment and software is expected to occur.**

A. The mass deployment of AMI meters and other AMI related infrastructure is proposed to occur over a three-year period commencing January 1, 2023 (the "Deployment Phase"). This will be followed by a two-year post-deployment period (the "Final Engineering Phase") wherein smart meter and/or other communications solutions will be installed for approximately 1% of customers that constitute complex metering such as MV-90, difficult to access locations and communication challenged locations (collectively, "Challenged Locations.") Year 1 of the twenty-year study period in the Business Case commences on January 1, 2023 with the start of the Deployment Phase. Thus, the mass deployment of

smart meters will occur over a three-year period, with Challenged Locations addressed during the two-year Final Engineering Phase. In other words, all meters will be installed within five years of the start of the Deployment Phase.

In addition, there will be a one-year period (consisting of two six month segments) before the Deployment Phase (the "Pre-deployment Phase") where certain necessary pre-deployment and planning work will take place. The commencement of the proposed phases is subject to receipt of timely Board approval. A discussion of each phase follows.

Pre-Deployment Phase: January 1, 2022 -December 31, 2022

This phase involves both a planning period (January 1, 2022 – June 30, 2022) and an IT build out period (July 1, 2022 - December 31, 2022). During the planning period, the Company will: i) assemble a project team; ii) contract with key vendors; iii) make arrangements for procurement of the necessary equipment and resources to commence deployment of an end-to-end AMI system; iv) develop construction and deployment schedules; and v) assess market conditions and pricing. For purposes of the AMI Plan, JCP&L assumes this period to be six months from the commencement date of the project. During the six-month IT build-out period, IT infrastructure necessary for the success of the AMI project will be upgraded.

Deployment Phase: January 1, 2023 - December 31, 2025

During this 36-month Deployment Phase, approximately 1.1 million smart meters (or 99% of all meters) and the related infrastructure would be deployed throughout the JCP&L service territory, absent unforeseen events. During this Phase, the Company will establish a FAN consisting of CGRs to communicate with meters, a WAN providing backhaul to the Head End, meters, Head End software that collects information via backhaul from the

meters, a FND to manage the network, and a MDMS to store the energy usage data delivered from the head end and various other core application processes. Further, during the Deployment Phase, the Company envisions an AMI installation process in which the AMI system is integrated with the ADMS, once operational, to maximize the benefits that can be derived from an AMI system.

Final Engineering Phase: January 1, 2026 - December 31, 2027

During this phase, which is anticipated to last 24 months, the Company will install the remaining smart meters in Challenged Locations and for large commercial accounts that already have advanced interval metering, and will engineer and install any final CGRs and range extenders necessary to strengthen and complete the RF mesh network.

Q. What is the basis for the time frames in these Phases?

A. These time frames are consistent with other FirstEnergy companies' experience when implementing a similar program in Pennsylvania and currently planned for in Ohio, as described in the Business Case.

Q. Will existing (non-smart) meters need to be removed as part of the Company's AMI deployment?

A. Yes. The plan is to install AMI meters and remove and retire the existing meters ("Legacy Meters"). Thus, compliance with the Board's AMI Filing Order and achievement of the benefits of AMI necessitate the "stranding" of the remaining undepreciated costs of the Legacy Meters. The extent of stranded Legacy Meter costs and the Company's proposal for recovery of them is set forth in the testimony of Company Witness Carol Pittavino.

Q. Please describe the Company's capability to successfully complete the mass installation of the AMI Solution over the proposed Deployment Phase.

A. Absent unforeseen events, the proposed installation is well within the Company's ability to perform, using internal and contract resources and available material resources over the proposed Deployment Phase. JCP&L has managed and continues to manage large capital projects, including the $97 million JCP&L Reliability Plus program, and has successfully met its objectives while managing the resources and cost of the projects. The Company has the requisite managerial experience to oversee Plan implementation and ensure it is completed it in a timely, efficient manner. Of course, as discussed below, it will be necessary for the Board to approve the Company's proposed cost recovery mechanism given the substantial incremental capital costs and expenses associated with the AMI Plan.

VI. OPT-OUT PROVISIONS

Q. Does the Company make provision for customers who seek to opt-out of the AMI Plan?

A. Yes. The Company proposes an opt-out process for residential customers that do not wish to have the two-way communication smart meters read via AMI, provided such customers are not receiving generation service under a time differentiated rate or involved in net metered generation. JCP&L proposes to provide any customer taking residential service under Rate RS with the option to either retain their Legacy Meter, or have an AMI smart meter installed, but with its bi-directional communication capabilities disabled. If the customer has a smart meter installed and then decides that it does not want it, they will have the same choice of either replacing their smart meter with a standard electric meter (if available) or having the two-way communication capabilities disabled on the smart meter. JCP&L will notify customers in writing that AMI meters are to be installed at least 30 days in advance of the AMI meter installation so as to minimize instances where

customers receive AMI meters prior to them opting out and avoid the meter change-out charge described below. This communication will provide details about the opt-out process and related charges for electing to opt out of receiving a smart meter.

Q. Are there charges associated with the opt-out process?

A. Yes, there are two charges that are necessary to recover the additional costs incurred as a result of a residential customer opting out of AMI meter reading. The charges are: (1) a one-time charge for removing the AMI meter and installing a non-AMI meter; and (2) a recurring monthly opt-out charge to recover the costs of manual meter reads.

The first (meter change-out) charge is $44.46. This charge is based on a blended hourly labor rate, the time to perform the meter exchange, the average travel time including the labor cost for driving and the vehicle mileage cost for the job. As noted above, the first charge can be avoided if a customer either notifies the Company prior to receiving an AMI meter, or alternatively opts for disabling of two-way communications capability on the AMI meter (which can be done remotely) rather than full meter replacement.

The monthly opt-out charge to recover the costs of manual meter reads is $28.09. This charge is based on a blended hourly labor rate, the time to perform the meter read, the average travel time including the labor cost for driving and the vehicle mileage cost for the job.

VII. AMI PLAN COSTS

Q. **What are the costs that the Company must incur to successfully implement the above-described AMI Solution?**

A. The Company has estimated costs for the AMI Plan over a twenty-year study period of $732 million in the Business Case. These costs for a successful AMI implementation can

be grouped into the following cost categories: (i) smart meters and FAN ($268 million); (ii) Information Technology ("IT") ($324 million); and (iii) staffing and support ($140 million). Through the Pre-deployment and Deployment Phases, these costs are estimated to be: (i) smart meters and FAN ($216 million); (ii) Information Technology ("IT") ($128 million); and (iii) staffing and support ($75 million). The twenty-year study period estimated costs for these categories (which are set forth in the Business Case) are further described as follows:

Meter and Field Area Network

The smart meter Capital costs include a 36-month warranty, initial installation costs, and shipping and handling. Meter O&M is predominantly for the labor needed over twenty years to investigate and replace failed meters. The field area network Capital costs are for CGRs, REs, and other required equipment, as well as installation and testing costs. The public backhaul O&M costs include twenty years of annual service fees.

Information Technology

Software Applications (Capital) costs represent purchase/licensing expenditures for applications such as MDMS, Head End, Field Network Director, and Application Integration Tools. Infrastructure hardware (Capital) costs represent those costs related to servers, storage, network, operating systems, and firewalls and other cyber security. The software and hardware O&M costs are predominantly annual maintenance fees. Resources include internal and contractor IT labor who will be responsible for implementation of the IT technologies needed to support a smart meter rollout.

Staffing and Support

Staffing and support costs include internal and external incremental labor costs associated with the project management office, system integration, steady state operations, customer communications, outside professional fees, and New Jersey smart meter support facilities. Capitalized labor costs during the Pre-Deployment and Deployment Phases are attributed to meter test lab personnel and field network engineers. All other labor, both during the Pre-Deployment and Deployment Phases, as well as the steady state phase was expensed. Steady state labor includes internal personnel responsible for the smart meter operations group that will manage and maintain the smart meter operations center, network operations and technical billing.

Q. Have you provided annual budgets for the Plan?

A. Yes. The Company's projected planning and deployment budget for the Plan is provide hereto as Attachment C and reflects the first six years of the Business Case. These projected annual costs are subject to the timing of receipt of Board approval of the AMI Plan, and assumes no unforeseen or uncontrollable events would occur that could significantly impact the execution of the AMI Plan.

Q. Should the projected amounts for the six years of the pre-Deployment, Deployment and Final Engineering Phase be proscriptive on the Company's spending?

A. No. There should not be any limits on spending in any particular sub-period of the deployment. The goal is to accomplish one large project—the mass deployment of AMI by the conclusion of a three year Deployment Phase via an efficient construction plan that will be developed during the Pre-Deployment Phase. Whether spending is accelerated further into earlier parts of the deployment, or shifted to later parts of the deployment

period, as a result of actual circumstances realized during the deployment, should not be restricted in any manner.

Q. Will JCP&L seek to recover all of its costs for the AMI Plan through the proposed cost recovery mechanism?

A. Yes. The Plan is filed in response to a Board mandate, and therefore it would be appropriate for the Board to permit recovery of all reasonable costs. JCP&L has provided its best estimate of costs through the Deployment Phase and over an extended study period. In addition, these Company's estimates are used for budgeting purposes and are reasonable and reliable for purposes of the JCP&L AMI Plan development and approval based on JCP&L's experience. However, final installation costs may deviate from these estimates – especially given the supply chain issues that may result from the COVID 19 pandemic. As long as the Company's expenditures to meet the Board's mandate are prudent and reasonable at the time they are incurred, all of them should be recovered through rates.

Q. Has the Company provided an overview of how the Company's estimates of costs for JCP&L AMI Plan, discussed above, were developed.

A. Yes. A discussion of how the Company estimated the cost of the JCP&L AMI Plan can be found in Section 3.0 of the Business Case attached as Attachment B, which I am incorporating by reference as part of my testimony**.**

Q. Is approval of the proposed clause for accelerated recovery of Plan costs essential to the Company's implementation of the Plan.

A. Yes. The AMI Plan entails a significant acceleration of investments that are the result of a Board mandate rather than a Company plan. Without the AMI Filing Order, the Company would have had the discretion to make such investments at some time in the future of its

own choosing and not on an accelerated basis and would have retained use of the funds that will now be devoted to the AMI Plan. Stated another way, the Board is effectively requiring Company funding that cannot be used for other investments. Accordingly, accelerated rate recovery of all costs is fair, necessary and proper. The Company's proposed rate recovery mechanism is set forth in the Direct Testimony of Company Witness Carol Pittavino.

VIII. JCP&L AMI PLAN BENEFITS AND SAVINGS

Q. Please summarize the benefits associated with JCP&L AMI Plan.

A. The JCP&L AMI Plan will generate quantifiable benefits to operations, customers and society (all of which are described in detail in the Business Case), as follow:

Operations Benefits

The AMI Plan projected potential operational benefits that may be realized by the Company through the installation of AMI technology. These benefits categories include (i) meter reading; (ii) meter services; (iii) back office; and (iv) contact center. All potential operational benefits would be avoided costs.

The operations benefits from the following sources can be summarized as follow:

Meter Reading – These operational benefits are the result of the reduction in the meter reading function and the elimination of the manual meter readers and their meter reading handheld devices. The Company plans to undertake placement actions for meter readers to provide opportunities in other utility jobs that had been vacated due to retirements and/or other employee attrition.

Meter Services – These operational benefits originate from the reduction in field visits of meter service personal for meter related issues and customer inquiries that need

more technical explanations than can be provided by the customer contact center. The deployment of smart meters will reduce the need to dispatch a meter technician for such field activities.

Back Office – These operational benefits come from the reduction in back office activities related to billing including the resolution of high bill complaints, misreads, estimated reads, and move-in / move out reads. The reduction of these activities are not achieved without the enabled smart meter technology and data and analytics that can be applied with technology.

Contact Center – These operational benefits arise from the reduction in customer calls that can be attributed to the reduction of estimated reads with a smart meters and the associated inquires and the reduction of customer inquiries due to the availability of granular energy usage history on the Company portal to name a few.

Customer Benefits/ Societal Benefits

There are additional non-operational benefits that accrue both to customers and society through the deployment of AMI technology. The Company estimates that additional benefits can be derived from the following sources: (i) Service Outage Management; (ii) Customer Energy Management; (iii) Time Varying Rates; (iv) Revenue Assurance; and (v) Carbon Emissions Reductions.

The customer benefits/ societal benefit from the following sources can be summarized as follow:

Service Outage Management – These societal benefits represent the estimated economic value in the reduction in the average outage duration that any given customer would experience in a given year.

Customer Energy Management – These customer benefits are derived from the more granular energy usage information made available to customers by smart meters allowing them to easy-to-understand analytical tools and work smarter to conserve overall electricity use.

Time Varying Rates – These customer benefits enabled by the smart meter technology allow for customers to take advantage of variable or differential price offerings by third party suppliers that encourage customers to reduce their electric bills by shifting their energy usage to lower cost periods.

Revenue Assurance – These customer benefits stem from revenue operations of a utility regarding energy usage accuracy, theft of service detection and reduction in write-offs. The enabling smart meter technology provides greater efficiencies in addressing these areas of revenue operations.

Carbon Emissions Reductions – These societal benefits are the result of either the need for fewer truck rolls by the utility, or the reduction in kW/kWh consumption by the customer. This in turn results in lower carbon emissions that can be translated into metric tons of CO-2 and valued at a nominal cost per metric ton of CO-2.

The dollar values of the foregoing benefits are quantified in the cost benefit analysis ("CBA") summarized below and as set forth in Section 3.4 of the Business Case. Rather than reiterate the discussion on benefits as found in the AMI Plan, I am incorporating these sections into my testimony by reference.

Q. Are there other benefits from the AMI Plan that have not been quantified in the Business Case?

A. Yes. There are many benefits to be leveraged over time from AMI that are difficult to measure and monetize. For example, AMI data can help enhance power quality. Smart meters can be programmed to generate a warning whenever phase voltage is outside of a pre-determined range. This allows for a simple diagnosis and provides warning of a potentially larger problem on the system which can proactively be addressed. Similarly, several smart meter analytics applications reach beyond simple billing and meter-to-cash considerations. Smart meter analytics can be segmented into four distinct categories, Grid Operations, Asset Management, Customer Experience, and Customer Operations, each of which is discussed further in Section 3.4.7 of the Business Case attached as Attachment B and which is incorporated by reference as part of my testimony.

In addition, AMI smart meter data enables utilities to better understand and forecast DER affected demand and output, to predict its locational effects on the grid, and more effectively perform resource, capital and operational planning. AMI also provides data that allows granular (household) level forecasting which can then be aggregated throughout the system, allowing utilities to undertake more precise long-term planning by better identifying peaks. This capability will be become more critical as electric vehicles and solar sources impact load profiles. As such, the capabilities of AMI help support major EMP strategies to reduce energy consumption as well as to support deployment of renewable energy and DER.

Q. Please summarize the results of the Company's Financial Analysis/CBA.

A. As described in the attached Business Case, the Company undertook a financial analysis to quantify the benefits from the proposed AMI Plan and compare them to the costs of installing and operating the AMI Solution. Based on that analysis, over the twenty year study period, JCP&L AMI Plan is estimated to provide benefits to customers of $1.358 billion on a cumulative, nominal dollar basis, compared to estimated costs of $732 million (including capital and expense), or a benefit to cost ratio of 1.85:1. On a Net Present Value ("NPV") basis, the AMI Plan is estimated to provide a benefit to cost ratio of 1.54:1 from the customer perspective, 1.65:1 from the societal perspective, and 1.17:1 from the Company perspective.

Q. Is job creation expected to result from the JCP&L AMI Plan?

A. Yes, the AMI Plan is expected to create jobs. Utility infrastructure investment typically creates jobs, particularly for contractors, and the AMI Plan represents a significant investment. The three-year Development Phase should also foster stability in the jobs the Plan creates. These additional jobs should provide additional economic stimulus.

Q. Are there any other economic benefits from the AMI Plan?

A. Yes. Businesses require reliable energy supplies. Reducing the duration of outages prevents negative economic impacts on employers in the State and encourages employers to locate businesses in New Jersey, keep business operations in New Jersey, or expand business operations in New Jersey. Utilities in neighboring states (i.e., New York and Pennsylvania) are pursuing AMI and JCP&L's proposal will put New Jersey on more equal footing when competing for business investment. As previously mentioned, AMI also supports reduced electricity consumption and lower energy costs, which is another

consideration when a business evaluates whether to come to or leave New Jersey. Likewise, the AMI Plan will have a positive economic impact on residential customers who will have the opportunity to reduce energy usage and bills, benefit from overall reductions in peak demand, and experience reduced outage durations.

IX. REPORTING AND METRICS

Q. What is the Company's proposal for reporting on the progress of the deployment and operation of the AMI Plan?

A. The Company proposes to provide semi-annual status reports to Board Staff and Rate Counsel containing multiple metrics regarding the installation and operation of AMI in the categories of: Physical Meters; Meter Reading; Data Access and Utilization; Billing Related; and Customer Impact Measures. The metrics are discussed in the Business Case in Chapter 4 and are incorporated by reference as part of my testimony.

The Company proposes to commence providing semi-annual reports to Board Staff and Rate Counsel six months after smart meter installation begins.

X. CUSTOMER EDUCATION

Q. Has JCP&L developed a Customer Communications Plan for the AMI Plan?

A. Yes, it has. The Plan is provided in Appendix A to the Business Case.

Q. What does the Customer Communications Plan entail?

A. The Customer Communications Plan is designed to complement the implementation of the Company's AMI Plan by enabling effective customer outreach, education and communication efforts. It includes communication plan objectives, key messages, communication challenges, key issues and key audiences and explains how each will be addressed.

Q. What are some of the objectives of the Customer Communications Plan?

A. Included as some of the objectives of the Customer Communications Plan are the following:

- Provide proactive communications in a manner that minimizes customer confusion by anticipating customer concerns and questions.

- Develop and deliver consistent and effective messages that coincide with the Company's AMI Business Case implementation plan and schedule.

- Keep employees, state and local government officials, regulators and media informed of significant developments.

- Continue to develop communications to customers, employees and other stakeholders throughout the smart meter deployment plan as major milestones are achieved.

- Inform third party suppliers throughout the lifecycle of the plan.

Q. Is there one main theme around the key messages of the Customer Communications Plan?

A. Yes. The Company will use the objectives throughout the implementation of the Customer Communications Plan to develop key messages that will help raise customer awareness of smart meters and their functionality.

