STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 15-E-0050 – Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service.

CASE 13-E-0030 – Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service.

CASE 13-G-0031 – Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Gas Service.

# ORDER APPROVING ADVANCED METERING INFRASTRUCTURE BUSINESS PLAN SUBJECT TO CONDITIONS

Issued and Effective March 17, 2016

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of Albany on March 17, 2016

COMMISSIONERS PRESENT:

Audrey Zibelman, Chair
Patricia L. Acampora
Gregg C. Sayre
Diane X. Burman, concurring

CASE 15-E-0050 – Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service.

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# ORDER APPROVING ADVANCED METERING INFRASTRUCTURE BUSINESS PLAN SUBJECT TO CONDITIONS

(Issued and Effective March 17, 2016)

BY THE COMMISSION:

## INTRODUCTION

The energy demands of the modern economy, and the need for system resiliency caused by climate trends, create an increasing need for utilities to have granular situational awareness of their distribution systems. At the same time, customers require increased ability to manage their energy

consumption and energy bills. Advanced Metering Infrastructure (AMI) is a technology that addresses both of these goals.

Consolidated Edison Company of New York, Inc. (Con Edison or the Company) has filed with the Commission an AMI Business Plan. AMI will contribute to the modernization of the Company's electric system and gas distribution system, creating substantial operating savings and efficiencies as well as increased visibility and control of its system.

Equally important, the deployment of AMI will transform the relationship between Con Edison and its customers. The enhanced information enabled by AMI will assist in managing outages and service connections, and will empower customers to manage their bills by participating in demand response and other opportunities presented by a modernized system. With correct management of data dissemination, and innovative rates to allow customers to take advantage of new capabilities, both customers and utilities can experience benefits in addition to the operational benefits that have been quantified by the Company. The opportunities created by AMI deployment will not only affect customer bills, they will also provide substantial environmental benefits by reducing emissions.

AMI as proposed by Con Edison has immediate operational benefits that exceed its costs. It also has long term unquantified benefits that may be even greater. By this Order, subject to the conditions contained herein, the Commission approves Con Edison's AMI Business Plan.

The costs and benefits in the Business Plan as approved here establish a baseline upon which the Company will be encouraged and expected to improve in the course of implementation. As discussed below, the funding for the AMI project is capped at the forecasted nominal cost of the project, as updated in Con Edison's November 15, 2015 AMI Business Plan.

The Company is also required to work with third-parties to develop partnerships and/or consumer engagement strategies that will offer innovative costs saving alternatives. The Company is required to collaborate with third-parties and identify opportunities to create additional cost saving opportunities and propose standards for shareholder retention of a share of achieved savings.

## BACKGROUND

Con Edison's current electric rate plan provides it with $68 million in funding in 2016 for an AMI backbone, which is comprised of the Meter Data Management System, Meter Asset Management system, and associated integrated software systems.[1] The 2015 Rate Plan Extension Order also required that the AMI system proposed by Con Edison be addressed further by interested parties in a collaborative process. The Company was also directed to "consider the feasibility of providing access to near real-time data to customers and third-parties authorized to have access to customer data, including authorized energy services companies (ESCOs) in the design and formation of its AMI business plan."[2] In addition, Con Edison was to include in its AMI Business Plan seven specific components: a Meter Asset Management System (MAMS); a Meter Data Management System (MDMS); system software integration; Meters and Communication Systems; Meters and Communication System Installation; an updated and detailed Benefit Cost Analysis (BCA); and, a Consumer Engagement plan. The Company was further directed to benchmark its

[1] Case 15-E-0050, et al., Con Edison – Electric Rates, Order Adopting Terms of Joint Proposal to Extend Electric Rate Plan (issued June 19, 2015)(2015 Rate Plan Extension Order).

[2] Id. at 39-40.

proposed AMI Business Plan with other utilities across the country and in Canada to identify best practices.

Through an extensive collaborative process, including the exchange of and comments on the Company's AMI Business Plan, the Company filed an updated plan with the Secretary November 15, 2016. Con Edison's filing requests that the Commission approve full implementation of AMI for its electric and gas businesses. The AMI Business Plan describes a six-year program to implement an AMI system that would be deployed to all of Con Edison's electric and gas customers. The AMI Business Plan includes a discussion of Con Edison's assertions of the operational, environmental, customer engagement, and other potential benefits that will be realized with the implementation of AMI. It also provides a Benefit Cost Analysis (BCA) and supporting documentation.

The AMI Business Plan

The AMI project nominal cost, as updated in Con Edison's November 15, 2015 AMI Business Plan, is forecasted to be $1.285 billion over seven years.[3] To place this investment in context, the assumed average annual spend for the AMI project is $184 million out of an approximate average annual $2.9 billion budget for capital expenditures. This amount, on an annualized basis, represents approximately 6.5% of total electric and gas capital expenditures for 2016-2022, and approximately 1.7% of the Company's electric and gas operations and maintenance budget for 2016-2022. Moreover, Con Edison estimates that over the 20-year life of the AMI project, in nominal dollars, AMI should result in $2.5 billion in cost savings and avoided costs and an additional $3 billion in Company and customer benefits.

[3] The $1.285 billion figure is the Company's projected capital spending on the AMI system in nominal dollars, or $1.075 billion on a net present value basis.

According to the Company's analysis, the benefits to customers of deploying AMI to its entire territory exceed its costs, calculated over a 20-year evaluation period on a Net Present Value (NPV) basis, the Company's analysis shows a net benefit of $1.08 billion and a ten year payback period.[4]

Con Edison's AMI project is comprised of three phases: implementation planning, back-office Information Technology (IT) system installation, and deployment of the communications infrastructure and meter assets. In 2015, Con Edison began the implementation planning phase, which focused on the selection of system equipment, software, and services that will be needed as part of the AMI project. Also, the implementation planning phase addressed the development of a detailed benefit cost analysis and the development of the AMI implementation plan.

The Company states in the AMI Business Plan that it will begin the installation of its back-office IT systems in 2016 and estimates that this process will take about 12 to 15 months.[5] During the second phase, Con Edison plans to design, configure, test, and activate the back-office IT infrastructure that will be needed to support meter deployment. During the last phase, Con Edison plans to shift to the deployment of

[4] The Company's benefits cost analysis was commenced prior to the Commission's adoption of Benefits Cost Analysis (BCA) framework and subsequently does not employ the Commission approved methodology. Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Establishing Benefit Cost Analysis Framework (issued January 21, 2016)(BCA Order). The Company will be required to file an update of its BCA analysis to reflect the Commission's current BCA framework.

[5] The back-office system is comprised of MAMS, MDMS and related system software integration. As noted above, Con Edison was authorized in the 2015 Rate Plan Extension Order to spend $68 million in 2016.

communications infrastructure, electric meters, and gas modules.[6] A total of approximately 3.5 million electric meters and about 1.2 million gas meters are anticipated to be deployed between 2017 and 2022.

The costs associated with the AMI project are categorized into four major areas: AMI meters, which includes both hardware and labor for installation of hardware at the customer's premises; a communication system[7], which includes planning, design, and implementation of communication hardware; an IT platform and ongoing IT operations, which include IT hardware, meter data management system implementation costs; meter asset management system and IT system integration; and, Project Management and ongoing operations. The cost estimates were obtained from actual vendor proposals, consultant reports, and industry benchmarking.

Con Edison also employed Nexant to study the net benefits that may flow from the introduction of innovative pricing to accompany AMI deployment. Specifically, the Nexant report provides an estimate of the net benefits associated with selected scenarios in which Time Variant Pricing (TVP) is offered to all residential customers. The net benefits are estimated based on five pricing scenarios that differ with respect to assumed acceptance rates of TVP, enrollment strategies (e.g., opt-in and default or opt-out) and targeting strategies (e.g., all customers versus high use customers). Over a 20-year horizon, benefits were determined to be $38

[6] The gas module is a telemetry device that is added to an existing gas meter.

[7] The communication system, as discussed in various parts of this Order, will be used for other operational applications, such as distribution automation. Therefore, it is not an AMI communication system, but rather AMI is an application that uses the communication infrastructure.

million on the low-end and $625 million on the high end, depending on which of the five enrollment strategies is used. The Nexant report notes that its estimates may significantly understate the net benefits achievable from the deployment of AMI. Non-residential impacts were not included, nor were the substantial load reductions resulting from the combination of TVP and enabling technology, such as smart thermostats and energy management systems.

