Consolidated Edison

Distributed System Implementation Plan

June 30, 2020

conEdison

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FIGURES AND TABLES

LIST OF ACRONYMS

- A/C – Air conditioning
- ADMS – Advanced distribution management system
- AMI – Advanced metering infrastructure
- API – Application program interface
- BCA – Benefit cost analysis
- BESS – Battery energy storage system
- BIR – Business incentive rate
- BQDM – Brooklyn Queens Demand Management
- BTM – Behind-the-meter
- CaaS – Charging-as-a-service
- CAGR – Compound annual growth rate
- CCA – Community Choice Aggregator
- CDG – Community distributed generation
- CES – Commercial Energy Solutions
- CESIR – Coordinated Electric System Interconnection Review
- CHP – Combined heat and power
- CIM – Common information model
- COD – Commercial operation date
- COF – Certificate of Fitness
- C&I – Commercial and industrial
- CLCPA – Climate Leadership and Community Protection Act
- CPMS – Customer Project Management System
- CSRP – Commercial System Relief Program
- CES – Customer Energy Solutions
- CVO – Conservation Voltage Optimization
- DCFC - Direct-current fast charger
- DCX – Digital Customer Experience
- DEC – Department of Environmental Conservation
- DER – Distributed energy resources
- DERMS – DER management system
- DG – Distributed generation
- DLC – Direct Load Control
- DLRP – Distribution Load Relief Program
- DMAP – Demand management analytics platform
- DMP – Demand management program
- DMTS – Demand management tracking system
- DOB – Department of Buildings
- DOT – Department of Transportation
- DPS – Department of Public Service
- DR – Demand response
- DRIVE – Distribution Resource Integration and Value Estimation
- DRMS – Demand response management system

- DSA – Data Security Agreement
- DSIP – Distributed System Implementation Plan
- DSM – Demand-side management
- DSO – Distribution system operator
- DSP – Distributed System Platform
- DSS – Distribution Switching Station
- EAM – Earnings Adjustment Mechanism
- ECM – Energy conservation measure
- EDAP – Enterprise data analytics platform
- EDI – Electronic Data Interchange
- EE – Energy efficiency
- EEDM – Energy efficiency and demand management
- EM&V – Evaluation, measurement and verification
- EPA – Environmental Protection Agency
- EPRI – Electric Power Research Institute
- ESCO – Energy service company
- ESR – Energy storage resource
- ESS – Energy storage system
- ETIP – Energy Efficiency Transition Implementation Plan
- EV – Electric vehicle
- EVSE – Electric vehicle supply equipment
- FDNY – Fire Department of the City of New York
- FERC – Federal Energy Regulatory Commission
- FLISR – Fault location, isolation, and service restoration
- GBC – Green Button Connect
- GBD – Green Button Download
- GE-MARS – General Electric – Multi-Area Reliability Simulation
- GHG – Greenhouse gas
- GIS – Geographic information system
- HAN – Home-Area Network
- HVAC – Heating, ventilation and air conditioning
- ICAP – Installed capacity
- IEEE – Institute of Electrical and Electronics Engineers
- IOAP – Interconnection Online Application Portal
- IoT – Internet of Things
- IPWG – Interconnection Policy Working Group
- IT – Information technology
- ITWG – Interconnection Technical Working Group
- LED – Light emitting diode
- LMI – Low- and moderate-income
- LSRV – Locational System Relief Value
- M&C – Monitoring and control
- M&S – Main and service
- MCOS – Marginal cost of service
- MDIWG - Market Design and Integration Working Group

- MDMS – Meter Data Management System
- MHV – Medium and heavy duty vehicles
- MIWG – Market Issues Working Group
- MNPR – Modernized network protector relays
- MTA – Metropolitan Transportation Authority
- NDA – Non-Disclosure Agreement
- NEM – Net energy metering
- NERC – North American Electric Reliability Corporation
- NIST – National Institute of Standards and Technology
- NRI – Network reliability index
- NWS – Non-wires solution
- NY-BEST – New York Battery and Energy Storage Technology Consortium
- NYISO – New York Independent System Operator
- NYPA – New York Power Authority
- O&R – Orange and Rockland Utilities, Inc.
- OMS – Outage management system
- P4P – Pay for Performance
- PII – Personally identifiable information
- POC – Proof of concept
- PON – Program opportunity notice
- PVL – Poly-voltage load flow
- R&D – Research and development
- REV – Reforming the Energy Vision
- RLT – REV Leadership Team
- RFP – Request for proposals
- RMS – Remote monitoring system
- RPC – Regulatory Policy Committee
- RTU – Remote terminal units
- SCADA – Supervisory control and data acquisition
- SCNY – SmartCharge New York
- SCT – Societal Cost Test
- SEP – Strategic Energy Partnership
- SHR – Smart Home Rate
- SIIWG – Smart Inverter Initiative Working Group
- SIR – Standardized Interconnection Requirements
- SME – Subject matter expert
- SP – Special Publication
- T&C – Terms and conditions
- T&D – Transmission and distribution
- T&L – Test and learn
- TBtu – Trillion British Thermal Units
- TCO – Total cost of ownership
- TO – Transmission owner
- TOU – Time-of-use
- UBP – Uniform Business Practices

- UER – Utility Energy Registry
- V2G – Vehicle-to-grid
- VDER – Value of DER
- VPP – Virtual power plant
- VVO – Volt/VAR optimization
- WAP – Weather-adjusted peak
- ZEV – Zero emission vehicle

EXECUTIVE SUMMARY

Con Edison is excited to present its third distributed system implementation plan ("DSIP") to increase customer choice and promote a sustainable and clean energy future. The DSIP supports the State's clean energy goals under the Climate Leadership and Community Protection Act ("CLCPA") and reflects the Company's commitment to furthering the State's vision by:

- Tripling energy efficiency ("EE") by 2030.
- Providing 100 percent clean energy by 2040.
- Integrating a portfolio of energy storage solutions.
- Giving all-in support for electric vehicles ("EVs").
- Accelerating reduction of fossil fuels for heating.

As the planner, builder, and operator of an increasingly sophisticated and complex electric system, Con Edison is developing the people, processes, and systems necessary for a reliable, resilient, and increasingly dynamic grid. The Company's investments under the Reforming the Energy Vision ("REV") initiative helped provide the foundation for a more flexible system that can effectively integrate a significant increase in renewable energy, including distributed energy resources ("DER").[1] Many of these investments provide multiple customer benefits, simultaneously supporting decarbonization, increasing resiliency to extreme weather events and climate change, growing DER adoption, and improving the customer experience.

The plans detailed in this DSIP are aligned with the Company's Electric Long-range Plan, which outlines how Con Edison is designing and investing in the electric grid to create a sustainable energy future.[2] Similarly, the DSIP was informed by the Company's Climate Change Vulnerability Study ("Vulnerability Study"), which identified potential risks from heat, flooding, and extreme and multi-hazard events, and proposed operational, planning, and design mitigation actions.[3] An implementation plan detailing priority actions for the next 5, 10, and 20 years is under development and will be completed by December 31, 2020. These actions complement and build on the extensive investments in system hardening and resiliency the Company made post-Hurricane Sandy, as well as ongoing investments under REV to support DER market growth.

Con Edison is committed to being a next-generation clean energy company and continues to take on the challenges of the State's energy policy goals. The Company's strong performance on key metrics formalized by the New York Public Service Commission ("Commission") as Earnings Adjustment Mechanisms ("EAMs") demonstrates the success of the performance-based incentives established under REV in promoting policy priorities, including DER utilization, electric peak reduction, and greenhouse gas ("GHG") emissions reduction from beneficial electrification. In 2019, the Company's performance exceeded the maximum stretch targets for five of its seven EAMs.[4]

[1] For purposes of this filing, DER is defined as end-use energy efficiency ("EE"), demand response ("DR"), distributed storage, and distributed generation ("DG").
[2] https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/electric-long-range-plan.pdf
[3] https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-vulnerability-study.pdf
[4] https://investor.conedison.com/static-files/72299589-a2fe-412e-a9f5-7ff8cb80e72a

Expansion of EE

EE is a critical building block to reducing energy usage and greening the grid and Con Edison has been an industry leader for over a decade. Since 2009, more than 1 million customers have upgraded to energy efficient equipment, saving more than 7 million metric tons of carbon emissions—equal to taking more than 1 million cars off the road.[5] The Company is driving increased peak savings from its EE and demand management ("DM") programs, contributing a total of nearly 1,050 MW in peak demand reduction by the end of 2025, thus mitigating overall growth in the system peak.[6] Building on this foundation, Con Edison will triple its EE programs with an investment of more than $1.5 billion by 2025, helping customers save energy and lower their utility bills. As part of this effort, the Company will provide easier access to programs and information for customers and building owners who want to reduce their use of fossil fuels and better manage their energy use. Utility actions will facilitate the growth in EE and building electrification through utility programs and enabling the development of a robust, dynamic marketplace for third-party EE products and services.

Significant DER growth

Con Edison has made significant progress in advancing the State's goals and building the capabilities for a distributed system platform ("DSP") that supports greater DER adoption. Specifically, improvements to the interconnection process are providing enhanced value to developers by allowing viable projects that pass the State-developed screens to quickly advance to interconnection or using screening results to verify the need to perform a detailed study. These improvements have enabled the interconnection of over 80 MW of solar capacity connected to Con Edison's distribution system since January 1, 2018, for a total of 293 MW of distribution-connected solar. Similarly, distribution-connected energy storage has grown to 11 MW, representing a 247 percent increase since January 1, 2018.

2 MW/10 MWh distributed battery system serving BQDM

The Company is working on a new DER forecasting tool that will better incorporate new technologies and end-uses, such as storage and building electrification, and will have the architecture and design in place to allow for future extension to EVs, solar PV, and other DER technologies. The new tool and other advancements in forecasting will allow the Company to adapt the forecast as trends shift and policy actions are implemented.

Enhanced customer engagement tools and strategies

Con Edison is continuously looking for ways to work with its customers, including low and moderate income ("LMI") customers, and provide solutions to their energy needs. For example, in coordination with NYSERDA, Con Edison is investing more than $175 million to support EE and DM programs for LMI customers as part of a statewide framework

[5] Con Edison 2019 Sustainability Report. https://www.conedison.com/ehs/2019-sustainability-report/

[6] This includes demand reduction from past achievements and excludes past and projected savings from programs administered by New York State Energy Research and Development Authority ("NYSERDA") and New York Power Authority ("NYPA").

for LMI customer programs. The Company is committed to providing customers with the information, education, and tools to make more informed energy decisions, as well as finding new ways to meet and exceed customer expectations.

The Company is evolving and expanding its customer programs to promote heat pumps, developing a framework for non-pipeline solutions, and incorporating program best practices to increase customer participation and achieved savings. Additionally, Con Edison has provided EE product training to more than 1,000 independent contractors to engage market partners, increase product knowledge, and provide tools to work directly with customers to deliver EE.

Several efforts are underway to promote customer EV awareness and adoption, including incentives for charging off-peak and a website that allows customers to compare the cost of purchasing and operating an EV to the cost of a similar gas-powered vehicle.[7] Further, the Company provides incentives for EV chargers and charger make-ready infrastructure, and is actively participating in and supports the development of the light-duty make-ready program to facilitate development of the charging infrastructure necessary to achieve the State policy goal of 850,000 zero emission vehicles ("ZEVs") by 2025.

The rollout of smart meters also creates new opportunities to engage customers by expanding tools to increase energy awareness and promote market development. As of June 1, 2020, Con Edison has installed over 2.65 million smart meters in Con Edison's service territory, representing over 50 percent of total deployment. The meters will serve as the backbone of future digital advances for our energy systems and help customers reduce energy use and save money, while also enabling the Company to operate the grid more efficiently, more easily integrate energy produced within the distribution system, and lower operating costs.

LMI CUSTOMER SUPPORT

The Company is committed to its LMI customers.

In 2019, the Multifamily program reached approximately 750 affordable multifamily buildings.

The Company also partnered with food banks to distribute LEDs to approximately 60,000 customers. In coordination with the statewide LMI EE effort, the Company is exploring additional strategies to expand its programs for this customer segment.

Expanded data sharing

The Company has increased the amount of customer and system data available to customers and authorized third parties, which helps developers with business case development and promotes customer choice. The Company launched Phases II and III of Green Button Connect ("GBC") implementation, which expanded the datasets automatically available to registered third parties. Con Edison continues to provide online guidance and support to third parties on how to register for data access and receive data through GBC and other third-party data access sites.[8] For building benchmarking, the Company uses its web service to automatically import building data directly into Energy Star Portfolio Manager®, which is the U.S. Environmental Protection Agency's ("EPA") online tool for benchmarking energy and water consumption with similar buildings nationwide.[9]

For system data, a centralized website directs third parties to Con Edison's hosting capacity map, which serves as the Company's system data portal and concentrates relevant data in one location. The hosting capacity map includes useful data on system characteristics to give developers further insight into business opportunities, such as 8,760 load

[7] https://cars.coned.com/
[8] https://www.coned.com/en/business-partners/access-customer-data
[9] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

forecasts and queued and installed DG at different points on the grid. Recent releases refreshed the hosting capacity analysis and provided additional data pop-up items and tables with downloadable feeder-level summary data. The Company will continue to improve data access and visualization, drawing on stakeholder input.

Continued market enablement

Con Edison is enabling market growth by expanding opportunities for DER to provide and be compensated for grid services. For example, Con Edison is successfully implementing portfolios of third-party NWS to defer traditional infrastructure investments planned for the Company's Water Street and Newtown Area Substations. Additionally, the Company is innovating within its utility programs to drive increased savings and promote market transformation, thus creating new opportunities for EE and DR suppliers and developers. The Company launched two rate pilots to test customer responsiveness to new rate designs and improve the alignment between the price of electricity delivery and the actual cost of providing service.

Further, through the largest energy storage solicitation to date in the State, the Company is creating opportunities for third parties to seed the storage market in New York. This is in addition to ongoing storage opportunities through customer programs and tariffs, development of a make-ready site on Company property where third parties can install storage and EV quick chargers, and a competitively sourced utility-scale battery to be located at the Company's Fox Hills substation. The Company, as the DSP, will play an important role in integrating technologies added to the system and managing assets for system benefits.

NEVINS STREET MAKE-READY SITE

Con Edison is making a vacant Company-owned property available for up to 10 MW / 60 MWh of energy storage.

The Company is providing the electrical infrastructure and offsetting the cost of interconnection.

The site will also be paired with EV quick charging stations to provide significant operational value and societal benefits to the grid and customers through multiple value streams.

Additionally, the Joint Utilities and the New York Independent System Operator ("NYISO") continue to collaborate to promote DER integration and market services.[10] As part of these efforts, Con Edison is working with NYISO on a DER aggregation pilot that will examine the interoperability of jointly operated storage assets, test the *Draft DSP Communications and Coordination Manual*,[11] and pilot new communications technologies that can be used as lower cost alternatives for monitoring and control of distributed assets. The Joint Utilities have also developed a *Draft DSP-Aggregator Agreement for the NYISO Pilot Program*[12] to further define the roles and responsibilities between the DSP and DER aggregators.

Implementation of DSP capabilities

DSPs are comprised of the people, processes, and systems that allow utilities to provide three core, interrelated services: (1) facilitating expanded DER integration, (2) sharing information that helps third parties identify and evaluate

[10] The Joint Utilities are Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc. ("CECONY"), New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation d/b/a National Grid, Orange and Rockland Utilities, Inc. ("O&R"), and Rochester Gas and Electric Corporation.

[11] Joint Utilities of New York, *Draft Joint Utilities DSP Communications and Coordination Manual* (updated July 2018). http://jointutilitiesofny.org/wp-content/uploads/2018/07/JU-DSP-Communications-and-Coordination-Manual-DRAFT-2.pdf.

[12] Joint Utilities of New York, *Draft Joint Utilities DSP-Aggregator Agreement for NYISO Pilot Program* (updated July 2018). http://jointutilitiesofny.org/wp-content/uploads/2018/07/JU-DSP-Aggregator-Agreement-for-NYISO-Pilot-Program-DRAFT.pdf.

business opportunities and helps customers understand their energy usage, and (3) expanding market services. For example, the Company is evolving its planning and operations to better integrate DER by:

- Installing advanced relays and telemetry in the underground system to facilitate two-way power flow.
- Forecasting DER at more granular levels to more accurately reflect its impact on demand, which will be facilitated by smart meter data and new forecasting tools.
- Continuing to identify and evaluate NWS as part of the capital planning process.
- Enhancing the hosting capacity map to provide additional data and insight to developers.
- Improving the interconnection process to increase transparency and bring projects online quicker and expanding it to address more technologies and configurations.
- Facilitating energy storage by removing technical and economic barriers through programs, procurements, pilot projects, and tariffs.

The result is a streamlined process for identifying DER opportunities and bringing new DER online, which is driving improvements in customer and developer satisfaction and facilitating greater DER deployment.

Modernization of the Grid

The CLCPA goals and the findings of the Company's Vulnerability Study necessitate moving faster and broader to modernize and build out the electric grid, including investment in transmission capacity to accommodate renewable generation, adding new capabilities to the distribution grid, and expanding the role of third-party projects and resources. The energy system transformation envisioned by the CLCPA heightens the role of the DSP as the foundation of a reliable and resilient grid that enables integration of large-scale renewables and energy storage at the transmission level and streamlined interconnection and integration of DER at the distribution level. Accordingly, the Company continues to invest in modern, cost-effective solutions to expand renewable energy deliverability and increase reliability. For example, the Company successfully deferred a substation need as part of the Plymouth/Water Street NWS portfolio and replaced the project with a less expensive Distribution Switching Station ("DSS") at Vinegar Hill that will add capacity and provide operational flexibility.

Through strategic investments in foundational technologies and advanced capabilities, the Company is making steady progress executing its Grid Modernization Plan and creating a modern grid that is flexible and agile in the face of industry change. For example, following extensive benchmarking and business case validation, the Company is proceeding with implementing an enterprise-wide geographic information system ("GIS"), which is foundational to a DER management system ("DERMS"). The GIS will offer one consolidated mapping and visualization system that stores the physical location and other operating characteristics of facilities and assets, including DER, and maintains the as-built model of the electric and gas distribution systems. It will also be the backbone for the connectivity model that shares information and provides feedback across the grid.

With the funding approved in Con Edison's current rate plan, the Company is also progressing in its DERMS functionality with the eventual goal of allowing system operators to monitor DER assets at the grid edge and forecast DER performance on a forecasted (day ahead) and real-time basis. This information will help system planners and operators assess whether there may be feeder issues as DER performance ramps up or down.

In light of the COVID-19 pandemic, the Company has worked to adjust operations to reflect new conditions and guidelines, modify implementation schedules where impacted, and understand near-term changes to load. The Company will continue to evaluate the longer-term impacts of COVID-19 on customer usage. The effects of COVID-19 on operations and project timelines are addressed in applicable sections throughout the document. Con Edison remains

committed to providing safe and reliable energy to customers, while maintaining safe and healthy work practices in accordance with City and State guidelines.

Ongoing stakeholder outreach

The Joint Utilities continue to collaborate with each other through working groups and with stakeholders through targeted stakeholder meetings, as well as broader stakeholder updates. To better understand the needs of stakeholders, the Joint Utilities conducted a survey soliciting feedback regarding the value obtained from the 2018 DSIPs, as well as potential modifications for future DSIPs. The survey included questions to identify which stakeholders are engaged, as well as their level of engagement. The results of the survey were presented during a webinar on December 11, 2019.

Based on the feedback received through the survey, the Joint Utilities updated the content, structure, and timing of the DSP Enablement Summary document to become a quarterly newsletter to share updates with stakeholders. The quarterly DSP Enablement Newsletters provide stakeholders with pertinent updates related to the DSIP five-year plans that occur within the two-year DSIP cycle, as well as highlight the availability of updated data or information. The result is a more succinct snapshot of how the utilities are making progress, as well as more ready access to information sources that are updated more frequently than the two-year DSIP cycle.

In addition, the Joint Utilities intend to hold semi-annual stakeholder webinars to review items contained in the newsletters and solicit stakeholder input. The most recent stakeholder webinar was conducted on April 23, 2020. The Joint Utilities' website is also continually updated with new resources, including regulatory filings and newsletters, and important stakeholder meeting information.

As with previous DSIPs, the Company will partner with O&R to present their respective DSIPs, and preview plans for 2021. A combined virtual stakeholder meeting is planned for late summer.

Conclusion

New York State is in the process of transforming its energy sector, with the electric system being called on to deliver greater choice and value to customers in the form of a cleaner and more modern grid capable of accommodating and leveraging an increasingly diverse resource mix. Con Edison is supportive of the State's ambitious clean energy goals and looks forward to being a part of this groundbreaking effort, including collaborating with stakeholders on how best to move forward to achieve the CLCPA goals.

Con Edison's DSIP is a practical, actionable, and evolving plan to enhance existing capabilities and develop new tools and processes to support the State's energy policy goals. The plan is drawn from ongoing collaboration with the Joint Utilities, including continued development of common standards, protocols, and processes that will support statewide markets and allow for greater convergence of capabilities over time. Con Edison welcomes the opportunity to share this plan with stakeholders and work collaboratively to implement it and support the State's clean energy goals.

1. PROGRESSING THE DSP

1.1. INTRODUCTION

This is Con Edison's third DSIP, but the first following the passage of the CLCPA, which represents a significant expansion and acceleration of the State's clean energy goals. The CLCPA sets the vision of net zero GHG emissions across all sectors within the next thirty years, including 70 percent renewable energy by 2030 and a 100 percent carbon neutral electric system by 2040. While beyond the five-year horizon of the DSIP, these goals require a reassessment of current efforts to align with the CLCPA goals. The Company's foresight, driven by its support of clean energy objectives in combination with efforts to develop DSP capabilities, position the Company well to integrate increasing amounts of DER and clean energy resources, operate a more dynamic and flexible grid dominated by renewable energy, and enhance the customer experience.

This DSIP highlights major accomplishments since the July 2018 DSIP and outlines the actions planned over the next five years to further develop the DSP in line with REV objectives and advance State policy goals. As discussed throughout the filing, the Company has sustained momentum and made additional progress in evolving the people, processes, and systems that underpin the DSP and adding new capabilities, particularly in DER integration. The Company will build on this progress over the next five years to further prepare for a decarbonized system that is resilient, reliable, and responsive to customer needs.

This filing presents Con Edison's overarching approach to enhancing DSP capabilities and responds to DPS Staff's whitepaper ("2018 DSIP Guidance"),[13] which clarifies the purpose of the DSIP filings and outlines the required contents. As stated in the 2018 DSIP Guidance, the purpose of the filing is to:

(1) Report on the utility's progress.
(2) Describe in detail the utility's plans for implementing necessary policies, processes, resources, and standards.
(3) Identify and describe how to access the tools and information that DER developers and other third parties can use to understand utility system needs and potential business opportunities.
(4) Describe how the utility's planning efforts are organized and managed.
(5) Describe how the utility's implementation efforts are organized and managed.[14]

The Company developed this DSIP with these objectives in mind. Because previous DSIPs provided a significant amount of background information on current practices and capabilities, this DSIP focuses on subsequent actions and results, with the aim of creating a useful reference guide to ongoing and future utility actions.

The DSIP is organized around the topics and outline of the 2018 DSIP Guidance. For each topic section, the DSIP provides general context and background information to orient the reader and presents an overview of achievements since the Initial DSIP and planned future actions. Each topic section also discusses implementation risks and the interface with stakeholders. These introductory sections are followed by responses to the itemized questions in the 2018 DSIP Guidance. To support information sharing while managing the volume of information provided in this DSIP, Con Edison directs readers, where applicable, to resources for additional information, such as those listed in Table 1. The Company provides a more detailed list of tools and resources as Appendix C.

[13] Case 16-M-0411, *In the Matter of Distributed System Implementation Plans* ("DSIP Proceeding"), DPS Staff Whitepaper: Guidance for 2018 DSIP Updates (issued May 30, 2018) ("2018 DSIP Guidance").
[14] *Id.,* p. 4.

Table 1: Examples of Additional Resources

Resource	Web Link
Con Edison's 2016 Initial DSIP	http://jointutilitiesofny.org/wp-content/uploads/2017/05/2ECF5647-BC11-4895-8DE8-7A3280E0E706-Con-Edison.pdf
Con Edison's 2018 DSIP	https://jointutilitiesofny.org/system-data/#tab-1497664740388-11-3
Con Edison website	https://www.coned.com
Joint Utilities website	http://jointutilitiesofny.org/home/
REV Connect	https://nyrevconnect.com

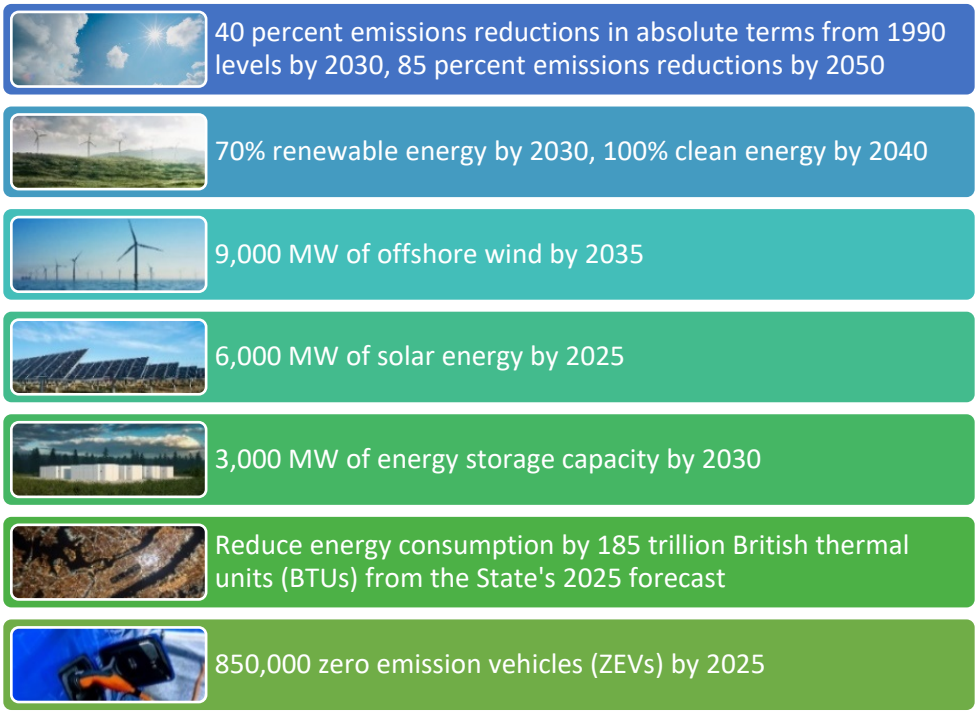
1.2. LONG-TERM VISION FOR THE DSP

Summary

The Commission's policy proceedings, including the REV effort, are progressing a comprehensive energy plan for New York that considers system efficiency, reliability and resilience, market animation, utility business models, customer empowerment, and GHG emissions reduction. Efforts in these areas have served as a critical starting point for the DSPs to expand distribution-level investments to enable more active participation of customers and DER in the New York energy marketplace.

Since the 2018 DSIP, the clean energy policy focus in New York has expanded beyond an emphasis on distribution-connected, small-scale energy resources to one which includes advancing decarbonization through larger-scale resources such as offshore wind and utility scale solar and fundamental shifts of demand toward electrification of transportation and building heating. The passage of the CLCPA in June 2019 furthers this evolution and expands upon the foundation established by REV. The CLCPA codifies multiple goals, targets, and policies designed to drive changes in the energy sector, as well as the broader New York economy, toward net zero GHG emissions over the coming decades (Figure 1). Con Edison will play a significant role in achieving the clean energy transition for New York State, including functions both at the distribution and transmission levels.

Figure 1: Summary of CLCPA Goals Plus Zero Emission Vehicle Regulation Targets

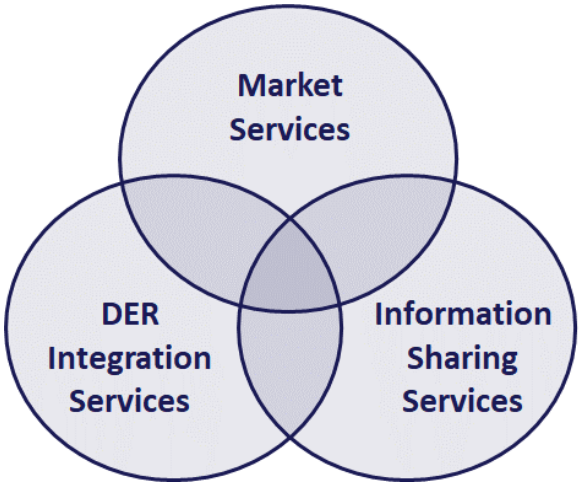


The CLCPA places an increased emphasis on large-scale renewables, beneficial electrification, and serving disadvantaged communities. The Company's vision is adapting accordingly. While Con Edison has long supported and planned for growth in renewable generation at both the distribution and transmission level, the CLCPA establishes a set of goals, targets, and policies to inform how New York will achieve carbon emissions reductions throughout the economy as it utilizes a vastly higher penetration of clean generation resources like solar PV and wind, which in turn will require

significant investments in transmission and distribution to deliver that clean energy to customers. Electrification of much of the State's transportation and space heating is expected to provide a meaningful portion of the State's carbon emissions reduction goals. Large-scale electrification will put upward pressure on electricity demand, with heating electrification impacting the winter peak. The DSP must continue to enhance its capabilities to be able to more dynamically manage these loads and accommodate increasing amounts of renewable generation in a manner that is safe, reliable, and efficient.

At the distribution level, the Joint Utilities' DSP vision continues to focus on facilitating the growth of distributed clean energy resources by providing three interrelated DSP services – DER integration, information sharing, and market services. Through these services, DSPs will deliver value for electricity customers and market participants through expanded customer choice, greater use of DER as a grid resource, and enhanced access to value streams that compensate DER for their realized distribution and wholesale value. The Company will continue to make coordinated investments to develop a DSP that manages a fully integrated grid. Con Edison has made progress in enhancing capabilities to provide services in all three areas (Figure 2) and details are provided throughout this DSIP update.

Figure 2: Long-Term Goals for DSP Functions within Each Core DSP Service Area



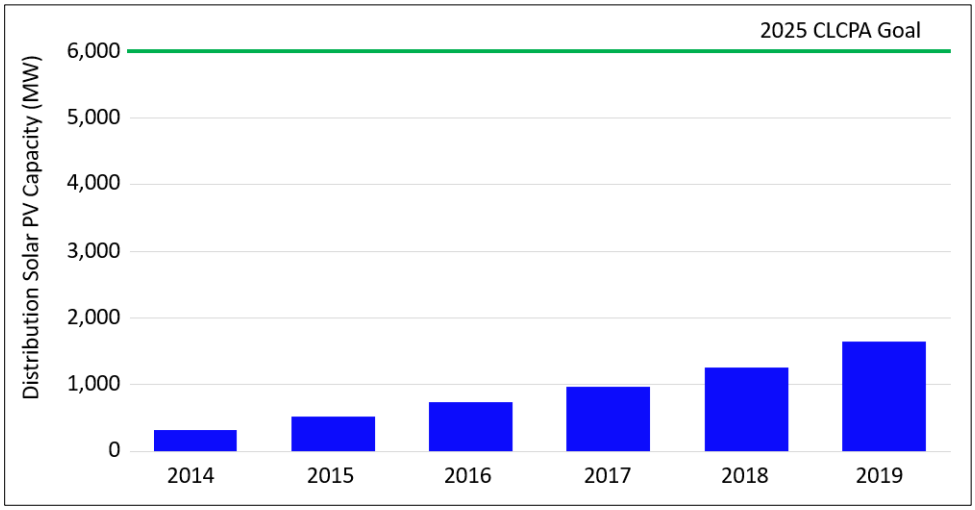
Nation-leading State Clean Energy Goals Emphasize the Importance of DSP Capabilities

The CLCPA sets a number of targets for specific technologies that will impact the resource mix in New York and enable a cleaner energy future. Our vision includes these targets, and the Company expects that supporting investments to achieve them will continue, leveraging the DSP building blocks that have been implemented or are in progress. Implementing the plans presented in this DSIP will create benefits for the distribution system customers and support expanded bulk system transmission capacity and market opportunities, where significant growth will need to occur in order to meet targets.