XI. LIST OF ATTACHMENTS

Q. Please summarize the attachments to this testimony described above.

A. I have attached the following documents hereto setting forth information in support of the Company's proposed AMI Plan, all of which are incorporated by reference within this testimony:

Attachment A	John C. Ahr Qualifications
Attachment B	AMI Plan (with Appendix A (JCP&L Customer Communications Plan, Appendix B (JCP&L Proposed Customer Opt-Out Process) and Appendix C (Metrics Tracker Template))
Attachment C	JCP&L AMI Business Case Budget

XII. CONCLUSION

Q. Does this conclude your pre-filed direct testimony at this time?

A. Yes.

Attachment A

John C. Ahr
FirstEnergy Service Company | 800 Cabin Hill Drive | Greensburg, PA 15601
jahr@firstenergycorp.com | 724-838-6831

Experience

FirstEnergy	Advisor, Regulatory Compliance - Smart Meter	Sep 2018
	Manager, Regulatory Compliance - Smart Meter	Dec 2012
West Penn Power	Special Assignment - PA Smart Meter Project	June 2012
	Manager, Customer Support	April 2011
Allegheny Power	Senior Consultant - Smart Grid	Jan 2009
	Senior Consultant - Transmission	Jan 2006
	Senior Consultant - Customer Services	Jan 2005
	Director, Meter Reading and Collections	April 2004
	Director, Energy Procurement	July 2003
	Director, System Operations and Support	Oct 2002
	Director, System Operations	Sep 1999
	General Manager, Operations	Oct 1998
	Group Leader, T&D Operations	May 1996
West Penn Power	Supervisor, T&D Dispatching	June 1992
	Engineer, Planning	Dec 1988
	Engineer, Division Planning	June 1984

Education

2009	Certificate, Six Sigma Green Belt Systematic Quality Improvement Methodologies Allegheny Energy
1990	Master of Business Administration Degree Katz Graduate School of Business University of Pittsburgh
1984	Certificate, Engineer-In-Training State of Pennsylvania
1984	Bachelor of Science Electrical Engineering Degree The Pennsylvania State University

Presented testimony in the following cases before various state public utility commissions:

Pennsylvania Public Utility Commission

Docket No.	***Case Name***
M-2009-2123951	*Petition of West Penn Power Company d/b/a/ Allegheny Power for Expedited Approval of its Smart Meter Technology Procurement and Installation Plan*

Maryland Public Service Commission

Case No.	*Case Name*
8523M	*Application for Adjustment of the Fuel Rate of the Potomac Edison Company d/b/a Allegheny Power*

West Virginia Public Service Commission

Case No.	*Case Name*
08-2072-E-GI	*General Investigation into the Smart Grid Standards set forth in the Energy Independence and Security Act of 2007*

Attachment B

BEFORE THE

NEW JERSEY BOARD OF PUBLIC UTILITIES

Advanced Metering Infrastructure (AMI) Plan

On Behalf of

Jersey Central Power & Light Company

August 27, 2020

Table of Contents

Introduction

This Advanced Metering Infrastructure (AMI) Plan, which is comprised of the proposed AMI solution, deployment plan, financial analysis, customer communications plan, and metrics and reporting (collectively "AMI Plan", "Plan" or "Business Case"), is submitted by Jersey Central Power & Light Company ("JCP&L" or "Company") to the New Jersey Board of Public Utilities ("BPU" or the "Board") in response to the Board's February 19, 2020 AMI Filing Order issued in the Rockland Electric Company AMI docket.[1] This AMI Plan is part of the Company's overall AMI filing, which includes a (1) Petition, (2) testimony regarding the proposed AMI Plan, and (3) testimony regarding cost recovery.

In its July 25, 2018 Order (2018 Storm Order), the BPU ordered JCP&L, among others, to submit "a plan and cost benefit analysis for implementation of Advanced Metering Infrastructure (AMI)."[2] The BPU indicated that the plan "should focus on the use and benefits of AMI for the purpose of reducing customer outages and outage durations during major storm events."[3] The BPU also released the BPU Staff Report and Recommendations on Utility Response and Restoration to Power Outages During the Winter Storms of March 2018, which discussed the reasoning behind the recommendations coming out of the 2018 Storm Order.[4] Specifically, regarding the AMI recommendation, BPU Staff recognized that AMI offered a potential solution with regard to the customer outage restoration process and stated its interest in reviewing such technology at that time. BPU Staff further recommended that the electric distribution companies (EDCs) submit a "feasibility study for AMI implementation, including a detailed cost-benefit analysis, for the purposes of reducing customer outages and improving the EDC's capabilities to effect timely system restoration following major weather events."[5] In accordance with the 2018 Storm Order, the Company submitted an AMI study and related cost benefit analysis on January 31, 2019, the benefits of which have been updated and incorporated into the financial analysis included in Chapter 3 of this Plan.

On October 7, 2019, Navigant Consulting, Inc. (Navigant) was retained by the Board to conduct two independent studies: (1) a cost-benefit analysis of Rockland Electric Company's AMI program

[1] *In re Petition of Rockland Electric Company for Approval of an Advanced Metering Program; and for Other Relief,* BPU Docket No. ER16060524, Decision and Order, p. 2 (Feb. 19, 2020, Effective February 29, 2020) ("AMI Filing Order").

[2] *In re Board's Review of Major Storm Events of March 2018,* BPU Docket No. EO18030255, Order at p. 13 (July 25, 2018, Effective August 4, 2018) (hereinafter, "2018 Storm Order").

[3] *Id.*

[4] *See generally*, Staff Report and Recommendations on Utility Response and Restoration to Power Outages During the Winter Storms of March 2018, New Jersey Board of Public Utilities, (July 12, 2018).

[5] *Id.* at p. 6.

(Capstone Report) which would serve as an AMI case study; and (2) a nationwide AMI gold standard analysis (AMI Gold Standards Report). The Capstone Report and the AMI Gold Standards Report were filed with the Board on November 6, 2019, and November 27, 2019, respectively. Both Reports were accepted by the Board. The AMI Gold Standards Report observed that AMI and Smart Meters are quickly becoming "the norm,"[6] noting that the installation of smart meters nationwide is anticipated to grow at an annual rate of 4.6%, from 92.1 million in 2019, to 138.4 million in 2028.[7] The AMI Gold Standards Report further provides that AMI may reduce labor costs, provide voltage optimization, detect outages, increase the opportunity for data collection, provide faster service restoration, improve billing accuracy, detect theft, and enhance energy efficiency.[8] Based on these reports, in its AMI Filing Order, the Board found that "AMI has the potential to benefit the distribution system, streamline and modernize utility operations, provide an enhanced customer experience, and benefit the environment."[9]

Additionally, New Jersey's 2019 Energy Master Plan: Pathway to 2050 (EMP), released in January of 2020, provides that the Board "direct the electric public utilities to develop plans that integrate grid modernization and capacity improvements that support demand growth from electrification, demand flexibility, [Distributed Energy Resources] penetration, grid resilience, and grid efficiency."[10] The EMP provides that AMI is a means to achieve this objective:

> AMI is a foundational component of a modernized electric distribution grid and uses an integrated system of smart meters, communications networks, and data management systems to enable two-way communication between utilities and customers. Statewide AMI installation is a prerequisite of many additional clean energy objectives as laid out in this EMP. Potential benefits include realization of potential gains in efficiencies and cost savings, accelerated service restoration during outages, better environmental outcomes, lower operations and maintenance costs, better demand-side customer engagement, and alternative rate designs.[11]

Based on the foregoing findings, in its AMI Filing Order the Board determined that AMI is a means to achieve the goals provided for in the EMP.[12]

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[6] *See* AMI Gold Standards Report at 5.5.

[7] *Id.* at 2.3.

[8] *Id.* at 2.1.

[9] AMI Filing Order, p. 2.

[10] *See* EMP 5.1, p. 176.

[11] *Id.* at 5.3.1, p. 184.

[12] AMI Filing Order, p. 3.

After making the foregoing findings, the Board ordered JCP&L, along with two other EDCs, to file either new or amended petitions for AMI implementation no later than 180 days after the effective date of the AMI Filing Order, which means the EDC filings are due August 27, 2020. [13]

In compliance with the Board's AMI Filing Order, JCP&L submits this AMI Plan, which is structured in the following manner: Chapter 1 provides an Executive Summary of the Plan. Chapter 2 describes JCP&L's proposed end-to-end AMI solution and deployment plan, which is based on the experience gained by several of JCP&L's sister companies and includes the installation of approximately 1.1 million AMI smart meters and other AMI components within the Company's service territory. Chapter 3 provides a financial analysis of the proposed solution, including a cost-benefit analysis, and includes not only an estimate of the capital and operational costs and expenses, but also an estimate of benefits to be derived therefrom from i) an operations perspective; ii) a customer perspective; and iii) a societal perspective. Chapter 4 addresses proposed metrics and reporting, with a proposed Metrics Tracker Template included in Appendix C to this Plan. Also included with this AMI Plan is a description of the Company's AMI Customer Communications Plan and customer opt-out process, which are included in Appendices A and B, respectively.

The proposed AMI solution includes AMI and an Advanced Distribution Management System (ADMS) that will replace the legacy Outage Management System (OMS). When fully integrated, the ADMS will maximize the benefits of the AMI Plan during storm events and blue-sky outages by allowing JCP&L to detect and localize outages more quickly, manage field resources more efficiently, and enhance customer satisfaction by providing more accurate and timely storm restoration information. The ADMS not only includes the full capabilities of a traditional OMS, but also integrates supervisory control and data acquisition (SCADA) information from various substation and circuit locations into one centralized software system and manages the distribution grid in real-time through advanced system modeling and control. The ADMS is expected to be fully operational by mid-2022 and fully integrated with AMI in 2023.

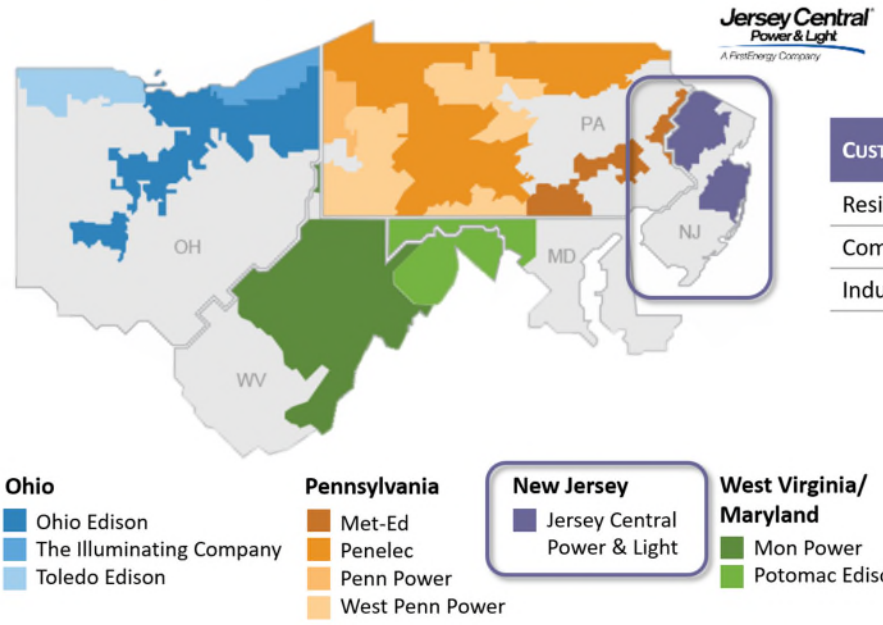
[13] *Id.*

1. Executive Summary

1.1. Overview

JCP&L is a wholly owned subsidiary of FirstEnergy Corp. (FirstEnergy) and serves approximately 1.14 million customers (89% residential, 10% commercial and less than 1% industrial) in central and northern New Jersey over approximately 19,000 circuit miles in a 3,300 square mile service territory. In addition to JCP&L, FirstEnergy owns three electric distribution companies in Ohio; four in Pennsylvania; and two in West Virginia/Maryland. With FirstEnergy's ten electric distribution companies, JCP&L is part of one of the largest investor-owned electric utilities in the United States, which serves approximately six million customers over an approximately 65,000 square-mile service territory.

Figure 1.1 FirstEnergy New Jersey Service Territory



Customer Class	Customer Count *As of 6/1/20*
Residential	1,011,613
Commercial	125,942
Industrial	3,372
Total	**1,140,927**

Several of JCP&L's sister companies have already embarked on smart meter projects. As a result of mandates established in Pennsylvania's Act 129 of 2008, and after an in-depth evaluation of technologies and available solutions, JCP&L's sister companies in Pennsylvania (Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company, hereinafter the "PA Companies") submitted a plan for full deployment of smart meters and related supporting infrastructure throughout their respective service territories

(hereinafter "PA Project").[14] Smart meter deployment and the related infrastructure build out began in 2014 for the PA Project. The PA Project reached the end of the Deployment Phase in September 2019, ahead of schedule and below the forecasted budget. As of June 30, 2020, approximately 2,092,000 of the PA Companies' 2.1 million smart meters and related infrastructure are fully operational, with only large commercial and industrial customer accounts with advanced metering, as well as communication-challenged and/or hard to access locations remaining for installation. The Pennsylvania smart meter solution has proven successful with meter read rates consistently in excess of 99%.

In Ohio, Cleveland Electric Illuminating Company (CEI), one of JCP&L's three Ohio sister companies, implemented an AMI project to enhance operating performance of the electric system and encourage customer participation in controlling electric demand through various programs, including a time-of-use pilot program (hereinafter, "Ohio Pilot"). Approximately 34,000 smart meters were deployed in CEI's service territory on a pilot basis in order to gain insight into customer participation in time of use rates. Additionally, in January 2020, the three Ohio Companies (CEI, Ohio Edison Company and The Toledo Edison Company) commenced deployment of approximately 700,000 smart meters and related infrastructure as part of their Grid Mod 1 smart meter/smart grid initiative (OH Project) through a stipulation that has been approved by the Public Utility Commission of Ohio (PUCO).[15] The OH Project utilizes an AMI system virtually identical to that used for the PA Project (adjusted for any improvements in technology). Initial OH Project deployment results have been consistent with those achieved in the PA Project.

While developing this AMI Plan, JCP&L evaluated the smart meter technology market and the lessons learned through the Ohio Pilot, the OH Project and the PA Project. To maintain consistency; minimize duplication of efforts, systems and personnel; leverage economies of scale; and create as seamless a FirstEnergy AMI system as possible, this JCP&L AMI Plan is modeled after the successful FirstEnergy smart meter projects that came before it. It will utilize the same system architecture as that used in the PA and OH Projects. Through the use of this common system architecture, JCP&L customers should benefit through economies of scale as more smart meters are installed.

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[14] To review the PA Companies' smart meter deployment plan approved by the Pennsylvania Public Utility Commission, *see, In re The Joint Petition of Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company for Approval of Their Smart Meter Plan,* Docket No. M-2013-2341990 et al, Deployment Plan (Revised June 16, 2014) (PPUC Jun 16, 2014), which can be found at http://www.puc.pa.gov/about_puc/consolidated_case_view.aspx?Docket=M-2013-2341990.

[15] *See generally*, Stipulation and Recommendation and Supplemental Stipulation and Recommendation filed in the following cases: *In re Filing by Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company [hereinafter collectively "The Ohio Companies"] of a Grid Modernization Business Plan,* PUCO Case No. 16-481-EL-UNC*; In re The Ohio Companies' Filing for Approval of a Distribution Platform Modernization Plan,* PUCO Case No. 17-2436-EL-UNC*; In re The Ohio Companies' Application to Implement Matters Relating to the Tax Cuts and Jobs Act of 2017,* PUCO Case No. 18-1604-EL-UNC*; and In re The Ohio Companies' Application for Approval of a Tariff Change,* PUCO Case No. 18-1656-EL-ATA, p. 14 (Nov. 9, 2018 and Jan. 25, 2019).

1.2. Objectives and Assumptions

1.2.1. Objectives

The objectives surrounding the development of this AMI Plan are as follows:

1. Submit an AMI Plan that is responsive to the Board's AMI Filing Order.
2. Leverage the work completed in the PA Project, OH Project, and the Ohio Pilot.
3. Leverage the new ADMS through integration with the AMI system in a solution that maximizes the potential storm and blue-sky outage restoration benefits.
4. Submit an AMI Plan that captures the full benefits of a cost-effective smart meter system, paying particular attention to those benefits that enhance the outage management process and the customer experience and support achievement of the Board's EMP goals.
5. Develop a proposed time-frame that allows for the realization of benefits from smart meters in a measured, timely manner.
6. Establish a customer communications plan to educate customers as to AMI installations, functionality and benefits.
7. Develop metrics and periodic reports to track AMI installations and benefits.
8. Develop an AMI Plan that is consistent with the findings and practices as set forth in the Navigant AMI Gold Standards Report.

1.2.2. Assumptions

For purposes of developing the AMI Plan, the following assumptions were made:

1. No unforeseen or uncontrollable events would occur that could significantly impact the execution of the AMI Plan.

2. An end-to-end AMI system similar to that being deployed in Pennsylvania and Ohio, adjusted, as necessary, for any advancements in the technology that may have recently occurred, will be deployed in the Company's service territory.

3. The recommended deployment plan includes a i) six-month ramp-up / planning period; ii) six-month IT buildout period; iii) 36-month deployment period; followed by iv) a 24-month post-deployment final engineering period.

4. The customer will have an opportunity to opt-out of having smart meter reading capabilities installed. The AMI Plan assumed a 0.5% customer opt-out rate, with the number of connected grid routers (CGRs) and range extenders adjusted accordingly. [16]

5. 99% percent of all smart meters will be installed within three years of commencement of smart meter deployment. This includes the estimated 0.5% of customers assumed to

[16] In an "opt-out" situation the customer may refuse the installation of a communicating smart meter and, instead, pay an additional monthly charge for a manual meter reading of the meter. *See* Appendix B for a description of the Company's Opt-Out process and the cost-based customer charges that the Company is proposing.

elect to opt-out of the Company's smart meter program. These customers will either receive a smart meter with the two-way communication function disabled or retain their current meter (Legacy Meter).

6. The remaining one percent of the meters represent locations where large commercial and industrial customers already have advanced interval metering, or are either difficult to reach, or may require alternative communication solutions (collectively, "Challenged Locations"). Meters at these Challenged Locations will be addressed at the end of the project (years five and six).

7. All smart meters will be deployed in the Company's service territory within five years of commencement of smart meter deployment.

8. Time-of-use and real time pricing programs would be available to customers with access to smart meter data through third party suppliers in the competitive generation market.

9. The smart meter solution will integrate with enterprise systems, such as SAP[17] and the ADMS.

1.3. The Proposed AMI Solution

The Company's proposed AMI network architecture (AMI Solution) utilizes a two-way communication mesh network in which smart meters communicate meter data via radio frequency (RF) to other smart meters and to range extenders and connected grid routers, looking for the most optimal route to the "Head End" system.

Below is a more detailed discussion of the major components of the AMI Solution:

Smart meters – The meters collect, store, and transmit total consumption data, interval data, and meter events to core applications after configuration, and communicate with Home Area Networks. The meters have two-way communication capability, such that the Company can send communications to the meters, as well as receive data from them.

Connected Grid Routers (CGRs) – A CGR is a bi-directional communications/data acquisition router that collects smart meter data and communicates directly with the Head End System. The modular CGR is a pole-top device that serves as the collection device for local smart meter networks. The CGR is the collection point between the RF mesh network (or FAN) and the wide area network (or WAN) described below. CGRs are equipped with up to eight hours of battery backup.

[17] SAP is an enterprise solution that the Company utilizes for billing and customer management.

Range Extenders – Range Extenders are devices placed between CGRs and smart meters in suboptimal communication areas that boost the smart meter signals when a smart meter is otherwise not within range.

Field Area Network (FAN) – A proprietary FAN is used for communications between the meters and CGRs, using RF.

Wide Area Network (WAN) – The WAN is the communication system between the CGRs and the Head End/Collection Engine and includes data center equipment and control software, such as that provided by Verizon or AT&T.

Head End/Collection Engine – The Head End/Collection Engine (Head End) software collects and delivers information from the meters via the CGRs to the Meter Data Management System.

Field Network Director (FND) – The FND is a communications network management platform that manages a multi-service network and security infrastructure and helps utilities transform their smart metering operations with unified network management. It works in conjunction with the Head End System and is the system that facilitates firmware updates to the meters and CGRs.

Meter Data Management System (MDMS) – The MDMS provides for storage of energy usage data recorded by the smart meters, including interval meter reads, and processes raw meter data with validate, edit and estimate (VEE) algorithms for utilization in corporate systems, such as billing and customer service.

Core Systems – The Company's core application processes that will be impacted by a smart meter installation fall into five major groups and will have to be enhanced to accommodate the smart meter system:

- *Billing, Revenue, and Settlement Operations-Related Systems*
- *Meter Data Collection Systems*
- *Meter Management Systems*
- *Customer Contact Systems*
- *ADMS*

The AMI Solution also provides a platform for customers to employ home area networks (HAN) in their home and expects them to do so. A HAN network contained within a user's home communicates information from the smart meter to in-home devices (IHDs) such as in-home displays and mobile phone applications. The competitive market is expected to offer HAN technology to customers, and the Company will provide to the customer a list of HAN devices that the Company believes to be compatible with the Company's smart meter system.

A more detailed discussion of the proposed AMI Solution, which is quite similar to that included in the Navigant AMI Gold Standards Report, can be found in Chapter 2.

1.4. The Deployment Schedule and Functionality

The Business Case anticipates three phases: i) a Pre-Deployment Phase; ii) a Deployment Phase; and iii) a Final Engineering Phase.

Pre-Deployment Phase: This phase involves both a planning period and an IT build out period. During the planning period, the Company will: i) assemble a project team; ii) contract with key vendors; iii) secure the necessary equipment and resources to commence deployment of an end-to-end AMI system; iv) develop construction and deployment schedules; and v) assess market conditions and pricing. For purposes of the AMI Plan, JCP&L assumed this period to be six months from the commencement date of the project. The Pre-Deployment Phase also includes an additional six-month IT build-out period in which the IT infrastructure necessary for the success of the AMI project is upgraded.