The Company's AMI Business Plan states there are many benefits that the Company and its customers will realize. For the sake of analysis, the Company classifies benefits as either "cost reduction benefits" or "Company and customer benefits", depending on whether they reflect direct system cost reductions or indirect benefits that flow from the greater information control and precision of AMI. In either event, the benefits from AMI will result in savings for Con Edison and its customers. According to Con Edison, customer benefits include enhancement of customer experience by empowering customers to make better decisions regarding energy usage, increase in customer convenience by eliminating the needs for indoor meter reads, reduction of disputes surrounding estimated bills, empowerment of low income customers to help them manage energy usage and costs, enhancement of service reliability, and reduction in the frequency and duration of outages during emergency events. In addition, Con Edison indicates that it will be able to achieve operational benefits that will result in cost reductions associated with the ability to automate its distribution systems, reduced resources needed for meter reading, reduction of the need for field services, and lower call center and customer complaints. Additional benefits are better outage management and restoration times, and the use of interval meters and the data they provide. The AMI Business

Plan also identifies environmental benefits, such as the reduction of Greenhouse Gas Emissions (GHG) through voltage optimization, energy usage through customer behavior changes, and vehicle emissions from various activities that would no longer be needed (e.g., meter reading, service turn on/off).

With respect to potential future benefits, the Company states that the communications network will facilitate its retail access program, the integration of Distributed Energy Resources (DER) applications and control center operations, and will enhance demand response (DR) because after AMI deployment customers will already have interval meters. In addition, the Company states that AMI will provide a means for customer engagement with the New York State Independent System Operator (NYISO) markets and the facilitation of Distributed System Platform (DSP) functionalities through two-way communications.

In addition, the AMI Business Plan discusses the future opportunity to use electric and gas sensors with the communications system to provide considerable benefits to gas and electric operations. These sensors could aid in the detection of natural gas leaks and improve response times to such events, as well as eliminate truck rolls and associated labor needed to perform gas pipe corrosion voltage tests. In addition, sensors could detect abnormal conditions on the Company's network protector vault locations before they result in unsafe conditions. Con Edison plans to evaluate the merits of these technologies, as they become available, to improve public safety, its response time to issues on its electric and gas systems, and, therefore, the reliability of these systems.

NOTICE OF PROPOSED RULEMAKING

Pursuant to the State Administrative Procedure Act (SAPA) §202(1), a Notice of Proposed Rulemaking was published in the State Register on November 4, 2015 (SAPA 13-E-0030SP11). The time for submission of comments pursuant to the Notice expired on December 19, 2015. Comments were received from nine parties: the City of New York (NYC or the City); PACE Energy and Climate Center (PACE); Environmental Defense Fund (EDF); Association for Energy Affordability, Inc. (AEA); New York State Department of State, Utility Intervention Unit (UIU); Metropolitan Transportation Authority (MTA); New York Energy Consumers Council, Inc. (NYECC); Advanced Energy Economy Institute, Alliance for Clean Energy New York, Inc., New England Clean Energy Council (collectively, AEEI-ACENY-NECEC); and, the Mission:data Coalition (collectively, Mission:data).

COMMENTS

Nearly all of the parties who filed comments support the deployment of AMI. Comments were largely centered on logistical concerns such as the installation schedule and how to ensure consumers benefit from the data collected by the AMI meters. The comments are summarized below.

NYC

The City supports the AMI Business Plan but suggests modifications to the proposed installation schedule. NYC proposes that the Commission modify the AMI Business Plan to allow for a targeted roll out to large scale customers first, stating that large scale users would be the most likely to take advantage of the possible benefits of AMI such as demand response and other demand-side measures. The City states that Con Edison should prioritize networks in each borough that have the highest concentration of mid-sized and multi-family

buildings because they are ideally situated to maximize the benefits of AMI. In addition, NYC recommends that AMI be used to support the Brooklyn/Queens Demand Management (BQDM) program.[8] NYC's alternative implementation schedule begins with Queens and then subsequently Brooklyn, Bronx, Manhattan, Staten Island, and Westchester County.

NYC requests that the AMI platform have the capability to improve compliance with New York City Local Law 84 (LL84) by automating the data exchange with the United States Environmental Protection Agency's (EPA) Portfolio Manager and other such programs. The City requests that the Company be directed to investigate barriers and solutions and file a report on the outcome of its investigation no later than March 15, 2016. NYC also notes that its proposal to automate the data exchange should allow the Company to stop charging customers $102.50 per tax lot to provide the data needed by the customer to comply with LL84.

The City asks that the Commission require that it and other stakeholders be updated on the development and/or publication of the Company's labor plan to address the impact on employees of the roll-out of AMI, particularly the number of positions eliminated through layoffs and attrition, as well as Company efforts to retrain or find other work for these employees. The City expects that this effort would be developed and shared with stakeholders before the AMI implementation begins.

NYC notes that the AMI Business Plan provides that residential electric meter reads be performed every 15 minutes, non-residential customer meters would be read every five minutes, and gas meters read every hour. The City is concerned

[8] Case 14-E-0302, Con Edison – Brooklyn/Queens Demand Management Program.

that the Company's plan indicates three possible scenarios for customer access to the data, but that no decision has been made by the Company at this time. Under the Company's plan, either 100% of the meter reads will be displayed in real-time, 20% of the meter reads will be displayed in real time, or data will be displayed on the Company's web portal the next day. NYC requests that the Commission ensure that the Company can provide meter data to customers in real time, when it is useful to them, and not hours or days later. Customers will need this data in real time in order to optimize the benefits of DER. The City also requests that the data be provided to customers free of charge, which would encourage customer participation in the benefits of AMI.

MTA

The MTA supports the deployment of AMI by Con Edison and believes that integration with its own energy management systems will help create efficiencies and energy usage reductions across its subway system. The MTA commented that targeted roll out to large scale customers should be performed first because large scale users, like the MTA, would be the most likely to take advantage of the possible benefits of AMI, such as demand response and other demand-side measures.

In addition, MTA notes that its support of AMI is conditioned on a reasonable installation schedule that will not "skip" its underground meters for those that are easier to access. MTA also expresses support for an AMI system that provides data in five minute intervals for commercial customers, as opposed to the AMI Business Plan's proposed 15-minute intervals. In addition, MTA requests that the AMI system be capable of simultaneously "pushing" energy data to MTA's Energy Management System (EMS) or available to be pulled from Con Edison's system by its EMS. MTA is also concerned that the

Company may seek to charge customers for all but "basic" data and asks that the Commission not make a decision on this issue until interested parties are afforded the opportunity to comment.

UIU

UIU is in favor of the AMI Business Plan and would like to ensure that low income and residential customers are provided access to programs that would help them manage their use and lower their energy bills. UIU further states, however, that the AMI Business Plan does not provide sufficient information regarding the costs and benefits of AMI to show that the benefits justify the costs. UIU also wants to ensure that residential and small commercial customers will realize their fair share of any benefits. UIU states that there is not a detailed breakdown in the AMI Business Plan as to how the costs and benefits of AMI would impact the various electric and gas customer classes, nor is there a discussion of allocation of the common costs of AMI among the electric, gas and steam businesses. Too much attention, according to UIU, is focused on the electric side of the business. UIU expresses concern that the lack of this information will prevent the costs from being allocated correctly. UIU asks that the Company's BCA be revised to address its concerns and that the Commission ensures that the savings are properly passed along to customers.

UIU indicates it is in favor of a roll out to all customer classes, stating that all customers should have equal access to participate in demand-side reduction measures made possible by AMI. It also supports establishing a detailed outreach and education program to help customers understand the functions and benefits of AMI so that the benefits to the Company and customers are actually realized. UIU appreciates that the Company's AMI Business Plan proposes that an outreach

and education plan be developed no later than July 2016, but is concerned that there is little detail regarding such efforts. Therefore, UIU asks that the Commission make it a central concern in future development and oversight of AMI to allow the parties to comment on the Company's plans prior to implementation.

Finally, UIU asks that the Commission explore approaches to minimize the negative impacts of the Company's recovery of the unrecovered book value of the Company's current meters, and to reduce such potential occurrences in the future that may flow from the AMI system. UIU, noting that it believes that the Commission cannot retroactively adjust rates reflecting the costs of the non-AMI meters, suggests that the Commission reduce Con Edison's return on equity (ROE) associated with the AMI meters in an equal amount because it believes that Con Edison should not "reap profits" on scrapped meters.

NYECC

NYECC states that the AMI Business Plan does not contain enough information to compare full deployment against targeted deployment. NYECC expresses concern that the costs and benefits of Company's AMI Business Plan cannot be adequately weighed without the ability to examine alternatives such as targeted or limited deployment of AMI. NYECC also is concerned that the $400 million in unrecovered book costs of the existing meters is not included in the Company's BCA, and therefore questions the Company's claims that over the 20-year evaluation period, benefits exceed costs by $1.149 billion. NYECC, therefore, asks that the Commission take the unrecovered meter costs into consideration.

NYECC further questions the Nexant study performed for Con Edison because of what it describes as an inordinate number of qualifications and caveats. NYECC suggests that the

Commission review more realistic and reasonable options, including 10 or 15 year time horizons for the evaluation of benefits and costs. NYECC also believes that the Company has not met its obligation to consider the experience of other utilities in rolling-out AMI in their territories, and notes it is especially disconcerting that none of the utilities it benchmarked provide real time meter data.