Figure 3 illustrates the recent trajectory for distributed solar PV growth, as well as the remaining work to achieve the CLCPA goal of 6,000 MW of distributed solar PV by 2025. The utilities' collective efforts to streamline interconnection, enhance planning processes, and deploy grid technologies have enabled significant growth of solar PV on the distribution system, achieving a five-fold increase in installed capacity from 2015 through 2019.

As detailed by NYSERDA[15] and illustrated in Figure 3, there will need to be accelerated growth of distribution-level solar PV to meet the CLCPA goal in 2025. However, to enable this accelerated growth and achieve the CLCPA target, significant investments will be needed to manage the increase in distribution-level solar PV and to enhance flexibility to operate an increasingly dynamic distribution system. Separately, the recently-enacted "Accelerated Renewable Energy Growth and Community Benefit Act"[16] explicitly recognizes the need to make major transmission investments and streamline siting of large-scale renewables to accommodate the bulk system renewable generation that will be needed to move from New York's current 28 percent of electricity that comes from renewable sources to the CLCPA's target of 70 percent by 2030.[17] Therefore, the Company's vision for the DSP incorporates this evolving understanding of the need to continue supporting more advanced distribution system DER integration and operation, while enhancing capabilities to integrate and manage renewable generation resources across the entirety of the delivery system.

Figure 3: New York's Progress Toward CLCPA Goal of 6,000 MW of Solar PV by 2025[18]



Advanced DSP capabilities will also help achieve the State's goal of 850,000 ZEVs by 2025. While the Company's efforts to advance EV demonstrations, pilot projects, and charging infrastructure awareness have helped New York State's light-duty EV deployment grow to nearly 50,000 vehicles, the current pace of EV adoption will need to increase to achieve the State policy targets. The Joint Utilities will play a key role in developing EV charging infrastructure and facilitating customer awareness of transportation electrification benefits. The Joint Utilities continue working with DPS Staff and other stakeholders on approaches toward a highly flexible framework that will help facilitate achievement of the light-duty make-ready program goals. The framework is currently the subject of a proceeding in Case 18-E-0138, through which the Company seeks to align future transportation electrification programs' objectives with appropriate recognition of the diverse interests of EV charging service providers and EV charging site hosts, while also providing benefits to all utility customers.[19]

Beyond these two technology types, the DSP will also need to expand investments in other areas to achieve the CLCPA goals. Enhanced EE and DR programs will drive lower levels of consumption and lower system peaks, thus improving

[15] NYSERDA, *Toward a Clean Energy Future: A Strategic Outlook 2020-2023*, https://www.nyserda.ny.gov/-/media/Files/About/Strategic-Plan/strategic-outlook.pdf.
[16] https://www.budget.ny.gov/aubs/archive/fy21/exec/30day/ted-artvii-newpart-jjj.pdf
[17] https://www.eia.gov/state/analysis.php?sid=NY
[18] https://data.ny.gov/Energy-Environment/Solar-Electric-Programs-Reported-by-NYSERDA-Beginn/3x8r-34rs/data
[19] Case 18-E-0138, *Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure* (EV Proceeding).

cost-effectiveness and reducing GHG emissions. Expanded deployment of energy storage will provide additional system flexibility and help integrate increasing levels of variable renewable generation.

Given the forthcoming growth across these clean energy technologies, the Company has incorporated into its vision an understanding that enhanced flexibility – a longstanding focus of DSP enablement efforts – is critical to achieving CLCPA targets. In particular, the future grid will require enhanced flexibility of load and DER to manage constraints on the distribution and transmission systems. The DSP serves as the link between the bulk power system and the end-user and plays a critical role in enabling the interconnection, integration, and reliable dispatch of all clean energy resources, with the goal of enhancing system and customer value.

The DSP envisions using markets to procure new energy products at lower costs to customers than the alternatives. Markets are an important element in achieving the State's clean energy targets at the least possible cost for customers.

Providing Safe, Reliable Electric Service as the System Evolves and Integrates DER

Con Edison will continue to further enable the secure, safe, and rapid integration of DER, and to enable dynamic network management and interface with DER.

One of the three core aspects of the DSP is DER integration services, which the Joint Utilities define as the planning and operational enhancements that promote streamlined interconnection and efficient integration of DER into operations, while maintaining safety and reliability of energy delivery.

The long-term DSP vision includes more seamless DER integration into all aspects of system planning and operations. Beginning with interconnection, continued improvements to streamline the process will allow DER to receive interconnection approval faster and include tailored requirements to specific DER types and locations. As DER penetration levels increase, mutually beneficial flexible interconnection arrangements will be necessary to more actively manage DER in response to dynamic system conditions (e.g., by leveraging smart inverter functionality). Although development of a framework for adapting to new DER behavior and penetration levels will likely go beyond the five-year timeframe of this DSIP, the Company is taking near-term steps to enable this type of active network management and provide the DSP with greater operational flexibility.

Con Edison envisions a more robust planning process that preserves system safety and reliability while helping usher in a clean energy future. The DSP will maximize system benefits of an increasing number of DER while enabling the evolution of a more harmonized planning process across the transmission-distribution interface to effectively account for the anticipated impacts of clean energy resources interconnected and operating at all levels of the system.

The Company also envisions more dynamic operation of the distribution system. For example, local constraints may be eliminated with Company assets or DER, including storage and load transfers, responding to dispatch, operational control, or price signals for real and/or reactive needs. Con Edison has taken steps to prepare for this increasingly dynamic grid, including analyzing M&C and operational system requirements and coordinating with the NYISO to define operational coordination processes needed to facilitate DER wholesale market participation, especially with those DER seeking to both participate in NYISO wholesale markets and provide distribution services.

Sharing Useful, Market-Enabling Information that Enhances Customer Value

Con Edison strives to expand information services with the guiding principles of enhancing customer value and attaining the CLCPA's emission goals.

Information sharing services are comprised of communications and analytics systems that measure, collect, analyze, manage, and display granular customer and system data. Protecting customer privacy and security remains a core

Company responsibility in the context of developing and sharing appropriate system and customer information with market participants.

The Company has made significant progress in expanding the types of system and customer data available and continues to evolve mechanisms to improve access while safeguarding customer privacy and system security. As technology, planning, operations, and DER penetration levels advance, the Company envisions the need for more uniform information and access across the New York utilities, which potentially may be achieved through more standardized data formats and presentation on individual utility data portals, such as has been done with Company-specific hosting capacity maps in response to stakeholder input. The Company is an active participant in ongoing proceedings related to data sharing.

The Company is supporting the achievement of its information sharing objectives in many ways, including through its participation in the evaluation and potential advancement of a statewide data resource platform, implementation of GBC, and expansion of data availability associated with NWS opportunities. Not only will these types of efforts provide more uniform information across all the utilities, but by providing greater access to consistent, accurate, and up-to-date information, the DSPs will improve the efficiency of distribution market signals by creating greater information symmetry across the marketplace's buyers and sellers. The Company believes that these efforts will create additional customer value, preserve data privacy and security, and enhance the distribution marketplace by more clearly identifying beneficial locations.

Enabling a Robust Marketplace for DER to Access Value at All Levels of the Grid

Con Edison supports a more competitive, transparent marketplace for distribution-level electric services that delivers efficient outcomes for investment and operation at the lowest cost to customers.

Today, the Company offers DER compensation through broad tariff mechanisms (i.e., VDER and Value Stack and net energy metering ("NEM")), demand-side management ("DSM") programs, and direct contracting with resources (i.e., non-wires). Each mechanism plays an important role in kick-starting and accelerating DER adoption. The long-term DSP vision builds upon this starting point and leads to a future energy marketplace based more on competitive market signals, leveraging DER participation in the NYISO wholesale markets, and layering on accurate pricing and compensation for distribution system value. The development of a more competitive distribution marketplace that delivers more cost-efficient outcomes for customers depends on market opportunities that compensate resources based on actual performance and value. This alignment between system needs and resource performance effectively signals to customers and DER operators the relative value of the locational and temporal grid services required to maintain safety and reliability. This will enable the DSP to pay or be paid at a level commensurate with value provided, and potentially support peer-to-peer settlements or transactions. Increased levels of deployment of grid modernization technology, other complementary enabling systems, and more dispatchable DER are all necessary to unlock the benefits of sophisticated and granular of distribution market pricing signals and enable the Company to add distribution market services that offer value to customers.

Forthcoming integration of DER into the NYISO wholesale markets will serve as a major step toward realizing the DSP market vision. As DER begin to more fully participate in the wholesale market, the DSP will play a critical role in ensuring that the NYISO's dispatch of wholesale participatory DER is compatible with distribution system safety and reliability. Within the five-year time horizon, the Company believes that with enhanced planning, operational capabilities, and evolving market rules, the DSP will begin to take steps toward building more granular and market-based distribution value compensation mechanisms that complement, and do not duplicate or distort, the NYISO wholesale markets and other compensation mechanisms.

In addition to ongoing NYISO market changes, there are multiple proceedings at the Commission regarding the compensation of resources for various sizes, including those related to resource adequacy, renewable energy credit procurements, off-shore wind solicitations, the DPS-led Market Design and Integration Working Group ("MDIWG"), and the VDER and successor to NEM proceedings. The Joint Utilities remain active participants in these processes and are focused on advancing our vision of promoting pathways to market value for energy resources, delivering value to customers through a low-carbon energy mix and achieving price parity for consumption and injection of electricity to guide investments to cost-effective resources and support future bilateral and peer-to-peer transactions.

The Company continually reviews and refines its grid modernization requirements that are critical for enabling all aspects of the DSP, including delivery of a long-term, competitive, and dynamic distribution marketplace. Con Edison is currently implementing key investments (e.g., AMI, ADMS, grid automation, etc.) to further enhance needed operational capabilities for this future.

1.3. DSP PROGRESS AND IMPLEMENTATION ROADMAP

Con Edison has made significant progress in advancing the State's goals and building DSP capabilities. As noted above, Con Edison, working with the Joint Utilities, has focused DSP implementation efforts in three core aspects: (1) facilitating expanded DER integration, (2) sharing information that helps third parties scope business opportunities and helps customers understand energy usage, and (3) expanding market services.

Integrating DER is a central function of the DSP and a key enabler of higher levels of DER. Effective modelling and utilization of DER in distribution planning and operations is essential to maintaining system safety and reliability in a high-DER environment and provides the operational framework that allows DER to access and achieve value through the DSP and the wholesale market. Con Edison continues to advance DER integration capabilities, including implementing its DSP and grid modernization roadmap and developing the people, processes, and systems necessary for a reliable, resilient, and increasingly dynamic grid. The Company's investments under the REV initiative provide the foundation for a more modern and flexible system that can effectively deliver a significant increase in renewable energy, including from DER, to our customers. Many of these investments provide multiple customer benefits, simultaneously supporting climate goals, increased resiliency and adaptability, DER market growth, and improved customer experience.

Expanded information sharing, including more granular customer and system data, facilitates DER market development and deployment by signaling where DER can provide the greatest value to customers and the grid, which in turn supports investment decisions in new DER products and offerings by third parties and customers. As described in the Customer Data, System Data, and Hosting Capacity sections, the Company continues to increase the amount of data available to customers and third parties to facilitate market development and customer engagement, while protecting sensitive data.

Market services provide the framework for DER value capture, including opportunities to "stack" multiple value streams and participate in multiple markets, which can enable new DER business models and in turn drive increased DER adoption. Customers are at the center of Con Edison's long-term market vision. Value should, and can be, realized both for customers who host DER, as well as customers who receive energy from the grid. It is critical that the market mechanisms that develop over time both compensate DER for the value they provide to the broader set of customers and charge them when they are using grid services. Transparency into the structured compensation for and pricing of distribution products, will encourage efficient deployment and operation of DER and is a core principle of market services development.

Market services must also be flexible and adaptive to changes in technology and customer needs over time. New market services must complement existing marketing mechanisms to minimize disruption, as well as being designed with a vision of the future. As market services develop, the Company must be mindful to support DER integration in a way to manage the dynamic needs of a transforming grid to benefit all customers, both DER hosts and those exclusively receiving energy from the grid. Ultimately, both the enabling DSP technology as well as the market rules and processes must send efficient price signals and be designed flexibly enough to support changes in DER technology and customer preferences over time.

The remainder of this section focuses on key market services outcomes and the roadmap for future developments. Development of market services and mechanisms described herein are closely interrelated and dependent on developments in grid operations, planning, and ultimately the pace of DER adoption.

Market Services Objectives

The core objective of providing distribution market services is to support efficient, reliable grid operations and cost-effective operations of customer-sited DER. Important steps toward achieving this vision, such as the market rules that allow DER participation in the NYISO wholesale markets, are already underway.

Today, DER adoption has accelerated and is supported by tariff-based compensation mechanisms such as NEM and VDER. The State has recognized the need to transition away from NEM to structures like VDER that better reflect wholesale price signals, as well as distribution and environmental benefits in order to encourage efficient investment in and operation of DER to benefit all customers. Market services will need to continue to develop with these objectives in mind and should provide the ability for DER to participate in the NYISO's energy, ancillary, and capacity markets. As distribution market services evolve, the Company expects they will leverage more of the features of the existing wholesale markets to capture the most value for DER, which in turn will help facilitate the clean energy transition in a coordinated and cost-effective manner.

Con Edison is actively engaged in the DPS-led MDIWG, which is exploring the many aspects of distribution market development. As that effort continues to evolve, the Company will look to further develop and refine our market vision and roadmap. It is important to acknowledge that incremental market services will not be adopted overnight, nor should they, considering the evolving nature of DER and customers' needs, and current levels of adoption. The increasing levels of DER capacity participating in wholesale and distribution market functions will require significant ongoing investment in technology and enhancements to utility systems; which can be implemented in stages to achieve the end-state vision.

NYISO - DER Roadmap and Market Integration

DER market participation represents a major milestone for enabling future market services. Providing customers with DER access to both wholesale and distribution market values is more efficient than using imprecise proxies of wholesale market revenues and more practical than attempting to replicate wholesale markets in blunt or lagging price signals. Ultimately, the efficient outcome is direct participation in the NYISO markets, which has evolved over two decades of operation and considerable technology investment for the benefit of all consumers.

Following extensive engagement with a diverse set of market stakeholders, the NYISO markets have adopted industry leading DER market participation rules that will continue to roll-out this year. Most notably, the new rules will facilitate dual participation of DER in both wholesale and retail markets, with the exception of resources taking service under the VDER tariff, which already compensates them for energy and capacity benefits. Direct participation in wholesale and retail markets has recently been made available for individual DER currently interconnected to the system, and will extend to individual ESRs greater than 100 kW in September 2020 and aggregations in late 2021. Enabling direct participation in wholesale markets will allow for more efficient DER dispatch and operation, improve the economics of DER, and reduce the cost shifts between customers from subsidies and inefficient DER operation. Additionally, direct participation will provide for DER and DER aggregations to participate in financial and physical trading of wholesale products, thereby further animating the marketplace as originally envisioned by REV.

Communication and coordination channels have been developed among the DSP, Transmission Owners ("TO"),[20] NYISO, and DER Participants to facilitate effective dual participation. This coordination experience will be critical to operating a comprehensive market and realizing value for the integrated grid going forward. With this important foundation, the

[20] The term TO also encapsulates the operator function since it is the same entity.

DSP will be able to transition to a market that layers on distribution value market mechanisms that foster robust DER wholesale market participation.

Capturing Distribution Value in the Market

Over the past five years the adoption of distributed solar in Con Edison's service territory has made tremendous progress. Policies such as NEM and VDER have kick-started this adoption with great success when coupled with REV's financial tools, such as EAMs that encourage utilities to accelerate the DER adoption trend by setting stretch, yet achievable DER utilization targets. However, these policies require evolution to fit within the principles of sustainable market design. Specifically, the simplified nature of the tariff-based mechanisms can distort market signals and lead to significant cost shifts from customers who host DER technology to those who do not. Now that the market is maturing, the State and other stakeholders have recognized the need to incorporate more transparency and direct linkage between value creation and compensation, and to attribute costs and benefits to customers equitably. Incentives will likely be needed for some time to keep pace with the clean energy adoption required to meet CLCPA goals; however, these incentives should become more transparent and be periodically reset to reflect actual costs to install DER and their ability to capture additional market revenues through NYISO participation.

In the future, the Company envisions that the DSP will incorporate new market services that adopt structured market compensation for distribution flexibility value that DER provide to the system, and by extension to customers. This value realization will eventually be incorporated into everyday grid planning and operations. To get there, advancements in grid operations and grid planning, and adoption of grid technologies will be necessary. For example, technology investment will be required to model impacts of distributed resources on our system, communicate with distribution-connected devices, and dynamically operate the distribution system. Full adoption and integration of a DERMS platform, comprehensive understanding and utilization of smart inverter technology, and enhanced distribution modeling capability will be foundational to creating future distribution market services. The full scope of this roadmap clearly extends beyond the five-year horizon that is the focus of this DSIP, and will require the flexibility to change over time and respond to evolving technology and customer preferences.

Outlook for the Market Services Roadmap

As described above, one of the first major steps toward realizing the end-state distribution market vision is effective integration of DER in the wholesale markets, which will be advanced with the implementation of the DER participation rules by the NYISO. Effective, direct participation in wholesale markets will facilitate the future adoption of transparent, complementary distribution level market mechanisms to realize the developing value streams of DER. In this step, the NYISO and DSP will achieve effective coordination of DER communication and dispatch to optimize the value across the integrated grid.

As Con Edison gains experience with these important incremental steps, the Company will thoughtfully look to transition to mechanisms that compensate DER for distribution flexibility and send efficient price signals for DER investment and effective operation of DER. Efficient market signals will complement effective operational coordination among DER operators, NYISO, TOs, and Distribution Operators to support reliable and cost-efficient operation of the system. Distribution system planners will also view DER as a flexible resource to incorporate into planning studies as DER capabilities and saturation increase.

1.4. GRID MODERNIZATION AND RESILIENCY PLANNING

Introduction

Decarbonization is at the heart of New York State's energy policy, which seeks to avoid the most severe impacts of climate change. Con Edison is aligned with this goal and supports the global scientific consensus that climate change is occurring at an accelerating rate. To understand the risks of a changing climate to Con Edison's system, the Company recently completed its Vulnerability Study, which used probabilistic models to identify potential risks from heat, flooding, and extreme and multi-hazard events, and proposed operational, planning, and design mitigation actions.[21] These actions complement and build on the extensive investments in system hardening and resiliency the Company made post-Hurricane Sandy, as well as ongoing DSP investments to support DER market growth.

The CLCPA goals and the findings of the Vulnerability Study necessitate moving faster and broader to modernize and build out the system, including investment in transmission capacity, adding new capabilities to the distribution grid, and expanding the role of third-party projects and resources. The electric system transformation envisioned by the CLCPA heightens the role of the DSP as the foundation of a reliable and resilient grid that enables integration of large-scale renewables and energy storage at the bulk system level and streamlined interconnection and integration of DER at the distribution level.

DSP investments are putting into place the foundational building blocks and tools for a modern electric grid that is flexible and adaptable to the changing resource mix, agile in the face of more dynamic grid operations, and enables effective coordination between the wholesale market and distribution system operations. Additionally, these investments are an important part of readying the grid for fleets of EVs and greater deployment of energy storage. Con Edison's Grid Modernization Plan expands capabilities in monitoring, sensing, communication, and control, which increase grid visibility, situational awareness, data collection, and the ability to respond to grid conditions in real time. These capabilities simultaneously support decarbonization, increased resiliency to extreme weather events and climate change, and DER market growth.

An example of a multi-value investment that offers myriad benefits is modernized network protector relays ("MNPRs"). MNPRs minimize trips from backfeed due to DG or energy storage discharge and allow for bi-directional communication with supervisory control and data acquisition ("SCADA"), resulting in greater ability to monitor two-way power flow and greater flexibility to host DER. MNPRs increase available hosting capacity and enable lower-cost interconnection, while also providing greater grid edge visibility and response time to system operators.

Similarly, the Company's ongoing investments in GIS are moving toward a comprehensive cataloguing of transmission and distribution assets, as well as behind-the-meter ("BTM") devices, and enhanced data visualization and other advanced applications to allow for more accurate distribution circuit models. Having this centralized record of system assets will assist in asset risk management and locating and documenting damage from climate events.

Con Edison's Grid Modernization Plan represents a holistic and comprehensive view of how the capabilities of the grid will evolve over time in support of State policy goals, changing customer expectations, and advances in technology. The Grid Modernization Plan builds on the foundational DSP-enabling investments to improve performance and add new capabilities in three broad areas: (1) reliability and resiliency, (2) safety and security, and (3) clean energy and flexibility. Reliability and resiliency refer to meeting and exceeding customer expectations for service in an era of increasingly diverse resources and ongoing weather disruptions. Safety and security refer to protecting people, cyber assets, and infrastructure in an ever-changing environment. Clean energy and flexibility largely speak to enabling customer

[21] Note 3, *supra*.

choice—including access to clean, reliable, and affordable energy—and the ability of grid operators to manage a grid with a cleaner, more distributed resource mix.

The Company's Grid Modernization Plan is based on a phased approach that includes a planned and logical sequence of investments and allows for iteration, optionality to include technologies as they evolve, and the incorporation of lessons learned from the many demonstration projects currently underway in New York and across the country. As discussed in the Vision section, the acceleration of State policy goals is likely to shorten the implementation timeline for certain grid modernization investments in order to enable the grid transformation implicit in the CLCPA goals.

Grid Modernization Implementation

Following investment approval in the Company's last rate case, Con Edison has made significant advances in developing its people, processes, and technologies as a DSP and furthering the goals of grid modernization. Notable accomplishments include:

- Continued streamlining of the interconnection process through software enhancements, process refinement, and organizational alignment.
- Increased geospatial granularity of non-network and network hosting capacity maps.
- Implementation of GBC Phases II and III, which provides easier access to an expanded range of customer-specific data through Share My Data.
- Successful development of a DERMS proof of concept ("POC"), which will be expanded upon to inform the Company's approach to scale DERMS over time.
- On track installation of MNPRs and SCADA, with 600 microprocessor relay upgrades and 200 SCADA-enabled locations scheduled per year for 2020-2022.
- Installation and commissioning of advanced tap changer controls and communication upgrades to 4 kV unit substations to support Volt/VAR optimization ("VVO").
- Implementation of a new DRMS solution for customers participating in the Company's DR programs.

Additional information on Con Edison's progress implementing the Grid Modernization Plan is below and more detailed discussion of DERMS and the Demand Response Management System ("DRMS") is included in Section 2.3. In addition to the DSP investments and foundational investments summarized below, the Company is building capabilities in grid edge sensing to have greater situational awareness of the electric system. Similarly, automation technologies improve reliability, resiliency, and operational efficiency by enabling "self-healing" functions in response to disruptions. Con Edison has years of experience deploying automation technologies on its distribution system and will seek to continue its investments in this beneficial technology. Additionally, Con Edison seeks to prepare the grid for an increase in EVs, including investments in make-ready infrastructure for customers requesting the interconnection of chargers.

DSP Investments

The Company continues to execute on its DSP investment plans, which support DER integration and build upon existing customer interfaces to facilitate enhanced customer engagement as markets evolve. Status updates are provided below.

Substation Metering and SCADA Upgrades: Con Edison is upgrading substation metering to enable enhanced VVO capabilities. Metering and SCADA upgrades will increase system visibility and expand the ability to leverage energy storage for grid support. The Company has developed the engineering designs and plans for upgrades to the respective area substation voltage regulation equipment. The recent COVID-19 pandemic has delayed the work, which may be able to resume during summer/fall 2020.

Modernized Network Protector Relay Upgrades: Con Edison is upgrading its underground network protectors to have bi-directional capabilities, which will result in greater ability to monitor two-way power flow and host DER. Con Edison has prioritized deployment in areas targeted for NWS and areas where DER penetration is greatest or the grid is most constrained. This investment continues and scales up the installations started in 2017. As of June 1, 2020, the Company has installed approximately 1,700 relay upgrades (252 with SCADA capabilities), and projects the installation of an additional 600 microprocessor relay upgrades and an additional 200 SCADA locations by the end of 2020. Between 2021 and 2022, the Company will continue the deployment at an annual rate of 1,200 relay upgrades, 400 of which will have SCADA capabilities.

VVO: Advancements in technology and the deployment of AMI have created an opportunity for better management of power flows (i.e., Volts and VARs*)* on the distribution system. Deploying systems to optimize Volt/VAR flows will facilitate energy conservation in the near term and enhance the management of DER in the longer term. Con Edison is preparing to expand its deployment of VVO for Conservation Voltage Optimization ("CVO"). CVO is a subset of VVO and describes the adjustment of area substation supply voltage to a lower value while providing adequate voltage levels for all customers. CVO reduces the amount of energy consumed by end use customers to power a given load, resulting in energy savings.

Deployment of CVO functionality across the service territory is incremental to, and dependent on, the AMI rollout. The investment includes load tap changer controllers in the 4 kV unit substations and some area substations and information technology ("IT") systems to interface with the Meter Data Management System ("MDMS") in order to act upon the greater granularity of data from AMI. The Company is implementing CVO according to its three-stage plan, described in Section 2.3. In late December 2018, Con Edison began the implementation of CVO in Staten Island in the Fox Hills load area. CVO is now implemented across all load areas in Staten Island. In October 2019, Con Edison began deployment of CVO in Westchester. As of June 1, 2020, CVO is implemented in 28 networks in Westchester, Staten Island, Brooklyn, and Manhattan.

VVO Investments are described in Section 2.3. The planned VVO projects for 2020 were substantially impacted by COVID-19. The projects are expected to resume in summer 2020 and continue through 2022.

Interconnection Portal: Con Edison has continued to improve the interconnection process, including additional enhancements to the PowerClerk® platform and supporting back-office systems that allow for greater visibility into the approval process through milestone tracking and automated emails, additional flexibility to pay online with electronic payments, and a more user-friendly experience through intra-system messaging, bypassing the need to use an external email application. Additionally, the Company successfully imported nearly 16,000 legacy DG projects into PowerClerk®, resulting in all DG projects on record being documented in the portal. This information will eventually be incorporated into the DER portfolio within DERMS for further alignment into operating systems and potential participation in transactive markets. The Company continues to engage developers to solicit feedback on the interconnection portal and process.

DRMS: DRMS supports the management of enrollment, event initiation, and settlement of the Company's DR programs. This system enables Con Edison to efficiently interact with customers enrolled in DR programs and manage peak demand. After a thorough evaluation of DRMS vendors in 2018 and implementation kick off in early 2019, the first phase of the DRMS Replacement Project was commissioned and released into production in Q1-2020. The new DRMS includes several new components that enhance customer interactions and Company DR dispatch capabilities. The new solution includes a new public-facing DR Portal to streamline customer interactions, a control system package to manage asset dispatch and performance, and a modern integration backbone to allow program scalability as the Company's AMI rollout continues. Dozens of features were upgraded relative to the old system and dozens of new features were added to benefit customer participation and program flexibility. This multi-phase effort is designed to

support continued growth of the DR program and proactively address evolving customer expectations as more become eligible to participate due to AMI rollout.

Demand Management Tracking System ("DMTS"): DMTS has continued to serve a critical role in the EE and DM ("EEDM") Department's technology and operational infrastructure. The system enables improved, standardized, and more accurate tracking and regulatory reporting; tools to effectively manage third-party implementation contractors and market partners; detailed tracking of customer projects; and more accurate and timely incentive processing. The Company implemented and continue to add new programs per business needs and is expanding on its Customer Relationship Management, measure and incentive calculation engine capabilities.

Demand Management Analytics Platform ("DMAP"): DMAP is a repository for a wide variety of information pertinent to the overall operations, marketing, and evaluation of EEDM programs. This robust customer-centric analytical tool will be used to support management and operational decisions, vendor activity, targeted marketing campaigns, and future EE program design. The DMAP will combine data from internal sources, such as the Customer Information System and MDMS, and external sources like the NYC Department of Building's ("DOB") database. In addition, data from demographic sources, marketing vendors, social media channels, and other external sources will provide a richer capability to manage the customer relationship. DMAP will also provide the critical infrastructure to link and analyze customer behaviors and the impact on distribution network assets and performance. Implementation of this tool began in May 2018 and is ongoing with program level analytics deployment in the pipeline. The addition of AMI data will provide a fuller view of EE-eligible customers.

Foundational Investments

AMI: Con Edison is deploying a total of 4,715,000 smart meters across its service territory between 2017 and 2022. The meters allow for more granular data collection that will be shared in near real time. As noted in Section 2.11, the Company is successfully implementing the AMI Business Plan, including installation of over 2.65 million electric and gas smart meters as of June 1, 2020.

GIS: Con Edison is implementing an enterprise-wide GIS that will track where all grid-connected assets are located geospatially and serve as the foundation for existing and future operational platforms (e.g., outage management system ("OMS"), ADMS, and DERMS). Phase 1 of the GIS project is currently underway and is projected to conclude by the end of 2022. Phase 1 includes all of the low tension plates for gas and electric assets across all boroughs and Westchester County. Phase 2 is projected to start in June 2020 and conclude by the end of 2022. Phase 2 of the project will include all medium voltage feeders across all boroughs and Westchester and all assets for Staten Island.

Communications Infrastructure: Communications infrastructure supports multiple investments, including but not limited to smart sensing, monitoring and control ("M&C"), DERMS, and VVO. For 2020, the Network and Telecommunications group began work on the following initiatives, which are expected to continue into 2021.

- *Wireless Migration* – Wireless deployment is dependent on crews being available. Deployment was expected to start in mid-May, but was placed on hold due to COVID-19 and is expected to begin by mid-June.
- *Gas Communication Carrier Circuit Deployment (Copper to Fiber Migration)* – The contract is going through the approval process with deployment expected to begin in early summer and be completed by December 2022.
- *Corporate Communications Transmission Network Fiber Upgrade Program* – The vendor is expected to spend the allotted funding for the fiber links installation starting in July 2020. This will be done on an accelerated schedule as outlined in the project plan.

DERMS: The purpose of a DERMS is to manage diverse DER, understand the unique status and capabilities of each, and present these capabilities to supporting applications to facilitate enhanced M&C of the system. A DERMS will provide visibility and control of a diverse portfolio of resources to address local constraints while flexibly addressing system-wide concerns. As discussed in Section 2.3, the Company has designed a working POC that demonstrates four fundamental functionalities of DERMS: weather and load forecasting, load flow planning, network modeling, real-time load flow.