Deployment Phase: During this phase, smart meters and the related infrastructure would be deployed throughout the JCP&L service territory. Absent unforeseen events, the Company assumes that it would install approximately 99% of all meters and related infrastructure within thirty-six months of the commencement of the Deployment Phase. Further, during the Deployment Phase, the Company envisions an AMI installation process in which the AMI system is integrated with the ADMS, once operational, to maximize the benefits that can be derived from an AMI system.

Final Engineering Phase: During this phase, which is anticipated to last 24 months, the Company will install the remaining smart meters in Challenged Locations and will engineer and install any final CGRs and range extenders necessary to complete the mesh network.

1.5. Customer Communication Plan and Opt-Out Process

The Company has included in Appendix A its AMI Customer Communications Plan which will commence approximately 90 days before smart meter deployment and continue throughout the AMI project. The Company also developed a customer opt-out process and related tariff for those customers who elect not to have a smart meter installed. The opt-out process, along with the related charges, are included in Appendix B. The opt-out tariff is included with testimony that is part of the Company's AMI filing.

1.6. Financial Implications: Benefits Exceed Costs

The Company's financial assessment, included in Chapter 3 of this AMI Plan, is based on a twenty-year study period. JCP&L utilized a detailed financial model designed to estimate the costs

associated with full smart meter deployment in the Company's service territory. Additionally, this model includes three types of benefits: operational benefits, customer-specific benefits and societal benefits, all of which, along with key assumptions and calculation drivers, are addressed in Chapter 3. Based upon the assumptions set forth herein for the proposed AMI Solution, the projected twenty-year lifecycle cost for this AMI Plan is estimated to be $732 million on a nominal dollar basis and approximately $469 million on a net present value ("NPV") basis when viewed from the Company's perspective. On the twenty-year lifecycle benefits side, operational benefits, customer-specific benefits and societal benefits have been estimated to be $1.358 billion on a cumulative, nominal dollar basis, and approximately $542 million on an NPV basis. This results in an overall positive benefit/cost ratio of 1.85:1 on a nominal basis and 1.17:1 on an NPV basis (Company perspective). The NPV benefit-cost ratios from both a customer and societal perspective are 1.54:1 and 1.65:1, respectively.

Below is a summary of both the estimated costs and estimated benefits in nominal dollars, cumulative over the twenty-year study period.

Benefits – 20-Year

Millions

Operational	Type	Total
Meter Reading	O&M	($341.39)
Meter Reading	Capital	($1.81)
Meter Services	O&M	($49.28)
Meter Services	Capital	($0.38)
Back Office	O&M	($0.72)
Call Center	O&M	($1.04)
Total Operational Benefits		($394.62)

Customer/Societal	Type	Total
Service Outage Management	Customer/Societal	($332.47)
Customer Energy Management	Customer	($159.52)
Time Varying Rates	Customer	($160.47)
Revenue Assurance	Customer/Societal	($255.95)
Carbon Emission Reduction	Societal	($55.31)
Total Customer/Societal Benefits		($963.72)
Total Benefits		($1,358.34)

Costs – 20-Year

Millions

	Capital	O&M	Total
Meters	$222.43	-	**$222.43**
Field Network	$24.37	$21.29	**$45.66**
Business Staff	$20.81	$57.63	**$78.44**
External Staff	$7.40	$43.91	**$51.31**
Shared Services	$2.70	$7.60	**$10.30**
IT	$227.88	$96.40	**$324.28**
Total Costs	**$505.59**	**$226.83**	**$732.42**

1.7. Metrics and Reporting

Tracking and reporting key metrics is critical to the success of any project of this magnitude. Therefore, the Company has developed a metrics and reporting plan, the results of which it intends to share with the Board Staff and Rate Counsel on a semi-annual basis. The metrics that the Company will track are set forth in Chapter 4 of the Plan, while a metrics tracker template is included in Appendix C.

2. The Proposed AMI Solution and Deployment Schedule

This chapter describes the proposed smart meter AMI Solution, along with a proposed build-out/meter deployment and ADMS integration schedule, the details of which were used to perform the cost-benefit analysis described in Chapter 3.

2.1. Smart Meter Functionality and Solution Architecture

2.1.1. Development of the Smart Meter Solution

In order to allow JCP&L to use a common system architecture and network design, which should provide customer benefits through economies of scale as more smart meters are installed, JCP&L adopted the smart meter solution developed and deployed in the PA Project, adjusted for any advancements in technology since the PA Project commenced, and currently being deployed in the OH Project. That system forms the foundation for the Company's proposed AMI Solution, which is described below.

2.1.2. Meter Functionality

The smart meters selected by the Company will include, at a minimum, the following functionality:

Remote Service Switch

With the smart meters, the Company will be able to remotely connect and disconnect the vast majority of residential and certain small commercial customers. The AMI Plan assumes that this feature will be utilized in all voluntary disconnection and reconnection situations. It will also be used for involuntary disconnections and reconnections due to non-pay (commonly referred to as "dunnings"), consistent with procedures set forth in current laws, regulations and Board orders addressing the same.

Automated Meter Reading & Interval Metering

Meter reading will be an automated, scheduled process through which meters measure, record, and send interval meter readings and other data on a regular frequency. Although capable of shorter interval reads, the Plan assumes that meter reads would occur at intervals no greater than sixty minutes, consistent with the Company's applicable rate schedules. The technology will enable interval metering for all customer classes, including Residential and small Commercial accounts. The meters will have the capability to provide over one year of load profile data storage.

Voltage Monitoring/Outages and Restoration

The smart meters will measure and record voltage information at the meter and transmit it to the Head End system. This information will be utilized by users of the ADMS to assist in voltage

analysis. The smart meters will also enable enhanced outage management functionality with voltage monitoring and "last gasp" outage notification capability from the meter to the Company should the need arise. They will also provide automated notification of status back to the utility upon power restoration. Current levels of voltage monitoring, while providing useful information, do not provide the location-based level of accuracy and insight from the transmission and distribution level down to the meter level, the latter of which is needed to support predictive, proactive outage management prevention and resolution. To automate outage reporting and restoration, the smart meter infrastructure must be in place and then interfaced with the Company's new ADMS.

Two-way Communication Capability

The smart meters will have the ability to send and receive data, enabling firmware, software, and configuration updates to be sent to the meter over the air.

Open Standards and Upgradability

The meters will comply with open standards and protocols, will have the capability to be remotely programmed, and will be upgradeable as technology advances.

2.1.3. Other Components of the Solution Architecture

In order to provide the requisite functionality, an entire network of hardware and communication systems must be integrated. In addition to the smart meters, the main components of this network will include: (i) the communication network (FAN/ WAN); (ii) the Head End; (iii) the Field Network Director (FND); (iv) the Meter Data Management System (MDMS); (v) the Company's enterprise systems; and, while not part of the Company's AMI solution, (vi) the customer's Home Area Network (HAN). Each of these components is discussed below.

Communications Network

Network communications are not a single solution but consist of a series of components that enable meters to communicate with each other and with the backhaul system. CGRs, after collecting data from the meters, communicate with the Head End. In the proposed network, the meters will use Radio Frequency (RF), for which a license is not required, to dynamically discover each other and form a mesh network that connects them to range extenders and / or the CGRs, creating a FAN.[18]

[18] The diverse geographic and urban density nature of the Company's service territory makes it unlikely that a single meter network vendor technology will be capable of servicing 100% of the smart meters, and a small population of meters will require alternative solutions. The Company has preliminarily determined that less than one percent of customers across the Company's service territory are in areas where RF meters may not be able to form an RF mesh or join a neighboring mesh for various reasons, including the distance from the nearest meter, the terrain, or a subterranean location. The Company will utilize alternative solutions in these cases or when a solution exists that may be more cost-effective than building an RF mesh in the local area.

The FAN connection between an individual meter and the CGR in the Company's proposed architecture will use a proprietary communications protocol that is unique to the meter vendor. The CGR will then link to a WAN, which uses a standard protocol for backhaul services to connect the meter to the Head End.

The Company anticipates using a combination of communication companies that provide cellular service in the JCP&L service territory. In order to address the fact that these networks include equipment outside of the Company's physical control, network intrusion prevention systems would be inserted between internal systems (including Head Ends) and the meter network for inbound traffic monitoring. This will add an independent security control between key points in the network.

Head End

In the proposed architecture, the Head End serves primarily as the gateway for all communications to and from the meters and other connected devices, such as CGRs. It collects unvalidated meter data (e.g. consumption, interval, event data, and power status) and transmits it to the MDMS.

Field Network Director (FND)

The Field Network Director is a communications network management platform that manages a multi-service network and security infrastructure and helps utilities transform their smart metering operations with unified network management.

Meter Data Management System (MDMS)

The MDMS is a software system that receives, stores, validates, estimates, and aggregates data from the Head End, and processes meter data in the three-step validation, estimation, and editing (VEE) process. The MDMS serves as the primary repository of all billing data collected by the smart meters. A MDMS will be integrated with utility billing and customer care software.

In the validation step, the MDMS reviews the unvalidated data from the smart meters and compares it to expected values. Meter reads that are outside the high/low range or exceed the variance of expected values, fail validation and are flagged. Subsequently, invalid, incomplete, or missing reads are estimated along with reads that fail validation. The VEE process ensures that the Company has validated smart meter data available for customer billing and operations.

The Company's Enterprise Systems

With the installation of smart meters, the Company anticipates the need to upgrade the enterprise systems described in Section 2.1.5.

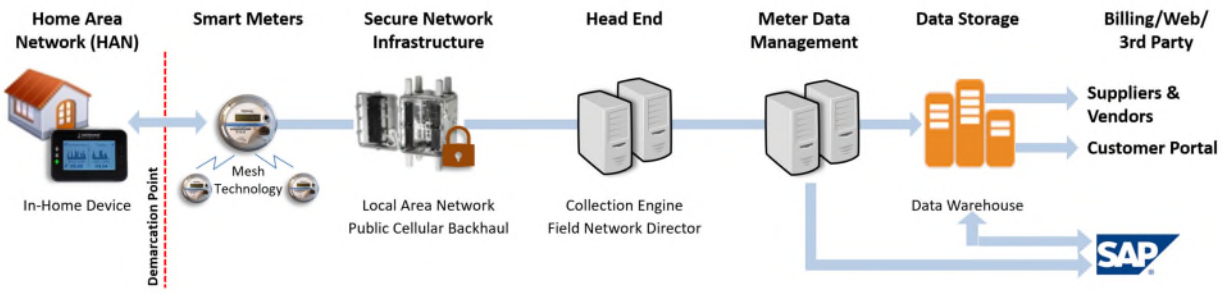
Home Area Network (HAN)

The HAN is a data network contained within a customer's premises that is capable of communication between the smart meter and the customer's In-Home Devices (IHDs). The purpose of the HAN will be to enable direct access to data at the customer's premises. IHDs may include in-home displays, power switches, and other load control devices. While the smart meters will have the capability of supporting data transmission to and from these IHDs, the functionality is only available should the customer elect to purchase the devices through the competitive market. The Company will qualify HAN devices in order to ensure compatibility with its smart meter network. However, the Company does not intend to provide IHDs or HAN technologies to customers.

2.1.4. The End-to-End Smart Meter Solution

Below is an illustration of the end-to-end Smart Meter network solution that is being proposed in this AMI Plan:

Figure 2.1 New Jersey Smart Meter Solution



2.1.5. Integration with Other Existing Enterprise Systems

The successful integration of the smart meter components, the MDMS, and the Company's core applications is crucial to the success of the AMI deployment. As a result of the installation of smart meters, the Company anticipates the need to upgrade certain enterprise systems, including the following:

- ***Billing, Revenue, and Settlement Operations-Related Systems*** – These systems perform billing functions and provide data to various peripheral billing applications. The Company utilizes the SAP solution for billing and customer management. In addition, these systems provide settlement information to reconcile load and generation reporting to PJM Interconnection, LLC, the Company's regional transmission organization, along with customer usage data to third party generation suppliers.
- ***Meter Management Systems*** – These applications primarily manage meter asset information including meter record creation, meter installation/removal, meter equipment specifications, and meter inventory tracking.

- ***Customer Contact Systems*** – These applications provide multiple contact points for customer communications and notifications. Applications include a web portal through which customers can view their energy usage data. Web presentment capabilities also include access to account and billing information, as well as a series of self-service transactions such as requests to move-in/move-out, upgrade service, report outages, and pay bills. Other capabilities include enrollment in budget billing and paperless billing, the ability to submit meter reads, online access to education and safety information, and a home energy analyzer allowing customers to receive personal energy profile information with graphs and downloadable data. The Company is also currently evaluating mobile telephone applications that would enhance the AMI benefits to customers by allowing them to better manage their electricity via their smart phones.
- ***ADMS*** – This application will monitor and manage the Company's distribution system, performing load flow analysis and informing Company personnel of outages and status of service restoration. Integration with AMI is necessary to maximize outage restoration benefits.

2.2. AMI Deployment Strategy

2.2.1. Deployment Schedule

For purposes of deployment, the Company envisions three phases to this project:

Pre-Deployment Phase: This phase is comprised of two six-month periods, the first of which is a planning period. During the planning period, the Company's project team would commence contract negotiations with the major vendors and necessary consultants to assemble a team of experts, many of whom have worked effectively with the PA Companies' employees and management to bring the PA Project in on schedule and on budget and are now part of the OH Project. Equipment vendors currently included with this team were the successful bidders in the PA Project (which involved a comprehensive, arduous RFI / RFP process). They have each demonstrated the ability to provide a high-quality work product and timely delivery. The Company will vet these same vendors and, absent unforeseen events will consider each of them for this AMI Plan. This will be done for several reasons. First, with the PA Project virtually complete and the OH Project underway, the Company will benefit from institutional knowledge and experience and volume purchasing discounts. Second, the common architecture will provide economies of scale through personnel and systems. And, third, the costs of re-engineering the solution to accommodate a new vendor's equipment will far outweigh any potential cost savings that may be obtained. The Company will also consider other vendors who are qualified to provide services under this Plan, with a focus on utilizing minority-, women- and veteran-owned businesses. When appropriate, the selection process will utilize RFIs and RFPs.

During this period, the team would also make arrangements to procure all necessary equipment and materials, develop construction and deployment schedules, and design and document, for the IT development period, requirements and specifications for start-up functionality. The second six-month period will focus on IT infrastructure development in which certain IT systems will be both upgraded in order to accommodate the demands placed on them by the AMI project, as well as modified in order to provide the AMI functionality for start-up deployment and billing.

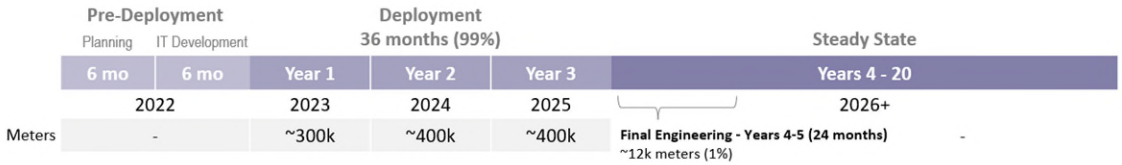
The Deployment Phase: The Deployment Phase will commence upon completion of the Pre-Deployment Phase and will continue until approximately 99% of all smart meters are installed – which, based on the PA Project experience, should be completed within three years. During this phase, the smart meter infrastructure will be built consistent with the deployment strategy and timelines established during the Pre-Deployment Phase. Additionally, within the first six months of the Deployment Phase, the AMI IT infrastructure will be upgraded to provide a full interface with the Company's ADMS, which is expected to be fully operational by mid-2022 and then fully integrated with the FirstEnergy AMI enterprise system in 2023. For purposes of developing the cost benefit analysis set forth in Chapter 3, the Company estimated the need to install 1,270 CGRs and 1,060 range extenders to fully enable communications within the mesh communications network. The Company further assumed meters would be deployed at a rate of 1,500 meters per day, five days per week, which is the average rate at which meters were installed in the PA Project and are expected to be installed in the OH Project**.** At this pace, and absent any unforeseen events, approximately 99% of all meters and related infrastructure should be installed within thirty-six months of the start of the Deployment Phase. While the meters upon installation will be *capable* of providing all smart meter functionality, *actual* functionality was assumed to lag smart meter installations by approximately three months to allow for the build-out of the end-to-end communication network.

Final Engineering Phase: The Company anticipates a 24-month period after the Deployment Phase in which remaining smart meters will be installed in Challenged Locations. During this period, the Company will also engineer and install any additional network equipment, such as range extenders and CGRs, in order to complete the mesh network.[19]

[19] Work on Challenged Locations may commence on or before the date that thirty-six-month Deployment Phase is completed, depending upon availability of the mesh network and cellular coverage within the JCP&L service territory. Once final engineering of the mesh network communications has been accomplished, Challenged Locations would be the primary focus of the project team during the Final Engineering Phase.

Figure 2.2 illustrates the anticipated deployment and steady state timeline:

Figure 2.2 New Jersey Smart Meter Deployment Plan Timeframe
Estimated schedule for planning purposes



2.2.2. Meter Installation

The AMI Plan assumes that approximately 98% of the meter installations will be standard and will be performed by qualified contractors. The remaining two percent, which generally will involve transformer rated meters and other special meter forms, will be installed by Company personnel due to the complexity of the installation. Should the installer encounter an unsafe condition on the customer's side of the meter, it is assumed that it will be the responsibility of the customer to make any necessary repairs before the smart meter is installed. In extreme cases where customer safety is at risk, the Company would make the repair. The cost-benefit analysis assumes that approximately one percent of the installations would be hazardous situations, which would require Company repairs. This estimate is consistent with experience gained in the PA and OH Projects.

2.3 Supplier Diversity

Supplier diversity is an important part of the FirstEnergy supply chain process. The Company believes that diversifying its supplier base enhances competition among suppliers which, in turn, results in increasingly innovative products and services, improved reliability, and lowers costs in the communities that it serves. Therefore, as the Company's AMI deployment plan is being developed, the Company will look for opportunities to engage minority-, women- and veteran-owned businesses as part of its deployment process.

3. Financial Analysis

The financial analysis set forth in this Chapter is based on a twenty-year study period to coincide with the expected service life of the smart meter. The Company utilized a team of FirstEnergy smart meter and project management office (PMO) personnel, working together with subject matter experts from the consulting firms of Accenture, LLP and Harbourfront Group, Inc., to develop this financial analysis. A central part of the planning focused on the utilization of a detailed financial analysis model (Financial Model) to estimate and analyze the future deployment and steady state costs coupled with informed estimates of operational benefits, customer-specific benefits, and societal benefits. A significant amount of granular information on both costs by major category and benefits by major category was taken from the PA Project and the PMO tracking of actual costs and benefits achieved through that project. These actual costs were then vetted both with personnel who are responsible for the PA Project and the OH Project costs and benefits, as well as with JCP&L staff who would be responsible for meeting Company project budgets in the future, resulting in the deployment and steady state costs used in the Financial Model. The analytics team also reviewed other recent smart meter-related business cases that provided updated insights into both customer and societal benefits streams.[20]

Activities performed in the development of the Financial Model include:

- Defining the scope and components of the smart meter program.
- Analyzing relevant operational data and smart meter project projections.
- Evaluating and validating data.
- Identifying key smart meter project financial analysis modeling variables and assumptions.
- Updating the existing Financial Model used for the PA Project and the OH Project, to meet New Jersey specifications and be more in line with more recently available Customer and Societal Benefit-specific information.
- Constructing a detailed view of the JCP&L smart meter project financial analysis based upon a thirty-six-month mass deployment of 1.15 million smart meters and supporting AMI infrastructure.
- Evaluating the reasonableness of the Financial Model results based on comparisons with other comparable utility smart meter projects.