Finally, NYECC states that further detailed information is needed regarding the potential benefits of AMI to customer programs; that is, the Company needs to specify which customer program benefits will actually be provided, as opposed to discussion of potential benefits of the deployment of AMI.

Mission:data

Mission:data states that AMI not only stands on operational efficiencies but will also enable customers to participate in demand-side benefits and attendant energy products made possible through AMI. Mission:data posits that in order to fully realize the value that AMI will bring, access to data is critical to allow consumers to "avail themselves of the data-driven products being developed in the national marketplace." In addition, Mission:data proposes that customers not be charged to access the Green Button[9] "Connect My Data®" functions. Instead, these Green Button functions should be included as part of the customer's utility service. Mission:data is concerned that the AMI Business Plan does not

[9] Green Button is an industry-led initiative to provide utility customers with easy and secure access to their energy usage information. Customers are able to securely download their own detailed energy usage by clicking the Green Button on the utility's website. http://energy.gov/data/green-button. Green Button Connect My Data® provides application developers an automated technique to access consumer energy information while providing consumers security.

indicate whether Green Button Connect®, or any other such customer engagement functionality, is included in the AMI project costs. Furthermore, Mission:data states that the AMI Business Plan lacks sufficient detail regarding enabling real-time data through the use of a Home Area Network (HAN) or like capability. Mission:data is also concerned that allowing Con Edison to charge for access to customer data will provide Con Edison an advantage in the DER marketplace over it and other third-party providers, thus hindering DER market development.

AEA

The AEA states that AMI is necessary to meet the current and future needs of customers and to enable the energy marketplace envisioned by the Commission's Reforming the Energy Vision (REV) proceeding.[10] AEA states that customers must be given access to their data, and they must also be given access to energy products, services and rate structures that will enable them to fully utilize and benefit from their usage data. In addition, AEA requests that the Commission direct Con Edison to view the multi-family housing sector as a discrete sector and have the Company provide energy efficiency programs aimed at lowering costs for these customers, especially low income customers. AEA is also concerned with the ease at which Con Edison will be able to remotely disconnect meters for non-payment.

AEA believes, as Mission:data, PACE, and EDF state in their comments, that customer data should be included in basic utility service and the Green Button Connect should be the primary portal. In addition, AEA notes that TVP should be available to help customers manage the load shape and usage

[10] Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision. (REV Proceeding)

patterns to help them identify efficiencies and manage their bills.

EDF

EDF is in favor of AMI deployment but suggests that the AMI Business Plan does not fully state the benefits that will be achieved by AMI. Specifically, EDF states that when combined with TVP, or other forms of time-of-use pricing, AMI will allow for meaningful system efficiencies not yet fully quantified in the AMI Business Plan. EDF believes the Nexant Report filed with the AMI Business Plan is conservative in its estimate of 15% TVP opt-in, citing to a report from the United States Department of Energy which reviewed American Recovery and Reinvestment Act (ARRA) of 2009 funded programs and indicated a 24% TVP opt-in rate.[11] EDF, like other commenters, suggests that Con Edison should be directed to adopt the Green Button Connect My Data® plan to allow for greater access to data by customers and third-party providers in order to ensure DER market animation and to further the goals of REV.

EDF also asserts that environmental benefits, such as the reduction of carbon and other GHG emissions, were not adequately presented in the AMI Business Plan. EDF believes that there should be a more robust method for valuing reductions in GHG emissions via load control and fuel savings achievable with implementation of the AMI system. EDF suggests that Con Edison evaluate how AMI could facilitate the State's stated goal of emissions reduction by 80% by 2050. EDF also proposes that the Commission adopt the Open Data Access Framework principles developed by EDF and the Citizens Utility Board as a way of

[11] U.S. Department of Energy, Interim Report on Customer Acceptance, Retention, and Response to Time-Based Rates For The Consumer Behavior Studies (July 2015), https://www.smartgrid.gov/files/CBS_interim_program_impact_report_FINAL.pdf, at 55.

addressing data access issues. According to EDF, the Company should not only be compensated on an outcome based regime but also compensated based on its performance. EDF believes that there should be performance based metrics for operational, environmental and societal benefits.

Finally, EDF is concerned that the AMI Business Plan only minimally addresses the Commission's directive in the 2015 Rate Plan Extension Order that the plan address engaging third-party providers and only addresses benefits to the Company and its customers, not other third-parties.

PACE

PACE supports a full AMI rollout but, as did EDF, states that the Company's AMI Business plan did not adequately identify or capture the "REV-related" benefits of AMI. PACE argues that the Company should do a more robust analysis of the benefits of demand-side savings as a result of AMI deployment in the Con Edison territory. PACE also states that the Company underestimated the environmental benefits of the AMI roll-out by not including metrics to capture environmental benefits of TVP, responsive DER, and other ancillary services. PACE would like the Company to commit to measuring and modeling such anticipated environmental benefits. PACE also believes the Company should procure master-meters for multi-family buildings that are capable of working with the associated submeters so that all customers can engage with their data. In addition, PACE believes that Con Edison should future-proof the system to ensure the long term viability of AMI to engage in ancillary devices (smart inverters and other DER devices) in the home and communicate with submeters.

AEEI-ACENY-NECE

AEEI-ACENY-NECEC submitted comments supporting the deployment of AMI as a means of enhancing customer knowledge,

system efficiency and reliability, and as a way of creating market animation for new energy services. In addition, AEEI-ACENY-NECEC states that AMI will support fuel diversity and carbon reductions. AEEI-ACENY-NECEC is, however, concerned that the AMI Business Plan is too focused on the benefits that will accrue to the Company and not on the benefits that will accrue to the customers through the creation of customer-centric programs that will lead to savings and lower overall energy consumption. AEEI-ACENY-NECEC asks that Con Edison be directed to develop a clear plan for how it will foster customer-centric programs both in the near and long term. Such programs could be behavioral demand management programs that alert customers to peak usage, notify them of potential savings before the peak and the provide feedback on customer behavior. AEEI-ACENY-NECEC states that these programs and benefits should be extended to small and medium commercial customers, as well as multifamily customers, who AEEI-ACENY-NECEC believes are often left out of utility deployment strategies.

AEEI-ACENY-NECEC also states that access to customer data by customers and third-parties "in near real-time" both "backhauled" through a centralized New York State energy data platform (similar to Green Button) and directly from the meter through a Home/Business Area Network (HAN/BAN) or wireless network can facilitate providing actionable energy information to the customers who can offer the greatest degree of resource value to meet REV objectives."[12] AEEI-ACENY-NECEC states that this level of granular data will be necessary for creating a standardized platform necessary to achieve system efficiencies.

AEEI-ACENY-NECEC further states that the inclusion of the HAN/BAN wireless chips will provide faster access to energy usage information which could lead to greater reductions than

[12] AEEI-ACENY-NECEC comments, at 4.

those by customers simply using a web portal to access information. Although the HAN/BAN devices would allow near real time data, AEEI-ACENY-NECEC states that the 15 minute time frame proposed in the AMI Business Plan would also allow customers to cost effectively participate in demand response and other energy services.

## DISCUSSION

AMI will contribute to the modernization of the Company's electric system and gas distribution system, creating substantial operating savings and efficiencies as well as increased visibility and control of its system. The quantified benefits exceed the costs, and there are substantial unquantified future benefits.

In addition, the deployment and use of AMI in the Company's electric and gas businesses will transform the relationship between Con Edison and its electric and gas customers. It is an important and valuable contribution to enabling the Company to assume the role of the DSP, facilitating customer access to products and services provided by third-parties. AMI can empower customers to become active in their energy usage by providing them with information to assist in the management of their usage, which will allow them to better manage their electric and gas costs. This Order requires the Company to take the necessary steps, in both planning and implementation, to make this potential a reality for its customers. The Commission understands the challenges that have been faced by other utilities across the country and that New York utilities will confront in achieving this goal – largely customer outreach and education and realization of all the promises of the technology in a timely manner. This is the reason the Commission's 2015 Rate Plan Extension Order requested

a detailed plan with appropriate metrics. While the Company's AMI Business Plan articulates appropriate goals and aspirations, the depth of planning and outreach requires further compliance filings as detailed in this Order.

If implemented successfully, AMI will have a positive impact not only on customer costs, but will also provide substantial benefits to the environment by minimizing GHG emissions from fossil fuels and the potential need for new central station generators that consume fossil fuels. AMI will capture and provide interval data which will afford customers the opportunity to participate in DR programs offered by the Company, as well as innovative value-added products and services by ESCOs and DER suppliers that will assist consumers in managing their energy use. The AMI system will modernize the electric grid and gas distribution system which, as the Company explains in the AMI Business Plan, will allow it to obtain operational efficiencies.