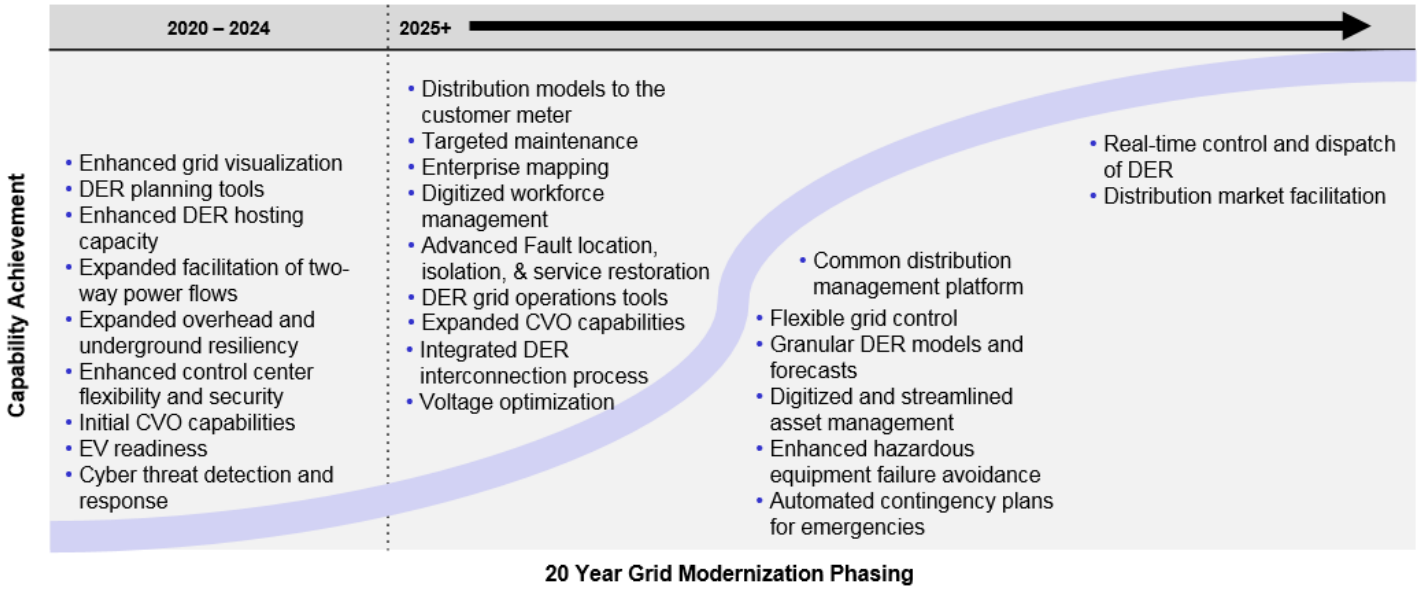
Cybersecurity Test Environment: Con Edison is establishing an advanced testing environment for information security solutions in preparation for comprehensive, quick, and accurate vulnerability discovery and remediation requirements. This test environment will also be used, in conjunction with the vendor's security controls, to confirm or validate third-party vendors and partners with whom the Company shares business, customer, or other sensitive information. In 2020, Con Edison is establishing advanced testing and detection platforms, particularly in high value networks. The Company is on track to implement new tools that will enhance the capability to detect advanced threat actors and preemptively identify security vulnerabilities.

Future Implementation and Planning

Future investments will provide an integrated and comprehensive view of the Company's entire system, visible from modernized control centers. DER operational data will be managed by a new DERMS, which, when integrated with an ADMS and paired with newly-available grid-edge data available through AMI, will allow the Company to monitor, reconfigure, and control the grid to respond to changing conditions and eventually deploy DER for system needs in near-real time. The DER operational data can also be input into load flow models to support improved forecasting and system planning. Additional future functionality expected from ADMS includes greater automation of Fault Location, Isolation, and Service Restoration ("FLISR") and optimization of distribution grid performance. Smart sensors and two-way communications networks will feed system data back to control centers to mitigate system issues in real time, improving operational awareness, and enabling greater DER penetration. Robust and secure communications systems to exchange data are needed to maximize the value of this new grid intelligence. Investments in cybersecurity will help protect the system and sensitive customer data.

The Grid Modernization Plan presents a prioritized series of investments to support reliability, resiliency, safety, security, flexibility, and clean energy. Figure 4 highlights the evolution of capabilities, with the first five years of Con Edison's Grid Modernization Plan focused on the investments in critical foundational technologies. Foundational investments form the base on which further applications and functionality are layered in a modular fashion and include AMI (currently being implemented), GIS, communications infrastructure, ADMS, DERMS, control center modernization, and a cybersecurity test environment.

Figure 4: Capability Evolution over Time

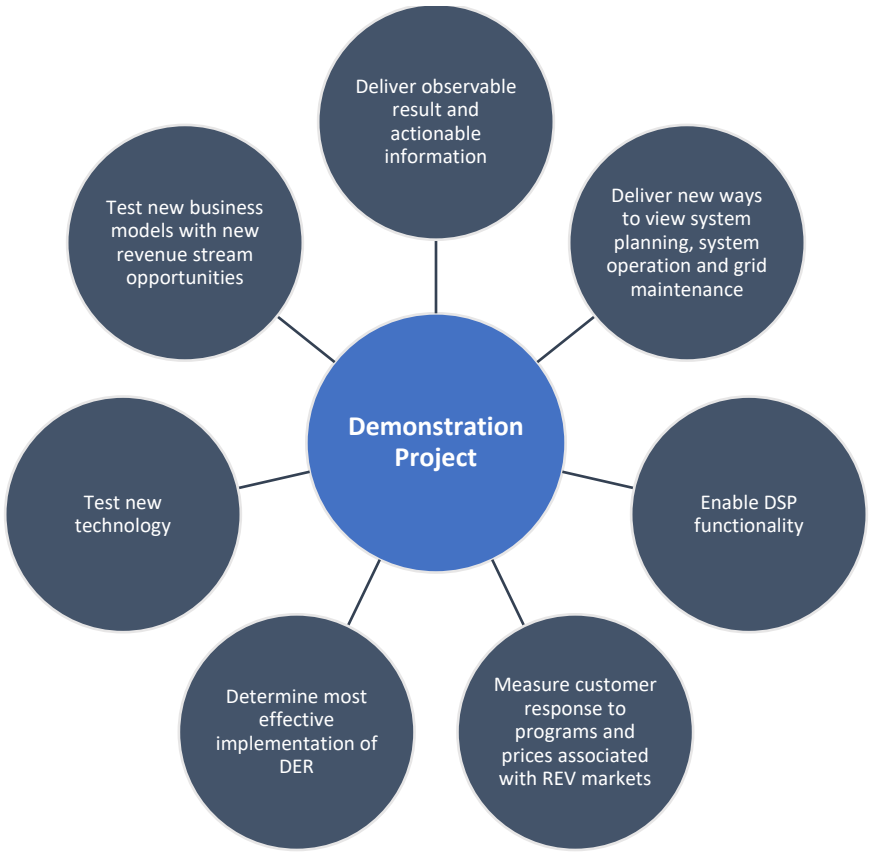


As the industry evolves and policy drives accelerated change, the grid must adapt to new requirements and expectations. The Company is investing in the system capabilities necessary to prepare for this future. Con Edison's Grid Modernization Plan expands upon the DSP investments included in past DSIPs and the Company's prior rate cases to move the Company further toward the State's clean energy vision and help enable future market development and customer choice.

1.5. INNOVATION AND DEMONSTRATION PROJECTS

Innovation has been a central aspect of REV, allowing the Company to test new technologies, prove conceptual business models, and inform DSP development. The Company initiated REV demos in 2015, as required by the Commission in the Track One Order.[22] REV demonstration projects are intended to "advance the development of new utility and third-party service or business models and to gain experience with integration of distributed energy resources."[23] Additionally, as stated by Staff, these demonstration projects are "intended to test new technologies and approaches to assess value, explore options, and stimulate innovation before committing to full-scale implementation."[24] Figure 5 shows the various principles the REV demonstration projects strive to achieve.

Figure 5: REV Demonstration Project Principles



[22] Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision* ("REV Proceeding"), Order Adopting Regulatory Policy Framework and Implementation Framework (issued February 26, 2015) ("REV Track One Order"), pp. 115-116.
[23] REV Proceeding, Memorandum and Resolution on Demonstration Projects (issued December 12, 2014), Appendix A.
[24] DPS Staff REV Demonstration Projects website. Available at http://www3.dps.ny.gov/W/PSCWeb.nsf/All/B2D9D834B0D307C685257F3F006FF1D9?OpenDocument

The Company has developed several REV demonstration projects, which are in various stages of implementation. The Company is focusing on advancing the implementation of these projects to deliver results consistent with the State policy goals while maximizing the remaining authorized spending cap for the portfolio of projects.

Con Edison has also been exploring market innovation as an active participant of REV Connect, which acts as another vehicle for identifying potential new business models and technology solutions.[25] In addition to offering third parties the ability to submit an idea through the website, REV Connect hosted innovation sprints to seek ideas on specific themes and listed potential utility partnership opportunities. For example, during the Connected Communities sprint, Con Edison identified the need for new solutions to scale methods to decrease the cost of LMI customer engagement on EE and leverage non-utility funding sources.[26,27] Additional sprints included new EE financing mechanisms and new business models for battery storage. The Company believes that exploring emerging challenges in forums such as the REV Connect sprints can be beneficial in furthering partnerships with market participants, provided the process is aligned with the principles of cost prudency and the Company's three-year rate cycle.

The Company developed a framework to categorize demonstration projects based on their observed results. The four categories include market-ready, utility ready, ahead of its time, and no viable path. A description of each of the categories is shown in Figure 6.

Figure 6: Demonstration Project Category Framework

Market Ready	Utility Ready	Ahead of its Time	No Viable Path
•Proven technological capability and customer acceptance - scalability and readiness potential for third-party implementation.	•Proven technological capability and customer acceptance - scalability and readiness potential for utility implementation.	•Proven customer acceptance, but technology capability continues to be a barrier for effective implementation.	•Customer acceptance and/or technology capability is low or unfeasible.

As part of the evolution of Con Edison's innovation portfolio, some concepts, such as Connected Homes have advanced as market or utility ready, while others, such as the Building Efficiency Marketplace, have been closed. It is important to reflect that testing innovative concepts can involve challenges and insurmountable obstacles, which are part of the learning process. Even the projects that are not proceeding have tested important concepts and technologies and contributed to Con Edison's and the Joint Utilities' understanding of customer needs, market dynamics, technology performance, and other factors. These lessons learned are valuable as Con Edison considers future demonstration projects and pilots.

[25] https://nyrevconnect.com/open-rfis-rfps/
[26] https://nyrevconnect.com/connected-communities/
[27] https://nyrevconnect.com/low-moderate-income-initiative-con-edison/

Initially, the goal of the portfolio of demonstration projects and pilots was primarily focused on market animation, as prioritized under REV. Today, the demonstration projects are shifting to include additional emphasis on establishing test pathways to deliver solutions that can support new policy goals, such as those articulated under the CPCLA. Beyond the portfolio of REV demonstration projects, other innovative projects also advance the state of technology, demonstrate new business models, and inform DSP development. For example, Con Edison worked with developers in Northeast Queens and Brownsville Brooklyn to implement smart inverter functions to enable greater solar PV to be installed into the underground network to align with minimum spring and fall loads, protect network transformer reliability, and maintain safe operating voltages for neighboring non-DG customers. The lessons from this innovative case study, alongside demonstration projects such as the Community Power project (community solar delivering benefits to LMI customers), will be leveraged to support greater use of smart inverters in the future, which serves multiple REV goals, including increasing available hosting capacity and providing lower cost monitoring and control of DER assets.

A brief description of notable current and recently closed innovation and demonstration projects is included below. While many of these projects serve multiple objectives and functions, they are grouped based on their primary theme. REV demonstration projects are noted below. Staff maintains a website for REV demonstration projects, including links to relevant regulatory filings.[28]

Customer Engagement and Market Development

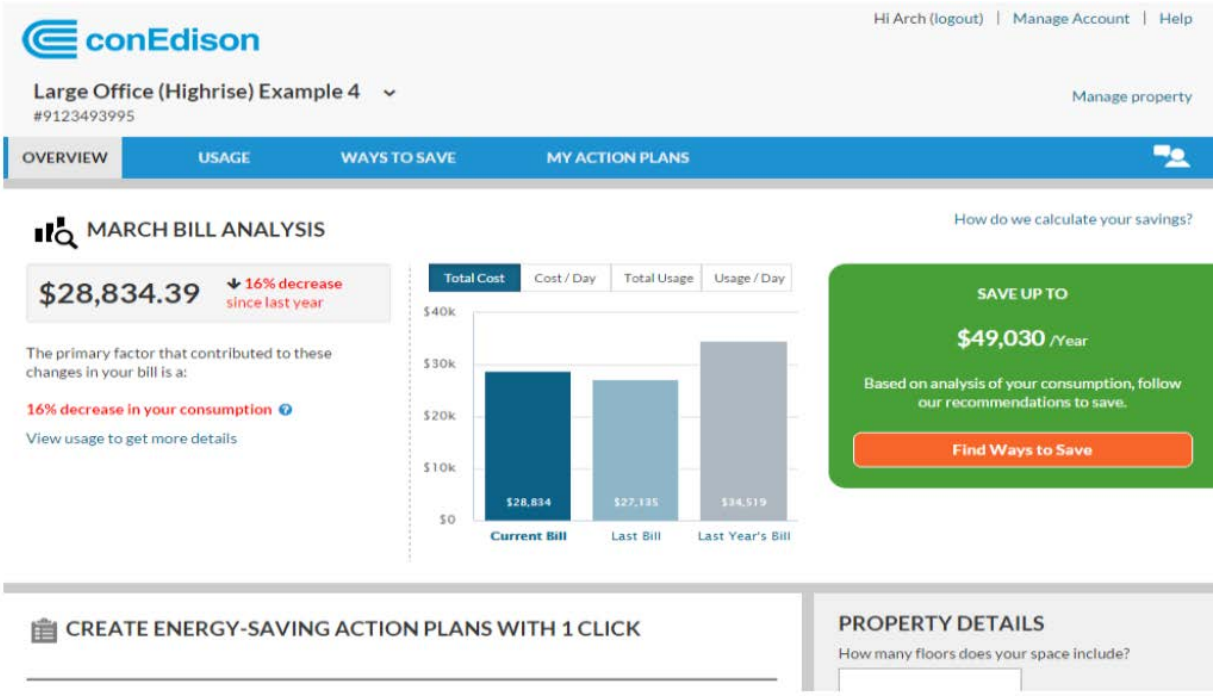
Building Efficiency Marketplace (REV Demo)

The Building Efficiency Marketplace demonstration project was completed on June 30, 2019. This project was designed to examine how Con Edison could leverage interval meter data analytics to enable targeting and multi-channel engagement of commercial customers with high potential for EE savings and demand reduction. The project consisted of a web-based portal (the "Efficiency Project Portal") used to engage certain C&I customers with information on their building's energy consumption, potential savings, and demand reduction opportunities. Once a customer identified Energy Conservation Measures ("ECMs"), the Energy Insights Marketplace helped streamline connections with EE partners. Even though the market research showed high levels of customer satisfaction with the platform, the challenges to monetize services, combined with the "high-touch" outreach required for customers to complete the identified ECM, made the long-term operation of this project cost and effort prohibitive. As such, the Company decided to close out this project. However, several of the key components of the project are now available to a larger population of customers. The Company started to offer Energy Insights to all C&I customers with smart meters and implemented high-touch white glove service through its Strategic Energy Partners program, thus continuing a personalized offering to this customer class. A sample of the Energy Insights Portal is shown in Figure 7.[29]

[28] http://www3.dps.ny.gov/W/PSCWeb.nsf/All/B2D9D834B0D307C685257F3F006FF1D9?OpenDocument

[29] REV Proceeding, REV Demonstration Project: Building Efficiency Marketplace 2019 2Q Quarterly Progress & Project Closeout Report (filed July 31, 2019).

Figure 7: Energy Insights Portal – Overview Page



Connected Homes (REV Demo)

The Connected Homes demonstration project was designed to facilitate DER residential adoption and promote market animation, proactively connecting customers with cost-effective EE products and services, as well as DG and EV offerings. The demonstration project met the REV goals of empowering customers to make more informed energy choices, developing new partnerships, unlocking new revenue streams, and achieving energy savings. Connected Homes used data analytics to match customers with specific DER solutions via an online marketplace (Con Edison Marketplace). On the Marketplace, which is still active, customers can compare energy-saving products by energy score, price, and reviews. Customers can also apply for Con Edison appliance rebates, purchase small items such as LED lightbulbs, smart thermostats, and smart power strips, and receive instant rebates where applicable. Additionally, customers have access to a solar concierge service that simplified the experience of evaluating and installing solar, including options for community solar for renters and multi-family homes.

The evaluation of the Con Edison Online Marketplace from July 2016 through December 2018 delivered 167.3 MW, 451,637 MWh, and 10,716,046 therms of gross lifetime savings from product purchases. This translates to 98.5 MW of net lifetime demand savings, 308,607 MWh of net lifetime electricity savings, and 6,451,645 therms of net lifetime gas savings.[30] The platform and related digital marketing drove 958,605 visits by unique active shoppers, resulting in an estimated 221,417 influenced purchases. Since deployment, the Community Solar program collected 1,996 leads and 180 completed contracts, while the Rooftop Solar program drove 3,089 leads and 281 sold solar projects. As a result of this success, the Con Edison Online Marketplace platform proved to be "utility ready" and has scaled into an ongoing program within the EEDM group as of January 1, 2020.

[30] REV Proceeding, REV Demonstration Project: Connected Homes Platform 2019 4Q Quarterly Progress Report & Project Closeout Report (filed January 31, 2020).

New Energy Solutions for LMI Customers (in development)

To increase the participation of the LMI customer segment in REV, Con Edison continues to explore demonstration projects to test innovative approaches to serve LMI customers. The Company issued a request for information, receiving 33 responses with ideas for products and services, customer engagement strategies, and partnerships. Con Edison had three overarching goals for these demonstrations:

(1) Help LMI customers gain access to clean energy and acquire new tools and services.

(2) Aid LMI customers in managing energy use and controlling costs.

(3) Achieve energy savings, reduced GHG emissions, system improvements, and other local benefits.

As a result of that process, Con Edison developed demonstration projects such as Community Power. The Community Power Project is designed to examine a new model for increasing DER access for LMI customers. The project seeks to demonstrate the use of smart inverters for grid support and the efficacy of specific marketing tactics at enrolling LMI customers in community distributed generation ("CDG") and increasing their satisfaction and trust in the Company. Separately, the project will observe the ability of the Community Power model to demonstrate a scalable business model, while providing economic benefits for LMI customers in a self-sustaining manner.[31]

LMI participants who subscribe to the CDG will receive bill credits for the solar power generated. These credits will reflect a discount on the value of the solar energy allotted to them each month from the project. The subscription fee will always be less than the solar energy bill credit received from participation in the demonstration project. There are no upfront or additional fees to participate.

During Q4-2019, the project team also began lease negotiations with the New York City Housing Authority, a key component of the development of the project installations. Initial timelines for lease negotiations have proven optimistic, and the project team is now seeking to finalize its roof lease with the Housing Authority in 2020.

Energy Storage

Commercial Battery Storage (REV Demo)

The Commercial Battery Storage demonstration project is designed to prove how distributed, front-of-the-meter ("FTM") energy storage can be utilized to provide customer value and distribution support; help defer capital investments; and generate wholesale market revenues. Con Edison is executing the project in partnership with GI Energy and Smarter Grid Solutions. The project partners are responsible for installing FTM batteries totaling 4 MW/4 MWh (4 individual 1 MW/1 MWh installations) at four customer sites. The first site was operational as of February 2020, with work progressing at other identified sites. Section 2.4 provides more detail on Con Edison's energy storage projects.[32]

Storage On Demand (REV Demo)

The Storage On Demand demonstration project consists of three Con Edison-owned mobile 500 kW/1.34 MWh lithium-ion battery trailers. The project is designed to show how mobile storage assets can increase their useful value to the distribution system under multiple use cases, such as distribution capital investment deferral, low voltage support, and temporary load needs in multiple locations (i.e., due to construction demands). The project will also demonstrate the

[31] REV Proceeding, REV Demonstration: Community Power 2019 4Q Quarterly Progress Report (filed January 31, 2020).

[32] REV Proceeding, REV Demonstration: Commercial Battery Storage 2019 4Q Quarterly Progress Report (filed January 31, 2020).

ability of storage to participate and earn revenues from the wholesale markets when the batteries are not being used to meet distribution and other local system needs. Con Edison is implementing the project with its partner NRG Energy. In Q4-2019, the Company focused on implementation, specifically contract execution, design, permitting, and interconnection applications. The anticipated commercial operation date is summer 2021, or potentially later given COVID impacts.[33]

Nevins Street Make-Ready Site for Energy Storage System ("ESS") (in development)

Con Edison is enabling energy storage through make-ready interconnection of ESS at the Company's Nevins Street property. The Company seeks to lower the interconnection hurdles by providing the land, along with electrical infrastructure, and offsetting the cost of interconnection. The site will also be paired with EV chargers, which when used together will offset EV load during peak. Con Edison will receive monthly, quarterly, or annual lease payments from the ESS operator for the make-ready site. The installed ESS will have a planned tenure on Con Edison's property from the summer period of 2021 to 2030. After 2030, Con Edison may require the removal and safe disposal of the system or the Company may pursue an arrangement to purchase the system, extend the reliability contract, and/or expand the system. The Company is targeting energy storage systems collectively rated up to 10 MW and 60 MWh. The project is in the contract phase for engineering, procurement, and construction. In February 2020, the Company issued an RFP for the ESS Owner/Operator. Prior to COVID-19, the ESS was expected to be in service by June 1, 2021.[34]

Clean Virtual Power Plant ("VPP") (REV Demo)

The VPP demonstration project was terminated and deemed "ahead of its time" in Q1-2020 due to the current permitting requirements for residential batteries in New York City. The VPP demo sought to demonstrate how aggregated fleets of residential solar plus storage assets could collectively provide resiliency services to customers and value to the distribution system, as well as participate in wholesale electricity markets. The VPP would have acted as a controllable power generation source and optimize resources to provide value as markets evolve.

Brooklyn Queens Demand Management ("BQDM") Utility-Owned Battery

The Company installed a utility-owned distributed battery energy storage system ("BESS") to help meet peak load at Ozone Park in the Richmond Hill 4 kV network. The BESS was designed to provide Con Edison with 12 MWh of stored energy and can be configured to deliver 1 MW of power for 12 hours or 2 MW of power for 6 hours. Permitting applications for the selected construction site were approved. Construction began in early 2018 and the site was commissioned in 2019. The storage asset was dispatched by Con Edison's control center on peak days during summer 2019 and is expected to continue to provide load relief in upcoming summers.[35] This BESS is in addition to the 4.3 MW of customer-owned batteries participating in the BQDM program.

BQDM Marcus Garvey Apartments

The Company's BQDM program completed the development of a multi-technology solution in the Crown Heights network at the Marcus Garvey mixed-income 625-unit apartment complex. The DER technologies included a 300

[33] REV Proceeding, REV Demonstration: Storage On Demand 2019 4Q Quarterly Progress Report (filed January 31, 2020).
[34] Consolidated Edison Company of New York, Inc. Request for Proposal, Energy Storage Installer / Owner / Operator for Nevins Street (Make Ready Site) Energy Storage System (last updated March 9, 2020).
[35] *BQDM Proceeding,* BQDM Program Implementation and Outreach Plan (filed January 31, 2020).

kW/1.2 MWh lithium-ion battery, a 400 kW fuel cell, and a 400 kW rooftop solar system. The system is helping to reduce the property's power consumption and GHG emissions by managing the onsite generation and storage of renewable energy, lowering operational costs for the property, and delivering load relief. Additionally, the system provides resiliency during outages by providing back-up power to a building that houses a community room with refrigerators and phone charging. The project is the first renewable-energy-plus-storage system in an affordable housing development in New York City.[36]

Innovative Pricing and Rate Design

Smart Home Rate (REV Demo)

The SHR demonstration project will test how alternative rate structures can provide price signals to residential customers and customer-sited DER to deliver greater control over energy use and costs. Enrollment in the SHR pilot will only be available for customers with AMI. Participants will be provided with home energy management technologies to help them maximize savings on the SHR rates. In Track 1, Uplight's Orchestrated Energy platform will be deployed to automate central air conditioning ("A/C") loads in participants' homes. In Track 2, Sunverge's platform will be deployed to automate 6 kW/19 kWh home battery systems coupled with rooftop solar PV systems. The SHR pilot will evaluate the changes in load in response to the dynamic time-varying rates, measure bill impacts, and gauge customers' engagement with the smart home rates and technologies. Due to COVID-19 impacts, deployment of the SHR rates will be postponed until 2021. Additionally, the Track 1 program has been modified to use only self-install approaches for in-home devices due to safety considerations.

Innovative Pricing Pilot ("IPP")

The IPP, publicly known as the Smart Energy Plan, is part of the AMI Customer Engagement Plan to explore novel rates structures to enhance customer benefits from AMI deployment in a cost-effective manner.[37] The pilot will test seven time-variant demand-based rates designed to provide customers with greater control over their energy costs, as well as test the impact of demand rates on customer acceptance, satisfaction, bill amounts, and energy-use behaviors. The seven rates differ from each other in various ways, including when the customer's peak demand is measured, how demand is priced, and how electric supply is priced. All customers who participate in the pilot will receive a one-year price guarantee, with low-income and concern customers receiving a two-year price guarantee.[38] Additionally, the pilot will collect data to help estimate customer benefits and inform future mass market rate design, testing both opt-in and opt-out approaches to customer recruitment.

The pilot is being rolled out in three waves and is scheduled to run from January 2019 through October 2022. Con Edison began enrolling Wave 1 customers in Staten Island and Westchester County in April 2019 and Wave 2 customers in October 2019. COVID-19 has resulted in two major changes to the pilot.

First, recognizing the impacts of COVID-19 to customers' daily lives and the challenge of introducing a new billing plan that asks customers to change their energy behaviors, the start date for Wave 3 has been delayed by six months until October 2020. Originally, the pilot schedule called for the rollout of Wave 3 billing in Brooklyn in April 2020, with first

[36] https://www.enelx.com/content/dam/enel-x-na/resources/case-study/pdf/P18016_Marcus-Garvey.pdf

[37] Cases 15-E-0050, *et al*., *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* ("Con Edison 2015 Electric Rate Case"), Order Approving Advanced Metering Infrastructure Business Plan Subject to Conditions (issued March 17, 2016) ("AMI Order"), p. 38.

[38] Low-income customers are those who are enrolled in Con Edison's low-income discount program. "Concern customers" are those who have self-reported as elderly (62 years or older), blind, and/or disabled.

bills going out in May. As a result of the COVID-19 pandemic, the first Wave 3 bills will go out in November. Due to the delay, the pilot close date will be extended from March 2022 to October 2022.

Second, the price guarantee will be extended from 12 months to 18 months for Wave 1 customers and will now run through October 2020. This will allow customers to stay enrolled on the Smart Energy Plan without paying more than they would have paid on the standard rate.

EVs

SmartCharge NY[39]

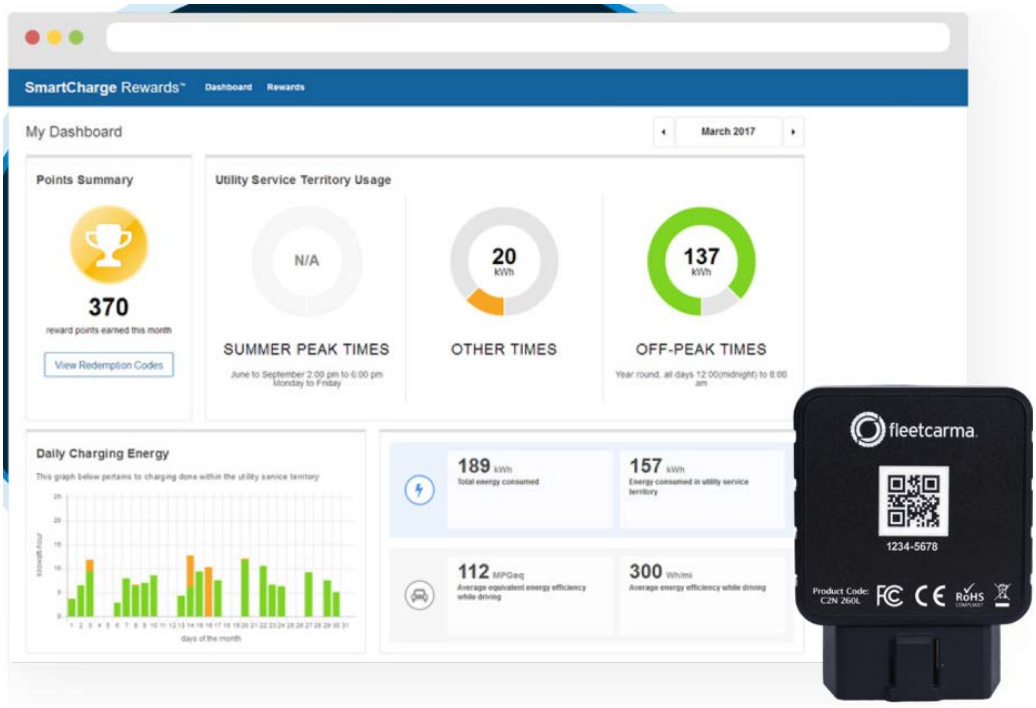
The Company continues its existing off-bill SmartCharge New York ("SCNY") Program, which provides incentives to enrolled vehicles charging within the Con Edison service territory at off-peak times. The existing non-tariffed SCNY program will remain for SC1 Rate I customers, providing a $150 incentive for installing and activating a free connected car device from FleetCarma that allows users (and the Company) to know where, when, and how much energy an EV consumes during charge events. [40] The SCNY program platform provides users with insights about their EVs charging efficiency, carbon footprint, and battery health. Additionally, the platform allows users to share their operating statistics and experiences with other EV drivers, refer friends in exchange for rewards, and monitor their incentives. Figure 8 provides a view of the SmartCharge dashboard. [41] Enrolled users receive $5 per month for keeping the device plugged in and charging in the Con Edison service territory, as well as earn $0.10 per kWh for charging between midnight and 8 a.m. on any day in the Con Edison service territory. During summer (June 1 – September 30), users receive an additional $20 monthly payment when they avoid charging between 2:00 p.m. and 6:00 p.m. on weekdays. Lastly, drivers can earn a $25 referral reward for every friend they connect to the program. The FleetCarma technology will help Con Edison understand charging behavior and EV driver response to incentives. Section 2.5 provides details regarding the SCNY program eligibility expansion to include medium-duty/heavy-duty vehicles ("MHVs"). As of June 1, 2020, there are over 3,000 EVs actively enrolled in the program.

[39] Con Edison, *Electric Vehicle Charging Rewards*, https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-residential-customers/electric-vehicle-rewards

[40] EV owners do not need to be Con Edison customers in order to enroll in the SCNY program. Case 16-E-0060 *et al.*, *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* ("Con Edison 2016 Electric Rate Case"), Order Approving Electric and Gas Rate Plans (issued January 25, 2017), p. 39.

[41] https://www.fleetcarma.com/smartchargenewyork/

Figure 8: SmartCharge Rewards Dashboard



Vehicle-to-Grid ("V2G") School Bus (REV Demo)

Recognizing that electric school buses can transport children in ZEVs during the school year and serve as dedicated DER in the summer, the V2G demonstration project aims to examine the technical and operational viability of using five school buses for both transportation and as a grid asset. V2G technology will allow Con Edison to manage the vehicle as a grid resource, including managing charging times and battery dispatch, while monitoring the wear and tear on the equipment.

Con Edison has partnered with First Priority Green Fleet, which is responsible for Project management, design and construction of vehicle and site hardware, and V2G operations and analysis. In Q4-2019, Con Edison, First Priority, Nuvve, and Lion Electric continued to make progress on V2G implementation, overcoming several technical setbacks. The first V2G bus has been retrofitted with the V2G hardware and two more retrofits are in progress. Pending the completion of several tests, the buses will become capable of discharging power onto the grid. V2G capability is planned for testing in summer 2020. The cumulative storage capacity of the demo is 65 kW and 500 kWh.[42]

NYC Curbside Charging (in development)

Con Edison partnered with the New York City Department of Transportation ("DOT") and AddEnergie to implement a plan to provide Level 2 EV charging to drivers across the City's five boroughs to increase EV adoption. The demonstration project includes 60 dual-charger posts for a total of 120 EV plugs, where 20 chargers are exclusive to NYC fleet vehicles and the rest will be open to the public. Publicly available EV charging fosters EV adoption by customers who lack off-street parking. Curbside parking represents large potential geography to install EV chargers in NYC and

[42] REV Proceeding, REV Demonstration Project Electric School Bus V2G 2019 4Q Quarterly Progress Report (filed January 31, 2020).

support clean electrification policy in the State. Stations are planned to be in service by end of 2020 and run through at least 2021 but may be delayed due to COVID-19 impacts.

The demonstration project will test strategies to integrate EV charging into host communities so that it is welcomed by both EV drivers and non-drivers, determine the role curbside charging plays in NYC EV charging infrastructure, and quantify the business opportunity of Level 2 curbside EV charging.