[20] *See e.g., In re Petition of Rockland Elec. Co. for Approval of an Advanced Metering Program; and for Other Relief,* BPU Docket No. ER16060524, Decision and Order (Feb. 29, 2020); *2019 New Jersey Energy Master Plan – Pathway to 2050; AMI Gold Standards Report – An Assessment of the Smart Electric Metering Landscape*, Navigant Research (Pub. 4Q 2019); *In re Pub. Serv. Elec. and Gas Co. for Approval of its Clean Energy Future Energy Cloud ("CEF-EC") Program on a Regulated Basis,* BPU Docket No. EO18101115, Petition (Apr. 1, 2020); *Rockland Elec Co. Advanced Metering Infrastructure Program*, BPU Docket No. ER16060524, Decision and Order (Aug. 23, 2017); *Rockland Elec. Co. Advanced Metering Infrastructure Metrics*, BPU Docket No. ER16060524 (Filed Mar. 31, 2019); I*n re Filing by Ohio Edison Company, The Cleveland Electric Illuminating Company, and the Toledo Edison Company of a Grid Modernization Business Plan, PUCO Case No. 16-481-EL-UNC* , Stipulation and Recommendation and Supplemental Stipulation and Recommendation (Nov. 9, 2018 and Jan. 25, 2019).

- Reviewing Navigant's AMI Gold Standards Report so as to ensure that best practices have been considered.

- Reviewing the JCP&L Financial Model results for reasonableness with affected business units, the PMO group, and the Company's senior management.

The financial analyses included in this chapter are based on the assumptions set forth in Section 1.2.2 and Section 3.1. Based on those assumptions and the results generated through the Financial Model, the estimated cost of installing and operating an AMI system over a twenty-year study period is $732 million in nominal dollars, $506 million of which are for capital expenditures (Capital) and $227 million for operations and maintenance (O&M) costs. Approximately $418 million ($342 capital; $76 O&M) is expected to be spent over the Pre-Deployment and Deployment Phases. Operational costs are discussed in detail in Section 3.2 below.

Total benefits over the twenty-year study period have been estimated to be approximately $1.358 billion on a nominal basis, approximately $395 million of which results from operational benefits. Customer and societal benefits are estimated to be $964 million over the same twenty-year study period. Details of the benefits analyses are discussed in Sections 3.3 and 3.4 below.

Based on these estimated costs and benefits and using the discount rates discussed in Section 3.1 below, the NPV benefit-cost ratios from the Company's perspective, the customer's perspective and society's perspective are 1.17:1, 1.54:1 and 1.65:1, respectively. On a nominal basis, the overall benefit-cost ratio is 1.85:1 and represents the summation of all benefits over the 20-year study period divided by the summation of all costs. The Net Present Value Benefit/Cost Ratios take into account the time value of money and use different discount rates to capture the differing perspectives of the time value of money for each of the three categories. These discount rates are more fully discussed below.

3.1. Scope and Assumptions

The financial analysis assumes a twenty-year study period, starting with a combined four-year Pre-Deployment and Deployment Phase, followed by sixteen years of steady state operation and maintenance of the AMI network. The financial analysis assumed a thirty-six-month mass deployment schedule (the Deployment Phase), in which 99% of all smart meters will be installed and all related infrastructure will be completed. This includes installing non-communicating smart meters for the 0.5% of the customers whom the Company assumes will opt-out of accepting a communicating smart meter. Thus, only the Challenged Locations, assumed to be one percent of customers, will remain after the Deployment Phase and will be installed and certified for billing and remote connection and disconnection during the 24-month Final Engineering Period. During this 24-month period, the backhaul infrastructure will also be reinforced where needed.

General Financial Inputs and Assumptions

- The financial analysis does not include costs of the existing metering infrastructure, which have already been incurred prior to the installation of AMI and which are already being recovered in rates. The Company has included a specific proposal for the recovery of "stranded" Legacy Meter costs, following removal of the meters, in its cost recovery testimony included as part of the AMI filing.
- Operational benefits were assumed to begin to be realized in year two of the Deployment Phase and then lag smart meter installation by three months thereafter to account for the build out of the communications network.[21] Customer and Societal Benefits were generally assumed to lag meter installation by three months before beginning to be realized in accordance with the participation levels assumed for each benefit stream.
- Employee costs, employee levels and other similar factors were based on actual costs and other metric levels as of December 31, 2019.
- Equipment and outside vendor service costs are based on budget estimates provided by the equipment, software, installation and consulting support contractors that are currently engaged in the OH Project.
- Labor related costs are fully loaded and include the escalation rates described below.

Book and Tax Depreciation

Based on the Company's standard capitalization policies, each of the cost categories were assessed to determine if they were Capital or O&M related costs. For Capital costs, the estimated book lives used for depreciation purposes were fifteen years for smart meters and communications equipment; five years for hardware; and seven years for software. Book lives were determined based on input from external resources and internal subject matter experts, while tax lives were based on current Internal Revenue Service guidelines.

Escalation Rates

The Financial Model assumes an escalation rate of 2% for internal labor. This escalation rate represents the weighted average of the major labor categories that would be used on a JCP&L AMI project. Those categories are: i) JCP&L meter staff; ii) meter services personnel; iii) line crew personnel; iv) corporate smart meter project personnel; and v) assigned management. All other

[21] The Plan has been designed with the objective of installing network communications (i.e., CGRs) approximately one quarter ahead of actual smart meter deployment in each deployment area. However, the business case conservatively assumes that the realization of operational benefits will lag meter deployment by three months should unforeseen circumstances arise.

escalation rates were based on inputs from individual workstreams and incorporated into the costs by year.

Discount Rates

For assessment of the AMI Plan's Net Present Value Benefit/Cost Ratios, the Financial Model utilized the Company's current after tax Weighted Average Cost of Capital of 7.47% to show the NPV Benefit/Cost ratios from the Company's perspective. For the Customer perspective, a discount rate of 2.46% was used, which represents the annual percentage rate (APR) yield on a New Jersey fifteen-year fixed rate mortgage as of August 7, 2020. For the societal perspective, a discount rate of 1.23% was employed, which represents the APR yield on a thirty-year U.S. Treasury Note as of August 7, 2020.

Deployment Inputs and Assumptions

- All costs and benefits are based on the assumption that the AMI system will be fully integrated with the Company's ADMS in 2023.
- Based upon the PA Companies' experience in deploying over 2 million meters, the Company assumed one percent of the meters will require emergency meter-related repairs on the customer's side of the meter prior to the installation. Except for such critical, safety-related repairs deemed necessary by Company deployment personnel, the Company assumed, based on a recent BPU Order,[22] that the costs of all other repairs would be borne by the customer needing such repairs.
- The Financial Model assumes a meter failure/replacement rate of 0.5% for the first ten years of the study period and a one percent per year failure rate thereafter, which is based on discussions with the Company's meter vendor and is consistent with the vendor's findings in other smart meter projects. The cost of the manufacturer's warranty covering the first three years of each smart meter's operational life has been capitalized as part of the meter cost and the appropriate costs for out-of-warranty smart meter replacements have been included in the financial analysis.
- CGRs and range extenders are assumed to have an annual failure rate of one percent, which is consistent with those experienced by other utilities, including the PA Companies.
- The Financial Model assumes that customers who elect to opt-out will have a non-communicating smart meter installed at their premises. (Although customers who opt out may retain their Legacy Meter, for purposes of financial modeling, this factor was ignored as it has no material effect on the outcome.) However, those customers will

[22] *I/M/O the Petition of Rockland Electric Company For Approval of An Advanced Metering Program; And For Other Relief*, BPU Docket No. ER16060524, Decision and Order (August 23, 2017), p. 22.

pay their full cost of billing setup, monthly meter reading and maintenance of that meter through a specific tariff charge. The costs and charges that will be incurred to serve opt-out customers are not included in the financial analysis. However, costs are included for additional CGRs and range extenders needed to fill out the mesh network due to opt-outs. That is, the mesh network relies on the smart meters' ability to "talk" to one another, which is dependent on the meters being in close proximity to each other. Because the number and location of customers that may opt-out of the smart meter program cannot be predicted at this time, the Company must provide a contingency for this additional equipment should signal boosts be necessary.

- The Financial Model assumes that Company personnel will perform all complex meter installations.

3.2. Overall Program Costs

Below is a summary of total costs, Capital, and O&M costs. These costs were then grouped into the following cost categories: (i) meter and FAN; (ii) Information Technology (IT); and (iii) staffing and support, which were further broken down as either Capital or O&M within the year(s) in which these costs are expected to be incurred.

Figure 3.4
Total Costs: $732M
20-Year Total Costs (Nominal)

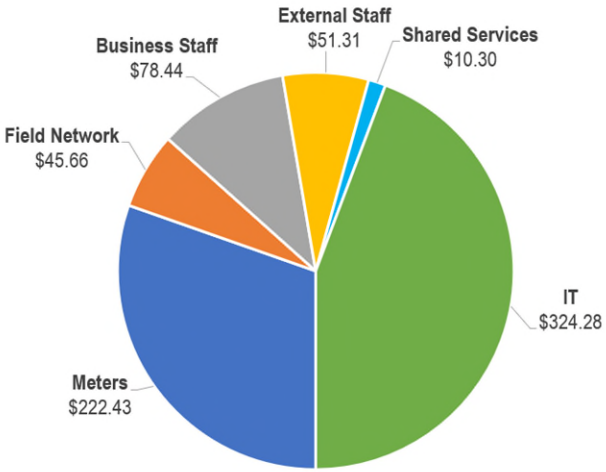


Figure 3.5

Capital Total: $506M

20-Year Total Costs (Nominal)

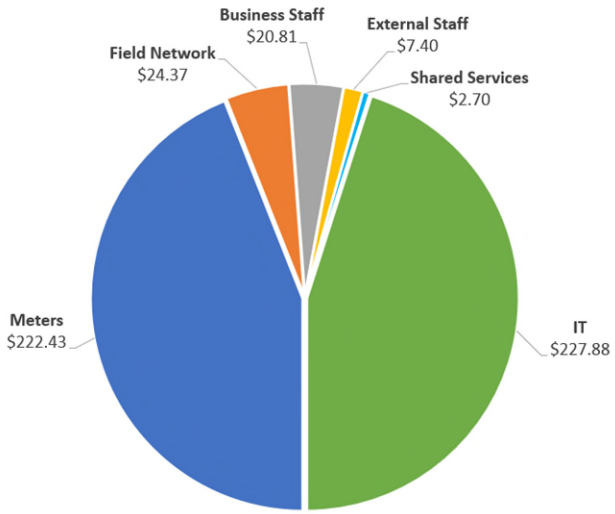
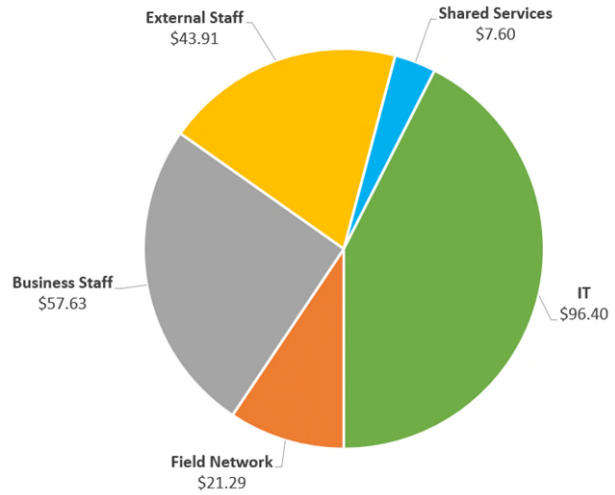


Figure 3.6

O&M Total: $227M

20-Year Total Costs (Nominal)



3.2.1. Costs by Program Component

The estimated costs presented in this section 3.2.1 are cumulative over the twenty-year study period and are presented in nominal dollars. Capital and O&M costs were determined consistent with Company capitalization policies.

Meter and Field Area Network

Total Estimated Cost	**$268.09 million (36.6% of total project costs)**
Meters (Capital)	$222.43 million
FAN (Capital)	$24.32 million
FAN (O&M)	$6.81 million
Public Backhaul (O&M)	$14.48 million
Public Backhaul (Capital)	$0.05 million

The Company estimates that it will spend approximately $216.2 million during the Pre-Deployment and Deployment Phases. The smart meter Capital costs include a 36-month warranty, initial installation costs, and shipping and handling. Meter O&M is predominantly for the labor needed over twenty years to investigate and replace failed meters. The field area network Capital costs are for 1,270 CGRs, 1,060 range extenders, and other required equipment, as well as installation and testing costs. The public backhaul O&M costs include twenty years of annual service fees. These cost estimates were derived from either internal labor cost estimates or the updated vendor pricing requested by the Company for the preparation of this AMI Plan.

Information Technology

Total Estimated Cost	**$324.28 million (44.4% of total project costs)**
Software Applications (Capital)	$73.32 million
Software Applications (O&M)	$49.57 million
Infrastructure Hardware (Capital)	$52.18 million
Infrastructure Hardware (O&M)	$3.52 million
Internal/External Labor – Planning & Deployment (Capital)	$70.74 million
Internal/External Labor – Planning & Deployment (O&M)	$7.40 million
Internal/External Labor – Steady State (Capital)	$31.64 million
Internal/External Labor – Steady State (O&M)	$35.91 million

The Company estimates that it will spend approximately $127.56 million during the Pre-Deployment and Deployment Phases. Software Applications (Capital) costs represent

purchase/licensing expenditures for applications such as MDMS, Head End, Field Network Director, and Application Integration Tools. Infrastructure hardware (Capital) costs represent those costs related to servers, storage, network, operating systems, and firewalls and other cyber security. The software and hardware O&M costs are predominantly annual maintenance fees. Resources include internal and contractor IT labor who will be responsible for implementation of the IT technologies needed to support a smart meter rollout. All IT costs were derived from vendor pricing budget estimates and internal experience gathered through other FirstEnergy AMI projects.

Staffing and Support

Total Estimated Cost	**$140.05 million (19.1% of total project costs)**
Internal/External Labor – Planning & Deployment (Capital)	$12.29 million
Internal/External Labor – Planning & Deployment (O&M)	$55.36 million
Internal Labor – Steady State (Capital)	$15.92 million
Internal Labor – Steady State (O&M)	$41.87 million
External Labor – Steady State (O&M)	$4.30 million
Shared (Support) Services (Capital)	$2.71 million
Shared (Support) Services (O&M)	$7.60 million

The Company estimates that it will spend approximately $74.58 million during the Pre-Deployment and Deployment Phases. Staffing and support costs include internal and external labor costs associated with PMO, system integration, steady state operations, customer communications, outside professional fees, and New Jersey smart meter support facilities. Capitalized labor costs during the Pre-Deployment and Deployment Phases are attributed to meter test lab personnel and field network engineers. All other labor, both during the Pre-Deployment and Deployment Phases, as well as the steady state phase was expensed. Steady state labor includes internal personnel responsible for the smart meter operations group that will manage and maintain the smart meter operations center, network operations and technical billing. All labor cost projections were based either on projected internal labor costs, vendor updated pricing, or experience in other FirstEnergy AMI projects.

3.2.2. Projected Planning and Deployment Budget by Year

Below is a projected annual budget for the planning and deployment of all meters. The cost categories below include those cost components as set forth in section 3.2.1.

CAPITAL COSTS:

Year	2022	2023	2024	2025	2026	2027
Meters	$ 5,937,950	$ 54,583,097	$ 73,365,323	$ 72,653,401	$ 3,079,286	$ 2,873,530
Network	$ 2,242,500	$ 6,241,030	$ 7,778,431	$ 5,403,903	$ 13,268	$ 26,919
IT	$ 28,170,081	$ 38,223,922	$ 29,094,545	$ 18,519,050	$ 3,372,753	$ 8,173,486
Total Capital	**$ 36,350,531**	**$ 99,048,049**	**$ 110,238,298**	**$ 96,576,354**	**$ 6,465,307**	**$ 11,073,935**

O&M EXPENSE:

Year	2022	2023	2024	2025	2026	2027
Incremental	$ 12,590,728	$ 14,445,224	$ 16,732,146	$ 15,122,935	$ 7,337,080	$ 7,080,685
Non-Incremental	$ 2,635,055	$ 4,320,098	$ 5,235,344	$ 5,054,673	$ 4,001,576	$ 3,510,500
Total O&M	**$ 15,225,783**	**$ 18,765,322**	**$ 21,967,490**	**$ 20,177,608**	**$ 11,338,656**	**$ 10,591,185**

Projected annual costs are subject to the timing of receipt of Board approval of the AMI Plan, and assumes no unforeseen or uncontrollable events would occur that could significantly impact the execution of the AMI Plan or costs thereof.

3.3. Potential Operational Benefits

The Financial Model also projected potential operational benefits that may be realized by the Company through the installation of smart meter technology. These benefits categories include (i) meter reading; (ii) meter services; (iii) back office; and (iv) contact center. All potential operational benefits would be avoided costs. The potential benefits projections were derived from an assessment of the impacts of business process changes that will occur as a result of the installation of smart meter technology. A determination was made, based on the Company's standard capitalization policies, whether each avoided cost was an O&M cost or a Capital cost. A twenty-year study period was similarly used, with assumptions made based on information as currently known. The benefits are cumulative over the twenty-year study period and are presented in nominal dollars. The estimated operational benefits that the Company believes will be quantifiable and verifiable are as follows and are discussed in detail below:

Operations Benefits – 20-Year

Millions

Operational	Type	Total
Meter Reading	O&M	**($341.39)**
Meter Reading	Capital	**($1.81)**
Meter Services	O&M	**($49.28)**
Meter Services	Capital	**($0.38)**
Back Office	O&M	**($0.72)**
Call Center	O&M	**($1.04)**
	Total Operational Benefits	**($394.62)**

3.3.1. Meter Reading

Estimated Realizable Benefits: Of the $343.20 million total operational cost savings, approximately 86.9% are the result of reductions in the Meter Reading positions.

Meter reading benefits accrue through the elimination of the meter reading function, thus eliminating the need for manual meter readers, support staff and related equipment such as handheld devices. As a result of this reduction in meter reader and support staff positions, costs such as direct labor, overtime, fully loaded pension and benefits, and incentives are eliminated. Similarly, costs associated with employee uniforms, supplies, personal mileage and company cars can also be eliminated. Meter readers' handheld devices will no longer be needed and therefore Capital costs associated with these devices, as well as the associated O&M can be eliminated over time. A significant employee safety benefit (e.g., reduced traffic accidents and employee injuries) will also be realized by the elimination of the need for these Company employees to be in the field daily to manually read meters.

The benefits estimates are aligned with the smart meter deployment schedule and are based on the following assumptions:

- Approximately 97.5% of the meter reading positions will be eliminated by the end of the Deployment Phase. During the PA Project, virtually all meter reader positions were eliminated through smart meter automation. However, the meter reader employees were placed in other utility jobs that had been vacated due to retirements and/or other employee attrition, and JCP&L plans to undertake the same placement actions for meter readers.
- The reduction in non-labor costs are proportional to the reduction in meter reading positions.
- Cost reductions are taken based on the percentage of meters installed but lagged by one year.

- In an opt-out situation, any necessary manual reads of smart meters post-Deployment Phase will be executed by meter services staff, the costs of which will be paid by those customers opting out of the smart meter program through a separate tariff charge.
- The reduction in handheld devices is proportional to the reduction in meter reading positions and is aligned with the existing handheld replacement maintenance schedule and the proposed deployment schedule.
- Labor related budgets are escalated beginning in the second year of the Deployment Phase using the Company's 2% per year escalation factor.

3.3.2. Meter Services

Estimated Realizable Benefits: Approximately $49.6 million (approximately 12.6% of total projected program operational benefits), the vast majority of which is a result of reduction in workforce and reduction in truck rolls.

Meter services activities include meter service personnel completing work orders for meter related issues and customer inquiries that need more technical explanations than can be provided by the customer contact center. The installation of smart meters will reduce the need to dispatch a meter technician for activities such as (i) restoration of service upon receipt of customer payment;[23] (ii) disconnection upon customer request or move out; and (iii) initiation of service upon customer request or move-in. Company personnel will also be able to remotely "ping" the meters to determine if the meter is working or remotely read a meter for bill investigation purposes. Also, customers will have access to more detailed information and it is assumed that many of the calls that required a technician to visit a customer will be able to be addressed by customer contact center personnel. With this automation, as well as the more detailed information being provided to customers, it is anticipated that fewer field visits will be necessary, resulting in fewer meter and technical support services technicians being needed, thus reducing workforce levels and truck rolls. Costs such as direct labor, overtime, fully loaded pension and benefits, incentives, and costs associated with employee uniforms, supplies, personal mileage and company cars will be reduced proportionately to the workforce reduction levels.