The following reviews the Commission's consideration of the AMI Business Plan, addresses comments received in response to the SAPA notice, and discusses further steps. This section of the Order is generally laid out in four distinct but related areas: economic analysis; benchmarking and engineering; customer engagement (including data access and privacy); and, compliance and metrics.

A. Economic Analysis

In its filing, Con Edison discusses the benefits and costs of implementing AMI. The Company contends that full AMI deployment has a ten year payback and provides a net benefit of $1.08 billion.[13] Con Edison estimates its AMI benefits to be

[13] Con Edison's Net Present Value calculation is based on a 20 year life expectancy for the AMI system.

$2.704 billion while the Company expects to invest $1.285 billion in new capital spending in nominal dollars and incur $552 million in operational costs. As noted above, Con Edison categorizes the benefits into "cost reduction benefits" and "Company and customer benefits" depending on the type of savings. While the Commission accepts the Company's categories for explanatory purposes, it must be clear that all of the benefits from AMI will result in savings in the operations of the Company's electric and gas delivery and billing systems, thus benefiting Con Edison and its customers. The Company's benefit estimates are detailed in Appendix A.

1) Cost Reduction Benefits

Con Edison lists various AMI benefits that provide $1.28 billion in cost reductions. Cost reduction benefits are achieved principally through a reduction in the cost to read and replace meters, turn service on or off,[14] manage outages, operate call centers, meter DER, and automate distribution. Direct operating benefits result in $1.04 billion in cost savings for meter reading, field services, meter capital, interval metering, billing, and call center operations. AMI meters will allow for elimination or reduction of trips related to meter reading and repair, automation of some manual billing processes, and reduction in visual meter reading and data entry errors. The AMI meters also allow for remote service activation, transfer, and disconnection. With these changes, Con Edison expects an increase in billing accuracy, less reprocessing of bills, and reduction in complaints related to billing, account

[14] While the ability to conduct remote disconnections of service is listed as a net positive to Company costs, we take this opportunity to remind the Company that any such disconnections must be in accordance with the requirements of Article two of the Public Service Law and the associated Commission Rules and Regulations.

investigation, and complaints to the Commission. Con Edison also expects cost savings from eliminating communication costs specific to interval meters, and labor associated with manual interval meter reading when communication lines are down. The Company currently has approximately 2.6 million electro-mechanical electric meters in service that can under-register usage as the meters age and irregular conditions occur, which results in incorrect billing to customers.[15] Replacing these devices with the full deployment of AMI meters avoids the cost of future replacement of these meters.

Power information provided by an AMI meter can provide Con Edison with valuable information without the need for employees to conduct field visits. Consequently, AMI can help reduce the cost associated with restoring service by allowing the Company to use fewer resources to locate faults, conduct load shedding, and identify nested outages.[16] Customers experiencing an outage or service issues should be addressed and resolved faster with AMI. This will positively impact identification of false outage calls, high voltage, low voltage, and flickering light situations. The efficiencies that AMI provides in outage management alone will garner cost savings of $86 million.

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[15] NYECC in its comments requested that the Commission take the $400 million in unrecovered book costs for the old meters into consideration when reviewing the BCA. In fact, the BCA filed by the Company initially and the Commission's revised BCA methodology discussed below, both include the $400 million in their analyses.

[16] A nested outage is a power loss to a customer that is caused by multiple faults or failures in the utility infrastructure such as a down primary feeder and fault on the service line supplying the customer. The utility can easily identify the failure on the primary feeder but not know about the fault on the service line.

AMI will also provide an estimated benefits of $156 million associated with retirement of programs and systems no longer needed with AMI implementation and elimination of the need for the installation of a new meter for customers that install distributed generation, such as solar equipment. The use of granular AMI data will enable distribution automation, improve engineering analysis of distribution system equipment such as distribution transformers, help to optimize capital expenditures, and generate operations and maintenance (O&M) savings. In addition, the data from the AMI meters will allow Con Edison to monitor equipment loading more precisely to prevent equipment failure due to overloading, thus avoiding costly emergency replacement of equipment and potential need for environmental cleanup.

2) Company and Customer Benefits

The AMI Business Plan further identifies $1.424 billion of benefits that are not directly related to reduction in delivery system operating costs. AMI meters will allow for a reduction in the amount of cost socialized amongst all customers due to increased meter accuracy, reduction in theft, better management of inactive accounts, and reduction in bad debt. AMI meters can improve theft detection through increased monitoring of energy usage, measurement capabilities, and theft detection alarms. Con Edison states that AMI reduces the accrual of additional charges related to inactive accounts and customers that have bad debt by reducing the time between the customers being eligible for disconnect and the time that the customer is actually disconnected.

In addition, AMI provides voltage measurement at distribution system end points, which will allow Con Edison to implement Conservation Voltage Optimization (CVO) on its

electric system.[17] CVO will allow Con Edison to reduce energy consumption, thus decrease the need for generation and concomitant air emissions associated with fossil fuel fired generation.

The Company states the data provided by AMI will facilitate demand side management programs, which will lead to greater customer participation, greater demand reductions, and reduced electric system investments. According to Con Edison, AMI allows customers to choose and respond to prices that more accurately reflect the cost of electricity supply and delivery. This will provide all customers, including low income customers, the ability to obtain wholesale market benefits from changing usage patterns. While we agree with the Company about the potential of these outcomes, we require the Company to provide specific programs and applications to facilitate these outcomes as discussed later in the Order.

3) Unquantified Future Benefits

The unquantified future benefits of AMI are substantial. AMI is a tool that can be used to further animate markets and drive system efficiency. The aggregation of AMI data can help system planners, third-party service providers, customers and their communities in understanding how energy is used and how to manage that usage to gain system and bill efficiencies. Third-party providers will be able to devise efficient demand response vehicles that benefit customers. In addition, AMI data can greatly facilitate more reliable savings projections and post-project measurement and verification, thus facilitating increased third-party investment in energy efficiency.

[17] CVO is the adjustment of line voltage to a lower value to reduce the amount of energy consumed by customers.

AMI may also provide additional benefits as technologies develop. For instance, Con Edison states that there are several sensor manufacturers working with the AMI community to develop standards to allow remote monitoring of methane and carbon monoxide levels, pipe corrosion protection systems, fault current, and stray voltage detection through the AMI communication infrastructure. Early detection, monitoring, and repair of system issues can lead to effective use of resources, increase consumer and public safety, provide good power quality, and reduce outages.

With AMI, Con Edison can provide the NYISO with actual customer hourly consumption data for settlement of the real time energy market, which will assist in determining installed capacity obligations and reducing the amount of resettlement required in the NYISO's four month true-up. AMI will provide consumers with timely and readily available information about their electricity usage pattern and its corresponding cost, knowledge that will result in a reduction in the overall use of electricity.[18]

In addition, AMI utilizes telecommunications standards that will lower the cost of integration and development for many future REV-driven programs and plans across the utility enterprise and provide data that can be leveraged to establish customer energy profiles for targeted marketing of energy efficiency and demand response programs. AMI is foundational to supporting rate designs representative of actual consumption behavior, including demand charges as well as other new time-variable rates. AMI will make it possible for all customers to participate in "smart home" rates and demand response programs

[18] Characterizing and Quantifying the Societal Benefits Attributable to Smart Metering Investments, Electric Power Research Institute, July 2008.

offered by the Company, third-parties and the NYISO without having to wait for and incur the cost of the installation of an advanced interval meter. AMI supports the development of market systems that can leverage customer actual AMI usage data instead of predictive models. With the appropriate data systems in place, AMI can make customer electricity usage data available, per customer consent and security requirements, to third-party providers who can provide additional services for customers. The NYISO plans on proposing in a filing with FERC a new Behind-the-Meter Net Generation tariff, which would allow net generators to sell Installed Capacity (ICAP) into the NYISO-administered ICAP market.[19] If the NYISO customers are paid like generators, they may require five minute (or less) interval meter data. AMI can provide the necessary revenue grade metering information to support this initiative with strict adherence to the confidentiality, integrity and availability of this data.

Another source of benefits that are presently unquantified lies in the opportunity for Con Edison to work with advanced energy companies to develop alternatives that achieve the same results of the Business Plan at lower ratepayer expense. These efforts could take the form of technology alternatives that are more optimal for specific locations or types of customers, or alternatives that can produce additional revenues from third-parties, to offset costs under the authorized spending cap with an appropriate shared savings incentive for the Company. The Commission requires the Company

[19] New York Independent System Operator, Inc., Management Committee Meeting, December 17, 2015. http://www.nyiso.com/public/markets_operations/committees/meeting_materials/index.jsp?com=mc

to continue to work with third-parties to identify these opportunities and pursue them as warranted.