Charging-as-a-service ("CaaS") is an emerging business being tested in several markets. This project will test how EV charging in public parking spaces can satisfy EV drivers, host communities, and EV charging network developers. The business model demonstrated is the use of public rights-of-way to host a Level 2 CaaS network. The hypothesis is that EV drivers will use these chargers as part of their growing portfolio of charging options and host communities will accept the chargers as an innovative use of public space. In that way, as EV use increases, a business case will develop for public long-dwell chargers.[43]

EV Charging Hub (in development)

The Company is working to develop EV charging hubs on selected properties. In March 2020, Con Edison issued an RFP for a third party-owned EV Charging Hub at the Nevins Street site to be co-located with a third party-owned battery energy storage system.[44] Con Edison will support the development of DC quick charge stations available for public use and in high enough concentration to minimize customer wait times and increase cost savings and utilization to improve the EV business models and catalyze investment in infrastructure to enable more adoption. Con Edison will contract with a business partner to provide an EV Charging Hub at a Company site in Brooklyn. The site can accommodate up to 18 EVSE-equipped parking stalls. Con Edison will provide the general site conditions (make-ready costs), while the business partner will install, own, and operate direct-current fast charger ("DCFC") and/or Level 2 EVSE, and necessary support equipment, to serve EV customers. The demonstration project contract is expected to be issued by the end of 2020.

[43] REV Proceeding, REV Demonstration Project Implementation Plan, New York City Curbside Electric Vehicle Charging Network. (filed February 10, 2020).
[44] Con Edison, Request for Proposals, Nevins Street Electric Vehicle Charging Hub Demonstration Project (issued March 2, 2020). https://www.coned.com/-/media/files/coned/documents/business-partners/business-opportunities/electric-vehicle-project-partners/charging-hub-rfp.pdf

2. TOPICAL SECTIONS

The 2018 DSIP Guidance directed the utilities to provide "planning and implementation details which will help the utilities and stakeholders align their respective needs and capabilities as the electric system evolves."[45] Staff outlined basic requirements common to each topic and specified detailed questions for each topic. In the following sections, the Company provides the common information and responds to the detailed questions, recognizing that there are some cases where detailed implementation plans are not yet fully developed or where planning efforts are in early stages due to ongoing related proceedings and policy development. In such cases, the Company describes its current status and planned next steps.

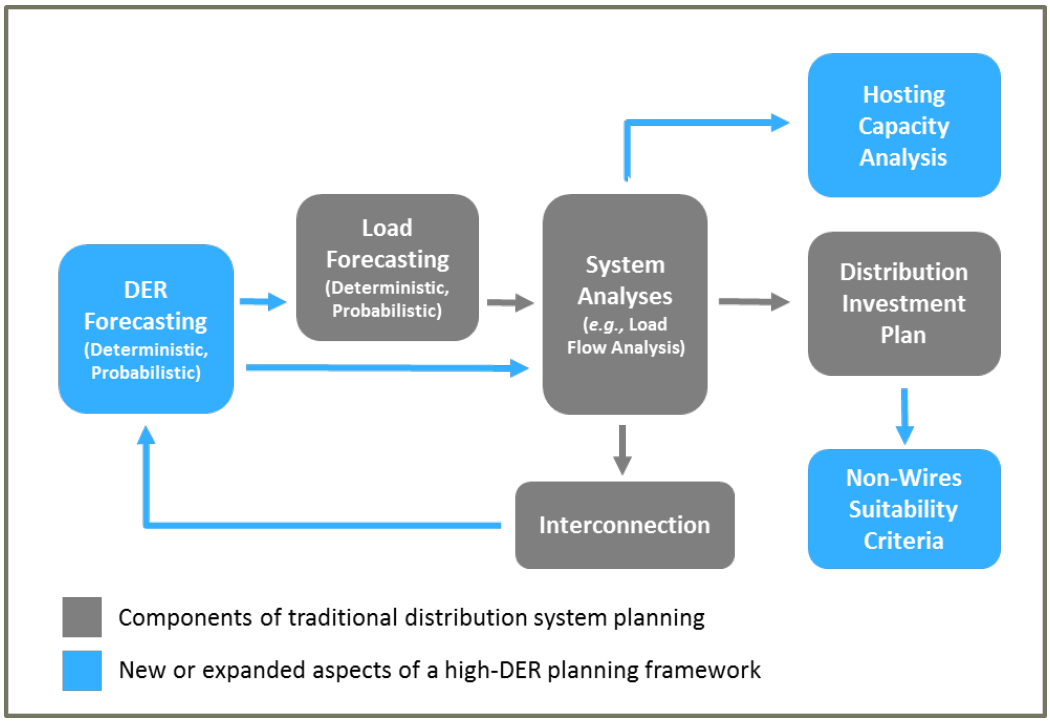
[45] DSIP Proceeding, 2018 DSIP Guidance, p. 5.

2.1. INTEGRATED SYSTEM PLANNING

Context and Background

Achieving State policy goals, including greater deployment of DER, will require enhancements to traditional distribution system planning processes to enable key DSP capabilities. The 2016 Supplemental DSIP presented a framework for evolving the distribution planning process, which remains relevant today. The gray-shaded boxes in Figure 9 below reflect the components of traditional distribution system planning and the blue-shaded boxes represent new or expanded aspects of an integrated planning framework that incorporates a broader range of data drivers, additional sources of uncertainty, and a more diverse resource mix.

Figure 9: Evolving Distribution System Planning Processes[46]



As discussed below and throughout this filing, Con Edison has integrated DER into its planning and operations to support DER growth, including directing DER to areas of the grid where it can provide the greatest system value through NWS. Additionally, Con Edison continues to improve its hosting capacity map with more granular data and streamline the interconnection process, which is driving improved customer and developer satisfaction and facilitating greater DER deployment.

[46] DSIP Proceeding, Joint Utilities Supplemental Distributed System Implementation Plan (filed November 1, 2016) ("Supplemental DSIP"), p. 28.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Refined and enhanced forecasting methodology, including addition of new load modifier for heating electrification.
- Incorporated DER forecasting efforts into DERMS POC work.
- Formalized the identification and evaluation of NWS as part of the capital planning process.
- Published Stage 3 and 3.1 hosting capacity maps, which increase the geospatial granularity.
- Streamlined and improved the interconnection process to increase speed and transparency.
- Continue to benchmark forecasting methodologies across the Joint Utilities and the NYISO.

Con Edison continues to enhance and expand its distribution system planning processes to:

- Facilitate DER integration, including considering DER as solutions to system needs
- Accounting for the various impacts DER can have on the grid and the value they can provide
- Adding features to hosting capacity maps and
- Streamlining the interconnection process and expanding it to address technologies beyond DG.

For example, Con Edison continues to refine its forecasting processes, including more granular DER forecasts and the addition of a load modifier for electric heating. The Company also performed a study with the Electric Power Research Institute ("EPRI") to understand potential electrification scenarios and the impact on the winter peak forecast,[47] and is developing a DER forecasting tool. These enhancements are intended to provide a more accurate assessment of DER's contribution to load, resulting in more representative forecasts. Additionally, Con Edison has refreshed its 8,760 hourly load forecasts at the network level, which are available in the Company's hosting capacity platform within the system data portal.

As discussed in Sections 2.13 and 2.14, the Company has institutionalized NWS as a formal element of the annual capital planning process and continues to refine its processes based on ongoing solicitation and implementation experience. Con Edison filed its NWS suitability criteria in March 2017 and is applying the criteria as part of the annual capital planning process to identify NWS opportunities.[48] The Company also worked with the Joint Utilities to standardize the approach to NWS, including posting the RFPs, providing similar information in the RFPs, and sharing lessons learned to develop best practices.

The Company's hosting capacity map, discussed in Section 2.12, is the only hosting capacity map for a networked system. Upon release of Stage 3 maps on October 1, 2019, per Commission requirements, Con Edison's hosting capacity map increased the geospatial granularity of the analysis to include sub-feeder level hosting capacity and relevant hosting capacity data at the substation level, and reflects explicit modeling of existing solar PV into the analysis. Additionally,

[47] EPRI, *Electrification Scenarios for New York's Energy Future* (February 27, 2020). https://www.epri.com/research/products/3002017940

[48] DSIP Proceeding, Utility-Specific Implementation Matrices for Non-Wires Alternatives Suitability Criteria (filed March 1, 2017) ("Non-Wires Suitability Criteria").

the hosting capacity maps continue to show where DER value may be higher through identification of NWS and Locational System Relief Values ("LSRV") areas. Through these actions, customers and third parties have more information to assess a project's cost and feasibility, which results in a more complete business case and more predictable project experience.

Complementing the more granular and comprehensive hosting capacity maps is a more streamlined and transparent interconnection process that allows developers to bring projects online more quickly and easily. For example, as discussed in Section 2.10, Con Edison launched new preliminary screens for the secondary network, consistent with the December 2019 Standardized Interconnection Requirements ("SIR") update. Because the initial preliminary screens were designed strictly for the overhead system, projects interconnecting on the Company's network system would fail upon submission, requiring a detailed engineering review per the SIR process. The implementation of the network screens allows projects to advance absent a detailed engineering study when the screens are "passed."

Con Edison is also moving toward a more integrated approach to system planning that will emphasize the ability to incorporate DER into system design over time. To that end, in 2019, Distribution Engineering released an updated operating procedure bulletin allowing for the deferment of load relief projects when a SCADA-operated switching plan can be created to de-load the overloaded sections during times of contingency. In turn, the Company included these load relief needs into the priority lists for the MNPR program. As a result, not only can the network protector upgrades continue to increase hosting capacity in the network system over time, but when paired with operator-controlled switching schemes, they can delay the need for load relief-related infrastructure investment in constrained areas, potentially deferring the traditional investment long enough to fall within the NWS lead time suitability criteria, thus creating a potential opportunity for a NWS. The Company has also re-examined standards for network protector backfeed to determine whether updates are necessary to align system design criteria with the proliferation of DER.

As the Company evolves its integrating planning approach and philosophy, there will be increased synergies between system design and third-party opportunities. For example, the Company has begun to leverage NWS portfolios to allow for unique system design throughout the distribution system. In the Plymouth/Water Street network areas, the Company was able to leverage NWS to help defer substation capacity upgrades and redesign the traditional solution into a lower cost, modern DSS at Vinegar Hill that will add capacity to the system, provide operational flexibility for contingency remediation, and add microgrid functionality through the addition of energy storage. The Company plans to evaluate lessons learned from the Plymouth/Water Street NWS portfolios and redesign of the traditional solution, as well as the bulk storage RFP, to continue to evolve our system design methodology to increase distribution flexibility while facilitating DER interconnections.

Future Implementation and Planning

Summary of Future Actions

- Refine forecasting methodologies to improve forecast accuracy.
- Maintain progress on hosting capacity roadmap.
- Adapt the interconnection process to accommodate new technologies and configurations.
- Continue evaluating potential NWS opportunities as part of the capital planning process.
- Create PV production and forecast curves for networks in the service territory.

The continued progress in integrating DER into planning and operations provides a solid foundation for the future. In addition to actions pursued with the Joint Utilities, the Company will continue to formalize and institutionalize DER into utility planning, including leveraging experience from NWS projects to potentially expand NWS opportunities and modify internal procedures to improve the efficiency and effectiveness of the NWS process.

The Company continues to explore opportunities to incorporate more probabilistic methods into the planning process where they can drive improvement. Probabilistic planning is expected to be most relevant in the forecasting process, as related to probabilities around DER performance and other variables.

Risks and Mitigation

Building capabilities to support integrated system planning will require investment in enabling technologies and, as such, the timing and extent of some aspects of implementation will be determined by the available funding. Additionally, continued learning as part of demonstration projects and early efforts to integrate DER into planning will be fed back into the integrated planning process to inform potential process enhancements.

Stakeholder Interface

As noted above, the Company is evolving the distribution planning process to integrate DER and support DER market growth. The additional value provided to stakeholders is most evident in the externally-facing elements of distribution planning, namely sharing of system data and hosting capacity analysis, identification of NWS opportunities, and improving DER interconnection. The stakeholder interface and benefits are presented in those sections.

Additional Detail

This section responds to the questions specific to integrated system planning.

1) **The means and methods used for integrated system planning.**

Distribution system planning focuses on forecasting load, identifying system needs, identifying potential solutions to those needs, and selecting and implementing the preferred solution.

Load forecasting is a central component of the distribution system planning process and informs many other planning analyses. Development of the load forecast enables distribution system planners to identify a range of system needs to maintain reliability. Planners use load flow modeling, network reliability modeling, and modeling of system performance to assess the current capability of existing distribution and substation assets to meet the forecasted load, based on the design criteria, type of asset, thermal ratings, and local power factors. These analyses determine which, if any, assets are at risk of becoming overloaded during system peak conditions and under various contingencies. Other areas of system need identified through distribution modeling include:

- Risk reduction programs to perform necessary inspections and replace components with known performance issues in order to enhance network reliability.
- New business projects to interconnect new customers or expand service for existing customers.
- Storm hardening or resiliency projects to strengthen the electric grid.

In addition to the areas of need listed above, the Company budgets for emergency response and replacement, IT solutions to meet strategic business needs, and public works projects to re-route Company equipment due to municipal right-of-way.

Once a list of system needs is compiled, Con Edison planners identify all potential solutions to address the issues. The capital projects are scored and ranked through an optimization process that seeks to reduce operating risks and efficiently meet strategic objectives. The projects are also assessed against the NWS suitability criteria. Specifically, Company planners review the projects in the 10-year load relief program and determine on a project-by-project basis if the project meets the NWS suitability criteria. The suitability criteria identify projects that: (1) are for load relief, (2) have enough lead time to pursue a NWS without foreclosing the opportunity to install a traditional solution if needed, and (3) offer enough capital deferral or displacement to overcome transaction costs and issues of scale. Suitable projects are advanced to the solicitation process, where the need is defined in terms of the total MW of load relief required to replace the traditional capacity, the applicable time of day the load relief must be available, and the in-service date(s). This information, along with additional demographic information and project- specific detail is included in the NWS solicitation. Based on responses, the Company evaluates the viability of implementing a NWS portfolio to meet the MW needs within the required timeframe and conducts a benefit-cost analysis informed by the Benefit-Cost Analysis ("BCA") Handbook. Several iterations may occur until an optimized portfolio is submitted and approved. More detailed information on the distribution planning process can be found in the Company's Initial DSIP.[49]

2) How the utility's means and methods enable probabilistic planning, which effectively anticipates the inter-related effects of distributed generation, energy storage, electric vehicles, beneficial electrification, and energy efficiency.

Probabilistic planning is a tool to address uncertainty and risk. With DER penetration still relatively low, probabilistic planning is in its early stages. Current probabilistic planning methods within distribution planning are focused on evaluating the need for feeder relief to meet reliability standards, as measured by the Network Reliability Index ("NRI"). The NRI model is the primary tool used to predict the reliability of the networks. It determines the relative strength of each network by calculating the probability of failure of multiple associated feeders within a network over time, as caused by individual component failures.

Starting May 2017, the Company modified its process of evaluating overloads on 13, 27, and 33 kV feeders to incorporate probabilistic planning, as well as DER. The probabilistic approach allows the Company to lengthen the load relief timeline, which increases the likelihood that DER could be deployed to meet the load relief need. When evaluating overloads, if the NRI is less than 0.2, the Company will defer resolving overloads of up to 10 percent of the network load by 3 years. In the past, the Company would relieve the overload for the next summer.

Because of the intermittent nature of the DER, specifically DG, the Company uses scenario analysis to consider additional factors to assess reliability under peak load conditions for normal and contingency conditions. The planning process requires two design requirements to be satisfied:

(1) Traditional Baked-in model,[50] which uses the net load of a peak day, factoring in DER output.

(2) New DER Baked-out model (or worst case DER scenario),[51] which assumes DER is unavailable on a peak day.

If both of these requirements are met, meaning the poly-voltage load flow ("PVL") model runs show no overload under these scenarios, there is no further analysis required. Where one or both of these requirements are not met, further analysis is required to determine if DER operations can adequately meet the peak load requirements.

[49] DSIP Proceeding, Initial DSIP, pp. 20-152.

[50] The term "baked-in" is used as this model just looks at the "net" load, and is confirming whether the system, with the loads and DER output at the time of the previous design peak, is adequate for the level of contingency needed.

[51] The model takes the nameplate or maximum value of the DER and adds it as load to the baked-in model.

Additionally, the Company incorporates probabilities when developing the PV and energy storage load modifiers for use in the forecast. For example, to assess the growth rate of solar PV installations, the initial two years of growth is based on an assumed probability of projects in the interconnection queue being completed. Similarly, the Company is modifying its storage forecast methodology to allow for a broader set of assumptions and factors driving storage growth and support more dynamic and informed storage forecasts. In addition, the more finely tuned production data that is being collected through ConnectDER efforts and DERMS POC work will continue to give the Company more data on the actual DG production relative to forecast.

The Company has also begun work on methodologies to incorporate CLCPA goals, policy objectives, and lessons learned from the Vulnerability Study as inputs to demand and sales forecasts. The Vulnerability Study is based on a probabilistic, risk-based approach that considers the likelihood and consequence of potential changes in the climate, including assessing the probability of plausible future climate outcomes and the associated impact on Con Edison's service territory. For example, to assess an asset class' risk to changes in heat and humidity, the study team used a risk workbook to develop an overall risk score for each relevant asset and climate change hazard combination. The information is being used to prioritize operations, planning processes, and asset types for further analysis and potential remediation. In addition, the Company may use outputs of the Vulnerability Study to identify areas that may be more likely to experience load growth, or DER penetration, based on projected climactic risks and impacts.

3) **The Company will continue to explore opportunities to incorporate more probabilistic methods into the planning process where they can drive improvement. How the utility ensures that the information needed for integrated system planning is timely acquired and properly evaluated.**

The Company has established processes for collecting and evaluating data required for system planning. The load forecast is developed internally using a range of inputs, including customer data, economic indices, and new business jobs in queue. DER forecasts are an increasingly important input to the system and network forecasts and are informed by data from the interconnection queue, as well as known program activity, such as approved EE programs. Additionally, the Company has visibility into new business jobs, typically extending over a five-year period. Each individual job within the electric service territory is evaluated to determine the total load (and appropriate phasing-in), the network location, and when it will come online. More detail on load and DER forecasting is included in Appendix A. Further, the Company's investments in AMI and grid modernization technologies, such as GIS and DERMS, will increase the information available to system planners, particularly at the grid edge.

4) **The types of sensitivity analyses performed and how those analyses are applied as part of the integrated planning process.**

The Asset Management Life-Cycle Models include sensitivity analyses as part of the modeling. These models, used in the electric long-range plan for asset management, simulate the behavior of the asset fleet under various conditions, permitting what-if analysis across multiple scenarios. The models incorporate three distinct components: the characteristics of the asset fleet, the effectiveness of proactive replacement and maintenance, and the asset-management actions needed to achieve the desired service level.

The project began in 2016 with the separation of major assets into 12 asset groups and selection of 3 assets to model in 2016: wood poles, underground distribution cable, and 4 kV unit substation transformers, and 2 in 2017: network transformers and network protectors. An Asset Management Life-Cycle model is created for each asset group to provide decision making and scenario planning, including sensitivity analyses. The model uses sensitivity analyses to evaluate a replacement strategy, such as replacing a certain percent of the poorest performing assets each year for the next 10 years. The model predicts asset failure rate trends and how the failure rate is influenced by variation in key parameters, such as inherent asset deterioration with age and use, unit cost, and the likely condition of the assets

renewed. Scenario planning will address future asset performance based on an asset maintenance strategy and renewal factoring in historical data and performance.

5) **How the utility would timely adjust its integrated system plan if future trends differ significantly with predictions, both in the short-term and in the long-term.**

The Company updates its 10-year load forecasts on an annual basis as part of the capital planning process. In developing the forecast, the Company incorporates the best information available at the time, extending over the 10-year period. To the extent that future trends differ from past assumptions, such as increased load from electrification efforts or ramp up of EE efforts, the Company incorporates the new information into the forecast, which would flow into the system planning process. As such, the system plan evolves in line with trends, as well as unforeseen developments. As discussed in Section 2.2, the Company is reviewing its forecasting process in light of EV, electrification, and EE goals included in the CLCPA.

Additionally, the Company's integrated system plan has evolved from what was once a capacity-centric expansion program to one that favors distribution level flexibility and optionality. While the rates of load growth and DER penetration may change over time, Con Edison aims to advance the grid's ability to move from a static system to a more modern system capable of adapting to changes in trends with operationally flexibility.

6) **The factors unrelated to DERs - such as aging infrastructure, electric vehicles, and beneficial electrification - which significantly affect the utility's integrated plan and describe how the utility's planning process addresses each of those factors.**

As noted above, Company planners use load flow modeling, network reliability modeling, and modeling of system performance to assess the current capability of existing distribution and substation assets to meet the forecasted load, based on the design criteria, type of asset, thermal ratings, and local power factors. This process identifies a range of system needs, including risk reduction programs to address asset health, of which equipment age is one factor, along with maintenance history, performance, and other factors. A number of assets have replacement/renewal strategies based upon calculated Asset Health Indexes. For example, the unit substation transformer health index calculation uses Dissolved Gas in Oil Analysis, Furan test results, transformer loading, apparent corrosion, oil leaks, load tap changer functionality, environmental impact, proximity to public, and age as factors.

Recent policy changes represent a significant departure from past EV and electrification trends. As noted in Section 2.5, on January 13, 2020, DPS Staff released a whitepaper on recommendations to accelerate the development of EV charging infrastructure as part of a statewide Make-Ready program.[52] The recommendations are intended to support the State's goal of deploying 850,000 ZEV by 2025. The Company is actively engaged in this open proceeding and evaluating the planning impacts of the draft recommendations, particularly the siting of additional DCFC stations, which are potentially a meaningful driver of infrastructure needs. The Company has a process for handling requests for DCFC stations and determining the service upgrades or system reinforcements required, but is committed to developing processes that enable accommodating the potentially increased volume of requests. To date, service requests for quick charge stations have ranged between 50 kW and almost 1.5 MW. The Company further expects the distribution system to accommodate the projected increase in home EV charging.

[52] Case 18-E-0138, *Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure* ("EV Proceeding"), Department of Public Service Staff Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment (filed January 13, 2020) ("EVSE&I Whitepaper or Whitepaper").

Similarly, the discussion around heating electrification is continuing to evolve. For example, the Commission established a statewide minimum heat pump target of 3.6 trillion British thermal units ("TBtu") by 2025 at a total cost of approximately $454 million, with utilities serving as the primary administrators of heat pump programs. Con Edison's 2020-2025 heat pump target is 1 TBtu with a budget of $227 million.[53] The added load from heat pumps is captured in a load modifier for heating electrification, applied in the winter peak forecast.

7) How the means and methods for integrated electric system planning evaluate the effects of potential energy efficiency measures.

The Company has a long-standing practice of incorporating EE and DR as load modifiers that reduce the total forecasted load (or gross load). The Company added organic or naturally occurring EE (and CVO) as load modifiers in the fall 2017 forecast to further refine the forecasting process. See Appendix A for a detailed discussion of how EE and DR forecasts are developed and applied in the Company's forecasts.

8) How the utility will inform the development of its integrated planning through best practices and lessons learned from other jurisdictions.

In addition to collaboration with the Joint Utilities, the Company coordinates through EPRI, Institute of Electrical and Electronics Engineers ("IEEE"), and other industry forums to exchange information and stay informed on best practices and lessons learned from other jurisdictions. Through those forums, Company planners have developed relationships with other utility peers, who are a resource for questions and discussion. Additionally, Con Edison is developing its own best practices based on the unique characteristics of its system, including modifying its planning procedures to increase opportunities for NWS.

[53] Case No. 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative ("Comprehensive EE Proceeding"),* Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 (issued January 16, 2020)("NENY Order"), Appendix C.

2.2. ADVANCED FORECASTING

Context and Background

The development of long-term load forecasts is a central function of distribution system planning and a key input to the Company's strategic and long-range planning. System and network peak demand forecasts guide infrastructure investment decisions, directing capital to the areas of greatest need and setting the stage for identification of NWS and location-specific pricing. Additionally, peak demand forecasts serve as an input to the bulk level system planning process, while energy forecasts determine the revenue forecast and set rates.

The massive shifts underway in the industry, driven in large part by the CLCPA and other policy actions, increase the importance of developing forecasts that accurately represent future load and support sound decision-making on future investments, including projecting the right type of investments and solutions at the right times and locations. The nature of these shifts also increases the complexity of predicting how consumption will change over time. The Company has continued to refine its forecasting processes, including more granular DER forecasts and the addition of a load modifier for electric heating, and performed a study with EPRI to understand potential electrification scenarios and the impact on the winter peak forecast.[54] The Company is also working with industry experts to develop a DER forecasting tool. Additionally, Con Edison continues to coordinate with NYISO to align forecasting inputs and methods and share best practices among the Joint Utilities.

In a continuation of recent trends, Con Edison's 2019 forecast projects overall electric system load growth to be nearly flat, with a compound annual growth rate ("CAGR") of -0.1 percent annually over the 5-year period and 0.1 percent annually over the 10-year period, resulting in a 2029 system coincident peak of 13,370 MW. The slight increase in the later years is due to projected demand growth and an increase in EVs, while savings growth from DSM levels off and CVO reaches saturation with the full deployment of AMI. The system peak forecast includes 1,107 MW of incremental coincident demand reduction by 2024, growing to 1,614 MW by 2029. Table 2 summarizes the impacts that offset peak load in the five-year system peak forecast.

Table 2: Summary of Forecasted Demand Reduction (MW) from Load Modifiers – 2019 Forecast

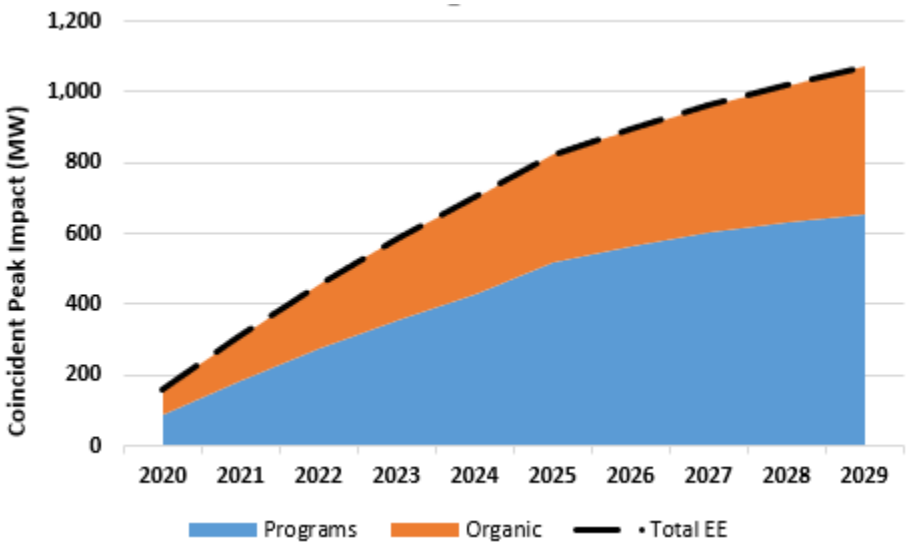
Negative Load Modifier	2020	2021	2022	2023	2024
Photovoltaics/Solar (PVs)	-27	-55	-83	-107	-125
DG	-32	-63	-78	-87	-97
Energy Storage	-2	-37	-50	-53	-59
CVO	0	-17	-17	-126	-126
Organic EE/ Codes and Standards	-71	-129	-181	-231	-270
Coincident DSM	-89	-182	-273	-354	-430
Total Rolling Incremental MW Reduction	**-221**	**-483**	**-682**	**-958**	**-1,107**

The Company incorporates the most current information available when producing the forecast and updates trends and assumptions accordingly. For example, as shown in

[54] Note 47, *supra*.

Figure 10 below, the Company's DSM peak demand forecasts have been updated to reflect the increased policy focus on EE savings and continuing market trends.

Figure 10: 10-Year Forecast for EE During System Peak (Rolling Incremental)



As DER penetration grows, the forecasting of DER at more granular levels becomes increasingly important. More robust and granular DER forecasts should improve forecast accuracy, all else being equal. At the same time, increased adoption of DER introduces new challenges for maintaining forecasting accuracy due to uncertainties associated with the variability of DER output, DER's evolving correlation with net load, and the impact of geographic diversity on aggregate DER output. The Joint Utilities have explored opportunities to develop long-term forecasting capabilities that can more precisely reflect the impacts of DER on system needs. For example, the Joint Utilities have focused on developing granular forecasts using a hybrid of top-down and bottom-up methodologies, which improves forecast accuracy by allowing for cross-referencing between project-specific information and overall macroeconomic trends. Additionally, the Joint Utilities are integrating additional sources of data into forecasts, such as system monitoring information, meteorological data, and customer demographics. Con Edison is committed to continued coordination with the Joint Utilities and NYISO to enhance and potentially align forecasting approaches.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Refined and enhanced forecasting methodology, including addition of new load modifier for heating electrification to the winter peak forecast.
- Developing a new DER forecasting integrated tool that will produce 20-year electric forecasts for battery storage and heating electrification, and will have the architecture and design to allow for future extension to EVs, solar PV, and DG/CHP.
- Collaborated with EPRI, NYPA, and NYISO on an in-depth evaluation of the economic and technical potential for electrification statewide and implications for the bulk power system.
- Collaborated with the Joint Utilities to share best practices and align forecasting approaches.
- Utilized an EEDM forecast tool developed by outside experts.
- Coordinated with NYISO to share data inputs and assumptions and promote alignment between distribution level and bulk system forecasts.
- Integrated the winter electric peak demand forecast and the natural gas peak demand forecast with consideration of electrification of CECONY gas heating, National Grid gas heating, and oil heating in CECONY's electric service territory.
- Published a refreshed 8,760 forecast at the network level.

The Company continues to refine its forecasting process to be more granular and incorporate a broader range of drivers affecting electric demand. The Company has a long-standing practice of incorporating EE and DR as load modifiers that reduce the total forecasted load (or gross load). The Company has evolved its forecasting methodologies and expanded them to specifically include PV, combined heat and power ("CHP"), EVs, and energy storage as load modifiers. Additionally, the Company added organic or naturally occurring EE and CVO as load modifiers in the fall 2017 forecast to further refine the forecasting process. In the fall 2019 winter peak forecast, the Company added a positive load modifier (contributes to load growth) for electrification of heating end uses. Together, these modifiers provide a more holistic view of consumption trends and impacts.

Other process refinements include the introduction of the EEDM Tool in 2019. This new integrated "Stock and Flow" model, which accounts for State and New York City policy EE targets and technology trends, produces 20-year forecasts for EE programs (Con Edison EE, New York Power Authority ("NYPA") EE, and NYSERDA EE), as well as organic EE. The EE programs aim to reduce customers' energy consumption by promoting the use of more energy-efficient lighting, appliances, industrial equipment, and offering incentives. Organic EE captures naturally occurring reductions in usage that are due to technological improvements or changes in customer behavior, which are not influenced by programs or incentives.

Additionally, the Company is developing a new DER forecasting tool that will better incorporate new technologies and end uses, such as storage and building electrification, and will have the architecture and design in place to allow for future extension to EVs, solar PV, and DG/CHP.

The Company was also part of the EPRI team that assessed the implications of the CLCPA goals on New York's future energy system.[55] This study used a sophisticated and integrated model (NY-REGEN) to evaluate scenarios for EVs, building energy systems, fuel-switching in energy end uses, rooftop solar and DER, energy storage, electric system operation, prices for energy and capacity, imports and exports, capacity additions, fuel use and diversity, and CO_2 emissions. The findings of this report, taken with internal Con Edison studies, inform the Company's understanding on how the peak will shift in response to CLCPA goals, including a higher winter peak, as well as opportunities to manage that growth. The Company also has been supporting the Local Law 97 Steering Council and now has a direct line of sight toward correlating this law to EE and electrification of heating forecast algorithms.

The Joint Utilities continued to collaborate on the evolution of long-term load forecasting, including enhancing forecasting tools and refining methodologies for forecasting DER, increasing the granularity of forecast data, and coordinating with NYISO to share data inputs and assumptions and discuss forecasting approaches, including capturing DER impacts in long-term forecasts in the context of system planning. For example, to better understand how DER impacts can be reflected in long-term forecasts in the context of system planning, the Joint Utilities Forecasting Working Group met with NYISO in June 2018 to discuss the following agenda items provided by NYISO:

- Disaggregated load forecasting.
- How utilities are profiling/defining small-area loads.
- Utilities' progress toward EV infrastructure planning and awareness of territory footprint.
- Ongoing discussions regarding electrification.