The benefit estimates are aligned with the smart meter deployment schedule and are based on the following assumptions:

- There will be a 99.5% reduction in field visits to obtain manual meter reads in situations such as high bill, move in, and initial reads, and an 85% reduction in work related to

[25] For purposes of this Business Case, the benefits accruing through "dunnings" disconnections and reconnections are included. However, the Company is aware of the potential for new regulations evolving with the technology and will adhere to any requirements set forth in any such regulations.

manual connect and disconnect (e.g., move out blocks, unblock dunnings, move in connections)[24].

- Cost reductions are taken based on the percentage of meters installed but lagged by one year.
- Labor benefits are based on the average FTE labor rates for the Company as of the twelve months ending December 2019.
- Non-labor operational benefits are estimated to be proportional to the reduction of labor costs.

3.3.3. Back Office

Estimated Realizable Benefits: Approximately $0.7 million, all O&M (approximately 0.2% of total projected operational benefits). The Company assumed minimal savings in this area, given the efficiencies already achieved by this group. Back office activities involve resolution of high bill complaints and other billing related issues such as misreads, estimated reads, and move-in / move out reads.

Because customers are not familiar with smart meters and the information that will be provided through smart meters, the Company anticipates that customer inquiries may increase slightly before reaching a steady state. Therefore, increases in costs may occur before a steady state is realized. This increase is reflected in the benefit analysis.

3.3.4. Contact Center

Estimated Realizable Benefits: Approximately $1.04 million, all of which is O&M (approximately 0.3% of total projected program operational benefits). The Company assumed minimal savings in this area, given the efficiencies already achieved by this group.

The contact center is responsible for addressing all customer inquiries received through the contact center. More complex issues raised by the customer are forwarded to the Company's back office for resolution. It is expected that there may initially be a small cost increase due to increased call volume arising from the installation of smart meters. This increase is reflected in the benefit analysis.

3.4. Potential Customer and Societal Benefits

There are additional non-operational benefits that accrue both to customers and society through the deployment of a smart meter network. The Company estimates that an additional $963.72

[24] These estimates were originally made by the PA Companies' meter services personnel in concert with consultants familiar with smart meter deployments in other states and have been updated based upon four years of actual post-smart meter deployment results in Pennsylvania. For the purposes of this financial analysis, it is assumed that a 0.5% opt-out rate will not significantly affect these estimates.

million of benefits can be derived from the following sources, all of which are discussed in detail below.

Customer/Societal Benefits – 20-Year
Millions

Customer/Societal	Type	Total
Service Outage Management	Customer/Societal	($332.47)
Customer Energy Management	Customer	($159.52)
Time Varying Rates	Customer	($160.47)
Revenue Assurance	Customer/Societal	($255.95)
Carbon Emission Reduction	Societal	($55.31)
Total Customer/Societal Benefits		($963.72)

3.4.1. Service Outage Management

Service Outage Benefits: A smart meter has communication capabilities that facilitate outage management by providing information down to the individual customer level. While a utility's ADMS or OMS will monitor the utility's distribution system on a macro level, it cannot do so at the customer level, the latter being the function of the smart meter system. The smart meter provides a valuable data stream that helps system operators identify potential reliability problems before they become an outage. In addition to measuring electricity consumption, smart meters also act as sensors that represent the equivalent of nerve-endings for the grid and monitor electricity flows and voltage levels. As part of this voltage monitoring capability, smart meters can provide certain information to the electric utility related to a power outage (no voltage) or restoration (normal voltage following an outage) at individual homes and businesses. This feature can be accomplished through an AMI system where individual meters are "pinged" (e.g., interrogated) either manually, or automatically through an integrated AMI system. A significant portion of the benefits to be derived through smart meters is accomplished either through voltage management or the pinging tool. When coupled with an ADMS, the smart meter is capable of automatically sending real time power outage notification ("PON") and power restoration notification ("PRN") alerts into the ADMS where they are systematically processed and analyzed. These features provide the vast majority of outage management improvements. Assuming the mesh communications network is operational, smart meters send an immediate PON to the electric utility when an individual customer loses power at the meter. This notification is a "last gasp" attempt to notify the utility of the outage. The "last gasp" notification from the smart meter into the ADMS supplements the customer calls, thus allowing the distribution system operators to better understand the scope and severity of the situation. With the additional information provided by the smart meter, the Company is better able to evaluate the scope of the outage and, thus, better able to estimate both the size of crew needed for repairs and the nature of equipment

that may be affected by the outage. As a result, restoration can be done in a more efficient manner, thus reducing the total length of the outage.

Once power is restored to the meter and the surrounding mesh communications network has re-formed, the smart meter will send a PRN signal to the electric utility to verify that power has been restored to that customer. In large outage scenarios, electric utilities consider these PRNs to be of greater value than the PONs because they help restoration crews verify that power has been restored to specific areas of the distribution system as well as individual customers prior to leaving the area. Through integration of the AMI system with the ADMS, the storm analysts have the complete picture in virtually real time. This enables the utility to manage and utilize field service and restoration crews more effectively by i) verifying full restoration of lines before leaving the area; ii) deploying crews closest to the outage location(s); and iii) greatly reducing, or possibly eliminating, the need to visit and visually verify restoration in specific neighborhoods or dwellings or, alternatively, having to call customers to verify power restoration – all of which reduce costs and unnecessary truck rolls and can generally enhance both Customer Average Interruption Duration Index (CAIDI) and System Average Interruption Frequency Index (SAIFI) results.[25]

Estimated Realizable Benefits: Approximately $332.47 million (34.5% of total customer/societal benefits) through service outage management.

The Company's 2020 estimate of smart meter-specific Service Outage Management customer/societal benefits are based on the following sources:

- *The Department of Energy's "Interruption Cost Estimate Calculator"* (ICE Tool) is an economic value of improved electric service reliability estimator that projects the customer-perceived economic value, by class of business, for improvements in System Average Interruption Duration Index (SAIDI), CAIDI and/or SAIFI minutes using the state-by-state results of "economic value of improved service reliability" surveys for both residential and commercial-industrial customer segments. With the ICE Tool, the Company can estimate the economic value of improved reliability to its customers for each minute of CAIDI reduction achieved by smart meters using New Jersey-specific survey results. This tool takes into account the actual number of JCP&L residential, small commercial, and mid-large commercial-industrial customers and estimates an economic value for each minute reduction in CAIDI.

- *Results of a recent Detroit Edison (DTE) Pilot Project* that estimated a 7.3% average reduction in CAIDI for 15 substations with AMI as compared to approximately 700 DTE substations

[25] CAIDI is the Customer Average Interruption Duration Index and represents the average outage duration that any given customer would experience in a given year. SAIFI is the System Average Interruption Frequency Index and represents the average number of interruptions a customer would experience in a given year. Estimated savings related to these indices are discussed in Section 4.4.1.

without AMI in the 2015-2016 study timeframe. These results are indicative of the potential savings resulting from the Company's completed AMI integration with the FirstEnergy enterprise ADMS as described in this AMI Plan.[26]

Thus, for purposes of this AMI Plan, the Company used the results of the recent DTE Pilot Program and applied the 7.3% reduction estimate to its 2019 reported CAIDI metric (i.e., 112.86 minutes x (1-.073) = 104.62 minutes) based on the assumption that the Company's AMI system will be integrated with the Company's new ADMS in 2023. The valuation of this customer/societal reliability improvement benefit was then estimated through the use of the ICE Tool, and the progression of benefits was developed using the yearly mass deployment meter installation rates lagged by three months.

3.4.2. Customer Energy Management

Estimated Realizable Benefits: Approximately $159.52 million (16.6% of total customer/societal benefits) from customer energy management.

Unlike meters that measure a customer's energy consumption over a monthly period resulting in one kWh value per monthly billing cycle, smart meters can measure energy usage over much shorter intervals during that same monthly cycle. This interval usage information is generally made available to customers on a secure customer online portal. Armed with this information made available by smart meters, and easy-to-understand analytical tools, customers can work smarter to conserve overall electricity use. Historical studies worldwide have shown that kWh saving of between five to fifteen percent are reasonably achievable once such information is available to customers. The Company has recently investigated the potential for making available to customers an internet-enabled mobile telephone application along with a wireless smart meter in-home interface that communicates with the participant's mobile telephone. Based upon data provided by a vendor in this space and by two other utilities using this service, it is estimated that an eventual 10% percent of the residential and small commercial customers would choose to better manage their electricity consumption and would achieve an average kWh savings between 2 and 6 percent, with attendant system peak-coincident savings averaging 1.6kW for those participants with both the mobile phone application and the in-home smart meter interface. For purposes of this financial analysis the Company assumed a 2% kWh annual savings for participants with only the mobile phone application and a 6% kWh annual savings for participants that have both the mobile phone application and the in-home interface with the smart meter. It was also assumed that the latter would be able to reduce their system coincident peak by an average of

[26] The November 6, 2019 Navigant "Independent Review of RECS's AMI Business Case and Recommendations for New Jersey Board of Public Utilities" also references DTE and this Pilot Program in Footnotes 22 and 23 on page 18 of its report under Section 3.2.4-Improved Reliability and Outage Restoration Times

1.6kW per participant. All of the above assumed values are well within the findings of other utilities that have implemented such solutions. The estimated kW reductions were then valued using the Avoided Summer Generation Capacity information found in Table 2, page 4, in the Technical Memo, Rutgers Center for Green Building (May 1, 2019), while the estimated kWh reductions were valued using the Company's weighted average Summer and Winter 2019 Residential tailblock cents per kWh charges found in its Residential tariff.

Because overall consumption and coincident peaks are reduced, so too are the carbon dioxide (CO-2) emissions that otherwise would be created through the generation of that energy. This CO-2 benefit component is factored into the carbon savings discussed in Section 3.4.5.

3.4.3. Time Varying Rates (TVR)

Estimated Realizable Benefits: The Company estimates benefits of approximately $160.47 million (16.6% of total benefits) from time varying rates.

Smart meters provide the enabling technology for residential and small commercial customers to take advantage of time varying rates, such as time-of-use rates, critical peak pricing, peak time rebates and variable peak pricing. Because electric prices vary from hour-to-hour, day to day and seasonally, customers can reduce their electric bills by shifting usage to lower cost periods. Leveraging interval data made available from AMI metering to create Time Varying Rates for all customer classes supports the NJ Energy Master Plan strategy to Maximize Energy Efficiency and Conservation and Reduce Peak Demand by giving appropriate price-signals to incent consumers to change consumption patterns aligned with this strategy. For purposes of this financial analysis, it was assumed that time varying rates would be offered through the competitive generation market.

The estimated benefits were developed using a number of sources. Generally, the results from the CEI Ohio Pilot project provided i) the average kilowatt (kW) demand savings estimated as an average 0.4 kW coincident demand reduction per participating customer; ii) average kilowatt hour (kWh) savings estimated as an average 4% kWh energy consumption per participant; and iii) customer participation rates.[27] These inputs were further supported by several other studies reported in the Arcturus 2.0 meta study.[28] The estimated kW reductions were then valued using the Avoided Summer Generation Capacity information found in Table 2, page 4, in the Technical Memo, Rutgers Center for Green Building (May 1, 2019), while the estimated kWh reductions

[27] TVR participation rates and overall levels were reduced to be consistent with the stipulated customer and societal benefit metrics agreed upon with PUCO Staff in 2019.

[28] *The Electricity Journal, vol. 30, issue 10, "Arcturus 2.0 A meta-analysis of Time-Varying Rates for Electricity",* Ahmad Faruqui, Sanem Sergici, Cody Warner, Dec. 2017, pp 64-72 (participation rates and kW demand percentage savings with and without enabling technologies).

were valued using the Company's weighted average Summer and Winter 2019 Residential tailblock cents per kWh charges found in its Residential tariff.

By reducing energy consumption and peak demand, society also benefits through the reduction of CO-2 emissions by minimizing the number of power plants that must run at any given time. With less electricity being generated, less carbon is emitted. (This benefit component is reported under the benefit category "Carbon Emission Reduction" that is discussed in Section 3.4.5.)

3.4.4. Revenue Assurance

Estimated Realizable Benefits: Approximately $256 million (26.6% of total benefits) through revenue assurance.

There are three components to the revenue assurance benefit: i) greater smart meter accuracy; ii) detection of theft of service; and iii) reduction in write-offs, each of which are discussed below:

Greater Smart Meter Accuracy: Approximately $157.1 million in savings. In order to value this benefit, the Company first reviewed the population of residential electronic meters and mechanical meters as of December 2019. It was found that 67.79% of the total residential meter population was comprised of mechanical meters with the remainder being electronic meters. Based upon meter testing of both types of meters, the results of which were provided to the Company by a major international smart meter manufacturer, an assumption was made that electronic meters are able to record consumption at a 99.5% accuracy level down to a 5 watt load level, while the older mechanical meters accuracy level is between 98-99% down to 20-40 watt load level, with older vintage meters at the higher end of that spectrum.

After consideration of these observations and consultation with the Company's smart meter vendor, a conservative assumption of a 0.0075 accuracy factor was applied to the average annual kWh/customer for both the Residential and Small Commercial customer classes and priced at the average annual tailblock rates for both classes, respectively.

There was further corroboration of this benefit in a 2011 Duke Energy study prepared for the PUCO Staff in which it was found that smart meters were three times more accurate than the legacy meters they were replacing, predominantly since aging legacy meters tend to run slower.[29]

In sum, this benefit has the effect of reducing "unaccounted for energy" which otherwise would be socialized through rates. With the introduction of smart meters, these costs can now be paid for by the individual consuming the electricity. While not all customers save money as a result of

[29] *"Duke Energy Ohio Smart Grid Audit and Assessment,"* Metavu, Inc. (June 30, 2011), p. 21. This increase in accuracy was verified by the same international smart meter manufacturer discussed above.

a more accurate read, the vast majority of customers who were subsidizing the cost for energy they did not use will.

Theft of Service: Approximately $78.4 million in savings. Unlike its Legacy Meter counterpart, the smart meter has onboard functionality to detect meter tampering. This functionality is further enhanced by the communication network that will recognize and report any meter that may be missing from the mesh network, due to a customer's attempt to disconnect the meter. Any such events will prompt meter services personnel to investigate and, if warranted, block the meter by either cutting the taps at the pole or using the smart meter's remote disconnect feature. As such, theft of service should be significantly reduced, thus reducing the need for this unaccounted-for electricity to be socialized through rates.[30]

In order to value this benefit, the Company used 0.25% of kWh revenue, which was determined through discussions with Company Revenue Protection personnel and which is more conservative by half than that used by PSE&G in its April 2020 AMI Business Case filing (0.5%).[31] The Company took an even further conservative approach to this estimated benefit value by only applying this revenue recovery benefit to the current population of mechanical meters (66.8% of the current meter population) within the Company's service territory.

Reduction in Write-offs: Approximately $20.4 million in savings. Currently, New Jersey field representatives work later in the day to allow time to reconnect customers who were disconnected for nonpayment within the 12-hour regulatory window. After smart meter implementation, reconnections will be completed over-the-air (OTA) or by Meter Services if OTA fails. Since reconnections will be done remotely, field personnel shifts will now align with the hours of disconnection which will result in an additional 2 orders per collector per day. Smart meter implementation is expected to lower uncollectible expense. Ultimately, lower uncollectible expense means that less of the uncollectible debt would be passed on to customers thus reducing the overall burden of such write-offs on all customers.

3.4.5. Carbon Emissions Reductions

Estimated Realizable Benefits: Approximately $55.31 million (5.7% of total benefits) from a reduction in carbon emissions. These reductions can generally be attributed to i) Remote Disconnect / Reconnect; ii) Customer Energy Management; and iii) Time Varying Rates. The carbon emissions reductions are a result of either the need for fewer truck rolls, or a reduction in

[30] *Id.* at 82, 85.

[31] *See In re Petition of Pub, Serv. Elec. & Gas Co. for Approval of its Clean Energy Future – Energy Cloud ("CEF-EC") Program on a Regulated Basis*, Docket No. EO18101115, PSEG Attachment 1, Schedule FGD-CEF-EC-2 page 74: "Avoided Theft---Improvement in Theft Recovery. Being able to remotely analyze meter load and event flags will reduce the occurrence. Industry average theft at 0.5% of revenue".

kW/kWh consumption per participant. The kWh reduction estimates were translated into metric tons of CO-2 based upon a study included in a report by the Smart Grid Consumer Collaborative.[32] Then, these carbon emissions reductions (in dollars per ton of CO-2) over the twenty-year study period were valued using information set forth in the "May 1, 2019 Energy Efficiency Cost-Benefit Analysis Avoided Cost Assumptions—Technical Memo prepared by Rutgers Center for Green Building" and Table 6 - "Social Cost of Carbon (Nominal $/ metric ton) and U.S. GDP Chain-type Pricing Index".

3.4.7 Non-quantified Additional Benefits

There are many benefits to be leveraged over time from AMI that are not quantifiable because the values are difficult to measure and monetize with any reasonable level of certainty. For example, AMI data can enhance power quality. Smart meters can be programmed to generate a warning whenever phase voltage is outside of a pre-determined range. This allows for a simple diagnosis and provides warning of a potentially larger problem on the system which can proactively be addressed.

Similarly, several smart meter *analytics* applications reach beyond simple billing and meter-to-cash considerations. As discussed in the AMI Gold Standards Report and/or the Capstone Report, smart meter analytics can be segmented into four distinct categories, Grid Operations, Asset Management, Customer Experience, and Customer Operations, discussions of which are summarized below.

Grid Operations Analytics

AMI can be used for various grid analytics, including connectivity mapping and load forecasting. With AMI, the Company can use interval and voltage data to identify mis-mapped meters for meter-to-transformer connectivity, which is critical for theft and outage detection using machine learning algorithms that accurately predict incorrect phase connectivity and correctly classify meters according to their phase. Without proper phase connectivity, it may be impossible to determine if customer outage events are a result of forced outages or planned interruptions.

Smart meter data can also be used as a load forecasting tool. Using aggregated meter data, the Company can reduce the cost of load research used to allocate operations and maintenance costs in the regulatory process. Distributed Energy Resources (DER) can cause significant disruptions to traditional supply and demand patterns and heavily affect the processes of resource, capital, and operational planning. Using meter data, utilities can better understand and forecast DER-affected demand and DER output. This allows the Company to better understand and predict its locational effects on the Company's transmission and distribution system and plan accordingly.

[32] Smart Grid Economic Benefits – A Review and Synthesis of Research on Smart Grid Benefits and Costs, Smart Grid Consumer Collaborative, p. 51, Table 10, variable E (Oct. 8, 2013).

Smart meters provide several valuable data streams for load forecasting engines that can generate real-time and forward-looking forecasting at a granular (household) level and then aggregate that up through the system. This enables more precise long-term planning by better identifying peaks – something that will become more critical as electric vehicles (EVs) and solar resources impact load profiles. Moreover, these capabilities support major strategies of the NJ Master Energy Plan to Reduce Energy Consumption and Emissions from the Transportation Sector to support the expansion of EV charging infrastructure that will encourage more widespread EV adoption as well as the strategy to Accelerate Deployment of Renewable Energy and DER.

Asset Management Analytics

Asset management analytics focuses on improved asset management through improved maintenance, more informed asset life cycle management, asset monitoring, and predictive asset maintenance. Smart meters can be considered sensors in the low voltage network, monitoring capabilities at the grid edge, and providing detailed actual versus planned profiles of assets.

Asset performance management provides much of the insight for utilities seeking to develop condition-based and predictive asset management strategies. Condition-based analytics systems for assets will help operations personnel see a failure before it happens, potentially preventing outages which results in savings for the utility industry. In addition to these benefits, it can decrease the number of truck rolls by limiting the need for scheduled asset maintenance. Condition-based asset maintenance is enabled by the capability to monitor assets in real time or near-real-time, providing more accurate and timely information on replacement or service needs. Condition monitoring is enabled by the spread of sensors, including smart meters, and communications in the grid, in addition to an informational backbone that can make algorithm-based determinations on asset health and performance. Maintenance is performed as the need arises when one or more indicators show equipment performance is deteriorating or that an asset is going to fail.