4) Benefit Cost Analysis

The Company's BCA analysis shows that the benefits exceed costs by a large margin (summarized in Appendix A) as discussed above. The analysis was completed prior to the Commission's issuance of the BCA Order. Although the Company's analysis did not utilize all of the assumptions and analyses directed in the BCA Order, the Company substantially demonstrated that the benefits of its AMI proposal outweigh the costs. Review of the data components of the Company's BCA analysis, and the methodology adopted in the BCA Order, establish a presumption that the Company's AMI proposal would also satisfy the analytic requirements adopted in the BCA Order. Con Edison is required to confirm this presumption by filing, within 30 days of issuance of this Order, an update of its BCA analysis of its AMI proposal utilizing the methodology established in the BCA Order.

B. Benchmarking and Engineering

1) Benchmarking

As of July 2014, nearly 43% of U.S. homes have a smart meter.[20] In light of this, in the 2015 Rate Plan Extension Order the Commission directed Con Edison to benchmark its AMI Business Plan against other utilities to gain insight to possible challenges to large scale deployment of AMI and to develop best practices. In compliance with that Order, Con Edison met with six geographically diverse utilities that had implemented a combination of gas/electric AMI in urban/mixed service territories. The results are included in Appendix E of the AMI Business Plan, and include lessons learned and best practices that the Company will implement as it rolls out AMI.

[20] AMI Business Plan, at 2.

Much of the benchmarking was used to identify the elements that the AMI Business Plan itself should contain. The Company was able to identify the major operational benefits that AMI has provided other utilities in terms of meter reading, outage management, revenue and theft protection, and field services. They are described as core benefits in the AMI Business Plan. Con Edison was also able to identify challenges that peer utilities have faced and was able to identify lessons learned and strategies to mitigate these challenges. Central to the lessons learned was the need for Change Management, that is, managing the change related to how the utility engages customers and how the utility is internally organized. As the Company changes how it engages customers with new programs and services it will have to mirror those efforts internally with new or modified organizational structures.

Operationally, the Company was able to identify several challenges faced by other utilities, such as data management. Many of the utilities Con Edison benchmarked indicated that a major operational challenge was having the appropriate technology and operational support to provide real-time data for customers. To this end, Con Edison proposes to be more proactive in establishing robust backend systems such as the MDMS and the MDMA to support not only the billing needs of customers but also to anticipate and manage future operational needs in providing real-time data to customers.

The customer survey that Con Edison hopes to build on, indicates, for example, that the "opt-out" rate experienced by peer utilities for AMI is less than 1%. Consequently, Con Edison states that early and thorough customer engagement is the key in lowering customer AMI "opt-out" rates.

While Con Edison was able to comparatively analyze benefits and risks experienced at other utilities that have

deployed AMI, the AMI Business Plan highlights that the Company is in a position to ensure that AMI realizes benefits to customers by allowing for better implementation of REV initiatives and the system benefits resulting from CVO, both of which will provide unique benefits to Con Edison's customers that other utilities cannot offer.

NYECC's concern that Con Edison failed to meet its obligation to consider the experiences of other utilities is not supported by the record. As discussed above, and more fully in the AMI Business Plan, the Company did benchmark to six peer utilities of similar size, scope and with similar urban topology.[21]

2) Deployment

With respect to the NYECC comment that the Commission should investigate a targeted deployment of AMI, the Commission finds that a targeted deployment is not optimal. The success of DSP in Con Edison's service territory is dependent on the full deployment of AMI, real time access to load data by the Company, DER vendors, and customers, and a reliable communications system. Moreover, full deployment is necessary to achieve the full operational savings that AMI can provide. This is because of the combined network and radial design of Con Edison's electric transmission and distribution system, and the difficulty in sending and receiving signals to and from some customers' meter locations (meters are often located well below street level in NYC). In addition, Con Edison's customers are faced with the high cost of electric commodity and a targeted deployment would deprive these customers of the ability to benefit from system flexibility and access to innovative pricing and DER services, including those that may minimize rate increases associated with load relief work.

[21] AMI Business Plan, at 37-38.

AEA suggests that Con Edison's AMI implementation should address issues related to the fact that customers in multi-family buildings may be submetered, which limits customer access to the DER marketplace. Con Edison should propose, as part of its customer engagement filing, how it will address these issues.

The City and MTA both propose ways of prioritizing the deployment of AMI meters which are different from the geographical approach in the AMI Business Plan. NYC recommends that Con Edison prioritize networks in each borough that have the highest concentration of mid-sized and multi-family buildings. According to the City, this is appropriate because these buildings are ideally situated to maximize the benefits of AMI. MTA offers a similar proposal, but states that the Company should roll-out AMI meters to large scale customers first because large scale users would be the most likely to take advantage of the benefits of AMI, including demand response and other demand-side measures. UIU, on the other hand, recommends that any deployment of AMI be done across all customer service classifications. In addition, NYC proposes that Con Edison change its geographic deployment to first begin with Queens and then proceed to Brooklyn, Bronx, Manhattan, Staten Island, and Westchester County. In response, Con Edison states that it is simply much more efficient from a manpower perspective, to roll-out AMI geographically, and hence, it is much more cost effective.

The Commission rejects the proposals of NYC and MTA. Focusing on networks that have the highest concentration of mid-sized buildings, multi-family buildings and large scale customers first is not an efficient way to roll out the AMI system. The mesh network deployment is required for the AMI meters to be functional. Therefore, the Company's proposal to

deploy AMI meters on a geographical basis is the appropriate way to roll-out AMI since it reflects this fact.

We decline to order the Company to revise its geographic deployment plan. Con Edison's geographical roll-out is sensible because it targets earlier places where meters are located on the outside of many customers' homes and businesses, making meter installation easier, while allowing the installers to gain experience in performing the work. In addition, it allows for significant improvements to outage management and crew dispatch in Staten Island and Westchester where customers and Con Edison facilities are not as concentrated as they are in the City, and therefore these geographic areas will receive significant value from AMI deployment.

Finally, the MTA notes that its support of AMI is conditioned on a reasonable installation schedule that will not "skip" its underground meters for those that are easier to access. The Commission requires the Company to not favor particular customers in the roll-out process, but to proceed expeditiously and fairly to replace all meters in the particular geographic area where the work is being performed.

3) Security

Con Edison states that its AMI cyber security policy is based on the International Organization for Standardization 27002 standard. This policy requires regular evaluation of AMI to ensure the confidentiality, integrity, and availability of systems and data. Con Edison also states that it maintains a corporate cyber security program built on the following principles: incorporation of cyber security designs into all computing and communications elements used by the Company and its customers; separation of computing networks from the corporate information network; establishment of layered cyber security defense; reduction of impact recovery by instituting

redundancy and diversity in all components; comprehensive internal risk assessment; and, independent third-party vulnerability assessments and penetration tests. The Company plans to improve employee awareness of cyber security through training and communication. In addition, Con Edison states that it requires vendors, application developers, external devices such as smart meters, and business owners to meet specific security requirements.

According to Con Edison, all new systems must follow the Software Development Life Cycle (SDLC) process. It consists of a detailed plan that describes how to develop, maintain, replace and alter or enhance specific software. The process defines a methodology for improving the quality of software and the overall development process. Con Edison's SDLC will include secure coding principles for developed applications, encryption of external data exchanges, and utilization of authentication techniques by users and system components. Regarding the security of external devices, Con Edison states it will: use dedicated and encrypted networks for transmission of data; restrict access to collected and stored data; receive firmware updates from vendors via secured and validated means; and, initiate all physical access to external devices with authorization and authentication controls from the management system.

The Commission finds that Con Edison not only meets the Commission's minimal requirements to secure its AMI, it is exceeding the requirements. Con Edison's policy is to adhere to stringent requirements as set forth by ISO-2002 and to take the ISO-2002 risk based approach for defining policy. The utility is using a state of the art Security Incident Event Monitor to monitor the AMI for security based abnormalities.

Con Edison is using standardized secure coding practices as defined by leading industry organizations that add an important additional layer of security to AMI. It is also employing end-to-end encryption with multiple layers to protect AMI data. Two-factor authentication and role based access controls will help ensure that only authorized users and devices have access to the Company's AMI system. Device manufacturers will be required to adhere to stringent security requirements and be subject to third-party assessments to certify adherence to Con Edison's requirements. These devices will be further vetted by Con Edison prior to being deployed on its AMI system. This will help ensure that the security of device firmware and hardware is not compromised during the course of 'supply chain' development, shipping, and manufacture. Con Edison has devised a 'fingerprint' solution to ensure software updates received from vendors are legitimate and have not been tampered with.

An important component of Con Edison's plan is the use of private wireless carriers and wired telecommunication lines. Access to the Internet would increase the risk to the AMI to an unacceptable level and expose it to hackers, viruses and malware. Only allowing data flows to be "pulled" from the "low trust" networks to the "high trust" networks will further solidify Con Edison's layered security model and protect its Data Centers. This means that only data that is requested (pulled) by the AMI computer systems residing in secure, internal "high trust" networks from less secure, "low trust" external networks, will be allowed access. All other external traffic flowing in the direction of the "high trust" network (pushed) will be denied entry.