The Joint Utilities' coordination with NYISO has been mutually beneficial and effective at communicating integrated transmission and distribution planning processes, planning assumptions, and data resources.

Future Implementation and Planning

Summary of Future Actions

- Refine existing load modifiers and add new modifiers, as appropriate.
- Explore potential refinements to the 8,760 forecasting methodology, as warranted.
- Share information and coordinate with the Joint Utilities and NYISO on load and DER forecasting.

The Company will continue to refine its forecasting methods in support of greater accuracy, recognizing that some degree of statistical error is inherent in the process. Aspects of these refinements, as well as new capabilities, will be enabled by the planned upgrade to the Company's primary forecasting tool, MetrixIDR. The tool will enable the Company to effectively provide hourly load forecasts for the distribution areas/networks and radial feeders on a daily basis to support any future distribution network market.

The MetrixIDR upgrade is expected to add the following new and enhanced features:

- Build 83 electric network hourly forecasts and 13 radial feeder hourly forecasts.
- Provide a mechanism to forecast DERs' contribution to the Weather Adjusted Peak ("WAPs") on a system wide basis and by electric networks, and to provide forecast for future DER.
- Provide Distribution Control Centers and Substation Operators access to the MetrixIDR Load Forecasting System.

[55] Note 47, *supra*.

- Develop five-minute interval forecasting models as the need arises.
- Integrate multiple weather forecasts to feed the model.
- Implement various automated reports such as model performance, network and feeder load summaries and statistics.
- Enhance details for network forecasts, both current and future (i.e., 8,760 hour forecast).

Additionally, to support more advanced forecasting methodologies, the Company is taking initial steps to leverage the more granular and accurate meter data available through AMI to help determine the customer contribution to network or substation peaks by customer type. Integration of AMI data into the existing forecasting process flow will allow for more accurate representation of load growth and better visibility into impacts and participation in EE programs and customer energy usage behaviors at more granular levels.

Con Edison will continue to coordinate with the Joint Utilities and NYISO on the forecasting of load and DER, as well as track developments in other states to identify lessons learned and best practices. Future discussions will continue information sharing on forecasting aspects, such as:

- Harmonizing utility and NYISO load and DER forecasts.
- Feedback from NYISO following review of utility portals.
- Utility to ISO feedback loop and process.
- Energy storage and EV forecasts.

The Joint Utilities will continue discussing forecasting items and begin holding technical workshops for subject matter experts ("SMEs") on topics such as:

- Locational value/marginal cost of service ("MCOS") studies.
- Advanced load/DER forecasting.
- Applying probabilistic forecasting to transmission, substation, and distribution planning models.
- Developments from other jurisdictions to identify relevant lessons for Joint Utilities forecasting efforts.

Risks and Mitigation

As forecasting becomes more complex and the demand for additional and more granular forecasts increases, such as forecasts at the circuit level, the Company may require additional resources, including staff. The availability of resources may affect implementation timelines.

Stakeholder Interface

With the publication of the 8,760 forecasts, the Joint Utilities shifted its stakeholder focus to coordination with NYISO, as described above. Con Edison remains open to further stakeholder engagement should the need or interest arise.

Additional Detail

This section responds to the questions specific to advanced forecasting.

1) **Identify where and how DER developers and other stakeholders can readily access, navigate, view, sort, filter, and download up-to-date load and supply forecasts.**

The Company provides extensive system data, including load and energy forecasts, through the Company's hosting capacity platform available through the online data portal.[56] The data portal and hosting capacity map are accessible through the DCX web interface, linked from the Joint Utilities' website,[57] and easily found via internet searches. Within the hosting capacity maps, developers and other stakeholders can view and download network-level 8,760 hourly load forecasts and network-level 24-hour peak load and minimum load duration curves.

Every year, following the summer peak season, the Company produces a series of forecasts to guide the next planning cycle, including a 10-year electric system peak demand forecast and a 5-year system energy forecast, as well as a 10-year network independent peak demand forecast. Appendix A includes the most current forecasts.

2) **Identify and characterize each load and supply forecasting requirement identified from stakeholder inputs.**

The Joint Utilities hosted two stakeholder engagement sessions in March and July 2017. The Joint Utilities solicited stakeholder feedback and participated in discussions on several forecasting topics of interest to stakeholders, including forecasting use cases and the role of 8,760 forecasts in addressing those use cases; incorporation of additional external inputs to utility forecasts such as public policy and developer forecasts; and the evolution of forecasting to incorporate more probabilistic methods and scenario analysis.

In response to stakeholder interest and Commission guidance, in 2018, Con Edison developed and published 8,760 hourly load forecasts at the network level, consistent with methodologies discussed with the Joint Utilities. The development of 8,760 forecasts included internal discussions among the Joint Utilities on topics like data resources, treatment of interconnection queue data, and policy issues. As noted above, refreshed 8,760 forecasts are available in the Company's hosting capacity platform within the system data portal.

3) **Describe in detail the existing and/or planned forecasts produced for third party use and explain how those forecasts fulfill each identified stakeholder requirement for load and supply forecasts.**

See response to 2) above for a discussion of the 8,760 forecast produced for third-party use.

4) **Describe the spatial and temporal granularity of the system-level and local-level load and supply forecasts produced.**

At the system level, the Company produces a 10-year electric peak demand forecast and a 5-year energy forecast. At the network level, the Company produces a 10-year independent peak demand forecast and 8,760 hourly load forecasts extending 3 years.

5) **Describe the forecasts provided separately for key areas including but not limited to photovoltaics, energy storage, electric vehicles, and energy efficiency.**

The Company has a long-standing practice of incorporating EE and DR as load modifiers that reduce the total forecasted system load (or gross load). The Company has evolved its forecasting methodologies and expanded them to specifically include PV, CHP, EVs, and energy storage. As discussed above, the Company added organic or naturally occurring EE and CVO as load modifiers in the fall 2017 forecasts and an electrification of heating load modifier to the fall 2019 winter

[56] https://www.coned.com/en/our-energy-future/our-energy-projects/distribution-system-platform.
[57] http://jointutilitiesofny.org/system-data/.

peak forecast to further refine the forecasting process. The Company will look for opportunities to refine existing load modifiers and potentially add new modifiers as DER technologies proliferate.

Appendix A includes a detailed description of the DER forecasts, including methodology and the latest forecasts.

6) Describe the advanced forecasting capabilities which are/will be implemented to enable effective probabilistic planning methods.

The Company has explored opportunities to advance forecasting capabilities to better reflect the impacts of DER on system needs, including developing draft forecast methodologies related to:

- Dispatching DER (five-minute intervals)
- Committing DER (hourly to day ahead or two days ahead)
- Scheduling work on the network (weekly)
- Scheduling DER maintenance (monthly)

For example, to build a forecast for dispatching DER, the Company would use the probabilistic output from multiple weather service models to blend weather temperatures and other variables with their corresponding probability of occurrence. To do this, the Company would need a short-term, local, and refined weather forecast that uses data from high-quality local weather radars, such as a high-frequency S-band dual pol radar, as well as short-term solar radiance and wind forecast models, NASA solar flare models, and multiple satellite images. The Company would incorporate feedback from DER set points to produce and forecast the next five-minute set points.

Additionally, the Joint Utilities are integrating additional sources of data into forecasts, where available, such as system monitoring information, meteorological data, and customer demographics. The Company also plans to use actual customer hourly load data from AMI to help determine customer contribution to peaks. As described above and below, Con Edison is adding and refining load modifiers to better capture exogenous factors influencing peak load.

7) Describe how the utility's existing/planned advanced forecasting capabilities anticipate the inter-related effects of distributed generation, energy storage, electric vehicles, beneficial electrification, and energy efficiency

See response to 5) above.

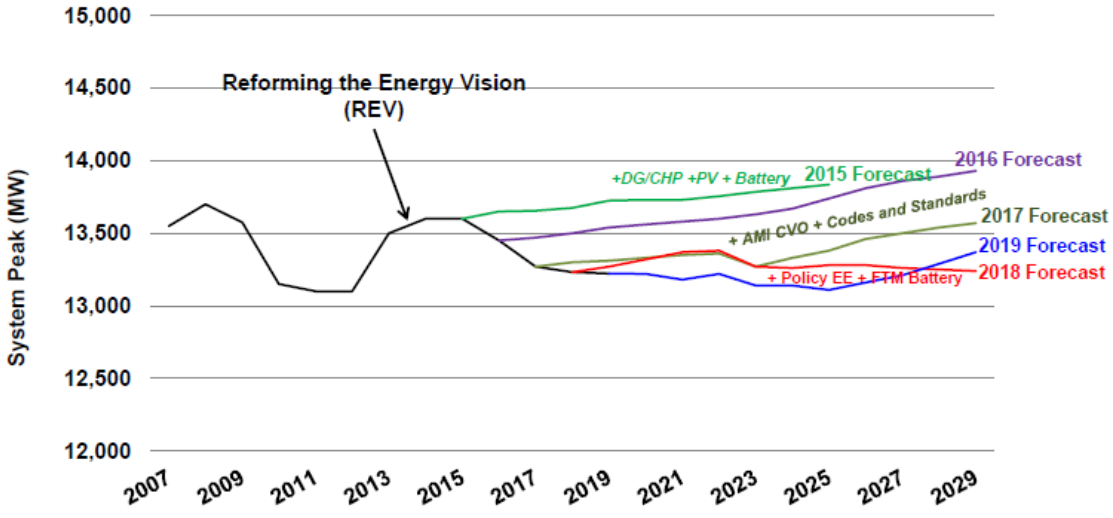
8) Describe in detail the forecasts produced for utility use and explain how those forecasts fulfill the evolving utility requirements for load and supply forecasts.

System and network peak demand forecasts guide infrastructure investment decisions, directing capital to the areas of greatest need and setting the stage for identification of NWS and location-specific pricing. Additionally, bulk level system planners use peak demand forecasts as an input to their planning process. Separately, Con Edison uses energy forecasts to determine the revenue forecast and set rates.

The forecasting of DER becomes increasingly important as DER penetration grows, requiring more granular load forecasts and a better understanding of DER performance. As peak demand forecasts incorporate more robust and granular DER forecasts, Con Edison expects forecast accuracy to improve and the impact of DER growth on system planning will be clearer and more actionable. At the same time, increased adoption of DER introduces new challenges for maintaining forecasting accuracy due to uncertainties associated with the variability of DER output, its evolving correlation with net load, and the impact of geographic diversity on aggregate DER output.

To that end, the Company continues to refine its forecasting process, including the addition of new load modifiers to provide a more complete assessment of the factors affecting the forecasts, thus supporting greater accuracy. Figure 11 shows how the addition of DER load modifiers has significantly reduced the 10-year forecasts in line with the increased adoption of these technologies, as driven by REV policies.

Figure 11: Historical 10-Year System Peak Forecasts



	2015	2016	2017	2018	2019
5 - Year CAGR	0.2%	0.2%	0.1%	0.1%	-0.1%
10 - Year CAGR	0.2%	0.3%	0.2%	0.0%	0.1%

The slight increase in the later years is due to projected demand growth and an increase in EVs, while savings growth from DSM levels off and CVO reaches saturation with the full deployment of AMI.

At this time, the Company treats resources capable of exporting energy to the grid, such as PV, as load modifiers in the forecasts. Separating onsite consumption from exported energy (i.e., supply) would require a level of disaggregation and granularity not currently practical or meaningful to forecast outputs.

9) Describe the utility's specific objectives, means, and methods for acquiring and managing the data needed for its advanced forecasting methodologies.

Con Edison uses a range of data inputs to produce its forecasts, including but not limited to meter data, queued projects, technology-specific growth forecasts, and macro-economic trends. To support more advanced forecasting methodologies, the Company plans to leverage the more granular and accurate meter data available through AMI. Actual customer hourly load data from AMI coincident with system, network or substation peaks will help in the determination of customer contribution to these peaks by customer type. The Company can then extrapolate this information to the queue of customers connecting to the system to determine short- and long-term (one-year) growth. With AMI data, the Company can also calculate a customer's load with DR and DER reductions to determine, by customer type, the reductions at the time of the peak.

The Company is also interested in evaluating the benefit of acquiring more meteorological data, such as high-frequency S-band dual pol radar data, to enable more granular DER forecasting and dispatch.

10) Describe the means and methods used to produce substation-level load and supply forecasts.

The network peak load forecast uses regression analysis to determine the individual network weather-adjusted peaks. The job growth and load modifiers use a combination of bottom-up (jobs in queue) and top-down (econometric and/or industry trends) methods. Con Edison uses a combination of queue data and historical trends to allocate top-down forecasts to each network.

The 3-year 8,760 network forecast modifies the actual hourly loads from the previous year based on monthly energy distribution from the previous year, forecasted peak demand, and energy send-out. The Company uses actual hourly loads to capture the DER impacts embedded in the service area to develop the load shapes for the individual networks. The Company adjusts the load shapes to the individual network peak demand and energy send-out forecasts including the projected DER impacts, such that the forecast includes the impact of load modifiers. Since 2018, the Company updated the 3-year 8,760 forecast methodology by integrating the regression algorithm developed in the Python Jupyter Notebook tool. Comparatively, the 2018 model used both the Python and the General Electric – Multi-Area Reliability Simulation ("GE-MARS") programs.

The 8,760 hour forecasts are for informational purposes. These forecasts have uncertainties such as weather and hourly load curves, as well as the typical inherent forecasting error, including, but not limited to economic drivers, customer decision/behavior, and forecasted DER. Con Edison does not warrant the accuracy of these informational forecasts.

11) Describe the levels of accuracy achieved in the substation-level forecasts produced to date for load and supply.

The system peak forecast has an average 5-year error rate of approximately 1.0 percent and the network independent peak forecast for individual networks and radial systems has an average 5-year error rate of 2.8 percent.

12) Describe the substation-level load forecasts provided to support analyses by DER developers and operators and explain why the forecasts are sufficient for supporting those analyses.

The Company's hosting capacity platform includes 8,760 hourly forecasts at the network level. Stakeholders requested the 8,760 forecasts to provide an indication of the duration of peak and off-peak periods, which is useful for evaluating energy storage opportunities.

13) Provide sensitivity analyses which explain how the accuracy of substation-level forecasts is affected by distributed generation, energy storage, electric vehicles, beneficial electrification, and energy efficiency measures.

The Company will continue to assess the impact of DER on network and system-level forecast accuracy and refine methodologies as appropriate. The Company updates its assumptions each year.

For example, the Company collects detailed outage information from CHP customers seeking a reliability credit and uses the information to develop metrics that analyze outage frequency, duration, causes, and many other factors related to outages. The Company will also issue an annual public report showing aggregate metrics for each network.

While Con Edison does not intend for CHP outage data to provide determinative performance measures, it does probabilistically quantify certain performance aspects by building transition rate tables for each distribution feeder. In addition to collecting simple CHP equipment availability, the Company will collect detailed information about individual outage events that, when analyzed at the network level, will provide data that the Company may use to improve

reliability. Con Edison will link specific equipment outages to disturbance reports on the networks, enabling better association of CHP outages with load and distribution outages. Additionally, the Company will now track outages by one CHP owner to outages of other CHP owners to establish any potential relationships among multiple outages.

As noted above, the system peak forecast has an average 5-year error rate of approximately 1.0 percent and the network independent peak forecast for individual networks and radial systems has an average 5-year error rate of 2.8 percent.

14) Identify and characterize the tools and methods the utility is using/will use to acquire and apply useful forecast input data from DER developers and other third parties.

The Company relies on actual impacts from installed DER technologies and programs, as well as data from government and industry sources to build the forecast. The Company believes the current practice of using actual performance data and data from trusted academic sources results in a more accurate forecast and prevents potential market manipulation. Additionally, some DER developers may consider information about forecasted installations and market activities to be sensitive competitive information.

15) Describe how the utility will inform its forecasting processes through best practices and lessons learned from other jurisdictions.

Con Edison continues to collaborate with the Joint Utilities to share internally-developed best practices, keep abreast of best practices from industry leaders, and align forecasting approaches. Future discussions will continue information sharing on forecasting aspects such as load modifiers, customer-owned generation, and other forecasting issues such as:

- Locational value/MCOS studies.
- Advanced load/DER forecasting.
- Applying probabilistic forecasting to transmission, substation, and distribution planning models.
- Developments from other jurisdictions to identify relevant lessons for Joint Utilities forecasting efforts.

16) Describe new methodologies to improve overall accuracy of forecasts for demand and energy reductions that derive from EE programs and increased penetration of DER. In particular, discuss how the increased potential for inaccurate load and energy forecasts associated with out-of-model EE and DER adjustments will be minimized or eliminated.

As discussed above, the Company has taken a number of steps to improve forecast accuracy by better capturing the impacts of DER on load, particularly through the addition and refinement of load modifiers. The Company will continue to refine its forecasting methods in support of greater forecasting accuracy, recognizing that it cannot completely eliminate statistical error and weather uncertainty inherent in the process.

2.3. GRID OPERATIONS

Context and Background

To reduce GHG emissions and mitigate the effects of climate change, the Company, guided by the CLCPA, is building out the grid and adding new grid capabilities to prepare for accelerated and expanded deployment of large-scale renewables, EE and DR, and distributed resources, as well as facilitating greater electrification in the transportation and building sectors. In this rapidly evolving environment, grid flexibility becomes paramount, which demands a more comprehensive view of system operations.

EPRI defines grid flexibility as "the ability to adapt to dynamic and changing conditions, for example, balancing supply and demand by the hour or minute, or deploying new generation and transmission resources over a period of years."[58] The Company's efforts under REV to integrate DER, as well as ongoing storm hardening, resiliency, and reliability investments have contributed to a more modern grid that is more flexible and adaptable to grid events, stresses, and emerging requirements. For example, through recent and ongoing DSP investments in monitoring, sensing, communication, and control, Con Edison is increasing grid flexibility by improving capabilities in grid visibility, situational awareness, and real-time response to grid conditions. These capabilities simultaneously support decarbonization through integration of intermittent resources, increased resiliency to extreme weather events and climate change, and DER market growth.

To prepare for more DER on the grid, the Company is taking a number of steps to enhance operational capabilities, improve operational efficiency, coordinate with NYISO, and test the interaction of DER technologies with the grid, all of which will support higher levels of DER penetration. Central to this plan are enabling investments in systems required to manage a grid with bi-directional power flows. For example, the Company is upgrading over 2,000 network protector relays to have bi-directional capabilities, which will allow export from DG systems and trips due to backfeed. Additionally, investments in distribution automation will enhance the Company's M&C capabilities, allowing for enhanced visibility at the grid edge. Installation of VVO hardware will improve system efficiency by lowering voltage and set the stage for DER to provide voltage regulation.

Following extensive benchmarking and business case validation, the Company is proceeding with its enterprise-wide GIS implementation, which will support a DERMS. The GIS will offer one consolidated mapping and visualization system that stores the physical location and other operating characteristics of facilities and assets, including DER, and maintains the as-built model of the electric and gas distribution systems. It will also be the backbone for the connectivity model that shares information and provides feedback across the grid.

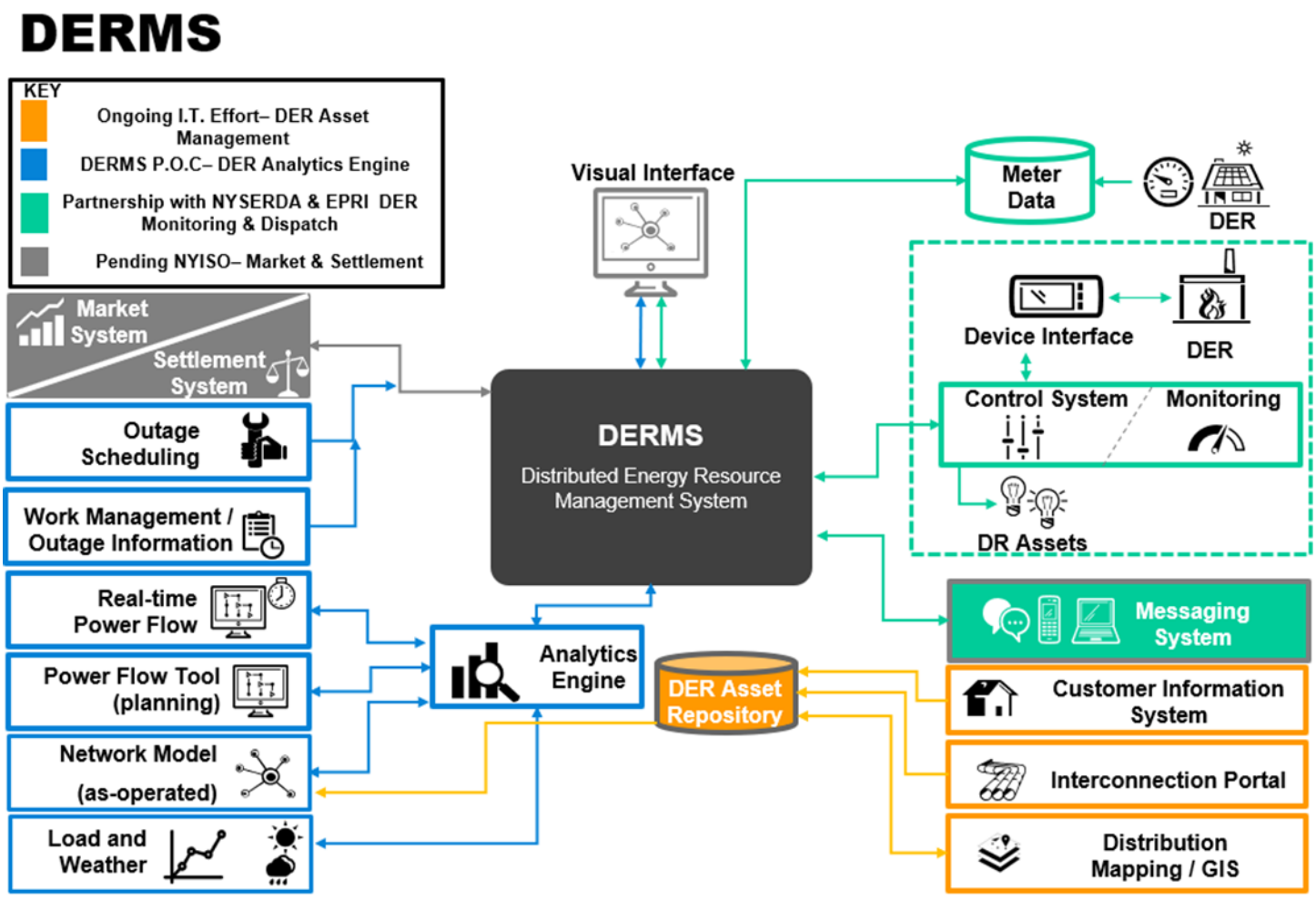
With the funding approved in Con Edison's last rate case, the Company is progressing in its DERMS functionality with the eventual goal of allowing system operators to monitor DER assets at the grid edge and forecast DER performance on a forecasted (day ahead) and real-time basis. This information helps system planners and operators assess whether there may be feeder issues as DER performance ramps up or down.

DERMS will provide a comprehensive view of DER assets, fully integrated with operating and planning systems, that will support better tracking and reporting on DER growth in the service territory. The purpose of a DERMS is to manage diverse DER, understand the unique status and capabilities of each, and present these capabilities to other supporting applications to facilitate enhanced M&C of the distribution system. A DERMS will provide visibility and control of a diverse portfolio of resources to address local constraints, while also flexibly addressing system-wide concerns. DERMS will start out as a planning tool and will evolve over time to add operations and market facilitation capabilities. The

[58] EPRI, *Electric Power System Flexibility: Challenges and Opportunities*. https://www.epri.com/#/pages/product/3002007374/

system will visualize, predict, and optimize DR and DG at the circuit, feeder, or segment level, and present the data in a dashboard suitable for operational use. An illustrative DERMS architecture is shown in Figure 12.

Figure 12: Illustrative DERMS Architecture



As shown above, the Company separated DERMS functionality into 15 modules. In 2019, the Company started POC research into six foundational modules of DERMS, and in the case of the DRMS, has closely monitored project development to document lessons learned and opportunities to leverage capabilities for a larger DERMS solution. The approach was to build an in-house version of each module in the POC, as well as assess off-the-shelf solutions.

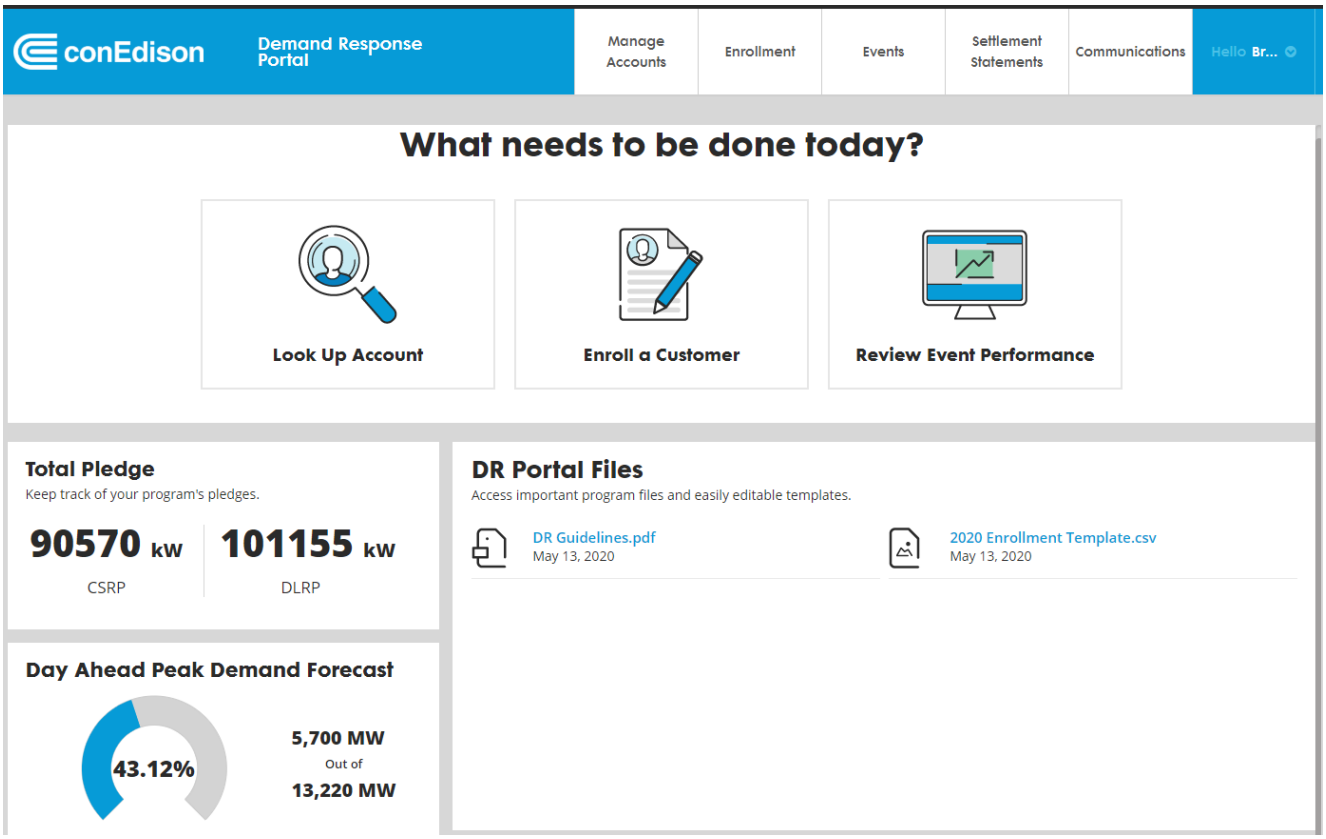
In 2020 and 2021, the Company will continue POC efforts with a focus on interoperability. The Company is consolidating data from multiple sources, cleaning up DG asset data, and building modules to support distribution planning and operational use cases. For example, within the load and weather module, adjusting for cloud cover and/or time of day displays the projected feeder overload as the sun sets and DG production drops off. Another example is the network module, where the Company will create a relational database tracing a customer back to the substation. The relational database will facilitate the implementation of a common information model ("CIM"). Using a CIM standard for the model will prove out interoperability with existing systems and improve understanding of DER impacts to the distribution system. Additionally, the Company will test CIM standards for market functionality similar to the UK, but extended for North America. This will allow the Company to better understand the impact of DER currently on the

system, improve the DER planning processes, and prepare DER's bidding into the wholesale market. By the end of 2020, Con Edison expects to translate the entire distribution system connectivity model to a CIM-compliant model, which will allow the data to be usable across the Company's systems.

The DRMS is validating the Company's DERMS vision and roadmap. The new DRMS is a monitoring system designed specifically for DR assets. The core DRMS module allows operators to dispatch for system-wide events and location-specific events. Each DR asset and corresponding meter is individually modeled and can be dispatched as needed. Although only designed for DR use cases, the similarity between baseline DRMS functionality and DERMS functionality has been noted, especially for the overlapping M&C components.

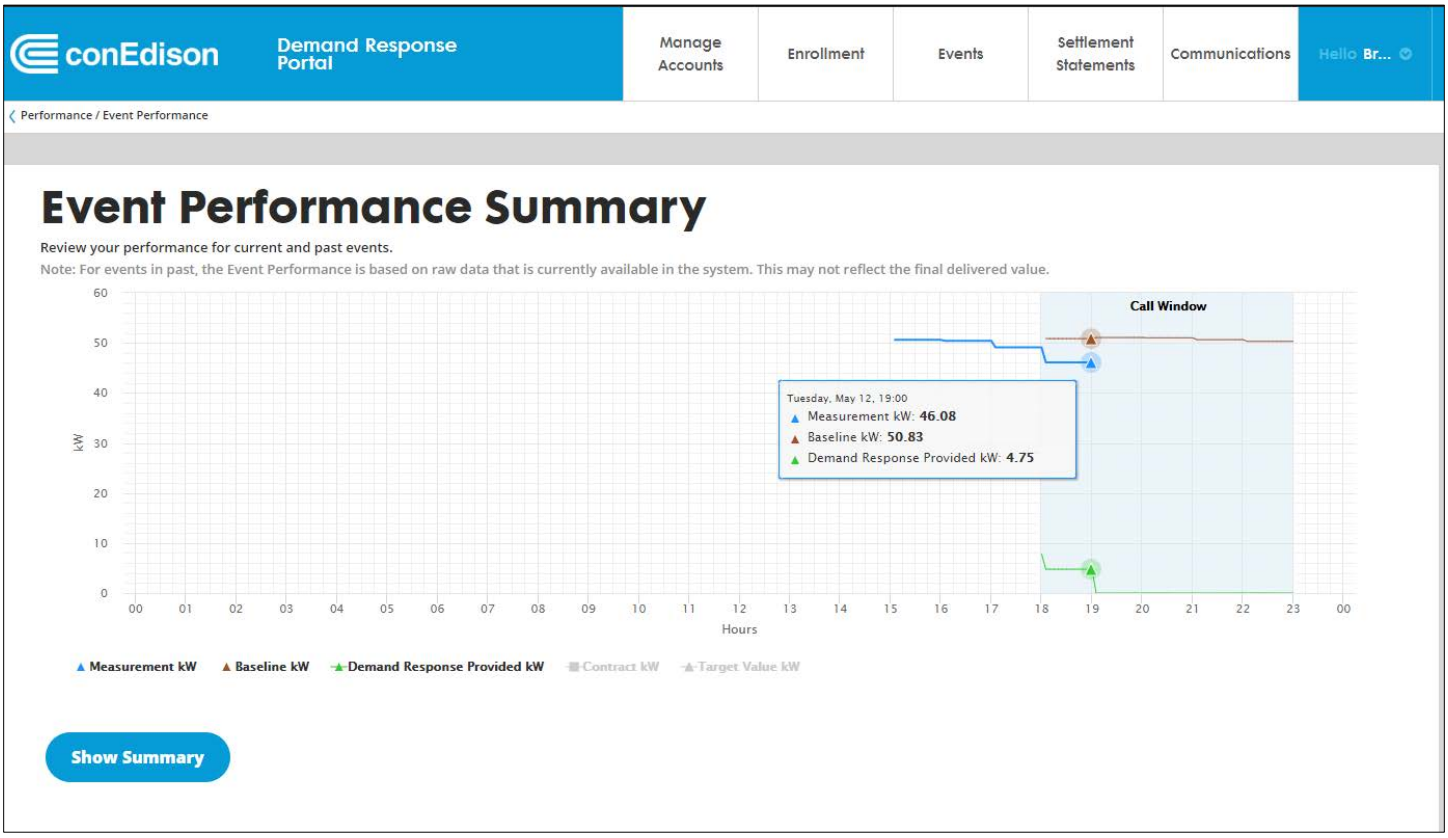
For example, as a core feature of the new DRMS, the DR Portal, shown in Figure 13 serves as a participant's main source of information and interaction with Company programs. This modern platform is fully integrated with the Company's DCX initiatives (including single sign-on) and provides a variety of capabilities to the customer. A primary use case is the ability to subscribe to DR event notifications and view DR event information. Through the messaging system, participants can receive text, phone, email, and other forms of electronic messages to alert in real time of DR events. In the future, several modern dispatch technologies are being considered for the roadmap (e.g., OpenADR, IEEE 2030.5, full suite of webservice application program interfaces ("APIs").