Customer Experience Analytics

Customer segmentation is the process of cataloging customers into groups, or classes, based on various characteristics, such as similar behavioral habits, demographics, and socioeconomic statuses. Utilities can leverage AMI datasets to support customer segmentation which has traditionally been a manual and time-consuming process. Proper customer segmentation can facilitate higher levels of program participation and better inform product development and communications teams. By creating personalized user experiences, utilities can boost its customer satisfaction scores and lower its operating cost through more efficient touch point interactions. Segmentation data can be used to enable customer-centric capabilities like next best action, personalized alerts, content and notifications, rewards programs, and targeted web marketing.

Customer Operations Analytics

This includes billing, front- and back-office operations analytics, customer care, and information. Contact center "next best action" allows utilities to surface a recommended next best action for its customer service representatives, based on what is known about that customer. This process can be supported with customer segmentation data that typically requires AMI data analysis. These capabilities provide benefits to the utility through cost-of-service reductions and increased program participation and to customers in the form of higher quality customer service.

AMI and Energy Efficiency

In addition to the above, the PA Companies have noted additional non-quantifiable benefits by leveraging AMI with Energy Efficiency. Examples include:

- Home Energy Reports include more granular information to better educate customers regarding their usage and target improved tips and recommendations.
- Peak demand reduction program offerings are reaching residential and smaller commercial and industrial customers who did not previously have interval metering without the installation of program infrastructure.
- AMI data is used to support program or custom project evaluation, measurement, and verification activities.

The Company expects to find similar uses through its AMI program and further anticipates that program offerings involving Demand Response, Energy Efficiency, and Electric Vehicles will evolve as AMI continues to evolve – all in furtherance of the goals set forth in the EMP.

4. Metrics and Reporting

Tracking and reporting key metrics is critical to the success of any project of this magnitude. Therefore, the Company has developed a metrics and reporting plan, the results of which it intends to share with the Board Staff and Rate Counsel on a semi-annual basis. The Company will track and report the following metrics related to the deployment of AMI meters:

PHYSICAL METERS

Certified meters

- The number of AMI meters installed, communicating, and available for billing
- Meters certified each month

AMI meters installed, but not certified

- The number of AMI meters installed, but not communicating and considered Active
- Meters installed each month that have not been certified

Certified smart meter failures

- The number of certified AMI Meters that are replaced each month due to fatal errors

METER READING

Manual Meter Reads

- The number of meter reads conducted by an individual on-site for monthly billing.

Successful ("actual" for the purpose of billing) AMI meter reads

- Total of actual reads recorded from AMI meters

Meter readers employed by JCP&L, expressed in FTEs

- Number of meter readers (expressed in FTE) employed by JCP&L each month

Meter readers employed by external contractor, expressed in FTEs

- Number of meter readers (expressed in FTE) employed by contractors each month

DATA ACCESS and UTILIZATION

Web Portal Views

- Number of customers who have accessed the web portal each month

HAN Authorized Devices

- Number of customers who have authorized the connection of HAN devices, including a breakout of devices by category, each month

TPS (Third Party Supplier) Data Access

- Number of customers who have authorized TPS access to customer energy usage data each month

Net Metering

- Number of customers taking service under the net energy metering rider each month

Net Metering (AMI)

- Number of customers with certified AMI meters taking service under the net energy metering rider each month

Shopping Levels

- Number of customers with certified AMI meters shopping each month, broken out by customer class

BILLING RELATED

Residential bills issued

- Number of residential bills issued each month

Residential bills based upon estimated read

- The number of estimated customer bills for all customers
- Number of estimated residential bills issued each month

Customers eligible for disconnect due to non-pay (All JCP&L)

- Number of customers eligible for disconnection each month

Customers eligible for disconnect due to non-pay (AMI Deployment Area)

- Customers with an AMI meter eligible for disconnection each month

Non-Pay Disconnects (All JCP&L)

- Number of customers disconnected due to non-pay each month

Non-Pay Disconnects (AMI Deployment Area)

- Customers with an AMI meter installed disconnected due to non-pay each month

AMI Meter Tampering Cases (#)

- Number of AMI meter tampering cases found each month

AMI Meter Tampering Case Investigation Outcomes ($)

- Outcomes of AMI meter tampering investigations, including any monetary value identified each month

CUSTOMER IMPACT MEASURES

Total call center calls

- Number of call center calls received each month

Call center calls related to meter reading

- Value based on Investigation orders type for check reads initiated from the call center
- Number of call center calls related to meter reading received each month

Call center calls related to billing complaints

- Value based on Investigation orders type for HI/LO Bill - Cust Complaint initiated from the call center

5. Conclusion

JCP&L thanks the Board for the opportunity to present its AMI Plan as part of its AMI filing. As demonstrated above, the AMI Plan is consistent with that set forth in the AMI Gold Standards Report, is cost effective from not only from the Company's perspective, but also from a customer and societal perspective, and further advances the energy goals of the State of New Jersey as set forth in the EMP. Accordingly, assuming the Board approves JCP&L's cost recovery proposal, the Company respectfully asks that the Board approve its AMI Plan as proposed.

Table of Contents

Overview

The AMI Plan filed with the Board of Public Utilities ("Board" or "BPU") by Jersey Central Power & Light Company ("JCP&L" or "the Company") is a multi-year, complex process that will generate significant interest by customers, employees, government officials, potential electric suppliers and others. In order to ensure that timely and accurate information regarding the Company's AMI Plan is disseminated, the Company has developed this Customer Communications Plan (hereinafter called "the Plan"). The Plan is designed to complement the implementation of the Company's AMI Plan by enabling effective customer outreach, education and communication efforts.

JCP&L's affiliated utilities in Pennsylvania developed a customer communication plan for use during the implementation of the PA smart meter implementation project. The strategies and methodologies incorporated into that plan have proven to be effective based on best practices from other utilities and are currently being implemented as part of the Ohio Grid Mod I AMI deployment. Many of these same strategies and methodologies have been incorporated into this Plan, adjusted for New Jersey circumstances and upgraded to benefit from improved communication channels, such as social media.

The Company anticipates a phasing in of AMI smart meter *functionality* over time. The Company will communicate this functionality to customers and will evolve its messaging as greater functionality is implemented. It is important to note that although this Plan anticipates many of the potential issues that may arise, there is no way to definitively predict all the information that the various interest groups will require. Therefore, a primary goal when designing this Plan was to incorporate flexibility that will allow the Company to change messaging as conditions warrant. Further, this Plan was developed based on an assumption that the COVID-19 pandemic would be under control prior to the start of AMI deployment. Should this prove not to be the case, certain face-to-face procedures described in this Plan will be modified depending on the circumstances at the time.

Plan Objectives

The objectives of the Plan are to:

1. Provide proactive communications in a manner that minimizes customer confusion by anticipating customer concerns and questions.
2. Provide communications in a cost-effective manner.

3. Develop and deliver consistent and effective messages that coincide with the Company's AMI Business Case implementation plan and schedule.
4. Keep employees, state and local government officials, regulators and media informed of significant developments.
5. Develop communications that are properly targeted to applicable interest groups.
6. Develop a process to identify issues in the marketplace and provide timely responses through effective communications.
7. Continue to develop communications to customers, employees and other stakeholders throughout the smart meter deployment program as major milestones are achieved.
8. Inform third party suppliers throughout the lifecycle of the program.
9. Seek feedback from affected parties and integrate that feedback into future communications.
10. Develop messages that properly balance "the need to know" with the need for customer security and privacy.

Overarching Key Messages

Throughout the implementation of the Plan, the Company will use the Plan Objectives to develop key messages that will help raise customer awareness of smart meters and their functionality, based on the following themes:

- Smart meter technologies will provide customers with additional electric usage information that should allow them to better manage their electricity consumption.
- Smart meters are capable of measuring electricity usage in greater detail and communicating that information to customers and their selected electric service provider.
- Over time, smart meters will enable customers in their own home or business to view detailed electricity usage information either directly from the meter or through a secure website or future mobile telephone application.
- While there will be up-front costs related to smart meter deployment, long-term benefits to customers and the Company are expected to outweigh those costs.
- The Company will educate customers about potential issues of concern, such as health issues, privacy and data security.
- The Company will inform customers with smart meters about available programs and enabling technologies, such as time of use (TOU) pricing, on-line Energy Management applications, the Company's new Outage Management System and the like, that may become available from the Company or a third party supplier.

Communication Opportunities

Past projects and best practices from other implementations have identified several communication opportunities that the Company expects to address. The Company believes that the following opportunities should be addressed in order to fully achieve the Plan Objectives previously outlined:

- Improving customer understanding of smart meters and awareness of the Company's AMI deployment plan.
- Educating state and local government officials and the media on issues involving smart metering.
- Managing customer expectations for smart meter functionality and benefits.
- Communicating with lower-income, vulnerable and elderly customers as well as those who may have concerns regarding the costs related to smart meters, privacy considerations, health concerns, and the many potential benefits that can be realized.
- Effectively addressing frequently asked customer questions and concerns.
- Addressing and correcting the various misunderstandings surrounding smart metering, such as concerns around health and privacy.
- Effectively addressing customer requests for information related to filed/pending approval of opt-out fees and charges

It is essential to effectively build customer awareness around smart meter technology, offer accurate expectations of smart meter capabilities and share implementation specifics to facilitate a smooth deployment process.

Key Issues

The Company will produce customer communications materials addressing key issues, regarding their smart meter program, including but not limited to:

- **Privacy:** Smart meters can be viewed by some as an invasive technology that provides the utility, and possibly others, with proprietary information regarding electricity usage. The Company takes the privacy of their customer data very seriously and will work with targeted groups to minimize privacy concerns and explain the Company's measures to protect data and privacy.
- **Security**: The Company has an extensive cyber security program under continuous senior management scrutiny that is reported to the Board of Directors and is audited annually.

The Company recognizes the importance of cyber security and is committed to continually ensure that our smart meter solution meets industry recognized standards.

- **Accuracy:** The Company will address concerns regarding the accuracy of smart meter measurements. Historically, analog meter components sometimes exhibit the effects of wear over their service lives, causing meter lagging and thus impacting the accuracy of the consumption. In the short term, after a smart meter is installed and the return to accurate readings for those affected locations is realized, the customer may perceive erroneous readings.
- **Deployment Expectations:** The Company will proactively keep customers aware of how to identify Company employees and deployment/ repair contractors during deployment, when such personnel are in their neighborhoods and when they leave the customer premise, as well as what to expect before and during the meter exchange.
- **Radio Frequency (RF) Emissions:** As smart meters have been rolled out across the United States and their functionality has become better understood, there has been a significant reduction in prior concerns regarding unfounded health impacts and interference with other wireless devices from RF emissions, as evidenced by regulatory approval of AMI installations and the expansion of smart meters throughout the country. Nonetheless, the Company is prepared to address, educate, and work to alleviate any remaining concerns related to RF emissions.

Key Audiences

The Company will be consistent in its messaging as it targets its various audiences, which includes:

- Customers
  - Low Income Customers
  - Elderly
  - Special Needs and other vulnerable customers
- Employees
- State and Local Government Officials
- Regulators
- Third Party Suppliers
- Consumer Advocates
- News Media
- Key Community Leaders
- Investment Community

There will be varying audiences, both internal and external, with varying degrees of knowledge of the Company's AMI plan. Accordingly, the Company has developed a messaging strategy for both internal and external audiences. The Company also has developed a monitoring and evaluation process, and an issue resolution process for implementation of this Plan. Each is discussed below.

Internal Messaging Strategy

The goal of the internal messaging strategy is to provide the Company's employees with training, consistent messaging and ongoing feedback opportunities to effectively anticipate and respond to customer questions and concerns regarding smart meter deployment. This internal strategy is consistent with best practices developed by other utilities across the country, including the Company's sister utilities in Pennsylvania.

The Company must adjust the mix of skills in its workforce for smart metering technologies and processes. Job responsibilities will change, and in some cases, roles will be eliminated. Change management is a structured approach to transitioning people, processes and systems from a current state to a desired future state. The objectives of change management are to minimize the extent of the disruption inherent in change, to promote understanding and commitment and build the foundation for heightened levels of sustained performance. (See Appendix A-1 for Change Management Plan overview and Appendix A-2 for Change Management Plan Details.)

The challenges of change management will be resolved through the smart meter training process. The Company has outlined a training strategy designed to mitigate potential knowledge and skill gaps throughout the deployment. The primary objective of the training courses and communication materials will be to provide timely, accurate and consistent smart meter technology training, as needed, to all team members and impacted groups in a way that builds not only awareness and understanding, but also commitment to the program's success. The key objectives of this process are to identify key role changes due to the installation of smart meter technology and the impacts on required skills, knowledge and abilities for key jobs. Coordination with business leadership, Human Resources, and Labor Relations to understand and successfully accomplish these objectives will be crucial. (See Appendix for A-3 Training Plan overview.)

Talking Points and FAQs for Employees: The Company intends to provide documents outlining the Company's key messages and background information, along with frequently asked questions, internally to External Communications, State, Local and Federal Governmental Affairs, Customer

Support, Customer Contact Centers, Meter Readers and other Company employees in direct contact with customers. (See the Appendix A-4 for sample FAQs.) These materials will enable employees to address the most frequently asked questions which have arisen in other markets during smart meter implementation. In addition, employees will be able to direct customers to resources such as the FirstEnergy website in order to access additional information regarding smart meters.

Customer Contact Center Training: Select Customer Contact Center (including web team) personnel will be trained and equipped with more detailed information so they are able to respond to smart meter related customer inquiries and concerns that are specifically routed to them. Customer Contact Center representatives will be able to record feedback and comments from customers. Training for these representatives and web team representatives will include best practices based on experiences from other utilities.

External Messaging Strategy

The goal of the external strategy is to manage external expectations and define high-level plans. Regular and consistent updates to educate customers will occur throughout the implementation of the Company's business case. At the outset, the Company will utilize communications that are designed to educate customers and set expectations through the use of FirstEnergy's website prior to smart meter installation. For customers without access to the Internet, printed information will be mailed to customers when they call the Customer Contact Center.

Customer Brochure: Customers will receive a welcome brochure 30 days prior to scheduled installations. This brochure will provide the customer receiving the smart meter with information about the technology, timing, functionality and benefits. It will also contain a FAQ section that defines a smart meter, provides information for customers who do not want a smart meter, as well as information about installation timing, privacy, and health concerns. (See Appendix A-7 for a sample Customer Brochure).

Targeted Customer Mail: Customers will receive a targeted mailing less than 30 days prior to scheduled installation that will detail the installation process, including specifics about the installation contractors and how to identify them, and contact information for an installation appointment if the meters are located inside the home. The letter will also reference the FirstEnergy website as a resource for more information. (See Appendix A-6 for a sample Customer Letter).

FirstEnergy's Website and FAQs: The FirstEnergy website will include a JCP&L smart meter section that includes a range of resources, including smart meter fact sheets, FAQs, detailed information about smart meter availability, and an anticipated rollout timeline in the Company's service areas.

Fact Sheets: Fact sheets will be available via the FirstEnergy Website. These fact sheets will address various topics of concern and interest regarding AMI, such as RF emissions health impacts, data privacy, and data security. The Company's employees will also have the ability to email these Fact Sheets as PDF files to customers through the Fax to PC database. (See the Appendix A-5 for a sample fact sheet).

Customer Contact Center: The Customer Contact Center will be training a core group of employees and equipping them with the information and resources required to anticipate and respond to customer inquiries about AMI. A technical team will also be established to assist with more complex questions.

Interact with Affected Stakeholder Groups:
The Company will gather feedback from various stakeholder groups, as needed, in order to effectively communicate and address issues specific to these groups.

Notification Strategy/Timeline:

The Company will work to communicate with communities and customers proactively in order to better manage expectations before, during and after the customer smart meter is installed. The strategy includes 3 segments of notification, as outlined in the following table:

1. **90-60-30 Day Pre-Installation**: Outreach and notifications will be designed to prepare and equip the community, customers, stakeholders and employees leading up to the installation of customers' smart meters at approximately 90, 60 and 30 days prior to the installation.
2. **Installation Day:** Outreach and notifications designed to prepare customers for what to expect the day their smart meter will be installed.
3. **Post-Installation**: Outreach and notifications designed to inform customers about tools and updates available on the FirstEnergy website or through third-party suppliers.

90-60-30 Pre-Installation, Installation Day and Post-Installation Notification Strategy

JCP&L Notification Strategy	Proposed Notification Tactic	Estimated Timeline
Pre-Installation	Stakeholder Outreach	90 days prior
	Speakers Bureau Presentation	90 days prior
	Meetings w/Elected Officials & Government Agencies	90 days prior
	FirstEnergy JCP&L Website	90 days prior
	Media Outreach	60 days prior
	Digital & Social Media	60 days prior
	Advertising	30 days prior
	Customer Brochure	30 days prior
	Targeted Customer Mail	Less than 30 days prior
	Appointment Scheduling	Less than 30 days prior as needed
Installation Day	Knock on the Door	Installation Day
	Install the Smart Meter	Installation Day
	Door Hanger	Installation Day
	Media outreach, as appropriate	Installation Day
Post-Installation	Access to Customer Tools and Programs	24-48 hours after installation for meter data
	Customer Monthly Bill Support	Monday-Friday
	Media outreach, as appropriate	As necessary

90-60-30 Day Pre-Installation:

During this period, the Company will make efforts to educate and inform customers, the communities and the media of the upcoming smart meter installation in their area. These efforts include communicating specific messages using various communications channels 90 days prior, 60 days prior and 30 days prior to actual installation. This effort includes some of the following proposed measures: briefings with local public officials and community leaders; media outreach; customer mailings; and Speaker's Bureau presentations to community groups. Key features of this pre-installation effort may include:

Media Education: Early in the outreach effort, the Company will begin to contact the media to alert them to the start of smart meter installations and to provide information on the program, including fact sheets, FAQs and detailed program implementation plans and a timeline, which are available on the FirstEnergy website.

News Releases: Updates on the progress of smart meter installations will be sent to the media throughout the outreach effort, along with releases noting new website features available for customers.

Stakeholder Outreach: The Company will reach out to community leaders and public officials to enlist their help in communicating key messages. Communication and conversation will be bi-directional, allowing for customer feedback to be incorporated into future communications and into the Deployment Plan.

Speaker's Bureau Presentations: A presentation about the smart meter program will be available to various groups and organizations in the community through the Company Speaker's Bureau.

Meetings with Elected Officials and Government Agencies: The Company will conduct telephone calls to local officials to proactively address constituent concerns, receive feedback and answer any questions. The Company may also deliver an information kit and provide contact information to government officials so that these officials may contact the Company when they have additional questions.

Media Outreach: Targeted advertising for the community may be purchased and included in newspapers, as appropriate. The Company will strive to work with the media to communicate and set realistic expectations for the functionality of the smart meters and the timeline of implementation of more advanced features. Other objectives of the media outreach are to communicate the smart meter plan through multiple media channels, and to establish awareness and understanding among consumers about how smart meters will be able to help them better manage their energy use.

FirstEnergy JCP&L Website: Building on existing website resources, the Company's smart meter section will be updated with resources that will prove useful as more and more communities get smart meters. A deployment schedule will be posted on the website so that customers and competitive electric suppliers have ready access to the information. In order to minimize the potential for fraud, the schedule will not include dates more specific than identification of the borough, township or city where deployment is scheduled "within the next sixty days." This website will also be updated periodically to confirm areas where deployment has been completed as well as when meters will be fully functional so that suppliers are able to offer pricing products tailored for customers with smart meters.

Social Media: The Company will monitor social media for discussions on smart meters in the communities where meters are being installed and may leverage social media outlets to disseminate messaging to customers.

Targeted Outreach Efforts: The Company will reach out to populations that may otherwise be difficult to reach, including vulnerable and low-income customers, using various means – such as utilizing direct mail and making informational handouts available at intake agencies and Comfort

Partners – or as appropriate under the circumstances. When applicable, the Company will work with and seek input from various stakeholder groups in order to leverage already existing relationships with such groups.