Another important element is the standardization of the communication platform, will greatly simplify and solidify the management and security of the AMI. Redundant communication

links and systems will help ensure the resiliency of the AMI. Physical access to external devices will be initiated with authorization and authentication controls employing certificates to help ensure the authenticity of field crews accessing the devices. Con Edison shall continue to upgrade its security protocols as further improvements are made within the industry.

4) Remote Monitoring Research and Development

In addition, the Commission finds that remote monitoring through sensors will allow for early detection, monitoring, and repair of system issues that can result in more effective use of resources, increased employee and public safety, improved power quality, and fewer outages. The sensors provide important benefits that shall be pursued by Con Edison through its Research and Development (R&D) program, the status of which should be reported in Con Edison's annual R&D filing to the Commission.

5) Home & Business Area Networks

To allow the AMI meters to communicate with customers who wish to install a HAN, BAN or similar systems, a ZigBee® chip will be installed in each AMI meter. The ZigBee® chip allows for communication between the HAN, or other such system, and the AMI meter. The chip's features can be upgraded remotely as technology and customer preferences change. Con Edison plans to install security measures to prevent access to its AMI network from the HAN. The AMI system will require a secure pairing of the HAN device to the meter and restricts the type of commands that can be communicated between the HAN and the meter. For any control operations, an authorized list of devices is maintained and change to this list will first need to be authorized by the AMI system. This change in authorized list of devices cannot be done through the HAN because HAN or anything that uses the ZigBee® chip to communicate does not have

direct access to the AMI network. All communications between the AMI network and the meter are encrypted in addition to data encryption between the HAN and the meter.

ZigBee® adheres to IEEE 802.15.4 standard and is the leading technology used for communication with internet based control systems such as HAN. Its dominancy in the industry is due to its low cost, high connectivity, and security features. It has an approximate 10-year history of being reliable and robust. Information communicated to and from ZigBee has an AES-128 bit encryption. ZigBee® uses open wireless standards that allows different devices to work together and for unlicensed use anywhere and by any merchant. Smart meters with ZigBee® chips installed should have sufficient memory available in the meter to allow for remote upgrades of future ZigBee features. Con Edison should partner with other vendors to grow the "internet of things" that can be interconnected and maintain relevancy with updates to its software that would match any communication upgrades.

C. Customer Engagement

1) Customer Engagement

The Company must plan for the benefits of AMI, individually and through overall system efficiency and performance, to be available and apparent to customers at the earliest practical time. Customers must be empowered with both knowledge and access to the benefits that can available through AMI deployment. A lesson learned from other jurisdictions is that the failure to deliver clear and apparent customer benefits is a cause of the criticism that surrounds many deployments of AMI.

Accordingly, the Commission requires that AMI deployment be accompanied with contemporaneous availability of initial applications that provide customers with an opportunity

to better manage their energy usage. Such programs will multiply over time, but the availability of tools for the customer on Day One of deployment, preceded by aggressive and effective customer education, is an integral component of Commission approval.

In order to achieve this, a well-planned and successfully executed customer engagement process will be needed. Accordingly, the Commission's approval of the AMI Business Plan is conditioned on a detailed plan from Con Edison to provide for the continuing engagement of customers and third-parties. While the Company's filing articulates goals related to customer engagement, little detail is provided on how the Company plans to achieve its goal. Accordingly, a detailed customer engagement plan will be required in a compliance filing discussed later in this section.

The utility's DSP function will require continuation of successful customer engagement beyond the initial roll-out of AMI. The Ultimate success will depend on the extent to which consumers of electricity and gas are offered an expanding portfolio of means to manage their use of electricity and gas through an expanding market of third-party providers.

The Company should actively collaborate with ESCOs, DER providers, and other stakeholders in developing and implementing its plan.[22] A successful plan will integrate the active participation of third-party partners who can enhance the consumer energy management benefits as part of the rollout. Educational efforts should be designed to increase acceptance, improve system utilization, and ease implementation issues. In the process, the Company and providers will gain understanding

[22] UIU expressed concern that the outreach and education plan needs to include adequate stakeholder participation to be effective, and the Commission agrees. This is essential before any rollout begins.

of the services that customers desire and are likely to utilize, and the Company's role in enabling third-parties to provide those services. Additionally, customers should understand how to timely access their own data, and to understand and control how it is accessed and used by others. Furthermore, Con Edison should work with DER providers and ESCOs to develop an understanding what it takes for them to participate actively and facilitate their participation.

Customer education also holds the key to successful dynamic pricing programs and DER programs. Customers participating in such programs need to understand their roles and responsibilities, as well as the role of the utility and any third-parties. An important aspect of AMI is its ability to enable active participation by customers, but customers must be equipped with the knowledge required to participate in a meaningful way. Customers will need to be actively supported in getting the right information to make informed decisions on their participation, and in acquiring the necessary knowledge and skills to take advantage of AMI-enabled programs.

PACE suggests that the AMI system should also be capable of communicating with submeters, DER at the customer's site, and interface with smart thermostats and major appliances. While Con Edison should design its communication infrastructure with the priority that it provide distribution automation, the Commission agrees that the benefits from the communications infrastructure should be expanded. It should be done in a way to accommodate changing environmental technologies, security requirements, and customer acceptance. The Company's consumer engagement plan should include the ongoing capability to take into account any requirements developed in the REV proceeding.

To maximize the benefits afforded customers through the introduction of AMI, innovative rate structures must be

explored. Such rate designs may include demand-metered delivery rates, hourly supply pricing, peak rebate pricing, or other time-and- location-sensitive designs. Voluntary TVP rates have been available statewide for many years, however, adoption among mass market customers is very low. While there are many factors contributing to this, the lack of a commitment to customer education and engagement is a factor.

NYECC, AEA, EDF, and PACE are critical of the Nexant Study (Study)[23] that lays out possible TVP options and possible benefits of the options. The net present value of benefits varies from $8.5 million up to $431.6 for residential programs that the Study admits are conservative. The estimates do not account for the full potential of Con Edison's proposed AMI system. While the AMI Business Plan does not rely on TVP programs to justify deploying the AMI system, the Company needs to effectively pursue all potential benefits. The customer engagement plan is to include innovative pricing proposals, which should include one or more pilot programs, developed in consultation with stakeholders.

In addition, Con Edison should include in its customer engagement plan an accommodation of web and smartphone applications offered by third-parties that allow customers to view their usage and energy costs in real time as well as cumulatively for the billing period. The Company is to strive to maximize third-party provider participation (e.g., smart thermostats, other smart home equipment, electric vehicle charging, demand response aggregators, solar and battery vendors, etc.). The Company is to gather data, at a minimum, sufficient to determine changes in customer energy usage, peak demand as well as cost savings.

[23] AMI Business Plan, Appendix D.

Enhancement of the AMI Business Plan may extend beyond the ways in which customers interact with AMI as AMI is currently planned. Enhancement can also be achieved through innovative alternatives to standard AMI deployment, which may be more cost-effective or otherwise beneficial in specific locations, or with specific types of customers or product offerings.

The AMI Business Plan as proposed by the Company and approved here should not have the effect of stifling further innovation. The total expenditures approved in this order will act as a cost cap, with the potential for the Company to enhance its earnings by working with third-parties who offer alternative solutions or deployment approaches that can reduce costs and/or generate new revenues, which will primarily benefit ratepayers, with an appropriate share of savings as an incentive for the Company. Con Edison's customer engagement plan should propose a framework under which third-parties can identify such opportunities; this framework should include a process for identifying, measuring, and sharing savings from such efforts.

2) Third-Party Access to Customer Data

Addressing technologies and protocols for providing customer data to customers and third-parties, the Commission directed that Con Edison evaluate access to customer data by both customers and third-party providers in the 2015 Rate Plan Extension Order.[24] In its AMI Business Plan, Con Edison describes how its new Digital Customer Experience (DCX) program will allow customers access to data using the Green Button format, provide graphical historic data, overlay bill information with other factors, such as the weather, to facilitate comparison with historical data, provide for data

[24] Id.

disaggregation to allow customers to identify efficiencies, and provide proactive usage alerts.[25] The DCX program is a separate initiative from AMI and was authorized in Case 13-E-0030.[26] This program will provide much of the funding and customer access functionality that Mission:data purports is missing from the current AMI Business Plan. A fuller understanding of the customer experience with AMI must be viewed in concert with the functionalities that will be enabled by the DCX.

The City, in its comments, claims that the use of AMI should allow the Company to stop charging customers $102.50 per tax lot to provide the data needed by the customer to comply with LL84. The Company should address this issue in its customer engagement plan filing and show whether, and how, these charges could be eliminated.