Figure 13: DR Portal Home Page



The new DRMS has next generation monitoring capabilities through access to AMI data. Although meter interval data is often delayed, or initially lost in transit, the new system is capable of processing and displaying customer meter data that is only minutes old, as shown in Figure 14.

Figure 14: Using the DR Portal to View Near Real Time AMI Meter Data



The new DRMS is fully integrated with Company internal systems. The architecture permits data extracts in real time to partner systems and allows teams to safely and securely develop an immersive user experience with all needed data available. For example, the Company is now able to efficiently receive data from internal systems in a matter of seconds. This allows users to quickly see their enrollments and assets on a geospatial map within the DRMS after enrollment.

As part of the Joint Proposal in the Company's latest rate case, Con Edison held a stakeholder seminar in April 2020 to present current efforts and future DERMS and related DRMS roadmap items to the broader DER community. Continued engagement will be beneficial as the Company graduates from internal functionality and design to more publicly-facing components of the system. The Company understands that these tools will form the core of how data is produced, exchanged, and catalogued between the utility and the DER community.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Invested in new M&C capabilities, including ongoing investments in AMI, GIS, and DERMS, as well as network protector relays that allow bi-directional communication with SCADA.
- Updated benchmarking of low cost M&C solutions to include new solutions.
- Piloted low cost M&C solutions, such as the ConnectDER™ meter collar.
- Collaborated with Joint Utilities to develop roadmap for integrating smart inverters.
- Worked with NYISO on a DER aggregation pilot that will examine the interoperability of jointly operated storage assets.
- Coordinated with the NYISO in the development of its proposed DER aggregation and energy storage resource ("ESR") participation models.
- Implemented new DRMS architecture and integrations to serve as initial blueprint for many future DERMS integrations.

The Joint Utilities have made progress in advancing M&C capabilities, expanding M&C requirements to include additional technologies like energy storage, and identifying lower-cost M&C solutions to reduce the cost burden on developers. These efforts have resulted in a more predictable operating environment for DER developers that attempts to leverage the full value of DER assets while preserving system reliability. Additionally, the Joint Utilities established a Smart Inverter Strategic Initiative to build a common understanding of smart inverter capabilities and use cases, and outline a shared approach to smart inverter integration. The Joint Utilities also continue to coordinate with NYISO to secure the reliability of the bulk electric system, the wholesale markets, and the distribution system, and open greater opportunities to realize DER value.

M&C Capabilities

Advanced M&C of DER provides operational situational awareness and allows the utility to dispatch and optimize resources based on current or forecasted system conditions. With DER penetration at relatively low levels, the development of advanced M&C capabilities is in a nascent stage. Currently, the Company uses M&C capabilities to monitor and control the operation of DER to within allowable system parameters. The Company can also use data generated by M&C for long-term purposes, such as distribution planning. For example, through the ConnectDER™ pilot, Con Edison is evaluating a monitoring solution for planning use cases (potentially evolving to control capabilities) that utilizes the cloud to collect and communicate recorded data points. The ConnectDER™ meter collar pulls in monitoring data at five-minute intervals, improving the visibility and level of granularity of data available for planning purposes. The lessons learned from the deployment of ConnectDER™ in Staten Island are expected to help the Company disaggregate load and further understand the impact of PV of load.

In the Initial DSIPs, each utility included plans for enabling investments in monitoring systems, control systems, and distribution infrastructure upgrades to support DSP capabilities, including the measurement and verification of DER performance. Section 1.4 discusses how the Company's ongoing investments in AMI, GIS, DERMS, and protective relays that have bi-directional communication with SCADA will provide the Company with new M&C capabilities as DER penetration increases.

Additionally, as markets evolve and more DER is capable of entering into Wholesale, Energy and Ancillary Services markets, requirements for M&C will need to align with NYISO coordination manual requirements. The Company is actively engaged with the NYISO, including through a pilot project, to discuss potential solutions for these M&C needs that will satisfy market requirements, system reliability, aggregator needs, and individual DER concerns.

Table 3 provides a snapshot of planned technology investments supporting enhanced M&C capabilities.

Table 3: Utility Technology Investments Supporting Enhanced M&C

Primary Technology	Impacted Business Use Case
AMI	• Leverage existing infrastructure for greater situational awareness for use in planning and distribution operations • Improve restoration metrics through improved outage management
Distribution Automation	• Improve restoration metrics through automation and remote control • Reduce losses through local, automated adjustments to equipment and circuit configurations
ADMS	• Improve automation management to achieve greater operational efficiencies • Improve situational awareness through advanced integration of disparate data sources, resulting in improved safety and reliability in real-time operations • Improve interaction with SCADA-connected DER, enabling the Company to use larger DER assets as operational NWS
DERMS	• Enable operators to manage DER based on reliability, economics, and carbon impact, which facilitates participation of DER in wholesale and distribution markets
DRMS	• Integration of direct AMI head end data for performance visualization (separate from GBC), permitting new era of responsiveness for corrective actions to be taken by DR program participants • Planned rollout of modern communications standards (e.g., OpenADR) for faster response times when customer communication technology permits

The technology investments listed above will advance current M&C capabilities and enable capability deployment at scale. AMI deployment provides immediate benefits to Con Edison through billing automation and greater visibility at the edge of the grid, ultimately informing net generation and load growth for planning purposes. As discussed in Section 1.4, the Company has made steady and significant progress implementing its Grid Modernization Plan and phasing in new grid capabilities.

Cost Reduction Efforts

Since January 2017, Con Edison has been meeting with the Joint Utilities, initially as part of the M&C Working Group and currently as part of the Interconnection Technical Working Group ("ITWG") and Smart Inverter Initiative Working Group ("SIIWG"), to understand and define M&C requirements in light of a changing grid and evolving market operations. The Working Group has discussed implementation issues and the continued evolution of standards, such as pursuing lower-cost M&C solutions and integrating new technologies in the M&C framework.

To continue developing low cost alternatives to M&C, the Joint Utilities have met several times with their own SMEs in metering, telemetry, security requirements, engineering, installation, and commissioning to coordinate on pilot projects, discuss potential solutions, and update the benchmarking. For example, the group met for a workshop in March 2019 to share details of the different low cost M&C development efforts at each utility, and to discuss their current benchmarking of inverter and non-inverter based solutions. While each utility is testing solutions that best address their

utility-specific needs, the Joint Utilities continue to see value in sharing lessons learned and the potential for common applicability between solutions. The M&C Working Group will continue to update members of the ITWG as new developments and technologies emerge that provide a low cost solution for developers in New York. Additionally, the Joint Utilities continue to coordinate with NYISO, which has its own requirements for resources participating in the wholesale markets, to define roles, responsibilities, and procedures to enable DER participation in the wholesale market while preserving system safety and reliability.

To advance the discussion on smart inverters, in June 2019, the Joint Utilities began to hold regularly occurring calls focused on smart inverters as part of a strategic initiative, culminating in a roadmap for facilitating smart inverter benefits. The Joint Utilities plan to share this roadmap first with the ITWG in 2020 to review the proposed targets, milestones, overall approach, and solicit input on the direction. Additional discussion of Con Edison's smart inverter activities is included in Section 2.10.

Additionally, Con Edison is working with NYISO on a DER aggregation pilot that will examine the interoperability of jointly operated storage assets, test the DSP/NYISO coordination manual, and pilot new SD-WAN technologies that can be used as lower cost alternatives for base pointing aggregations and routing telemetry. The Company expanded the Storage On Demand demonstration project, originally designed to explore aggregation of smaller resources, to meet the previous 1 MW threshold for wholesale market participation, and partnered with the NYISO to begin practical applications of coordination functions and examine the interoperability of shared assets to inform future roadmap items involving advanced communications, technologies, and data portal functionality. The pilot leverages utility-scale SCADA communications for distribution needs and SD-WAN (Dispersive Technologies) for NYISO telemetry.

During 2018-2019, the Company and the NYISO scoped communications and use cases, as well as tested SD-WAN communications in preparations for 2020 pilot testing and deployment. The Company's demonstration projects team has one battery commissioned in Staten Island that will be dispatched for utility needs in summer 2020 and released to a third party for market participation when not required for forecasted constraints. The Company also plans to commission a second battery in the Bronx during 2020. Thus far, the Company has already been able to leverage lessons learned and inform the Company's approach to distribution coordination and operations. The Distribution Control Centers were integral in the process to design SCADA operating screens and create operating procedures that will serve as the foundation for future grid operations practices.

ISO-DSP Coordination

The Joint Utilities have collaborated with the NYISO since 2017 to develop operational coordination requirements to continue the safe and reliable operation of the system while providing greater opportunities to realize DER value. Con Edison has continued to participate in the Joint Utilities ISO-DSP Coordination Working Group, which primarily focuses on the DSP operational requirements. Recent activities have centered on coordinating with NYISO to create a wholesale DER aggregation participation model. For example, in December 2019, the Federal Energy Regulatory Commission ("FERC") approved the majority of NYISO's proposed tariff changes to create a DER aggregation participation model, which was informed by discussions between the NYISO and Joint Utilities on:

- Information exchanges and operational coordination between the DSP, NYISO, aggregators, and individual DER.
- DER aggregation registration and mapping of individual DER to a transmission node.
- DER/ESR metering and telemetry requirements, including development of the new Meter Service Entity role.
- Dual participation of DER/ESR in wholesale and distribution markets.

NYISO plans on implementing the full DER aggregation model in Q4-2021 with dual participation rules going into effect May 1, 2020 and ESRs being phased in by September 2020. The Joint Utilities continue to coordinate to define utility and NYISO actions required to facilitate wholesale market "go-live" of the DER aggregation and ESR participation

models. These actions also include discussions surrounding data portal requirements for future automations that will be required as penetration and market participation increases.

Additionally, the Joint Utilities' *Draft DSP Communications and Coordination Manual* reflects requirements and processes related to the timeliness and exchange of data required to secure the reliability of the bulk electric system, the wholesale markets, and the distribution system.[59] These processes guard against market activity adversely impacting the reliability of the underlying distribution systems, as well as allowing ample time for the NYISO to find additional market solutions and for the aggregator to afford them the opportunity to reallocate resources and update their market bids.

Future Implementation and Planning

Summary of Future Actions

- Focus on low-cost M&C of DER within planned pilots.
- Explore pilots to test DERMS functionality and integration with existing platforms.
- Collaborate with Joint Utilities, NYISO, DPS, NYSERDA, and other industry stakeholders on evolving M&C requirements.

Con Edison will look to further pilot M&C technologies as DERMS development progresses, recognizing that one of the main challenges to overcome is transmitting data securely. Additionally, Con Edison will continue to participate in Joint Utilities discussions on low cost M&C of DER within planned pilots, as well as M&C solutions that are harmonized with NYISO requirements and individual utility requirements. Similarly, the group will continue to harmonize M&C requirements and implementation across the Joint Utilities in accordance with NYISO and non-market-facing requirements. The effort to develop utility options for low cost M&C, as well as standardizing and harmonizing with the NYISO requirements, further supports the operational and market benefits of DER. In collaboration with the Joint Utilities, Con Edison will continue to support realizing those benefits to the DER community by developing M&C requirements that support high DER penetration and are also sensitive to project economics.

The Joint Utilities and NYISO will continue to coordinate to support implementation of the DER aggregation participation model. The Joint Utilities will also remain active participants in the NYISO's stakeholder forums, including the Installed Capacity Working Group and Market Issues Working Group.

As discussed in Section 1.4, Con Edison is on track with the implementation of its Grid Modernization Plan and will continue to invest in advanced capabilities that support a more flexible, dynamic, and resilient grid.

Risks and Mitigation

Building capabilities to support advanced grid operations, including advanced M&C, will require sustained investment in grid modernization technologies. The amount of available funding will influence the timing and extent of implementation. The safety and availability of the Company's field crew and contractors, in light of the COVID-19 pandemic, is another consideration that may impact implementation timelines.

[59] Note 11, *supra*.

Additionally, cybersecurity remains of paramount importance as the grid adds digital technologies. Emerging cybersecurity concerns or requirements have the potential to impact the implementation timeline in an effort to manage risk. The Company closely follows cybersecurity developments as provided in the Joint Utilities Cyber and Privacy Framework filed in the Supplemental DSIP and is actively engaged in industry discussions.[60]

Stakeholder Interface

As noted above, the Joint Utilities worked with stakeholders to align on M&C requirements and potential lower cost M&C solutions. The Joint Utilities continue to work with the DER community through the ITWG and other venues to find mutually satisfactory solutions and maintain the transparency of M&C requirements. Additionally, the Joint Utilities remain active participants in the NYISO's stakeholder forums, including the Installed Capacity Working Group and Market Issues Working Group.

Additional Detail

This section responds to the questions specific to grid operations.

1) **Describe in detail the roles and responsibilities of the utility and other parties involved in planning and executing grid operations which accommodate and productively employ DERs.**

The utility's primary responsibility is to preserve distribution system safety and reliability, with growing focus on creating a flexible system that is resilient to disruptions. Con Edison has coordinated with DER aggregators and the NYISO to define operational coordination requirements, including specific roles and responsibilities for each party, to preserve safety and reliability for a system characterized by increasing amounts of DER. As part of distribution system programs (e.g., DR) and procurements (e.g., NWS), the utility requires participants (e.g., DER aggregators) to sign a contractual agreement that defines the roles and responsibilities for both the utility and DER aggregator. For example, contracts typically specify the amount of advanced notification the utility will provide the DER aggregator prior to an event, and separately they define all reporting and settlement requirements for the DER aggregator.

In addition to operational coordination for DER participating as part of utility programs and procurements, the Joint Utilities have developed and refined a *Draft DSP Communications and Coordination Manual*[61] to define the roles and responsibilities among the DSP, NYISO, DER aggregators, and individual DER to enable DER wholesale market participation while preserving system safety and reliability. The Joint Utilities have also developed a *Draft DSP-Aggregator Agreement for the NYISO Pilot Program*[62] to further define the roles and responsibilities between the DSP and DER aggregators.

2) **Describe other role and responsibility models considered and explain the reasons for choosing the planned model.**

Con Edison's programs and procurements define the types of roles and responsibilities the Company, in coordination with third parties, has defined as being necessary for effectively addressing utility needs while providing actionable information to DER aggregators and individual DER operators to help preserve distribution system safety and reliability. With respect to DER wholesale market participation, the Joint Utilities coordinate with the NYISO on an ongoing basis to define the roles and responsibilities for relevant parties to facilitate DER wholesale market participation in a safe and

[60] DSIP Proceeding, Supplemental DSIP, pp. 148-160.
[61] Note 11, *supra*.
[62] Note 12, *supra*.

reliable manner. Similarly, input received through the NYISO stakeholder process has informed the development of these currently defined roles and responsibilities.

3) Describe how roles and responsibilities have been/will be developed, documented, and managed for each party involved in the planning and execution of grid operations.

For distribution-related programs and procurements, Con Edison will continue to capture all roles and responsibilities within contractual agreements with relevant parties. The Joint Utilities continue to coordinate on opportunities to align the procurement process, which may help inform a more standardized set of roles and responsibilities across the utilities. While the high-level roles and responsibilities will generally be consistent across the different utilities' programs and procurements, the unique nature of each system need may result in differences (e.g., pre-defined time periods in which the DER portfolio is required to be available for performance).

With respect to operational coordination for DER wholesale market participation, the Joint Utilities have developed a *Draft DSP Communications and Coordination Manual*[63] to define the coordination requirements between the DSP, NYISO, DER aggregator, and individual DER. As DER increase participation in the wholesale market, there may need to be enhanced coordination across four major functions: (1) registration, (2) planning, (3) operations, and (4) settlement. The Joint Utilities have also developed a *Draft DSP-Aggregator Agreement*[64] to: (1) close the operating and communication gap between the utility interconnection agreements or tariffs and NYISO tariffs, and (2) provide DER aggregators with transparency into how to coordinate with the DSP to maximize the ability of DER aggregations to deliver value across different services. While the utility may use this as part of the NYISO pilot program, the agreement is meant to inform the development of a full DSP-DER aggregator operational agreement for use once the NYISO fully implements its DER participation model.

4) Describe in detail how the utilities and other parties will provide processes, resources, and standards to support planning and execution of advanced grid operations which accommodate and extensively employ DER services. The information provided should address:

a. organizations;

As discussed above, Con Edison coordinates with DER aggregators and the NYISO to define operational coordination requirements, including specific roles and responsibilities for each party, to preserve safety and reliability for a system characterized by increasing amounts of DER.

Internally, the Company maintains an extensive collection of standard operating procedures and specifications for electric system planning and operations that incorporate DER as appropriate. Con Edison is also modernizing its control centers to proactively manage a more complex distribution grid. Modernizing the control centers will bring significant enabling benefits for integrating the latest technology, resiliency, and standardization of processes, including establishing a centralized area to deploy advanced distribution management functionalities.

b. operating policies and processes;

The Company develops and maintains operating guides for Company personnel that describe the policies and procedures for performing a range of operational functions. As the Company implements new processes and functionalities, such as the Interconnection Online Application Portal ("IOAP") and hosting capacity map, the Company integrates lessons learned from early stages of deployment into the relevant policies and procedures, as appropriate. Con Edison has established cross-functional steering committees and project teams, representative of the organizations

[63] Note 11, *supra*.
[64] Note 12, *supra.*

involved in DSP activities and inclusive of the executive levels, to facilitate the governance structures necessary to institutionalize, monitor, and enforce operating policies and processes.

c. information systems for system modeling, data acquisition and management, situational awareness, resource optimization, dispatch and control, etc.;

Con Edison is committed to building the systems and functionality that maximize the integration of DER assets into utility operations. For example, as part of the DERMS POC, the Company is building out communications functionality in its CIM, which will provide a uniform interface definition language to communicate with internal and external resources. Bringing in additional grid endpoints will require further investment in SCADA technologies and communication infrastructure to maximize the value of the investment. The Company maintains an overall strategy to meet communications requirements across multiple criteria. This communications strategy delivers sufficient capacity and diversity of communications channels in advance of planned device deployment, while also addressing cybersecurity and other operational requirements.

To accommodate future systems, applications, and devices, the Company will expand or enhance existing communications infrastructure to meet the needs of each asset. This infrastructure expansion will span a 20-year horizon in alignment with Con Edison's Grid Modernization Plan. The Company's efforts to gather system, application, and device requirements informed the determination of optimal communications solutions.

The need to incorporate DER assets into traditional operations will necessitate the integration of new DERMS and ADMS systems in more modern control center environments. Additionally, GIS is foundational to DERMS and ADMS and will help provide a holistic view of how DER fits into the overall system. Modernized control centers will require a suite of situational awareness tools to allow operators to analyze and react to inputs from both utility-owned assets and third-party equipment. The Company has built a solid foundation for modern control centers, with SCADA-enabled network protectors and fault interrupting switches, which will support DERMS and ADMS functionality. However, the unique characteristics of Con Edison's system, particularly the secondary mesh networks serving New York City, present challenges to fully preparing the control centers for DERMS, potentially requiring significant additional evaluation and resources. For example, grid-level solutions that leverage distributed intelligence may assist operators when system issues cascade rapidly.

d. data communications infrastructure;

The Company understands that streamlined data management and optimization will underpin the future of utility operations and as such, the Company has procedures and roadmaps in place to layer these needs into a corporate repository that can serve as a single source of data and reporting. For example, as part of the ongoing AMI deployment, Con Edison has established data governance teams and structures to facilitate an enterprise-wide approach to data management and the creation of an EDAP. The Company has also developed a hierarchical approach to data management and communications to facilitate decisions regarding the safe and reliable transfer of data assets for a wide range of use cases. The Company is committed to working with the Joint Utilities and NYISO on the development of advanced information and data portals that will continue to streamline the coordination process.

e. grid sensors and control devices;

As technological advances bring new sensing and communication capabilities, Con Edison will leverage these advancements to support integration of higher penetrations of customer-owned and operated assets. The Company has and will continue to deploy smart sensors throughout the system. These sensors have already led to the detection and correction of numerous defects on the electrical distribution system, resulting in improved employee and public safety. In the years ahead, the diversity and volume of sensors will only compound this benefit. These data points will allow

Con Edison to remotely perform many activities that currently require onsite labor, a capability that will provide greater workforce flexibility and lower costs over time. As DER penetration levels continue to increase, grid sensing equipment will offer a more complete look at the impact customers will have on the grid, allowing the Company to continue to incentivize electric generation and demand in a way that brings the highest value with the greatest reliability. Additionally, investment in SCADA communications and technology will offer operators a wider range of control that will lead to faster system response times and a wider range of operational flexibility.

f. grid infrastructure components such as switches, power flow controllers, and solid-state transformers;

As noted in the responses to 4c and 6c in this section, the Company is investing in equipment that supports system reliability in a high DER environment. These investments build on ongoing efforts to reduce the impact of storms, including installing additional automatic devices, such as reclosers or gang switches, fuses, fuse bypass switches, and automatic sectionalizing switches on the overhead system.

Investments in network protectors with communicating relays that are capable of two-way wireless communication allow for SCADA, which provide control centers the ability to remotely monitor and operate the network protectors, allowing more dynamic ability to load and de-load specific feeders. In addition to timelier fault identification, the MNPRs also enable soft transfer trips in which, upon a feeder fault, a customer breaker or network protector is opened. Soft transfer trips, executed automatically and in near real-time, de-energize the backfeed on feeders to protect both customer and utility equipment and the safety of Con Edison field workers. As DER penetration increases, the risk to worker safety and equipment damage due to backfeed increases, and more granular distribution control becomes a priority.

By modernizing the network protective relays in prioritized areas (e.g., where DER penetration is greatest or the system is most constrained) and in a pre-emptive manner, the Company is maintaining the system reliability and resiliency while integrating more DER into the electric system.

Power flow controllers and solid-state transformers are emerging technologies currently in the research and development phase. As such, these technologies are not part of the current investment plan. The Company continues to explore new technologies in a demonstration project or research and development capacity, as appropriate.

g. cyber security measures for protecting grid operations from cybersecurity threats; and,

The Supplemental DSIP outlined a common and comprehensive approach to managing cybersecurity risks in the evolving REV environment. The Joint Utilities Cyber and Privacy Framework focuses on people, processes, and technology to maintain data security.[65] The Framework requires the implementation of an industry-approved risk management methodology and an alignment of control implementations with the control families in the National Institute of Standards and Technology ("NIST") Special Publication 800-53 revision 4. The Joint Utilities periodically assess the need for updates to the Framework. The current version, as filed in the Supplemental DSIP, remains relevant with no updates required. As technology evolves, the Joint Utilities will align the protocols in the Framework with security controls.

h. cyber recovery measures for restoring grid cyber operations following cyber disruptions.

Con Edison has developed incident response and recovery plans, which the Company practices on a regular basis for key processes, systems, and departments. Additional detail on cybersecurity practices is included in Section 2.9.

[65] DSIP Proceeding, Supplemental DSIP, pp. 148-160.

5) Describe the utility resources and capabilities which enable automated Volt-VAR Optimization (VVO). The information provided should:

a. identify where automated VVO is currently deployed in the utility's system;

Voltage management has long been a crucial part of maintaining the stability of the electric grid. Initially, the Company managed voltage using hardware at the station. More recently, voltage is controlled at each station using SCADA. Both methods control voltage by adjusting the area substation transformer tap changer. The methods do not automatically switch capacitor banks or make other decisions. Some of the Company's grid modernization investments will enhance the control systems and necessary components to automate this process, as well as increase accuracy for appropriate measurement, verification, and control.

Currently, the Company regulates voltage with limited knowledge of the customer voltage. As the Company deploys AMI, it will provide new voltage measurement capability at meters (i.e., what voltage the customer is receiving), thus increasing the amount of information available to grid operators and planners and enabling Con Edison to better control voltage across the system.

b. in both technical and economic terms, provide the energy loss and demand reductions achieved with the utility's existing automated VVO capabilities;

VVO is a broad term related to reactive compensation and voltage optimization and includes CVO. CVO is the adjustment of area substation supply voltages to a lower value while providing adequate voltage levels for all customers. CVO reduces the amount of energy consumed by end use customers to power a given load, resulting in energy savings.[66] With the right enabling technologies, CVO can also optimize voltage and improve the power factor.

The target for AMI-enabled CVO is 3.0 percent voltage reduction, which equates to approximately 1.5 percent energy savings, subject to measurement and verification studies. This results in an environmental impact of 1.9 percent fewer total CO_2 emissions due to the reduction of power fossil fuel plants generate annually across the Company's service territory and a 1.0 percent total reduction in New York State. This equates to 229,125 metric tons and 368,821 metric tons of CO_2 across the Company's service territory and New York State, respectively. Further, as the AMI Business Plan states, the Company estimates a $346 million NPV cost savings for the 20-year BCA, of which $292 million results from fuel savings and $54 million is due to CO_2 reductions.[67] The Company did not perform a business case at the circuit level.

c. describe in detail the utility's approach to evaluating the business case for implementing automated VVO on a distribution circuit;

See response to 5b.

d. provide a preliminary benefit/cost analysis (using preliminary cost and benefit estimates) for adding/enhancing automated VVO capabilities throughout the utility's distribution system;

See response to 5b.

[66] Energy savings vary depending on the type of customer load profile.
[67] Con Edison 2015 Electric Rate Case, Advanced Metering Infrastructure Business Plan (filed November 16, 2015).

e. provide the utility's plan and schedule for expanding its automated VVO capabilities;

Con Edison is in the early stages of its VVO program, with initial efforts focused on implementing CVO, as described in the AMI Business Plan.[68]

The Company is implementing CVO according to its three-stage plan. The first stage follows AMI deployment in an area and involves fixing any low-voltage areas and iteratively adjusting the area station or unit station voltage schedule. In order to have sufficient voltage data to perform the necessary analysis to implement new CVO voltage schedules, the Company requires 90 percent AMI meter deployment in a region, which serves a key dependency and trigger for the CVO deployment schedule. The second stage involves more dynamic voltage management, where the customer's voltage reading dynamically adjusts the area station or unit station bus voltage. The third stage seeks to leverage DER to help regulate the voltage in local pockets.

In late December 2018, Con Edison began the implementation of CVO in Staten Island in the Fox Hills load area. CVO is now implemented across all load areas in Staten Island. In October 2019, Con Edison began deployment of CVO in Westchester. As of June 1, 2020, CVO is implemented in 28 networks in Westchester, Staten Island, Brooklyn, and Manhattan.

VVO provides communication with smart inverters to give or take VARs to maintain an optimized power factor. This functionality supports the penetration of smart inverter technology and in achieving the right balance of active and reactive power, improves grid efficiency by reducing line losses. DERMS implementation will facilitate the interaction with smart inverters and enhance VVO capabilities.

The Company has begun investing in capabilities to more dynamically manage voltage at different levels of the distribution system. First, voltage management capabilities are greatly enhanced with the AMI implementation, as operators will have more granular and frequently updated voltage data from the grid edge. Also, the Company has completed the installation of VVO controllers and communicating modems at 4kV unit substations.

The Company foresees developing VVO capabilities in three phases, with each phase becoming more dynamic and distributed:

- The first phase involves setting more efficient static voltage schedules by analyzing the AMI voltage information.
- The second phase involves dynamic centralized voltage control based on real-time AMI and sensor data.
- The final phase extends to distributed voltage control, which may potentially include leveraging DER and smart inverters for reactive power support.

The VVO investment for 2020 to 2022 focuses on the equipment needed to enable the first phase of VVO capabilities. These investments include equipment in the area substations and IT systems to interface with the MDMS in order to act upon the greater granularity of data from AMI, including:

- *Area station metering*: Upgrading the substation metering is necessary to enable the more granular VVO use cases. Area substation meters monitor the voltage and current at the area substation bus so that the voltage delivered to customers is within specifications. Most of the existing meters are nearly 40 years old. This program targets the 41 substation meters at substations built before 1980 for replacement to provide more granular voltage measurements for VVO. Metering upgrades will prioritize low accuracy transducers and other single element metering elements.

[68] *Id*.

- *Instrument transformer upgrades*: Equipment that supports metering and voltage regulation, such as potential transformer and current transformer replacements, is targeted to provide accurate input to meters and a reliable, granular VVO system. This enhancement is also needed to verify the energy savings that are achieved through AMI-enabled VVO capabilities.
- *Vintage Remote Terminal Units ("RTUs")*: RTUs that affect the station's ability to maintain remote voltage control or metering will be targeted for replacement. A small population of RTUs that commonly affect remote communication and the control of tap changers have been identified.
- *Non-network distribution system pole top regulator:* Upgrades will provide more precise voltage regulation, as well as remote monitoring and control capabilities.

Additional communications and control upgrades will be needed to support some of these replacements with costs varying based on the specific area substation.

Approximately 17 area substations will receive Contact Making Volt Meter replacements at an estimated cost of $500,000 per substation. In addition, up to 41 of the area substations with older metering, as described above, will receive metering replacements at an estimated cost of $500,000 per substation. Three RTUs have also been identified for replacement at an estimated cost off $1 million per RTU.

f. describe the utility's planned approach for securely utilizing DERs for VVO functions; and,

As described above, the Company is in the early stages of advanced voltage management. The Company expects to use DER for voltage management functions as part of the third stage of CVO deployment, which DERMS will enable.

g. in both technical and economic terms, provide the predicted energy loss and demand reductions resulting from the expanded automated VVO capabilities.

See response to 5b.

6) Describe the utility's approach and ability to implement advanced capabilities:

a. Identify the existing level of system monitoring and distribution automation.

Con Edison currently has a significant level of monitoring for utility-owned assets on the distribution system. Con Edison monitors approximately 27,000 distribution transformers on the network system via the Net Remote Monitoring System ("RMS"), along with SCADA communications for area substation circuit breaker and transformer equipment. The Company uses these data streams for both real-time monitoring as well as an historical input to circuit models for load flow and planning cases.

In addition to the RMS on the distribution network transformers, Con Edison monitors the network protectors on the secondary side of these units. The Company is able to remotely control a portion of these locations through the SCADA system and plans to increase this capacity over time through capital investment that will be strategically located in areas where the Company implements NWS projects or DG penetration levels exceed network thresholds.

Additionally, the installation of AMI infrastructure throughout the service territory will increase grid visibility from the network transformer level to the service delivery point offering.

The Con Edison overhead system incorporates loop designs with alternate circuit feeds that will operate to segment feeders and restore load through relaying; Con Edison can operate some through remote operation. Currently, Con Edison has over 2,000 monitored reclosers on the overhead system.

b. Identify areas to be enhanced through additional monitoring and/or distribution automation.

As the Company expands AMI deployment and has increased availability of granular network data, it will be able to improve existing planning models. This will allow grid operations use cases to be more inclusive of DG penetration and help guide M&C investments to coincide with the most needed areas in the distribution grid.