Direct Mail Brochures: Brochures will be sent to customers informing them about the upcoming smart meter installation at their home or business. The brochures will include general information about the program and will direct customers to find more information on the FirstEnergy website.

Targeted Customer Mail: Approximately two weeks prior to a community's scheduled installation, customers will receive a letter with an estimated installation date as well as information about the meter. Customers will also receive contact information on how to contact the Company to have any questions addressed. (See Appendix A-6 for a sample targeted customer mailing.)

Appointment Scheduling: The Company will schedule appointments for customers on an as-needed basis. This includes appointments for customers who have meters that are indoors or otherwise inaccessible to the installer.

Installation Day:

Initiate Contact with Customer: Either an employee or contractor displaying company credentials will knock at each customer's door the day that their smart meter will be installed. Customers will be notified of the meter exchange and the brief outage during the installation.

Installation of the Smart Meter: The Company's employee or contractor will locate the existing analog meter and exchange it with a smart meter if it is readily accessible. If the customer is home, the customer will then be notified when the installation is complete. If the analog meter is not accessible, the employee or contractor will work with the customer to gain access to the meter on that same day, or obtain customer contact information to schedule an appointment.

Door Hanger: A door hanger will be left indicating that a smart meter was successfully installed or that the customer will need to make an appointment. If an appointment is needed, contact information to schedule the appointment is provided. (See Appendix A-8 for a sample door hanger.)

Feedback: The Company will actively solicit feedback from the meter installers to help refine communications and strategies accordingly.

Post-Installation:

Following installation of the smart meter, the Company will make those customers aware of any smart meter-related programs being offered through the Company.

Customer Monthly Bill Support: The Company recognizes that the initial months with a smart meter and extreme temperatures may cause fluctuations in the monthly bills from the bills received prior to smart meter installation, which usage and corresponding bills are not attributable to the smart meters themselves. As such, the Company will train its Customer Contact Center employees to be able to troubleshoot and otherwise explain and manage these concerns from customers. Additionally, the Company may provide information on the FirstEnergy website that explains what factors (such as extreme temperatures, changes in usage behavior and differing supplier costs) may contribute to a higher bill than expected.

Media Outreach After Installation: The Company will continue to proactively contact and respond to any media inquiries to provide support to reporters and media outlets who wish to cover deployment progress.

Customer Bill Inserts and Messages: Customers may receive inserts in their monthly bills, which could periodically provide basic information regarding smart meters, featured articles addressing various topics related to smart meters and directing customers to available resources, such as the FirstEnergy website.

Ongoing Media Relations and Outreach: As important milestones are reached in smart meter installation and functionality; the Company will proactively engage with media representatives to communicate those achievements. In addition, the Company will continue to respond to any media inquiries to provide support of reporters and media outlets who wish to cover deployment progress.

Monitoring and Evaluation

Consistent and effective communication is necessary for customer acceptance and the successful deployment of smart meters across their utility service area, and will help address the following three primary challenges:

- Focusing on the overall progress of communication to avoid allowing small-scale problems to create disproportionate customer skepticism and unhappiness, as has occurred with other utilities.
- Engaging customers early in the implementation process.
- Measuring and monitoring RF-challenged areas as needed.

Issue Resolution Process

Though smart meters will bring new features to customers, the introduction of new technology and the transition to a new way of managing energy has the potential to cause confusion and concerns among customers and the community.

The Company's communications, customer contact and smart meter teams will draw on best practices and lessons learned by its affiliated companies and other utilities across the country. The Company will be prepared to anticipate, quickly respond to and address any situations that could arise during the implementation of the Company's AMI Plan. The Company plans to mitigate customer issues by creating a highly focused customer relations team to internally prioritize communications and response activities as problems are identified, and track problems individually and sort them into groups of similar issues. Quickly resolving issues for customers will improve customer experiences not only with smart meters but also with their utility.

Objectives:

The Company's approach to managing smart meter deployment issues is guided by the following principles:

- **Keeping Customers Informed:** Work to communicate the smart meter installation plan and all related policies and procedures to customers using multiple channels to proactively answer questions and address concerns.
- **Customer Segmentation:** The Company may look to address population segments differently and customize communication accordingly, particularly in dealing with concerns and fears.
- **Anticipation of Concerns:** Proactively address concerns to prevent problems and complaints before they occur.
- **Empathy for Customers:** The Company will approach each customer's concern with courtesy and respect. Each inquiry will be approached with the goal that the concern is heard and addressed through open dialogue.

Risk Mitigation:

A cross-functional business team will proactively identify potential customer questions and concerns. The team will utilize a comprehensive risk mitigation procedure to determine how various types of issues will be routed and develop a process to address and resolve them. The Company's plan for risk mitigation includes the following key activities:

- Proactively communicating upcoming changes in order to manage customer expectations
- Using existing processes to address and escalate issues as appropriate
- Encouraging all teams to report any issues related to deployment and ensuring all are documented, resolved and compiled for easy reference

- Responding in a timely manner to customer feedback and resolving concerns to their satisfaction
- Preparing potential solutions for issues, with more focus on developing these solutions for recurring issues
- Analyzing resolved issues to quantify and understand causes; proactively preventing recurrence of such issues
- Applying best practices throughout the process
- Providing post review with the team

The Company must regularly review and compile feedback, then prioritize, route and address it appropriately. Channels for customer feedback will include the following:

- The Customer Contact Center (including web inquiries)
- Experiences of smart meter installation contractors and FE employees
- Letters, emails or Short Message Service text messages from customers
- Social media messaging and forum postings
- Direct inquiries to executive management and/or staff
- Media reporting
- Public officials and regulators
- The BPU
- Interested stakeholders

Once the issues have been documented, they will generally be routed to the team designated to handle smart meter related issues. Representatives from this team are trained and equipped to resolve customer issues. All Company employees with direct contact with customers will be trained on the protocol to handle issues as they come up with a customer, and to know where to direct customers with questions or concerns about the smart meter installation process. Legislators' and local government officials' inquiries will be handled by the Company's governmental affairs team and media inquiries will be handled by the Company's Communications Department.

The Company will specifically train and equip customer-facing employees to take a leadership role as ambassadors of the Smart Meter program:

- **Corporate Communications and Smart Meter Change Management:** Will set the overall communications strategy; develop, provide and train employees to use resources such as the FAQs, talking points and data sheets.
- **Customer Contact Center and Web Team:** Will be trained to handle smart meter-related issues and billing inquiries, in addition to typical utility-related questions.
- **Customer Support:** Will handle questions and issues for large industrial accounts.

- **All Field Employees (i.e. Meter Readers, Meter Services, and Lineman):** Meetings and educational materials will be provided to all field employees to ensure a positive, common understanding of the roll out and features with smart meters.
- **Billing Department:** Members of the Billing Department will be trained to understand how to manage billing complaints they receive regarding new smart meters and how to troubleshoot.
- **Meter Installation contractor team:** Will handle questions and issues arising during the installation process.

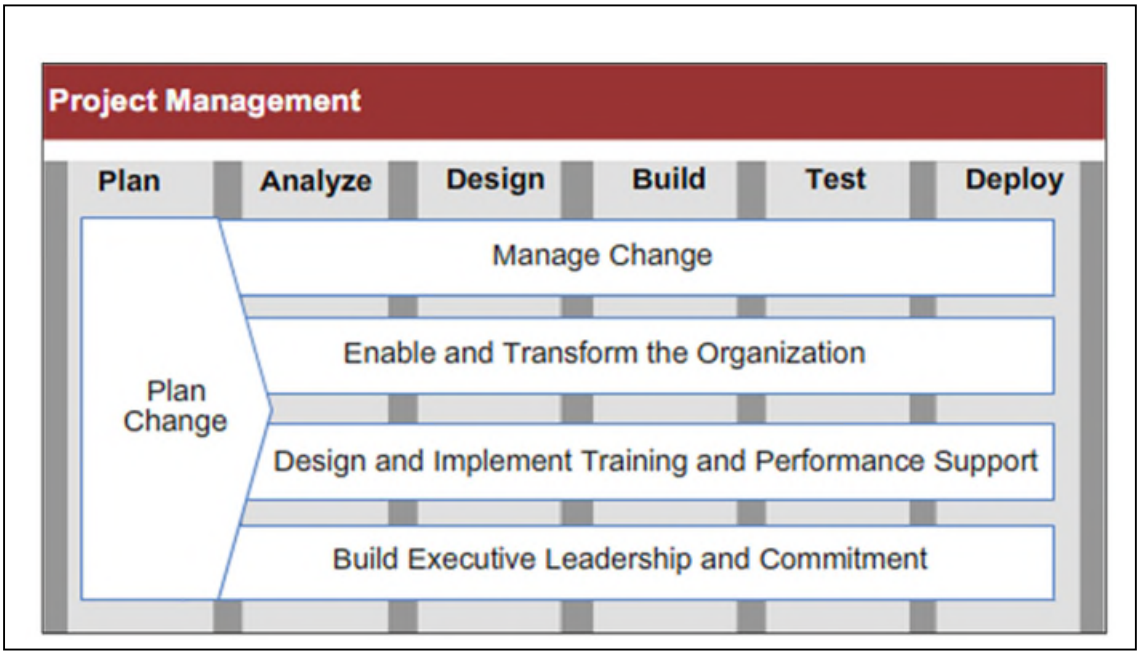
The Company envisions the risk mitigation process flow to mirror some variation of the following scenarios:

1. Customer contacts the Customer Contact Center and is connected to speak with a representative.
2. Customer Contact Center representative determines the nature of the customer inquiry or issue, and gathers any background information that may be useful during the resolution process.
3. Customer Contact Center representative helps to resolve the concern using available resources, such as existing protocols, Talking Points resources, etc. If the issue is successfully resolved, the issue is logged and closed out. If the issue is not resolved, it is escalated to the Smart Meter project team.
4. If the issue has not been resolved, the Company will connect the appropriate departments within FirstEnergy to resolve the issue and will contact the customer in a timely manner with an update and/or solution. Ongoing progress will be logged. The issue will be closed out once it has been resolved.

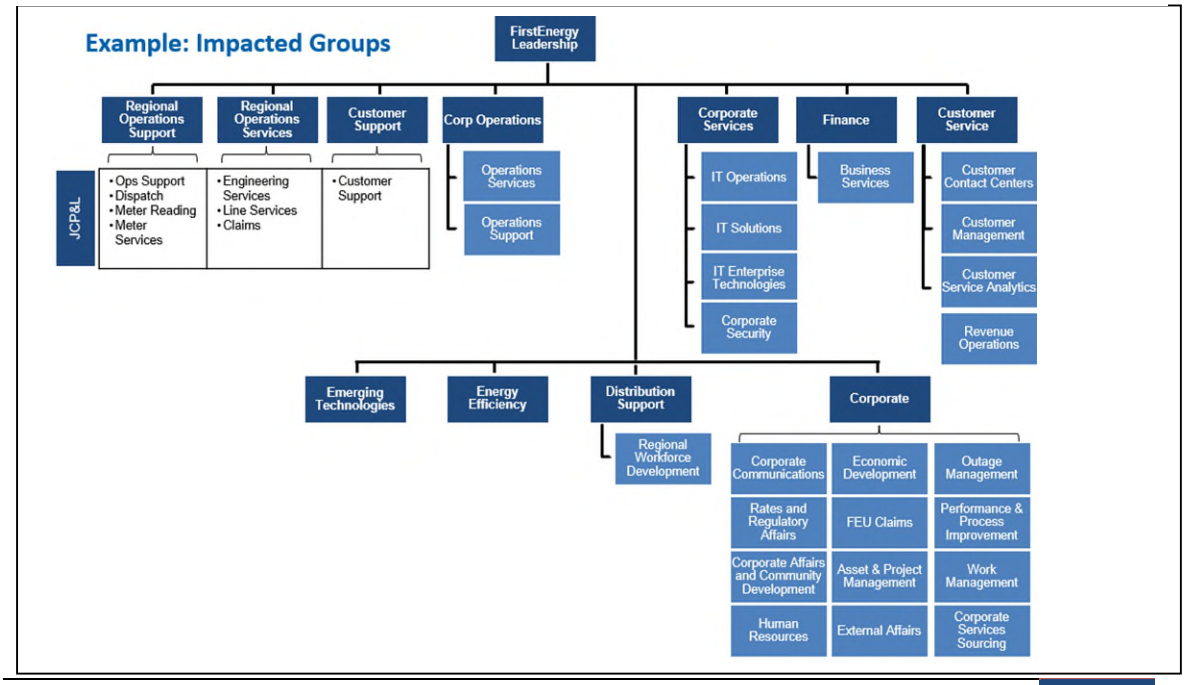
Appendices

Appendix A-1: Change Management Plan Overview

The Company's Change Management team will utilize the approach below to plan for and manage the change for the duration of the program.

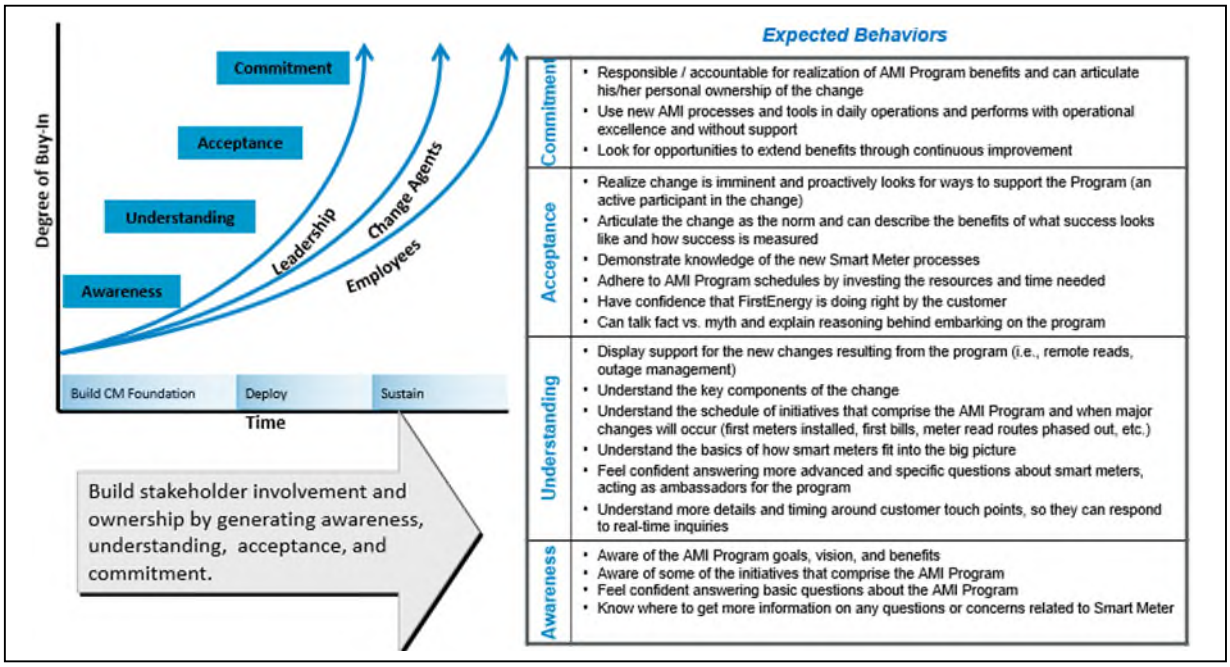


The Company's change management team will focus their efforts on a number of groups throughout the organization to ensure full support of the program.

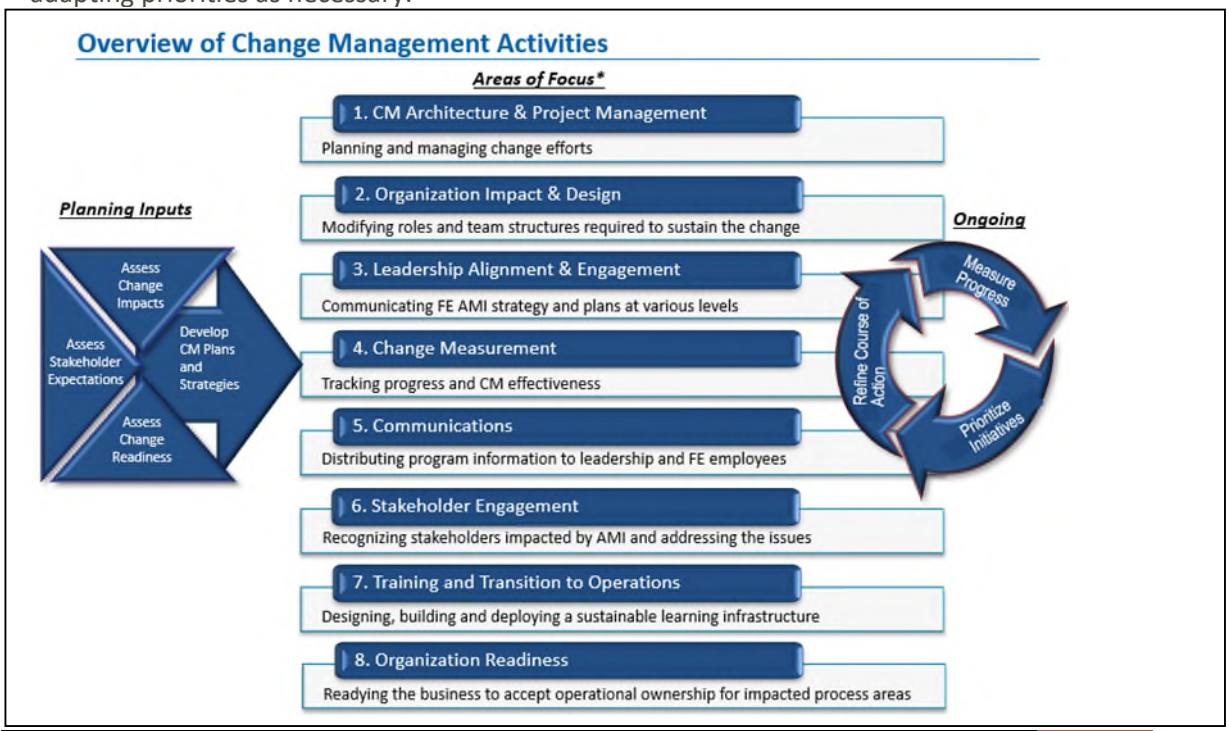


Appendix A-2: Change Management Plan Details

Engagement will drive ownership and accountability which will help stakeholder groups move up the change curve from awareness to commitment. Different stakeholder groups require different timelines and levels of buy in.

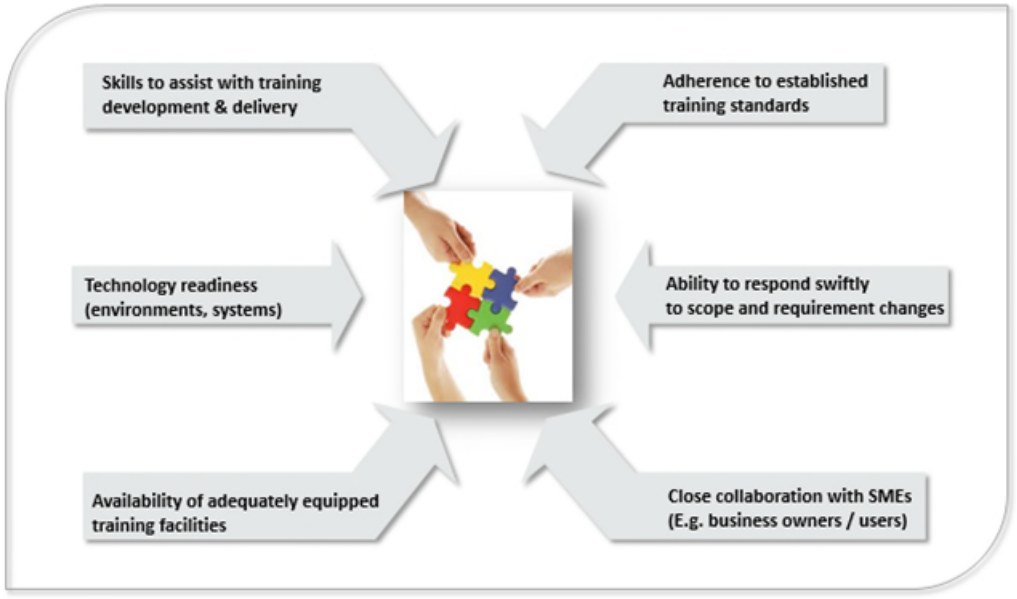


This chart identifies the step-by-step process that the Company will employ to drive change within the organization, while maintaining an ongoing emphasis on measuring progress and adapting priorities as necessary.