The AMI Business Plan states that the Company currently offers Green Button download capabilities, allowing customers to share simple monthly usage data. As AMI meters are installed, the Company's DCX initiative will include Green Button download as a base feature. Customers will have access to 15-minute interval data, instead of the simple monthly usage data under the current system.[27]

Con Edison also explains in its AMI Business Plan that is seeks to offer more robust data exchange capabilities to its customers, such as those offered by Green Button Connect My Data®, an existing industry-standard protocol that enables customers to share their granular energy usage data with vendors

[25] AMI Business Plan, at 8.

[26] Case 13-E-0030, et al., Con Edison – Rates, Order Approving Electric, Gas and Steam Rate Plans in Accord with Joint Proposal (issued February 21, 2014), at 112.

[27] AMI Business Plan, at 17-18.

they select. According to Con Edison, Green Button Connect My Data® is attractive because its offers to both customers and third-parties robust capabilities and national standards that will enhance customers' ability to be active and engaged energy customers.[28]

Issues of customer and third-party access to customer energy data are important to fully utilizing the value that AMI presents not only to customers and third-party providers but to the Company as well. As the Company states in its AMI Business Plan, these issues are also under consideration in other forums, particularly REV Track Two.[29] Furthermore, as discussed herein, AEA, Mission:data, PACE, and EDF also support the use of Green Button Connect My Data®.

In light of the parties' favorable comments and Con Edison's initially favorable review of Green Button Connect My Data®, Con Edison is directed to implement Green Button Connect My Data® as an integral part of its AMI Business Plan, unless it can show that there is a better approach offered by a competing standard that offers similar functionality. As a first step, Con Edison shall develop a proposed implementation plan, budget and timeline for implementing Green Button Connect My Data® so that customer's usage data is available from a central portal using Green Button Connect My Data®. This proposed implementation plan shall be included in Con Edison's consumer engagement plan filing, discussed above, which is due no later than July 29, 2016. Recognizing that Green Button Connect My Data® is designed to accommodate a range of datasets and other parameters regarding data delivery, in preparing that filing, Con Edison shall consult with ESCOs and DER vendors to explore

[28] AMI Business Plan, at 18.

[29] Case 14-M-0101, supra.

how these options should be addressed. In addition, Con Edison is to ensure that ESCOs have access to AMI data though the Electronic Data Interchange (EDI), as the ESCOs have made significant investments in their EDI systems.[30] This additional stakeholder engagement is necessary to determine the specific customer data that is made available by AMI, which should be made available to customers and third-parties through Green Button Connect My Data® and EDI.

3) Data Privacy

Deployment of AMI raises specific issues relating to privacy that need to be explored further. As AMI is deployed, along with other behind the meter technologies, personally identifiable information, generally defined as information that is capable of directly identifying an individual, will be made available to utilities and other entities. The collection and management of such data raises important privacy issues.

The NIST "Guidelines for Smart Grid Cyber Security"[31] include an assessment of the impact on privacy that smart grid technology may have. NIST recommends that a privacy impact assessment should be conducted before deploying smart grid technologies and updated for all major changes in order to identify privacy risks. Con Edison, therefore, is directed to conduct a formal privacy assessment as recommended by NIST, prior to commencing installation of AMI meters, and file the report on its assessment as a part of the customer engagement proposal.

[30] It is expected that EDI will continue to be useful and appropriate to exchange data between ESCOs and utilities, including hourly, interval, and billing quality data on a monthly basis.

[31] NISTIR 7628 (September 2010).

In addition, the NIST report further recommends that formal data access and privacy policies, called Fair Information Practice Principles, be developed and documented. There are many examples of existing and well-established principles that describe the manner in which entities will collect, use, and safeguard personal information to assure their practice is fair and provides adequate information privacy protection. Authorization for such access must be given affirmatively, through an opt-in process that reflects and records the customer's informed consent. Con Edison's data access and privacy principles need to incorporate this feature. Con Edison is directed to further investigate these matters, and to propose in its customer engagement compliance filing, data privacy and access principles relating to implementation of AMI for Commission review.

4) Third-Party Ownership of Meters

Regarding meter ownership, Con Edison believes it should own AMI meters for several reasons, including:

1. It can obtain the best pricing for the meters;
2. Consistent standards for all meters and seamless upgrades;
3. Allow customer data to be used to provide new standard services to customers and allow the Company to price those services;
4. Allow Con Edison to measure and verify DER performance criteria; and,
5. Monitor users of granular data.

Con Edison further states that AMI will support other functions in addition to billing and is concerned that if a third-party owns the meter, Con Edison's own access to information it needs from the meters may be limited or curtailed

by the non-uniformity of the communications and meter type. Information such as voltage and outage alarms is required to support the other functionalities of AMI, such as CVO and outage management. In addition, testing and maintenance of meters, including over the air upgrades of meter and communication system firmware, is both an expensive and critical task. Con Edison claims that only through economies of scale will the installation and system maintenance be kept at a reasonable cost to maintain metering system accuracy.

The Company's concerns should not prevent third-parties from owning meters, so long as the ownership is seamless from the utility perspective. The utility can develop contract requirements including, but not limited to, standards for interoperability, cyber security, and maintenance and technology specifications. If a third-party can provide metering services on terms that are better for customers, it should be allowed to provide such service. Indeed, the Commission has already indicated that third-parties would be provided such opportunities to own advanced meters.[32] Therefore, the Commission will allow for third-party ownership, provided that the third-party complies with Con Edison's standards and the third-party is willing to incur any additional costs that puts on the system.

D. Compliance and Metrics

The Company was directed in the 2015 Rate Plan Extension Order to consider ways in which third-parties can be active partners in realizing the totality of benefits that can be extracted from AMI technology and the information it provides. EDF noted in its comments that the AMI Business Plan

[32] Case 94-E-0952, Competitive Opportunities Regarding Electric Service, Order Providing for Competitive Metering (issued June 16, 1999), at 7-8.

only minimally addresses the Commission's directive that the plan engage third-party providers and that it only addresses benefits to the Company and its customers, not other third-parties. The Commission agrees and finds the Company's filing lacking in this area with the potential result that customers will not achieve all of the benefits available from AMI. Con Edison should look for ways to partner with third-parties in other ways (e.g., consumer tools which integrate interval meter data with appliance-specific usage data). The Company is directed to reach out to ESCOs and other vendors to determine how such collaboration can be accomplished and to file a report with the Secretary to the Commission as part of its customer engagement compliance filing.

The Company shall confer with Staff on the design of the plan to actively collaborate with third-parties, including but not limited to UIU. The customer engagement plan should be a Market Facing Implementation Plan including, but not limited to:

1. Education and literacy on bill savings opportunities; opportunities for third-parties to offer services and thereby provide benefits, including but not limited to HAN/BAN;
2. The incorporation of lessons learned from current demonstration projects related to the development and implementation of customer facing portals; and,
3. Implementation of Green Button Connect My Data®, Green Button compliance deployment and other means to enable customers and third-parties to share information.

The terms and conditions under which Con Edison's electric customers are allowed to opt-out of AMI installation require further development. In approving Con Edison's opt-out

tariff, the Commission noted that the Company's proposed limitation of opt-out to one- to four-family homes was sufficient to address any potential health concerns that may arise with respect to AMR meters; however, the Company's opt-out program must also be able to address customer privacy and security concerns raised by AMI meters, including customers residing in multi-family buildings.[33] The Commission therefore directs that Con Edison file further tariff amendments proposing a solution or solutions for customers who wish to opt-out of AMI when it makes its customer engagement compliance filing.

1) Metrics

The deployment of AMI will require the development of new metrics to properly capture the value of the new markets AMI will create, customer engagement, and the environmental benefits that will result due to AMI. Metrics that measure increased customer engagement via the online portal, data analysis, and advertising should be established. Metrics to support customer oriented products such as enhanced power quality, low income energy efficiency programs, and energy services financing should also be created. One such example is tracking the number of customers contacted in relation to new energy products and DER providers. Another example would be metrics to track progress with low-income programs. By creating new performance based metrics the Company will be able to drive value-added products and services to the customer while creating new revenue streams that will off-set rate impacts system efficiencies not previously valued under the traditional cost-of-service model.

Metrics are also important for outage management and system operations. AMI allows Con Edison to obtain more real time data regarding the state of its electric and gas system.

[33] Cases 14-E-0570 et al., Con Edison - Meter Opt-Out, Order Approving Tariff Amendments (issued December 23, 2015).

Therefore, outage management metrics should be developed that focus on the improvements made to estimated restoration time calculation and power quality identification. For system operations, increasing the automation of its distribution system, reducing meter operations cost, and reducing emissions are important and should be tracked by metrics. Measuring these successes will help to quantify the cost reduction benefits discussed in Con Edison's business plan. A list of potential metrics for the Company to consider is attached as Appendix B.

To ensure that the benefits of AMI materialize, Con Edison is directed to submit, within 20 days of issuance of this Order, in the pending rate cases for Commission review and determination supplemental testimony and proposed metrics that can be used by the Commission to monitor the success of this AMI project based on Con Edison's purported benefits related to system operation, outage management, and billing errors, discussed above.[34] While the Company has already filed testimony in those proceedings, enough time is available for the Company to file and for Staff and the parties to review this supplemental testimony.