The phased implementation of a DERMS and ADMS will be a significant driver for monitoring, control, and distribution automation. Con Edison will use these systems as the optimization engines to fully integrate DG operation into traditional grid management. These systems will require significant M&C data points from the utility grid and third-party DER assets that will be available to provide grid support. Con Edison has actively participated in the Joint Utilities efforts on lower-cost M&C initiatives and will continue to invest in solutions that provide the necessary operational information without impeding DG projects.

As the Company looks to the future and continues to expand grid visibility and utility distribution automation, there will be a need to consolidate older systems into more modern, flexible technologies that are capable of marrying tremendous amounts of disparate information into a complete model of the real-time system. To meet future needs, the Company will need these systems to consolidate broad skill sets in both planning and operations. Con Edison will look to both modernize and consolidate control center locations and functionality so it can deploy the full benefits of future systems (e.g., DERMS, ADMS) across the service territory.

Additionally, as VVO efforts increase, there will be further ability to control voltage profiles by having more monitored and controlled end points.

c. Describe the means and methods used for deploying additional monitoring and/or distribution automation in the utility's system.

Communications channels and functionality will continue to grow as a result of the Company's grid modernization efforts, as it is a key component of future operations. For example, Con Edison currently is engaged in a multi-year project focusing on equipping existing network protectors with newer model relays and SCADA functionality. The relays allow for more backfeed in the secondary network, while SCADA enhancements give operators the ability to remotely operate the protectors. The goal of this project has been to target areas with existing or projected DG penetration growth to facilitate a network topology that is more accepting of network backfeed under low load conditions.

In the near term, the Company is increasing the number of switches on the overhead system and enhancing FLISR capabilities. The Company also plans to continue to increase automation on the overhead distribution system, especially as it builds ADMS functionality and is able to support operational actions that will offer a greater level of flexibility during system events. Con Edison will make these types of investments as part of the Company's overall grid modernization strategy, which will target areas that would receive the greatest benefit from automated operations.

The Company also recognizes the need to monitor and, in some cases, control third party-owned DG. The Company's investment in DERMS capabilities will expand this functionality. Con Edison will explore cost-effective ways of backhauling data for optimization and operational decisions.

d. Identify the benefits to be obtained from deploying additional monitoring and/or distribution automation in the utility's system.

Expanded monitoring across the system will enable planners and operators to optimize the value of utility and non-utility owned assets. This co-optimization will lead to more informed operational decisions and capital investments that

will drive customer benefit. In addition, the ability to trend data over time will refine the ways the Company is able to offer value streams to the DG community (i.e., NWS, LSRV, and market facilitation).

Similarly, an increase in distribution automation, through ADMS investment, will increase operational flexibility and continue to advance Con Edison's ability to provide safe and reliable electric service while incorporating greater levels of system value and support from DER.

e. Identify the capabilities currently provided by Advanced Distribution Management Systems (ADMS).

Con Edison does not currently operate an ADMS system. However, the Company operates a suite of systems that can perform some of the core functionalities characteristic of an ADMS system (e.g., fault location, OMS modeling, and SCADA interfaces) and many of the Company's planned grid modernization investments, such as GIS, will support ADMS functionality. For example, the Company's investments in hardware such as SCADA-enabled switches for non-network locations, SCADA-enabled MNPRs, interrupting switches for network locations, and pole top regulators, as well as enhanced models and real time load flow capabilities, provide a robust foundation for a total system ADMS.

f. Describe how ADMS capabilities will increase and improve over time;

Con Edison plans on utilizing a phased approach to grid modernization where it can incorporate new functionality as DERMS and ADMS software become more mature. As discussed above, currently, the Company does not have an ADMS in the traditional sense, but achieves ADMS-like functionality through a suite of systems. The Company plans to leverage software solutions that it has and will procure for specific needs in the near term, to pilot the future development of modern tools that the Company can successfully integrate into its operational environment. The Company will have a four-step approach, as follows.

(1) Continue building out ADMS hardware functionality for all network topologies at CECONY.

(2) Focus on improved models of all system assets.

(3) Test out ADMS schemes based on real world needs, such as unavailability of DER assets.

(4) Explore distributed intelligence as a way to mitigate constraints.

Additionally, the Company will work with O&R to learn from its ADMS experience and bring relevant knowledge to the Company.

g. Identify other approaches or functionalities used to better manage grid performance and describe how they are/will be integrated into daily operations.

Con Edison will continue to use lessons learned from demonstration and pilot projects to prove out the conceptual elements that the Company will need to advance grid operations in the future. The Company sees this as a necessary environment to partner with leaders in technology development to refine the Company's software and technology roadmap as the Company moves closer to full DSP functionality. These lessons learned will facilitate "no risk" investments that the Company can phase into grid operations.

2.4. ENERGY STORAGE INTEGRATION

Context and Background

The policy landscape for storage has continued to evolve since submitting the 2018 DSIP. In June 2018, the Governor announced a goal to deploy 1,500 MW of energy storage statewide by 2025. To support this goal, NYSERDA, in partnership with DPS Staff, developed a strategic roadmap that presented "near-term policies, regulations, and initiatives needed to realize the Governor's ambitious 2025 energy storage target."[69] The Commission in December 2018 set a secondary goal of 3,000 MW statewide by 2030, which CLPCA codified into law. The Commission initiated several actions intended to:

- Address barriers to storage deployment,
- Accelerate the energy storage market learning curve,
- Drive down energy storage costs, and
- Speed the deployment of the highest-value energy storage applications.[70]

These actions included authorizing a $310 million market acceleration bridge incentive to be administered by NYSERDA, in addition to $40 million announced in November for pairing storage with PV projects, and directing Con Edison, along with the State's other major electric utilities to hold competitive procurements for a combined minimum 350 MW of bulk energy storage systems. The Order also included recommendations for retail rate enhancements, utility initiatives, wholesale market changes, data sharing requirements, and soft cost reductions. The Commission also directed the utilities to develop information on optimal locations and levels of energy storage, either connected on the distribution system or behind the customer's meter,[71] including an inventory of suitable, unused, and undedicated utility land for use in NWS.[72]

Con Edison is committed to supporting the CLCPA's clean energy goals by integrating a portfolio of energy storage solutions at all levels of the power grid, from the bulk power to the distribution system, in a balanced manner that provides benefits for all customers and minimizes overall bill impacts. The Company is making a strong push to bring more storage onto the system, where it can provide value, including allowing the Company to better manage peak load in constrained areas, enable more efficient and resilient operations, increase the hosting capacity of distribution circuits, and increase flexibility in light of the influx of intermittent resources onto the system.

In support of a balanced approach, the Company is also making it easier for customers and communities to interconnect storage, by reducing economic and technical barriers. Storage systems allow individual customers to, for example, increase reliability, manage their usage and bills, respond to more cost-reflective rate designs, such as hourly pricing and demand-based rate structures, and integrate with other clean energy applications like onsite PV and EV charging.

In addition to complying with the Commission's direction, Con Edison has significantly increased the amount of storage on its system, both behind the meter and on the utility side. As of June 1, 2020, customers have installed and

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[69] Case 18-E-0130, *Proceeding in the Matter of Energy Storage Deployment Program* ("Energy Storage Proceeding"), New York State Energy Storage Roadmap and Department of Public Service/New York State Energy Research and Development Authority Staff Recommendations (issued June 21, 2018) ("Energy Storage Roadmap"), p. 4.
[70] Energy Storage Proceeding, Order Establishing Energy Storage Goal and Deployment Policy (issued December 13, 2018) ("Storage Order").
[71] *Id.,* p. 44
[72] *Id.,* p. 46

interconnected 109 ESS with a total capacity of 11 MW. Con Edison has installed and interconnected approximately 2 MW of utility-owned storage.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Increased the amount of storage on the system, including distribution-connected batteries representing 11 MW of capability, as of June 1, 2020.
- Completed solicitation for 300 MW of bulk energy storage dispatch rights.
- Fully operationalized the 2 MW Ozone Park (BQDM) battery and initiated development of 7.5 MW at Fox Hills and 10 MW make-ready site for third-party storage and EV chargers, all on utility land.
- Pursuing utility-sited demonstration projects, working with competitively sourced third-party vendors to better understand energy storage capabilities and test new business and operational models.
- Opened new opportunities for energy storage to support distribution system needs through tariffs, procurements, and programs.
- Reduced technical barriers to interconnecting energy storage, including working with the NYC DOB and the Fire Department of the City of New York ("FDNY") to establish a standardized testing and permitting process for lithium-ion energy storage in outdoor installations in New York City.
- Developed process with Joint Utilities to inventory suitable, unused, and undedicated land for potential siting of DER on utility-owned property as part of NWS solicitation process.

Energy storage plays a critical role in the clean energy future and Con Edison continues to actively engage with the DPS and NYSERDA to support energy storage policy goals. The Company's storage efforts have been diverse and robust, ranging from bulk procurements to facilitating interconnection of individual smaller systems. For example, in 2019, the Company developed and implemented an RFP that targeted utility-scale storage projects for participation in the NYISO markets. The Company is currently negotiating contracts with selected projects, which are expected to be in service by the end of 2022. Additionally, Con Edison is leading a variety of projects and programs to test new business models, build utility capabilities, engage third-party providers for greater representation of storage in NWS portfolios, and support customers to interconnect energy storage, including an online guide to the typical steps, challenges, and technical solutions to interconnecting ESS on the distribution system. While challenges remain, developers can now more efficiently install and interconnect lithium-ion devices in New York City through the creation of a more standardized and transparent interconnection process for outdoor devices.

The following sections provide additional detail on the Company's storage achievements and plans, organized by the following objectives: (1) Reduce economic barriers, (2) Reduce technical barriers, and (3) Target storage for distribution system needs.

Reduce Economic Barriers

Since 2015, Con Edison has developed and implemented several projects aimed at advancing new business models and expanding wholesale market participation for energy storage. These projects include: (1) Commercial Battery Storage, (2) Storage On Demand, (3) Smart Home Rate, (4) V2G School Buses, (5) Bulk Storage Procurement, and (6) Nevins Street

Make-Ready. For project status and implementation timelines, the Company notes that manufacturing and other delays related to COVID-19 may impact COD estimates.

Table 4 summarizes the Company's current energy storage projects focused on market development. For project status and implementation timelines, the Company notes that manufacturing and other delays related to COVID-19 may impact COD estimates.

Table 4: Current Con Edison Energy Storage Projects Improving Storage Economics

Project/Program Name	Description	Battery Rating (MW/MWh)
REV Demo: Commercial Battery Storage	Con Edison has contracted with third party-owned customer-sited, front-of-the-meter batteries to meet distribution system needs and participate in wholesale markets. This model tests dual participation.	4 sites, each 1 MW/1 MWh
REV Demo: Storage On Demand	Con Edison will deploy mobile batteries to provide support for peak shaving, low-voltage scenarios and temporary load needs, in addition to testing wholesale market participation. This model tests dual participation and mobile point identifiers ("PTIDs") in the wholesale markets.	1.5 MW/4 MWh
REV Demo: SHR – Track 2	Track 2 of the SHR demonstration project pairs solar plus storage with dynamic, time-varying rates. Con Edison will offer solar customers opting into a SHR a free battery system automated by price-responsive optimization software.	6 kW/19 kWh (per participating household)
V2G School Buses	Con Edison is retrofitting five school buses with two-way on-board invertors that allow each bus to discharge onto the grid. The site has onsite switchgear for voltage and anti-islanding protection.	66 kW/ 500 kWh (cumulative)
Bulk Storage Procurement	Con Edison solicited 300 MW of dispatch rights from ESS in July 2019. The winning bidders will build, own, and operate the storage systems that are at least 5 MW each. Con Edison will bid the assets into the wholesale markets and retain any revenues. This model reduces merchant risk for developers and reports realizable revenues to the market to encourage future storage developments to include this value stream in financial planning and pricing.	In contracting
Nevins Street Make-Ready	Con Edison will enable the energy storage market by converting a vacant Company-owned property to energy storage application. The Company also seeks to lower the interconnection hurdles by providing the electrical infrastructure and offsetting the cost of interconnection. The site will also be paired with EV chargers to provide significant operational value and societal benefits to the grid and customers through multiple value streams.	10 MW / 40-60 MWh

In addition to the projects noted above, the Company has made significant updates to tariffs to enable greater participation of storage and quicker access to value streams. Notably, the Company updated its SC 11 Buy-Back tariff to allow export on the secondary network and to compensate generators under 5 MW for their wholesale capacity value.

The VDER tariff has created new markets for individual and hybrid storage paired with BTM renewable energy systems up to 5 MW in size. The Company's VDER tariff promotes grid export by compensating resources for actual hourly output with multiple, concurrent value streams. The VDER rates are valued at avoided costs and include hourly energy prices, capacity, and avoided transmission and distribution ("T&D"). Hybrid systems paired with BTM renewables can elect compensation under one of four different technical configurations and corresponding rates. When charged exclusively by a renewable technology, hybrid storage systems can also be eligible for a renewable energy credit. Additionally, paired storage can participate in the Company's Community Distributed Generation program and receive added incentives. The Phase Two VDER rates, implemented by the Company in June 2019 and currently in effect, provide greater revenue certainty that aligns with the typical life of a storage asset. Due to these changes, the Company has since seen growth in paired and stand-alone storage interconnection requests.

Additionally, the FERC issued Order 841, which requires each Regional Transmission Operator and Independent System Operator to remove barriers to participation of energy storage across all capacity, energy, and ancillary service markets.[73] FERC approved, in large part, the NYISO's compliance filing in December 2019.[74] Implementation of the NYISO's ESR program is on-track to be implemented no later than September 2020. This program, coupled with FERC's approval of the NYISO's DER program, which includes "dual participation" rules, will allow energy storage to capture multiple value streams.[75] Energy storage will be permitted to participate as a single resource in the ESR program, or as part of an aggregation in the DER program that is on track to be implemented in May 2021.

Reducing Technical Barriers

While energy storage devices are proliferating around the country, they lack an extensive operational track record for large-scale commercial deployment in conjunction with electric distribution systems. Con Edison has worked with several stakeholder groups to reduce both financial and technical barriers to energy storage with the goal of supporting the CLCPA targets through a portfolio of opportunities that maximizes benefits to all customers and the grid.

For example, the Company's actions to advance the technical feasibility of deploying energy storage include working with municipalities to mitigate permitting concerns regarding energy storage devices in and around buildings and actively participating in and co-sponsoring stakeholder forums, particularly the New York Battery and Energy Storage Technology Consortium ("NY-BEST"). In May 2019, in partnership with NY-BEST and NYSERDA, the Company hosted the first annual Con Edison Energy Storage Day, which drew over 200 people. The event consisted of presentations from NYSERDA, NY-BEST, the Mayor's Office of Sustainability, O&R and Con Edison, and an Ask an Expert session with City and State interconnection representatives and Con Edison SMEs.

Con Edison, in concert with the Joint Utilities, has supported development of SIR revisions that facilitate interconnection of energy storage, including releasing technical documents addressing treatment of energy storage and guidelines for solar + storage installations. Improvements to the interconnection process are providing enhanced value to developers

[73] FERC Docket Nos. RM16-23-000 and AD16-20-000, Order 841, *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators* (issued February 15, 2018), p. 1.
[74] *Order on Compliance Filing*, 169 FERC ¶ 61,225 (issued Dec. 20, 2019).
[75] *Order Accepting Tariff Revisions and Directing Compliance Filing and Informational Report* 170 FERC ¶ 61,033 (issued Jan. 23, 2020).

and facilitating technical improvements by allowing viable projects that pass the State-developed screens to quickly advance to interconnection or using screening results to quickly verify the need to perform a detailed study.

Con Edison has also worked closely with New York City and other municipalities in its service territory to define rules for battery installations that balance safety with the expectations of future battery growth. Con Edison continues to support the Mayor's Office of Sustainability, DOB, FDNY and Department of City Planning on standardized siting and permitting processes for energy storage in outdoor installations. To this end, Con Edison participated in the development of the FDNY Certificate of Fitness ("COF") certification program and received a COF for Ozone Park personnel.

Targeting Storage for Distribution System Needs

Con Edison has also expanded opportunities for energy storage to participate in T&D deferral programs and provide distribution value, through continued and enhanced NWS procurements and substation-sited storage implemented through competitively sourced third-party storage vendors. NWS solicitations have been effective at procuring storage to assist with distribution system load relief needs. Section 2.14 notes that past solicitations have invited innovative solutions, including advanced technologies such as energy storage, advanced controls, and DG. In 2019, the Company released energy storage-specific market solicitations in three NWS areas under consideration to encourage participation of dispatchable energy resources in providing load relief. The Company received nearly 30 applications and contracted with vendors to provide 19 MW of peak load relief in now-active NWS networks. These BESS are in addition to the 2 MW/10 MWh utility-owned battery at Ozone Park in the Richmond Hill network, which is operated by Con Edison control centers, and 4.3 MW of customer-owned batteries participating in the BQDM program.

NWS BATTERY STORAGE

As of June 1, 2020, the BQDM program initiative has operationalized over 6 MW of battery storage to provide load relief, including the utility-owned battery in the Richmond Hill network.

Through other active NWS programs, the Company anticipates an additional 19 MW of peak load reduction to come from dispatchable energy storage resources.

Working with the Joint Utilities, Con Edison has developed a process to identify suitable, unused, and undedicated land prior to releasing an NWS solicitation. Any utility-owned property identified will be made available during the RFP process for potential lease or purchase by developers, with the goal of facilitating siting of DER assets and further contributing to T&D deferral objectives.

In addition to encouraging energy storage participation in NWS solicitations, the Company has improved NWS RFPs and developed contract terms for energy storage to align with the Commission's directions, optimized use of these resources in response to distribution system needs, and encouraged participation in other value streams. The Company developed standard contracts for ESRs participating in NWS areas and provided the terms and conditions in advance of certain solicitations to better inform proposal responses. The NWS energy storage-specific RFPs released in 2019 drive battery storage resources to maximize current and future market revenue streams, such as participation in NYISO programs when not responding to distribution load relief needs to enable cost-competitive proposals. The NWS contract terms for energy storage extend to ten years providing payment certainty for the life expectancy of the DER asset.

The Fox Hills Project is being developed to meet an emerging distribution need on our system. Due to the success of solar PV in Staten Island, the Fox Hills network is beginning to forecast a slight "duck curve." Con Edison will install a 7.5 MW / 30 MWh BESS at its Fox Hills substation on Staten Island. The system will be located on the edge of the existing substation, taking advantage of adjacent property that the Company owns. The battery will be competitively sourced, with engineering, procurement, and construction completed by Con Edison. This model will show that the Company can manage emerging duck curves due to increased PV, develop restricted sites in constrained territory, and potentially use

the ESS for market participation. Restricted sites within substation boundaries impose strict requirements during construction and subsequent operations and maintenance. However, developing this land is critical for incorporating storage into the distribution system architecture, particularly within Con Edison's territory, which has limited available land for storage development.

Future Implementation and Planning

Summary of Future Actions

- Continue collaboration with stakeholders to increase the efficiency and transparency of required processes to build and interconnect ESS.
- Advance business model projects and gather lessons learned to reduce operational and market barriersand develop additional opportunities for energy storage.
- Participate in a working group comprised of Joint Utilities, NYISO, DPS Staff, and NYSERDA representatives to address tasks as part of the Market Design and Integration Report.
- Coordinate with DPS Staff and NYSERDA on future bulk solicitations.
- Enhance NWS scope, market solicitations, and procurement activities to align with the Energy Storage Order.

Con Edison will continue to support and meet the State's energy goals through a portfolio of solutions and approaches that leverage energy storage across multiple use cases. This will include evaluating the potential to deploy energy storage at scale on utility property to directly serve the distribution grid, such as at substations with capacity constraints, and more readily provide services to the bulk power system. This will also include coordinating with NYISO to leverage storage as a bulk system asset. To help create a streamlined and transparent process for developing ESRs, the Company will continue its participation as part of the Joint Utilities, ITWG, and other industry forums and collaborations across the State. In addition, Con Edison will continue its business model projects to test different operational and business models that can promote expanded opportunities for energy storage. The Company feeds the lessons learned from its projects back to industry stakeholders to open up market opportunities for storage.

The Company will seek to build on the experiences of the NWS program to encourage and support the development of ESRs where and when these resources provide the most value. Con Edison will continue to enhance processes to increase opportunities for ESR to serve the distribution grid, including identifying cost-effective opportunities for energy storage to reduce customers' total bills in NWS areas. In addition, the Company will continue identifying new distribution and wholesale market revenue streams from DER participating in NWS and refining future NWS market solicitations to provide storage developers additional information related to interconnection processes and potential costs.

Risks and Mitigation

Risks that could affect timely implementation of higher levels of energy storage include permitting, access to NYISO markets, operational challenges in capturing multiple value streams, continuing high costs of storage and NYC installation, and a protracted process to adjust incentive mechanisms. Additionally, as is common with new technologies and when testing new business arrangements, processes around permitting, contracting, and negotiation can be complex and time-consuming. Con Edison will continue to undertake actions to mitigate these risks. The

Company will continue its work with municipal authorities and other stakeholders to streamline and clarify the processes for permitting, building, and interconnecting energy storage.

In February 2020, FERC rejected the request to provide energy storage a blanket exemption from Buyer-Side Mitigation, or in the alternative, allow for a 300 MW annual ESR exemption. In March, Con Edison joined other members of the Joint Utilities to file a petition for rehearing of FERC's decision. FERC's response is unknown. Applying Buyer-Side Mitigation to ESRs may limit their ability to receive capacity revenues through the NYISO's markets and fail to appropriately compensate these resources for their bulk-system reliability value.

Stakeholder Interface

Con Edison consistently engages stakeholders, including developers, through the Joint Utilities stakeholder engagement groups, the ITWG, and other industry forums and collaborations across the State. For example, Con Edison plans to continue partnership with NY-BEST and NYSERDA to develop and host the annual Energy Storage Day. The Company intends to continue engaging stakeholders as it progresses DSIP implementation.

In addition to incorporating stakeholder feedback into many aspects of this DSIP filing, the Company will continue to leverage this input into ongoing engagement efforts with relevant parties to advance opportunities for energy storage. For example, to enhance customer and developer understanding of the interconnection process for energy storage, Con Edison supported the City University of New York, in collaboration with the NYC DOB and the FDNY, in the development of their process guide for permitting and interconnecting lithium-ion outdoor systems in New York City. [76] This guide provides clarity on the requirements, processes, and responsibilities for obtaining approval to install lithium-ion energy storage devices. Separately, to increase developer understanding of opportunities for energy storage on Con Edison's system, the Company has provided actionable information to NY-BEST, which invites Con Edison to present on storage topics. Additionally, Con Edison has participated with the Joint Utilities in ITWG efforts to propose and draft new SIR technical requirements for energy storage to help create a consistent and effective process for the interconnection of energy storage devices.

Additional Detail

This section responds to the questions specific to energy storage.

1) **Provide the locations, types, capacities (power and energy), configurations (i.e., standalone or co-located with load and/or generation), and functions of existing energy storage resources in the distribution system.**

As of June 1, 2020, customers have installed and interconnected 109 ESS for a total capacity of 11 MW. Appendix B provides information on storage resources currently interconnected.[77] The Company believes demand reduction is the primary function of most of these resources but does not track this information.

2) **Describe the utility's current efforts to plan, implement, and operate beneficial energy storage applications. Information provided should include:**
   a. **a detailed description of each project, existing and planned, with an explanation of how the project fits**

[76] New York City Department of Buildings and Fire Department of New York, *Energy Storage System Permitting and Interconnection Process Guide for New York City Lithium-Ion Outdoor Systems, April 2018.* https://www.nyserda.ny.gov/-/media/Files/Programs/Energy-Storage/lithium-ion-energy-storage-systems-permitting-process-guide.pdf

[77] The table above does not include installations that are not yet operational.

into the utility's long range energy storage plans;

Con Edison has several projects underway to plan, implement, and operate energy storage applications. The Company has designed its portfolio of projects to test different use cases and business models and assess how it can best leverage storage to meet distribution and bulk system and customer needs. These projects will help inform the Company's long-term energy storage plan by providing real-world experience with energy storage technologies and data on the costs and benefits, and advance market development. For additional information on these projects, see Table 5 and more detailed descriptions in Section 1.5.

b. the original project schedule;

Table 5 summarizes the original project schedule and current project status of the storage projects described above, including expected COD.

Table 5: Original Schedules and Current Status of Storage Projects as of June 1, 2020

Project	Original Project Schedule	Current Project Status	Next Steps
Commercial Battery Storage	Planned installation in April 2018.	BESS installed and operational at one site. Second site in commissioning, and third site beginning construction.	Refer to Con Edison's REV Demonstration Project: Commercial Battery Storage Q1-2020 Quarterly Progress Report, dated April 30, 2020.
Storage On Demand	Scheduled COD in early 2019.	Contracting complete and manufacturing has begun. Continued discussions with FDNY and NYISO. Expected COD of 2021.	Refer to Con Edison's REV Demonstration Project: Storage On Demand Q1-2020 Quarterly Progress Report, dated April 30, 2020.
SHR Demonstration Project	Project expected to go live in April 2019.	Contracting underway. Delayed from original project schedule.	Revise project plans in light of schedule delays and COVID-19 impacts.

V2G School Buses	Because of a project change requiring the use of the vehicle's inverters, V2G was delayed from starting in summer 2019 to summer 2020. The lost discharge time will be made up for during weekends and school holidays. The demonstration is scheduled to run through summer 2021.	The solution is complete; buses can charge and discharge on a schedule. All site work is complete. Three vehicles have been shipped to Montreal for upgrading and maintenance work so that they can commence V2G discharge.	The remaining four buses will be retrofitted and the V2G capability will be tested in 2020.
Bulk Storage Procurement	Projects scheduled for COD December 2022.	Contract negotiations on track for Q2-2020 completion. Permitting and design underway.	Continue permitting, interconnection and design.
Nevins Street Make-Ready	Project is scheduled to be commissioned Q2-2021	Contracting phase; RFP issued for Owner / Operators	Start engineering, procurement, and construction work; Evaluate Owner / Operator bids and negotiate contracts
Fox Hills ESS Project	Project is scheduled to be commissioned Q4-2022	Initial high-level design and estimate complete	Start detailed engineering

c. the current project status;

See response to 2b above.

d. lessons learned to-date;

The Company's energy storage projects are in the early stages of planning, construction, and operation, thus making it premature to cite definitive lessons learned. A consistent early observation is that obtaining the necessary permits from municipal authorities requires significant time and effort, which should not be underestimated. The permitting process will require additional stakeholder focus to support a robust market for energy storage. The Company will continue its efforts to collaborate with stakeholders to streamline the permitting process, define zoning requirements, and increase transparency into the process for its customers.

An early lesson learned from the first operational demonstration project is that warranty provisions can restrict the optimal dispatch of the asset based on economics and grid need by restricting the number of hours a battery is fully charged. For instance, batteries generally charge before 8:00 AM due to tariff requirements, and therefore may be required to discharge before the optimal time to reduce late evening peak loads.

The early observations from the first bulk solicitation indicate there is not much merchant risk appetite in the market, suggesting energy storage still requires utility solicitations to be viable in our territory. The timing and uncertainty of the NYISO Class Year process will continue to be a necessary consideration of project risks.

e. project adjustments and improvement opportunities identified to-date; and,

The Company expects ongoing streamlining in permitting processes and definitive market participation rules to facilitate future improvement opportunities. Additionally, the existence of incentive programs like NYSERDA's market acceleration bridge incentive, VDER tariff, and NWS program will continue to grow installed capacity as the market evolves and system costs decline. These early projects produce a wider pool of experienced developers, which further grow the market and reduce soft costs of storage installations.

f. next steps with clear timelines and deliverables.

See response to 2b above.

3) Provide a five-year forecast of energy storage locations, types, capacities, configurations, and functions.

Appendix A presents Con Edison's system-level forecast, which includes a five-year outlook for energy storage.

4) Identify, describe, and prioritize the current and future opportunities for beneficial use of energy storage located in the distribution system. Uses considered should encompass functions which benefit utility customers, the distribution system, and/or the bulk power system. Each opportunity identified should be characterized by:

a. its location;
b. the energy storage capacity (power and energy) provided;
c. the function(s) performed;
d. the period(s) of time when the function(s) would be performed; and,
e. the nature and economic value of each benefit derived from the energy storage resource.

The Company supports and will continue to pursue the State's energy storage goals through a portfolio of solutions and approaches to maximize benefits to the grid and customers. Current and future opportunities will represent a diversity of locations, sizes, functions, and business models. The Company encourages the development of storage policies, programs, and installations that provide all customers with grid benefits, while maintaining flexibility to adjust course to take advantage of additional savings opportunities as the storage market matures. For example, utility-sited storage and customer-sited front-of-the-meter storage with utility control can help with load relief, reliability, and resiliency. Similarly, storage at the bulk power level can support the integration of intermittent generation and help NYISO fulfill future needs for capacity and other bulk power services. Separately, customer-sited BTM storage can help customers manage their load more efficiently (i.e., peak shaving), be more resilient to power outages and interruptions, and support grid needs when sent the appropriate signals, such as when an NWS or demand management program activates an event.

The Company is exploring adding ESRs where and how they can best benefit the system and customers, including coordinating with NYISO to leverage storage as a bulk system asset. Specifically, distribution system and bulk system storage deployments will produce significantly higher overall benefits for all utility customers and should be prioritized. Both use cases allow for the development of larger and more economic storage installations that support the needs of the electricity grid (e.g., support reliability in a targeted manner). Customer-sited applications, which tend to be more expensive than distribution and bulk system installations, can be operated to provide distribution and bulk system

benefits when located in constrained networks. Conversely, customer-sited applications in unconstrained networks provide little or no benefits to other customers.

As the Company continues efforts to implement the Storage Order and CLCPA requirements and gains more experience with energy storage applications, the Company will be able to better identify and prioritize future opportunities and pathways for meeting the State's goal. Several projects are underway to test different operational and business models, and the Company is deploying energy storage at scale on utility property to serve the distribution grid, such as at substations with capacity constraints, and more readily provide services to the bulk power system.

The Company envisions energy storage enabling the integration of an increasing amount of intermittent renewable resources, supporting distribution system needs, providing resilience and reducing GHG emissions. will help customers and communities manage their usage to align with system capabilities, participate in DR programs, support new applications like EV charging, and respond to more cost-reflective rate designs, including hourly pricing and demand-based rate structures.

5) **Identify and describe all significant resources and functions that the utility and stakeholders use for planning, implementing, monitoring, and managing energy storage at multiple levels in the distribution system.**
   a. **Explain how each of those resources and functions supports the utility's needs.**
   b. **Explain how each of those resources and functions supports the stakeholders' needs.**

Given the infancy of the storage market in Con Edison's service territory and the limited installations to date, as well as permitting issues, the Company is continuing to identify what resources and functions it may need in the future for planning, monitoring, and managing energy storage. For example, a GIS system will serve as the system of record for the specific location and operating characteristics of grid-connected assets and be the software platform for enhanced data visualization and other advanced applications. A GIS will also allow for more accurate distribution circuit models for planning and operations and more sophisticated hosting capacity capabilities, among other uses. Additionally, Con Edison expects the DERMS to provide M&C capabilities for utility-sited and controlled devices to provide benefit to the distribution and bulk power systems. Con Edison plans on using its demonstration projects to test options for monitoring and communicating with storage assets and provide a test case for integrating storage within the DERMS environment. Additionally, NYISO pilot projects in the Company's service territory, in which Con Edison is actively engaged, will also help test monitoring, coordination, and communication of aggregated storage resources.

Separately, the Company expects ADMS to provide enhanced capabilities to monitor and manage the distribution system, including energy storage devices, while AMI will provide customers with information needed to monitor and manage energy use and help determine the value of adopting energy storage devices.

6) **Describe the means and methods for determining the real-time status, behavior, and effect of energy storage resources in the distribution system. Information produced by those means and methods should include:**
   a. **the amount of energy currently stored (state of charge);**
   b. **the time, size, duration, energy source (grid and/or local generation), and purpose for each charging event;**
   c. **the time, size, duration, consumer (grid and/or local load), and purpose of each energy storage discharge;**
   d. **the net effect (amount and duration of supply or demand) on the distribution system of each charge/discharge event (considering any co-located load and/or generation); and,**
   e. **the capacity of the distribution system to deliver or receive power at a given location and time.**

See response to 5) above.