Appendix A-3: Training Plan Overview

The Company's approach this training with three key objectives: 1) to provide users with the skills and knowledge to perform business functions with minimal interruption, 2) increase effectiveness of training by tailoring course content and delivery methods for each group's specific needs, and 3) ensure end users understand the context behind the solutions and changes being introduced. The successful execution of the training strategy is dependent on the following:



To provide the most effective training courses, participants' feedback is key. Through course surveys and learning evaluations, the trainers will be able to readily determine if the participants were successful in learning the content and if the objectives of the course were met – and training will be continually refined to achieve results.

Measurement Tools

- *Knowledge Checkpoints*: Each participant will complete checkpoints throughout the course to allow the trainer to determine if the content is being retained; typically at the end of each module
- *Final Assessment* - A final assessment will review all course content to ensure the participants retain the knowledge and skills needed to perform their job
  - Results provide insight into how well the participants are learning the material and will help the training team evaluate if adjustments are required

Feedback Mechanisms

- *Course survey*: Each participant will complete a survey that will measure the participants' impression of the course
  - Questions about the quality of the instructors, content, facilities, usefulness of activities/exercises, and delivery methods
  - Participants can respond candidly and are assured anonymity in their responses
  - Feedback is reviewed by the change management team and will provide input for possible adjustments

Appendix A-4: Example of Smart Meter Frequently Asked Questions

FAQs

Q: What is a smart meter?
A: A smart meter is a digital electric meter that collects electricity usage information and sends that data to the local utility through a secure telecommunications connection.

Q: When will a smart meter be installed on my home/business?
A: Please see our Deployment Schedule for a detailed look at when we will be installing meters in your area.

Q: Will I be notified when I am receiving a smart meter?
A: Approximately one month before your meter is exchanged, you will receive a brochure in the mail to provide you with information about the meter and the installation process. A few weeks prior to the actual installation date, you will receive a letter that will give you the time period when we will be in your area to exchange your meter.

Q: Do I need to make an appointment for my smart meter installation?
A: Most smart meter installations will be performed without an appointment. Every effort is made to notify you in advance of your meter installation. Appointments for special needs will be handled on a case-by-case basis.

Q: Is my usage information transmitted by smart meters secure?
A: Yes. FirstEnergy places the utmost importance on the security and protection of all aspects of our electric system and associated subsystems. Our communication network is a high security environment that uses multiple layers of protection from unwanted access – including the use of passwords, firewalls, data encryption, continuous monitoring and other security controls. We follow the cybersecurity guidelines published by the National Institute of Standards and Technology (NIST).

Q: After I get my smart meter, will I be able to see more detailed information about how my home uses electricity?
A: Yes. After your meter is installed and the utility starts gathering your usage in intervals, you will be able to access that information using our online Home Energy Analyzer tool. The company will notify you when this functionality is available to you.

Q: Will I receive fewer estimated bills with a smart meter?
A: Yes. Since we will be able to read smart meters remotely, we will have easier access to the meter information. Please note that this functionality will be implemented over time, so meter readers will continue to manually read the smart meter for some time after the meter is installed.

Appendix A-5: Example Fact Sheet: Radio Frequency

Smart Meter

RADIO FREQUENCY FACT SHEET

FirstEnergy's Ohio utilities – Ohio Edison, Toledo Edison and The Illuminating Company – are starting to install smart meters on customers' homes and businesses in several locations throughout our service area. This effort is part of a three year investment approved by the Public Utilities Commission of Ohio to modernize the electric distribution system in Ohio with advanced automation equipment, real-time voltage controls and the installation of 700,000 smart meters.

This step toward a more modernized electric system will enable automated meter readings and may enhance our ability to respond to outages faster and more efficiently.

Plus, in the future, you will have access to more detailed energy information through our online Home Energy Analyzer tool that will help you better understand your electricity use – which means you can then make informed decisions on how to manage and control your electricity consumption.

As with any new technology, you may have questions about how a smart meter works. The following FAQs discuss how smart meters use radio frequencies (RF) to provide communication between your meter and our billing system. While there have been some concerns about the potential impact of the RF generated by smart meters, numerous studies have proven that smart meters using RF technologies pose no health risk. For additional information, please visit **firstenergycorp.com/Ohiosmartmeter**.

Be assured that the smart meter technology being implemented has been rigorously tested and proven by manufacturers to be accurate, safe and secure in systems throughout the country.

Q. What is radio frequency (RF)?

A. According to the Federal Communications Commission (FCC), "Radio waves and microwaves... are one form of electromagnetic energy. They are collectively referred to as 'radiofrequency' or 'RF' energy."[1] Radio waves are used for telecommunications services. However, most homes already have electric devices that use RF signals, such as cell phones, garage door openers, televisions, microwaves and wireless internet. Radio waves have been used for communications in highly populated regions for over 100 years. The FCC has established safe limits for exposure. The RFs from smart meters are well below those limits.

[1] Federal Communications Commission Web site, Office of Engineering and Technology, "Radio Frequency Safety," http://transition.fcc.gov/oet/rfsafety/rf-faqs.html.

Appendix A-6: Example Customer Letter

Your power is about to get
BRIGHTER.

Dear Customer,

In the next few weeks, we will be installing smart meters on homes and businesses in your area. This effort is part of a three year investment approved by the Public Utilities Commission of Ohio to modernize the electric distribution system in Ohio with advanced automation equipment, real-time voltage controls and the installation of 700,000 smart meters.

This step toward a more modernized electric system will enable automated meter readings and may enhance our ability to respond to outages faster and more efficiently.

Plus, in the future, you will have access to more detailed energy information through our online Home Energy Analyzer tool that will help you better understand your electricity use – which means you can then make informed decisions on how to manage and control your electricity consumption.

Exchanging your current meter with a smart meter takes very little time and even less effort from you. In fact, if your meter is readily accessible, you may not even need to be there when it occurs. On the day of the installation, an installer from FirstEnergy or our vendor – Wellington Energy – will come to your door to let you know they are installing your meter. If no one answers, we will leave a door hanger either indicating that the meter has been changed or asking you to contact us to schedule an appointment to change your meter.

Unless your meter is located inside your premises, the installer will not need to enter your premises. Please be aware that all of our installers will be carrying a photo identification badge from FirstEnergy. In addition, FirstEnergy installers will have FirstEnergy uniforms and trucks. Wellington Energy installers will wear a brown uniform with a Wellington logo and their white trucks will have Wellington Energy and FirstEnergy logos. If an installer cannot show you an identification badge, or if you have a concern about that person's identity, please call Wellington Energy at 888-317-8815.

There will be a brief interruption in your electric service when the meter is being installed, so you may need to reset some of your electronic equipment.

Be assured that the smart meter technology being implemented has been rigorously tested and proven by manufacturers to be accurate, safe and secure in systems throughout the country. If you have any questions about your installation, please call Wellington Energy at 888-317-8815. If you'd like more information about our smart meter program, please visit our website at **firstenergycorp.com/Ohiosmartmeter**.

Thank you.

FirstEnergy

Appendix A-7: Example Customer Brochure

FirstEnergy's Ohio utilities – Ohio Edison, Toledo Edison and The Illuminating Company – are starting to install smart meters on customers' homes and businesses in several locations throughout our service area. This effort is part of a three year investment approved by the Public Utilities Commission of Ohio to modernize the electric distribution system in Ohio with advanced automation equipment, real-time voltage controls and the installation of 700,000 smart meters.

This step toward a more modernized electric system will enable automated meter readings and may enhance our ability to respond to outages faster and more efficiently.

Plus, in the future, you will have access to more detailed energy information through our online Home Energy Analyzer tool that will help you better understand your electricity use – which means you can then make informed decisions on how to manage and control your electricity consumption.

Please take a look at some of these Frequently Asked Questions for more information about our Smart Meter Program:

Q. What is a smart meter?

A. A smart meter is a digital electric meter that collects electricity usage information and sends that data to the local utility through a secure telecommunications connection.

SMART METER NETWORK COMPONENTS

Q. What if I don't want a smart meter?

A. Please call us at 855-344-3400 (Monday through Friday, 8:00 a.m. to 6:00 p.m.) to discuss your options. We would like to answer questions that you have regarding our smart meter program and address any concerns about the installation of the new meter.

Q. When will a smart meter be installed on my home/business?

A. In the next few weeks, you will receive a letter that will give you the time period when we will be in your area to exchange your meter. We will follow all appropriate social distancing guidelines when we arrive at your residence to install the new meter.

Q. I'm concerned about privacy. Are you able to track when my family is home or my business is occupied?

A. No. The meter does not provide us with information regarding the occupancy of your home or business – or the activities of those in your home or business. In addition, the meter is able to track your hourly usage but cannot measure the usage of individual appliances or other electrical devices within your home or business.

Q. Will you limit the amount of electricity I am allowed to use?

A. No. The utility will not limit the amount of power you can use.

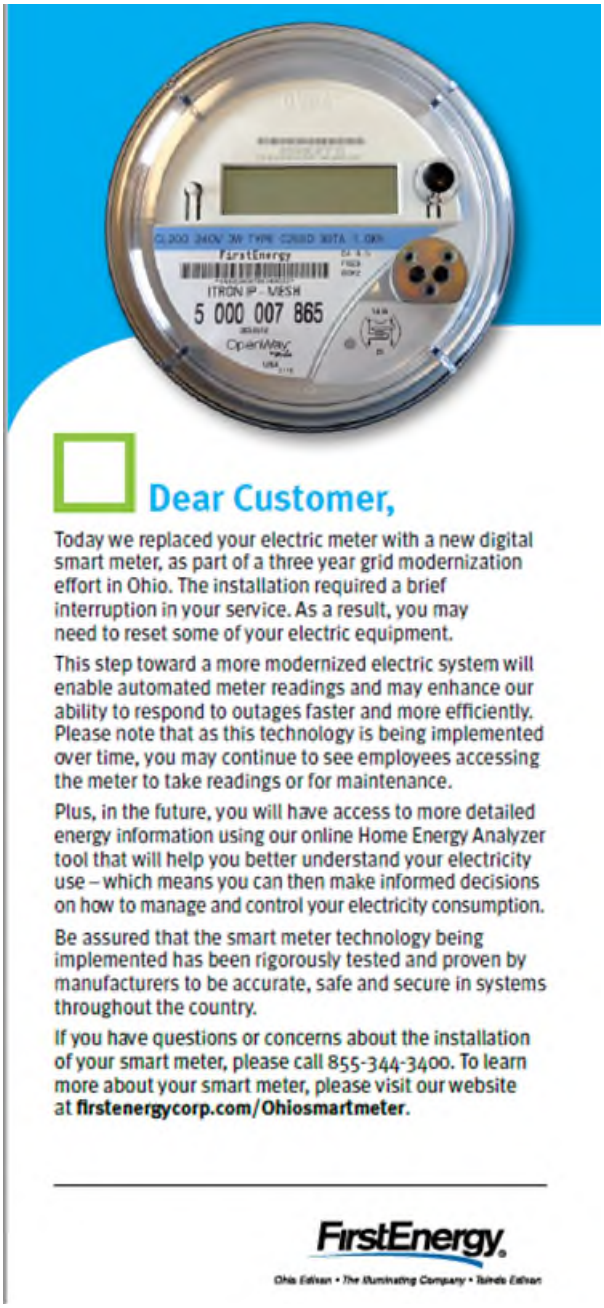
Q. Will this smart meter affect my health?

A. No, numerous studies have shown that smart meters using radio frequency (RF) technologies pose no health risk. While smart meters emit a low level of RF, RF exposure from smart meters is a fraction of the level that comes from other commonly used household devices, including cell phones, garage door openers, televisions, microwaves, wireless internet and baby monitors.

For more information, please visit our website at **firstenergycorp.com/Ohiosmartmeter** or call us at 855-344-3400.

Be assured that the smart meter technology being implemented has been rigorously tested and proven by manufacturers to be accurate, safe and secure in systems throughout the country.

Appendix A-8: Example Door Hanger (front and back)



Dear Customer,

Today we replaced your electric meter with a new digital smart meter, as part of a three year grid modernization effort in Ohio. The installation required a brief interruption in your service. As a result, you may need to reset some of your electric equipment.

This step toward a more modernized electric system will enable automated meter readings and may enhance our ability to respond to outages faster and more efficiently. Please note that as this technology is being implemented over time, you may continue to see employees accessing the meter to take readings or for maintenance.

Plus, in the future, you will have access to more detailed energy information using our online Home Energy Analyzer tool that will help you better understand your electricity use – which means you can then make informed decisions on how to manage and control your electricity consumption.

Be assured that the smart meter technology being implemented has been rigorously tested and proven by manufacturers to be accurate, safe and secure in systems throughout the country.

If you have questions or concerns about the installation of your smart meter, please call 855-344-3400. To learn more about your smart meter, please visit our website at **firstenergycorp.com/Ohiosmartmeter**.

FirstEnergy
Ohio Edison • The Illuminating Company • Toledo Edison

Dear Customer,

We were here today to replace your electric meter with a new digital smart meter, as part of a three year grid modernization effort in Ohio. However, we were not able to install the meter because:

- ☐ your electric service requires repair first
- ☐ we could not access your meter
- ☐ we could not open the fence/gate
- ☐ a dog was preventing access to the meter
- ☐ other _____

Comments: _____

_____

_____

Please call 855-344-3400 so we can set up an appointment to return and install the meter.

This step toward a more modernized electric system will enable automated meter readings and may enhance our ability to respond to outages faster and more efficiently.

With a smart meter, in the future, you will have access to more detailed energy information using our online Home Energy Analyzer tool that will help you better understand your electricity use – which means you can then make informed decisions on how to manage and control your electricity consumption.

Thank you.

FirstEnergy
Ohio Edison • The Illuminating Company • Toledo Edison

Appendix B: JCP&L Proposed Customer Opt-Out Process

JCP&L proposes to provide any customer taking residential service under Rate RS with the option to either retain their Legacy Meter, or have an AMI meter ("smart meter") installed, but with its two-way communication capabilities disabled. Similarly, if the customer has a smart meter installed and then decides that it does not want it, they will have the same choice of either replacing their smart meter with a standard electric meter (if available) or having the two-way communication capabilities disabled on their smart meter. However, customers who are taking generation service under a time differentiated rate or are involved in net metered generation will not have the option to opt out of having a smart meter due to the fact that smart meter capabilities are necessary to provide these types of services.

JCP&L will notify customers in writing that AMI meters are to be installed at least 30 days in advance of the AMI meter installation so as to minimize instances where customers receive AMI meters prior to them opting out. This communication will provide details about the opt-out process and related charges for electing to opt out of receiving a smart meter.

If the Company is required to make a service call to replace a customer's smart meter with a standard electric meter (if available), that customer will have to pay a charge for the service call and meter replacement. This charge can be avoided if the customer notifies the Company that they are exercising their right to opt out prior to the smart meter being installed, or if the customer elects to simply have the two-way communication capabilities disabled on their smart meter, rather than having it replaced.

JCP&L may refuse to provide AMI opt-out service if: i) such a service creates a safety hazard to customers or their premises, the public, or the Company's personnel or facilities; or ii) a customer cannot or does not allow the Company's employees or agents access to the meter.

Charges

If the Company is required to make a service call to replace a smart meter, the customer will be charged for the service call. The upfront charge to remove the AMI meter for this service and install a non-communicating meter is **$44.46**. This charge is based on a blended hourly labor rate, the estimated time to perform the meter exchange, the average travel time including the labor cost for driving and the vehicle mileage cost for the job. As noted above, the first charge can be avoided if a customer either notifies the Company prior to receiving an AMI meter, or alternatively opts for disabling of two-way communications capability on the AMI meter rather than full meter replacement. Because the customer has elected to refuse the installation of a communicating smart meter, the Company will incur additional costs to read the meter. These costs will be recovered through a monthly customer opt out charge of **$28.09**. This charge is based on a blended hourly labor rate, the time to perform the meter read, the average travel time including the labor cost for driving and the vehicle mileage cost for the job. Both of these charges must be paid even if the customer elects to take generation service from a certified supplier.

Appendix C: Metrics Tracker Template

Performance Metrics		Year 1		Year 2		Year 3	
		June	Dec	June	Dec	June	Dec
AMI / Meter Metrics							
Physical Meters	**Metric Definition**						
Certified meters	The number of AMI meters installed, communicating, and available for billing. • Meters certified each month						
AMI meters installed, but not certified	The number of AMI meters installed, but not communicating and considered Active. • Meters installed each month that have not been certified						
Certified smart meter failures	The number of certified AMI Meters that are replaced each month due to fatal errors.						
Meter Reading	**Metric Definition**						
Manual Meter Reads	The number of meter reads conducted by an individual on-site for monthly billing.						
Successful ("actual" for the purpose of billing) AMI meter reads	Total of actual reads recorded from AMI meters						
Meter readers employed by JCP&L, expressed in FTEs	Number of meter readers (expressed in FTE) employed by JCP&L each month						
Meter readers employed by external contractor, expressed in FTEs	Number of meter readers (expressed in FTE) employed by contractors each month						
Data Access and Utilization	**Metric Definition**						
Web Portal Views	Number of customers who have viewed the web portal each month						
HAN Authorized Devices	Number of customers who have authorized the connection of home area network (HAN) devices, including a break out of devices by category, each month						
TPS (Third Party Access) Data Access	Number of customers who have authorized TPS access to customer energy usage data each month						
Net Metering	Number of customers taking service under the net energy metering rider each month						
Net Metering (AMI)	Number of customers with certified AMI meters taking service under the net energy metering rider each month						
Shopping Levels	Number of customers with certified AMI meters shopping each month, broken out by customer class						
Billing Related	**Metric Definition**						
Residential bills issued	Number of residential bills issued each month						
Residential bills based upon estimated read	The number of estimated customer bills for all customers. • Number of estimated residential bills issued each month						
Customers eligible for disconnect due to non-pay (All JCP&L)	Number of customers eligible for disconnection each month						
Customers eligible for disconnect due to non-pay (AMI Deployment Area)	Customers with an AMI meter eligible for disconnection each month						
Non-Pay Disconnects (All JCP&L)	Number of customers disconnected due to non-pay each month						
Non-Pay Disconnects (AMI Deployment Area)	Customers with an AMI meter installed disconnected due to non-pay each month						
AMI Meter Tampering Cases (#)	Number of AMI meter tampering cases found each month						
AMI Meter Tampering Case Investigation Outcomes ($)	Outcomes of AMI meter tampering investigations, including any monetary value identified each month						
Customers Impact Measures	**Metric Definition**						
Total call center calls	Number of call center calls received each month						
Call center calls related to meter reading	Value based on Investigation orders type for check reads initiated from the call center. • Number of call center calls related to meter reading received each month						
Call center calls related to billing complaints	Value based on Investigation orders type for HI/LO Bill - Cust Complaint initiated from the call center						

Attachment C

JERSEY CENTRAL POWER & LIGHT
AMI BUSINESS CASE BUDGET

CAPITAL COSTS:

Year	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Meters	$ 5,937,950	$ 54,583,097	$ 73,365,323	$ 72,653,401	$ 3,079,286	$ 2,873,530
Network	$ 2,242,500	$ 6,241,030	$ 7,778,431	$ 5,403,903	$ 13,268	$ 26,919
IT	$ 28,170,081	$ 38,223,922	$ 29,094,545	$ 18,519,050	$ 3,372,753	$ 8,173,486
Total	$ 36,350,531	$ 99,048,049	$ 110,238,298	$ 96,576,354	$ 6,465,307	$ 11,073,935

INCREMENTAL O&M EXPENSE:

Year	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Incremental O&M	$ 12,590,728	$ 14,445,224	$ 16,732,146	$ 15,122,935	$ 7,337,080	$ 7,080,685