E. Other Issues

The City expresses concern, which the Commission shares, regarding the impact of the AMI roll-out on the Company's meter readers and proposes that the parties work collaboratively to discuss retraining these employees for other work at Con Edison. We agree that this issue is best addressed collaboratively between the parties, although, since this issue was raised by the Company in its testimony in the current rate

[34] Case 16-E-0060, et al., Con Edison – Rates. The presiding Administrative Law Judges will address any procedural or substantive concerns of the parties related to this directive.

cases, the City may file testimony in those proceedings, proposing a solution.

Regarding the proposal by UIU that the Commission provide Con Edison with a lower ROE on its AMI meter investment to offset the return on the unrecovered book cost of the current meters, the Commission rejects the proposal. UIU characterizes its proposal as one that would avoid retroactive ratemaking. In fact, retroactive ratemaking is not the issue here, even if the Commission were to adjust the ROE on the unrecovered book cost of the old meters only. The issue UIU raises is actually one of prudence. The legal test for prudence is whether the utility acted reasonably, under the circumstances at the time, "considering that the company had to solve its problems prospectively, rather than in reliance on hindsight".[35]

There is no basis presented by UIU or any other party to conclude that the investment in the old meter technology should not have been made at the time the investments were approved by the Commission and the Company's management. Therefore, the UIU proposal is rejected because there is no showing here that inefficient management or poor planning resulted in these costs being stranded. Con Edison also proposes in the AMI Business Plan to not change the timing for the recovery of unrecovered meter costs reflected currently in electric and gas rates. The Commission expects that the time frame for recovery will be addressed in the current rate cases.

Turning to AEA's concern regarding remote disconnect for non-payment, the Commission's order on AMI minimum functional requirements provides that:

[35] Matter of Long Island Lighting Company v. PSC, et al., 134 A.D.2d 135, at 144-145 (citing Matter of Con Edison, Opinion No. 79-1, at 6 (issued January 16, 1979)).

> "[t]ermination of service for nonpayment is subject to Home Energy Fair Practices Act (HEFPA) regardless of whether that disconnection is performed by physical (on site) or electronic (remote) service shut off. No utility may utilize AMI for remote disconnection of service for nonpayment unless it has taken all of the prerequisite steps required by HEFPA, including the requirement of 16 NYCRR §11.4(a)(7) that customers must be afforded the opportunity to make payment to utility personnel at the time of termination. This process requires a site visit, even where a remote device is utilized."[36]

Con Edison's AMI Business Plan recognizes this, and states that "[w]hile Con Edison is required to make an attempt to physically contact a customer prior to disconnection for non-payment, there remain a large number of trips associated with this process due to access issues."[37] The Company's estimation of savings is related to avoided subsequent trips for disconnect due to access issues after an initial attempt. The Company also claims savings related to scheduled turn-on activity, and scheduled disconnects not due to non-payment. Cost allocation among customer classes and among Con Edison's various services (electric, gas, and steam) will be determined in rate proceedings.

## CONCLUSION

By this Order, and subject to the cap on total AMI capital costs of $1.285 billion, and the directives in the body

[36] Case 09-M-0074, supra, at 19.

[37] AMI Business Plan, at 44.

of this Order, the Commission approves Con Edison's AMI Business Plan. The deployment and use of AMI in the Company's electric and gas businesses will transform the relationship between Con Edison and its customers. Customers will be empowered to become more cognizant of their energy usage. This will have a positive impact on not only their costs, but will also provide substantial benefits to the environment and society by minimizing greenhouse gases created from the burning of fossil fuels and the potential need for new central station generators that consume fossil fuels. AMI will also afford customers the opportunity to participate in DR programs offered by the Company. Finally, AMI will modernize the Company's electric system and gas distribution system which will allow the Company to obtain significant operational efficiencies for its electric and gas businesses.

The Commission orders:

1. The Advanced Metering Infrastructure Business Plan filed by Consolidated Edison Company of New York, Inc. is approved, subject to a cap on capital expenditures of $1.285 billion, as discussed in the body of this Order.

2. As discussed in the body of this Order, Consolidated Edison Company of New York, Inc. is directed to file with the Secretary no later than July 29, 2016 a customer engagement plan including a formal privacy assessment, formal data access and privacy policies, Green Button Connect My Data® implementation, data privacy and access principles, one or more pilot project(s), and further tariff amendments proposing a solution or solutions for customers who wish to opt-out of the use of Advanced Metering Infrastructure meters. Prior to this filing, Consolidated Edison Company of New York, Inc. is

directed to reach out to Energy Services Companies and other vendors to determine how such collaboration can be accomplished.

3. As discussed in the body of this Order, Consolidated Edison Company of New York, Inc. is directed to file within 30 days of issuance of this Order an update of its benefit cost analysis using the Benefit Cost Analysis Framework adopted by the Commission by Order dated January 21, 2016 in Case 14-M-0101.

4. As discussed in the body of this Order, Consolidated Edison Company of New York, Inc. is directed to submit testimony in the pending electric and gas rate proceedings, within 20 days of issuance of this Order, regarding metrics that can be used by the Commission to monitor the success of the Advanced Metering Infrastructure project based on the benefits related to system operation, outage management, and billing errors.

5. In the Secretary's sole discretion, the deadlines set forth in this order may be extended. Any request for an extension must be in writing, must include a justification for the extension, and must be filed at least one day prior to the affected deadline.

6. These proceedings are continued.

By the Commission,

(SIGNED) KATHLEEN H. BURGESS
Secretary

Appendix A

| Benefit | 20 Year 6.1% NPV (millions) |
|---|---|
| **A. Cost** | |
| O&M Expense for AMI System | $552 |
| New Capital Investment for AMI System | $1,074 |
| **Subtotal - Cost** | $1,627 |
| **B. Cost Reduction Benefits** | |
| Meter Reading Labor | $353 |
| Field Services Labor | $238 |
| Meter Capital | $300 |
| Contractor and Company Outage Management Labor | $86 |
| Interval Metering | $47 |
| Gas Meters | $47 |
| Call Center Labor | $39 |
| Distribution System Capital Expenditure Reductions | $35 |
| Billing Improvements | $16 |
| Meter Reading Support Systems | $16 |
| Distribution Transformers O&M Savings | $8 |
| Solar Support | $36 |
| System Retirement | $61 |
| **Subtotal - Cost Reduction Benefits** | $1,282 |
| **C. Customer and Company Benefits** | |
| Revenue Protection | $388 |
| Meter Accuracy/Irregular Meter Conditions | $491 |
| Conservation Voltage Optimization | $346 |
| Bad Debt | $34 |
| Demand Side Management Expansion | $90 |
| Inactive Meter/Unoccupied Premises | $75 |
| **Subtotal - Customer and Company Benefits** | $1,424 |
| Total Benefits = B+C | $2,706 |
| **Benefits minus Cost = (B+C) - A** | **$1,079** |

Appendix B

| Sample AMI Performance Metrics | |
|---|---|
| Metric | Metric Description |
| **Customer Engagement** | |
| 1. Online Portal | a. Number of customer users<br>b. Number of low income and elderly users |
| 2. Awareness/ Education | Customer knowledge of AMI |
| 3. Community Outreach | Number of community organizations contacted |
| **Billing** | |
| 1. Bill Error | Reduction in billing errors |
| **Outage Management** | |
| 1. ETR | Timely and accurate ETRs |
| 2. Outage Frequency | Reduction in frequency of outages |
| 3. Outage Duration | Reduction in duration of outages by improved crew dispatch and DER deployment |
| 4. O&M Cost Reduction | Emergency response labor cost reduction |
| 5. Power Quality | a. Reduction in power quality complaints<br>b. Identification of power quality issues through AMI |
| 6. Customer Satisfaction | Customer satisfaction after a major storm/emergency event |
| 7. False Outages | Number of false outages determined through AMI |
| **System Operations** | |
| 1. Line Loss | Reduction in unaccounted line loss |
| 2. Peak Load | Reduction in peak load |
| 3. Meter Operation | Reduction in meter operation cost |
| 4. Distribution Automation | Expansion of distribution automation |
| **Miscellaneous** | |
| 1. Meter malfunctions | Number of AMI meter malfunctions. |
| 2. AMI Deployment | Number of AMI meters deployed monthly/quarterly/semiannually/annually |
| 3. Vehicle Usage | Reduction in vehicle miles driven, vehicle fuel consumption, and vehicle emissions |
| 4. Real Time Data | Number of customers who have access to real time data in 2017 after AMI meter installation |
| 5. Third-Party Involvement | Number of programs and offers provided to customers as a result of AMI |

Commissioner Diane X. Burman, concurring:

As reflected in my comments made at the public session on March 17, 2016, I concur on this item.