7) Describe the means and methods for forecasting the status, behavior, and effect of energy storage resources in the distribution system at future times. Forecasts produced by the utility should include:

a. the amount of energy stored (state of charge);

b. the time, size, duration, energy source (grid and/or local generation), and purpose of charging events;

c. the time, size, duration, consumer (grid and/or local load), and purpose of energy storage discharges; and,

d. the net effect on the distribution system of each charge/discharge event (considering any co-located load and/or generation); and,

e. the capacity of the distribution system to deliver or receive power at a given location and time.

As Appendix A highlights, energy storage is a separate line item in the DG forecast. Energy storage penetration and growth information are derived from the Company's interconnection queue, which provides a near-term view of proposed and under-construction projects. For the 2019 forecast, the Company reviewed existing and queued energy storage projects. Given the early development of energy storage technology in the service territory, the Company used conservative assumptions on energy storage growth. The Company is evolving toward a probabilistic approach that incorporates historical growth rates of DER technologies with similar characteristics, such as space requirements. The Company is working on a new forecasting tool that will better incorporate new technologies and end-uses, such as energy storage. This new forecasting tool will be introduced in 2020, and will begin with energy storage and building electrification, and will have the architecture and design in place to allow for future extension to EVs, solar PV, and DG/CHP.

Energy storage systems are a flexible resource with varying system impacts. For example, a 10 MW, 4-hour (or 40 MWh) battery can discharge in several ways–10 MW discharged for 4 hours, 5 MW discharged for 8 hours, or different levels of discharge for varying durations. Battery systems can target a use case that provides more consistent output of intermittent renewable sources or flattening the peaks of load curves of customers with highly variable loads. These systems are most predictable when they discharge in a manner set by program rules. For planning purposes, the Company will view the demand reduction from the battery as the amount of discharge it can provide over four hours, in line with the network peak load. Thus, a 500 kW reduction from peak would be a 2 MWh battery discharged over 4 hours. The Company understands that a battery system could discharge in a variety of ways and if an incentive mechanism (e.g., DR, NYISO price signals, or VDER) caused the battery discharge pattern to vary from this standard, then the Company could adjust the amount of reduction the forecast includes.

When the storage is charging, it adds demand to the system. Storage use, and its impact on peak load, varies by intended purpose (e.g., customer-peak shaving, DR, direct utility-control) and size of resource. Customer-peak shaving depends on the time of the customer's peak and may not be coincident with the utility or NYISO peak. Additionally, resources targeting customer-specific energy needs may have obligations that cause them to be unavailable at certain times. The Company recognizes that several factors require further study, including storage use and charging methods.

Detailing storage operational requirements within contracts allows the Company to measure and influence or control a range of storage use cases. For example, the demonstration projects support a higher level of utility visibility and impact to peak demand. NWS also provide an opportunity for the Company to activate an energy storage unit to discharge, providing localized relief as part of a larger suite of DM projects. Similar RFPs would guarantee coincidence with the Company's greatest need. The Company expects data from these programs to contribute to peak load and energy use impact studies in the coming years.

8) Identify the types of customer and system data that are necessary for planning, implementing, and managing energy storage and describe how the utility provides those data to developers and other stakeholders.

The business model for the storage resource will influence which types of customer and system data the storage operator needs for planning, implementing, and managing targeted use cases. For example, Con Edison uses information from the distribution planning process to identify locations experiencing or expecting to experience constraints that storage (or other technologies) may be able to mitigate and shares this information with third parties through NWS postings and solicitations and identification of LSRV areas.

For developers marketing BTM storage to customers, the customer's energy demand and consumption data is typically necessary. This data is available through Con Edison via GBC and Electronic Data Interchange ("EDI"). Developers can also work with customers to obtain data directly – i.e., customers can use the Green Button Download My Data tool available in My Account and share the resulting file (available in both xml and csv formats) with the developer.

9) By citing specific objectives, means, and methods describe in detail how the utility's accomplishments and plans are aligned with the objectives established in New York State's recently signed Energy Storage Deployment legislation and Governor Cuomo's new initiative to deploy 1,500 megawatts of energy storage in New York State by 2025.

The Company has focused efforts to address economic and technical barriers for energy storage, including cost, market participation, permitting and zoning, access to system data, and subsidies/incentives. These have been advanced through new business models, coordination with NYISO, work with applicable Authorities Having Jurisdiction, GBC and hosting capacity maps, and NWS and VDER programs, respectively.

By integrating NWS into the planning process, the Company is routinely looking for opportunities to defer traditional investment through DER. One example is the storage-specific RFP issued on June 14, 2019 seeking cost-effective, ESS technologies for operational availability starting as early as May 1, 2021 within the Newtown targeted areas.

Additionally, as described above, Con Edison has actively sought and introduced new opportunities for energy storage to participate in the Company's tariffs and programs. For example, Con Edison's revised tariffs expand the circumstances under which energy storage systems can export power onto the distribution system.[78] Changes to the VDER tariff are promoting market growth by making it easier for storage developers to obtain financing and maximize available compensation.[79]

Con Edison has continued to work with stakeholders to advance the technical feasibility of deploying energy storage. The Company has worked with municipalities to mitigate permitting concerns regarding energy storage devices in and

[78] Case 17-E-0104, *Tariff Filing by Consolidated Edison Company of New York, Inc. to Revise P.S.C. No. 10 - Electricity, General Rule 8.3 - Generating Facilities Used on an Emergency Basis for Export, to Permit the Export of Electricity Discharged by Battery Storage Systems during Demand-response Events under the Brooklyn/Queens Demand Management Program,* Order Approving Subject to Modifications Tariff Amendment For Battery Discharge In Brooklyn/Queens Demand Management Program and Making Other Findings (issued May 18, 2017). Case 17-E-0458, *Tariff Filing by Consolidated Edison Company of New York, Inc. to Modify Its Electric Tariff Schedule, P.S.C. No. 10, Regarding Energy Storage Systems*, Order Approving Tariff Changes with Modification (issued February 22, 2018).

[79] Energy Storage Proceeding, State of Storage in New York (issued April 1, 2020), p. 15.

around buildings, and continues to actively participate in stakeholder forums, particularly those with NY-BEST. The Company is also complying with new requirements in the SIR designed to facilitate the interconnection of storage assets.

Finally, the Company is actively implementing the Storage Order and planning for the CLCPA, including the solicitation for at least 300 MW of bulk energy storage dispatch rights.[80]

10) Explain how the Joint Utilities are coordinating the individual utility energy storage projects to ensure diversity of both the energy storage applications implemented and the technologies/methods employed in those applications.

The Joint Utilities established an internal working group to coordinate and share insights on each utility's energy storage deployment efforts, including implementation challenges. These coordination efforts have focused on permitting considerations, the most common technologies, evaluation and contracting processes. Con Edison, in its role as the first NY utility to issue the bulk solicitation as required in the Storage Order, was instrumental in sharing templates and lessons learned with the Joint Utilities for their own solicitations. The Joint Utilities will continue this coordination effort to facilitate further progress in energy storage deployments and implement the Storage Order and the CLCPA.

[80] Energy Storage Proceeding, Implementation Plan of Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc. for a Competitive Direct Procurement of Scheduling and Dispatch Rights from Qualified Energy Storage Systems (filed February 11, 2019).

2.5. EV INTEGRATION

Context and Background

Con Edison recognizes EVs as integral to achieving the State's clean energy goals and are supporting and encouraging EV adoption. While the EV market is still in its infancy, the State's EV industry is progressing toward the goals of the Charge NY initiative and Multi-State ZEV Action Plan, which calls for as many as 3.3 million ZEVs on the road by 2025. New York will contribute hundreds of thousands of ZEVs to this multi-state 2025 goal, in line with a State target of 850,000 EVs by 2025. The State continues to offer an instant rebate of $2,000 per vehicle, in addition to a federal tax credit of up to $7,500 per vehicle.

New York State has the second highest EV sales in the nation.[81] Historically, national EV sales have grown every year by an average of 55 percent since 2012. EVs continue to improve in variety, cost, and range. In 2019, however, national EV sales declined due to many factors. While the 2018 widespread availability of the Tesla Model 3 buoyed that year's EV sales, factors such as the phase out of the federal tax credit for General Motors and Tesla depressed 2019 sales. Nevertheless, in 2019, the Con Edison service territory increased EV registrations by 30 percent to almost 13,000 vehicles. Con Edison also saw increased participation in its programs, including approximately 3,000 SCNY customers. While the impact of COVID-19 on car sales in general, and EVs in particular, is still unfolding, making it difficult to predict trends, the efforts to bolster EV infrastructure and raise consumer awareness support continued gains in EV market share over the long term.

On January 13, 2020 DPS Staff issued a whitepaper to create a statewide Make-Ready Program for EV charging infrastructure.[82] The Company supports the vision in DPS' whitepaper that a new light-duty electric vehicle make-ready program will increase widespread and visible charging station development, reduce consumer range anxiety, and encourage the transition to EVs. Further, Con Edison believes utility investments to strengthen EV charging infrastructure will serve to facilitate greater EV adoption, result in a cleaner transportation sector, and encourage job creation in the aftermath of the economic uncertainty resulting from the COVID-19 pandemic. To support market growth, Con Edison has advanced EV charging demonstration projects, pilots, and programs, and continues to work with customers, regional groups, associations, and governments to advance EV initiatives and charging infrastructure awareness.

Con Edison has also engaged with stakeholders to expand charging infrastructure, including creating operating and capital incentives for DCFC stations and supporting Level 2 and DCFC make-ready programs. The Company has continually expanded its SCNY program, most recently to include medium and heavy-duty vehicles. Together with the Joint Utilities, Con Edison has been an active participant in the EV proceeding since its inception in April 2018, and provided recommendations and feedback to support development of charging infrastructure.

Under the proposed statewide Make-Ready Program, utilities would incentivize development of EV charging infrastructure through providing funds toward both utility-side and customer-side make-ready infrastructure. The Program's goal is to create enough Level 2 and DCFC charging infrastructure to support 850,000 EVs in New York State. As noted in the Joint Utilities' initial comments in response to the whitepaper, Con Edison supports the State's ambitious climate and transportation electrification goals and a flexible Make-Ready Program framework appropriately balanced with accountability achieved through EAM mechanisms that drive utility performance. Such a flexible framework must

[81] https://www.atlasevhub.com/materials/state-ev-sales-and-model-availability/
[82] Note 52, *supra*.

be established with an understanding of the incipient nature of the EV market and allow utilities to make rapid changes in program design as market needs and customer preferences evolve. The Joint Utilities support developing charging in a wide range of sites and applications, including multi-family, commercial, and public locations.[83] The Company anticipates that there will be a Commission order issued during 2020 authorizing a Make-Ready Program. Once the Commission issues an order, the Company will develop and implement a program strategy to align with the stated targets and mandates.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Implemented a multi-faceted approach to promoting and preparing for increased EV adoption, including off-peak charging incentives, facilitating charging infrastructure deployment, and fleet initiatives.
  - Funding of $39 million to support the Make-Ready Program for the 2020-2022 rate period.
  - Implementation of incentives for DCFCs.
  - Over 3,000 participants in SCNY.
  - Over 1,700 Level 2 chargers and 180 DCFCs in the service territory.

Con Edison is proactively promoting and preparing for increased EV adoption and has demonstration projects and programs in various stages of implementation to test market enablement strategies and promote EV readiness. The initiatives generally fall into three areas: (1) off-peak charging incentives and rate design, (2) facilitation of charging infrastructure deployment, and (3) fleet initiatives. Additionally, Con Edison is a channel partner for vehicle and charging infrastructure manufacturers, and provides a comparison tool, referred to as Cars Marketplace, which allows customers to compare car models, including available EV and hybrid models, based on fuel efficiency, available incentives, and total cost of ownership ("TCO"). Through its Home Energy Reports, the Company educated thousands of customers about EVs and cross-promoted the Cars Marketplace. In 2018 and 2019, the Company co-hosted a New York International Auto Show booth with NYPA and NYSERDA to promote available programs and EV activities. Further, the Company increased visibility for EVs as part of partner events, such as Earth Week and fleet education events in Union Square, as shown below.

[83] EV Proceeding, Joint Utilities Initial Comments on the DPS Staff Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment (filed April 27, 2020).

Credit: Empire Clean Cities

Beyond its make-ready efforts, the Company tests a range of EV enablement activities and assesses where it can make the largest impact on market growth and create the most benefits.

Off-Peak Charging Incentives and Rate Design

Con Edison offers programs and rates to incentivize off-peak charging.

SCNY

Con Edison's SCNY program offers incentives to eligible EV drivers for charging in Con Edison's service territory at off-peak times, including a $150 upfront signup incentive for installing and activating a free connected car device from FleetCarma. This device plugs into the vehicle's diagnostic connector and allows users (and the Company) to know where, when, and how much energy an EV consumes during charge events.[84] Single-owner fleet customers have the option of using data from smart chargers to verify charging behavior. The SCNY program is helping Con Edison understand charging behavior and EV driver response to incentives. Con Edison piloted the first iteration of the smart device within its workplace charging program, which is described below, in 2016. The program was launched in April 2017. As of June 1, 2020, over 3,000 EVs are enrolled in the program.

Participating customers have the opportunity to earn up to an additional $1,000 annually, consisting of $5 per month for keeping the device plugged in and charging in the Con Edison service territory and $0.10 per kWh for charging between midnight and 8:00 a.m. on any day in the Con Edison service territory. During the summer (June 1 to September 30), customers receive an additional $20 per month when they avoid charging between 2:00 p.m. and 6:00 p.m. on weekdays.

As of March 1, 2020, EV owners on the residential time-of-use ("TOU") rate (SC1 Rate III) earn alternative incentives: $5 per month for keeping the device plugged in and charging in the Con Edison service territory and $0.166 per kWh for charging between midnight and 8:00 a.m. on any day in the Con Edison service territory. During the summer (June 1 to

[84] https://www.coned.com/smartchargenewyork. EV owners do not need to be Con Edison customers in order to enroll in the SCNY program.

September 30), customers receive an additional $20 when they avoid charging between 2:00 p.m. and 6:00 p.m. on weekdays, and during the non-summer months (October 1 – May 31) customers receive an additional $10 when they avoid charging between 2 p.m. and 6:00 p.m. on weekdays.

On September 12, 2018, the Commission approved Con Edison's proposal to expand the eligibility criteria for the SCNY program to include MHVs, thereby providing price signals to a larger subset of vehicles to charge at off-peak times.[85] The SCNY incentive structure for MHVs provides a $0.0221 per kWh incentive for MHVs charging off-peak and a $250 per month incentive during June through September to MHVs that do not charge during the four-hour weekday Commercial System Relief Program ("CSRP") period in the network where the MHVs charge. As of June 1, 2020, 14 of NYC Transit's electric buses and 6 Mitsubishi FUSO e-Canter trucks operated by 4 local non-profits are enrolled in the SCNY program.

Con Edison is now exploring the use of onboard telematics to monitor charging behavior, thereby eliminating the need for an external device. In collaboration with the American Honda Motor Company, Con Edison ran a three-month Honda Clarity SmartCharge Pilot Program using charge data collected by the vehicle's onboard telematics. The 86 Honda Clarity owners who participated in the pilot earned $150 for enrolling, $5 per month for sharing their charge data, and $0.10 per kWh for any charge session entirely within off-peak hours (12 midnight – 8 am). In 2020, Con Edison plans to launch a full-scale program where Honda Clarity owners will earn the same incentives as the program under FleetCarma. There are approximately 400 Honda Clarity PHEVs in the Con Edison service territory.

Con Edison has also contracted with Ford and BMW to develop an EV charging dashboard that includes anonymized charging data from the vehicle's onboard telematics for all BMW and Ford EVs that charge in the Con Edison service territory. Con Edison is working with both Ford and BMW to transform this EV charging dashboard into a platform for managing SCNY including:

(1) Enrollment of EVs into SCNY,

(2) Monitoring charging behavior with onboard telematics of the vehicle,

(3) Development of an EV charging dashboard on a mobile app accessible to participating EV owners, and

(4) Providing incentive payment system.

SCNY has been able to provide incentives for EVs in different vehicle classes using many tools, including vehicle telematics, onboard devices, and charging stations.

TOU Rates

Public Service Law 66-o required all utilities to make a filing by April 1, 2018 establishing a residential tariff for charging EVs. The Company already had several rate options that comply with this requirement and promote off-peak charging through differentiated rates for on-peak, off-peak, super peak, and by season. For example, Special Provision E allows residential customers who own an EV to enroll in the whole house TOU rate with a one-year price guarantee that mitigates their rate related risk.[86] After 12 months, the Company will compare what was paid under TOU rates with what would have been billed under the standard residential rate. If a customer paid more on the TOU rate, the

[85] Con Edison 2016 Electric Rate Case, *Order Expanding Electric Vehicle Charging Program Eligibility* (issued September 12, 2018).
[86] https://www.coned.com/_external/cerates/documents/elecPSC10/SCs.pdf, Tariff Leaf 395.

Company credits the customer's account for the difference. As of June 1, 2020, the Company has over 250 EV customers enrolled in the whole house TOU rate, with additional applications pending TOU meter installation.

Special Provision F allows customers to measure EV load on a separate meter from other electric consumption for billing purposes, thus allowing for EV-specific TOU rates.[87]

Facilitating Charging Infrastructure Deployment

Con Edison continues to facilitate charging infrastructure deployment and leverage partnerships with public agencies and the private sector. The Company's demonstration projects and programs span many market segments, including workplace charging, public quick charging, transit bus charging, and school bus charging.

Workplace Charging

Many EV drivers want to be able to charge their vehicles at work. Workplace charging can induce EV demand and serve as primary charging for drivers without dedicated parking. A recent Company survey found that over 40 percent of its customers do not have access to home charging. Workplace parking is typically limited in parts of Con Edison's service territory, but there are areas in the outer boroughs and Westchester County where workplace charging could be more readily expanded. Workplace charging creates similar social benefits to public charging and has similar cost drivers. Con Edison believes that workplaces should receive the same make-ready incentive levels as public stations.

Con Edison offers workplace charging to Con Edison employees on a pilot basis. As of June 1, 2020, Con Edison had installed 28 dedicated 120V outlets at 16 Con Edison facilities. The Workplace Charging program currently serves approximately 40 employees with EVs. All Con Edison employees who participate in the Workplace Charging program are required to enroll in SCNY.

Public Charging

Con Edison views public EV charging as a necessary segment for dense urban environments, with so many New Yorkers lacking dedicated parking. New York City drivers do not have dedicated parking or access to workplace charging. Quick charging is particularly attractive given the limited availability of onsite charging stations in the Company's territory and the number of customers without access to private off-street parking. Quick charger hubs fill the role that a gas station does for fossil-fueled vehicles.

EV Quick Charging Station program

With current charging station utilization rates the economics of building EV charging stations can be challenging. The EV Quick Charging Station program offered as part of the BIR program aims to support the infrastructure deployment needed to increase EV penetration by providing incentives to site hosts. The program provides a 34 or 39 percent lower delivery service rate for these stations for up to 5, 10, or 15 years. The new rates became available May 1, 2018.

The Commission's *Order Establishing Framework for DCFC Infrastructure Program* ("DCFC Order") modified the terms of the tariff to expand eligibility to government customers and eliminated the requirement that the station must receive economic incentives from federal, state, or local authorities.[88] To qualify for the EV program, the facility must be open to the public, such as supermarkets, malls and retail outlets, or train stations and have a newly constructed station with a minimum 100 kW of aggregate charging capacity and a maximum aggregate demand of 2,000 kW. Though station

[87] *Id*.

[88] EV Proceeding, Order Establishing Framework for Direct Current Fast Charging Infrastructure Program (issued February 7, 2019).

economics can be challenging, as EVs use these stations for charging, their load factor improves and over time, the stations are expected to become more economic.

In conjunction with the EV Quick Charging Station program, Con Edison offers a per-plug incentive, consistent with the terms of the DCFC Order.

NYC Curbside Charging Demonstration Project

The Company is partnering with the New York City DOT and AddEnergie to install 60 Level 2 dual-charger posts, for a total of 120 EV plugs throughout the city. Of the 120 EV plugs, 20 will be exclusive to NYC fleet vehicles and the rest will be available for public curbside parking. The project will test charger utilization, installation process, hardware durability, and customer technology acceptance.

Con Edison and DOT signed a demonstration agreement in September 2019 to allow for installation of curbside chargers in public rights-of-way for a three-year term of operation with DOT option to extend to four years. AddEnergie agreed to cost and revenue sharing terms with Con Edison in their partnership agreement. The New York City Design Commission provided approval of the unit design and DOT has identified sites and presented to community boards. The Level 2 curbside stations were planned to be in service during 2020 (prior to COVID-19).

EV Charging Hub Demonstration Project

Con Edison is working with charging partners to assess the installation of quick charging stations to catalyze initial investment in infrastructure that enables more EV adoption and test various aspects of quick charging, including utilization, operations, economics, and customer acceptance. The intent is to provide valuable data on key drivers of scaling the quick charge business model and enable more EV adoption. Con Edison will support development of DCFC available for public use and in high enough concentration to minimize customer wait times. As part of the project, the Company will look at utilization drivers in an effort to improve the New York area business model.

Con Edison will choose selected properties for the purpose of hosting EV charging stations, and partner with third-party operators that own and operate their charging equipment. The operator(s) will test innovative business models of EV charging, such as mixing EV charging standards, fleet partnerships, and energy storage and/or renewable energy.

In March 2020, Con Edison issued an RFP inviting business partners to provide an EV Charging Hub at a Company Nevins Street site in Brooklyn. The site can accommodate up to 18 EVSE-equipped parking stalls in addition to a battery project discussed in Section 2.4. Con Edison will provide the general site conditions (e.g., grading, paving, striping, draining, landscaping, site egress, etc.) and make-ready infrastructure, such as utility interconnection to provide electrical service up to 2 MW, pre-installed outdoor-rated distribution service panel, conduit and conductor from the service panel to parking stalls, utility-grade meter infrastructure, and physical site security (e.g., fencing, bollards, etc.). The RFP awardee will install, own, and operate DCFC and/or Level 2 EVSE and necessary support equipment to serve EV customers. The Company received responses on May 8, 2020 and is currently evaluating them. Contract execution is expected by the end of 2020.

Fleet Initiatives

Con Edison Transportation

Con Edison continues to opt for plug-in electric fleet solutions that meet the Company's operational criteria. The Company is transitioning its light-duty fleet to EVs wherever possible and reducing the use of fossil fuels in medium/heavy-duty trucks. As of May 15, 2020, the Company's fleet included 82 plug-in passenger vehicles and 23 plug-in work trucks. Con Edison has installed a total of 119 electric vehicle chargers (108 Level 2, 11 DCFC) across 12

Company locations to serve the plug-in electric fleet. Most sites are equipped with one DC fast charger and nine Level 2 chargers. The Company continues to engage employees in its fleet electrification efforts using pool vehicles available to employees for business use.

School Bus V2G Demonstration Project

Electric school buses transport children during the school year and can serve as dedicated DER in the summer. This has particular value in Con Edison's service territory, which has high summertime electricity demand and low school bus demand during the summer. Since a school bus typically sits idle during the summer, when loads are highest, the battery can become an asset that charges in the off-peak periods and discharges to the grid at times of high load. The fleet operator can do this on simple fixed cycles or can intelligently manage it to align with times of maximum benefit. The new revenue stream captured by the fleet operator can lower the TCO; utility incentives towards the cost of the batteries can help reduce upfront capital costs. The hypothesis is that the shared use of electric school buses makes this new technology more affordable for the bus operator and the utility.

Con Edison and its partners, First Priority Green Fleet, Nuvve, and the bus manufacturer Lion Electric are creating the nation's first V2G school bus deployment. V2G deployment is scheduled for summer 2020. Currently, the partners are making progress addressing technical issues before deployment. Pending the completion of several tests, the first bus will return to service and discharge power onto the grid. The first bus operated for 332 days without vehicle failures from technical causes or otherwise. The remaining four buses will be retrofitted over an upcoming school holiday and the V2G capability is planned for summer 2020 over 8 hours at an aggregate 66 kW (13.2 kW per bus). The Company plans to run the demonstration through summer 2021.

Electric Transit Bus Charging

Electric transit buses have significant environmental and customer benefits, including lower CO_2 emissions, reductions in PM and NO_x pollutants, and less noise for passengers and the public. Developing charging models for transit is necessary for widespread adoption of electric buses. Transit bus charging is maturing, with the Society of Automotive Engineers having recently finalized standards for three-phase plugged and on-route charging. There are two types of charging transit agencies have deployed: (1) in-depot overnight charging, and (2) on-route opportunity charging. Additionally, the two basic bus designs available today align with these two charging approaches. Large battery packs with high upfront capital costs typically utilize overnight charging (at 50 kW), while small battery packs with lower upfront costs rely on on-route charging. While the best solution is a function of the route lengths and energy consumption, the wide diversity of route types and distances seems to indicate that no single solution will emerge, but rather aligning technology to use cases will become the preferred solution.

New York City's Metropolitan Transportation Authority ("MTA") fleets have begun the process of electrification through integrating electric buses into their fleet. In 2019, the MTA had a total of 10 electric buses and late in the year began adding 15 new higher capacity, articulated electric buses for its 14th St. crosstown service. The MTA's most recent capital plan calls for purchasing 500 electric buses by 2024 and buying only electric buses by 2029. The Company continues to engage with the MTA and the New York City DOT to support their fleet electrification efforts including assisting in their installation of chargers in bus depots and overhead on-route chargers.

Summary of Future Actions

- Provide make-ready infrastructure to support State EV goals.
- Collaborate with the Joint Utilities on EV readiness activities, outreach and education, including sharing lessons learned.
- Actively participate in ongoing EV regulatory proceeding.

Con Edison is committed to the State's EV goals and implementing make-ready programs that facilitate development of charging infrastructure to support increased EV adoption. The Company will continue to apply the data, experience, and lessons learned from its portfolio of EV demonstration projects and programs to develop future customer offerings.

As part of the Joint Utilities EV Working Group, Con Edison will continue collaborating on lessons learned and best practices related to critical EV issues. The EV Working Group will also continue working with other related working groups, including the Information Sharing Working Group and the Integrated Planning Working Group.

Risks and Mitigation

The EV market is continually improving, with EVs increasing in range and declining in cost. Commercial fast charging speeds are increasing as well, with stations rated at 350 kW or higher being introduced. At the same time, the market's development is subject to continued federal and local regulatory support, and automaker development. There is the risk that vehicle cost and performance may not improve at the expected pace and magnitude, which could slow adoption. Various market forecasts indicate a market inflection point in the next several years, at which point the upfront costs of EVs are projected to be comparable to conventional vehicles. Even as the industry and technology progresses to reach the inflection point when EV adoption can be expected to accelerate very rapidly beyond the current policy goals, the Company's programs will continue to provide incentives and support for EVSE infrastructure development that keeps pace with such growth.

Similarly, rapid growth often brings significant market disruption, which could result in some of the Company's project vendors or business partners going out of business or being acquired by other firms. Con Edison mitigates the risk of partnerships by using competitive solicitations and robust procurement practices, and by conducting extensive due diligence prior to entering a relationship and practicing robust project management and risk mitigation practices.

There is also the risk of diminishing policy support at the federal level, which could slow adoption. For example, the federal tax credit available for plug-in EVs has expired for several automakers and contributed to 2019's decline in sales growth. Additionally, fluctuations in the economy could impact overall car sales, including EVs, and declines in the price of gasoline could, in the short term, negatively impact EV growth.

Stakeholder Interface

Con Edison continues to consistently and regularly engage stakeholders. The Company and the Joint Utilities have participated in five technical conferences hosted by DPS Staff. The Company has held five stakeholder information-sharing events and, recently with the New York Green Bank, hosted a Clean Transportation Forum for over 220 people.

Con Edison's EV webpage[89] provides information on available incentives for both charger developers and consumers. Con Edison's Cars Marketplace also provides customers a simple way to compare the TCO differences between a conventional car and a comparable electric one. The Joint Utilities also developed webpage dedicated to the new DCFC incentive program.[90] Interested parties participated in a Joint Utilities stakeholder webinar on November 27, 2018 to learn more about the development of the per-plug incentive program.[91] The Joint Utilities will continue to engage stakeholders as part of the EV proceeding in upcoming technical conferences and as EV programs are developed, such as the statewide Make-Ready Program.

Additional Detail

This section responds to the questions specific to EV integration.

1) **Using a common framework (organization, format, semantics, definitions, etc.) developed jointly with the other utilities, identify and characterize the existing and anticipated EV charging scenarios in the utility's service territory. Each scenario identified should be characterized by:**

   a. **the type of location (home, apartment complex, store, workplace, public parking site, rest stop, etc.);**

The future state of EV charging will develop in uncertain ways, driven by extrinsic factors like vehicle battery costs, EV models introduced in the marketplace, and new business creation. Efforts to expand EV charging have often been aligned with internally defined business and investment decisions, rather than the subject of a jointly conceived siting framework. New solutions, such as curbside charging, advertising supported services, and battery integrated chargers are being constantly developed. Other solutions, such as autonomous or shared vehicles have struggled. Chargers supported by State and utility programs will allow more data to be collected.

The most detailed analysis of charging scenarios comes from the National Renewable Energy Laboratory's *National Plug-in Electric Vehicle Infrastructure Analysis*, which includes an estimated number of public Level 2 and DC fast charging or quick charging ports in several geographies.[92] However, that analysis does not address the majority of the characteristics requested (and outlined below). Some of the characteristics of each scenario requested can be populated by information and lessons learned from completed, ongoing, or planned pilot projects. However, many of these characteristics require myriad assumptions regarding aspects of the vehicle market that are not well understood, including travel patterns, the anticipated evolution of the market moving forward (e.g., plug-in hybrid vs. battery electric), and the expected or preferred technology for charging vehicles in different locations.

[89] www.coned.com/electricvehicles
[90] https://jointutilitiesofny.org/utility-specific-pages/electric-vehicles/
[91] EV Proceeding, Joint Utilities Presentation (filed November 29, 2018).
[92] National Renewable Energy Laboratory, *National Plug-in Electric Vehicle Infrastructure Analysis.* https://www.nrel.gov/docs/fy17osti/69031.pdf

Table 6 highlights Con Edison's categorization of charging infrastructure (or EVSE) into types of market segments, locations, and examples.

Table 6: Categorization of EVSE

	Residential	Commercial
Private Property-Sited Vehicle Charging	• Single-family home • Multi-unit dwelling	• Workplace • Maintenance yards and depots (light-duty fleet) • Transit bus depot • School bus depot • Private parking lots (e.g., event parking, other required visitor validation)
Publicly Accessible Vehicle Charging	• N/A	*Co-located with commercial host* • Stores • Shopping centers/malls • Parking garages • Rest areas *Dedicated charging location* • Municipal curbside and parking lot • Quick charge hubs

b. the number and spatial distribution of existing instances of the scenario;

The U.S. Department of Energy Alternative Fuels Data Center has an interactive online station locator at https://www.afdc.energy.gov/stations/#/find/nearest. The locator includes a searchable database and capability to download data about existing and announced or planned charging stations. It is searchable by state and zip code and returns the number of chargers available and/or planned in a given geography. Data fields include location, charger type, charging network, and other useful information. The Plugshare website at https://www.plugshare.com/ also identifies public Level 2 and DC quick chargers.

c. the forecast number and spatial distribution of anticipated instances of the scenario over the next five years;

While it does not forecast the number of chargers or the spatial distribution of chargers to meet future EV load, Con Edison forecasts annual EV-related system and network coincident peak demand and integrates those results into the peak demand forecast. At a high level, the methodology considers the number of electric light-duty vehicles in the Company's service area to meet the State's ZEV policy goal, allocates the number of electric light-duty vehicles by zip code based on current vehicle registrations, aligns those zip code allocations to networks, and estimates the expected peak charge rate and hour.

National studies suggest that 80 to 90 percent of EV charging will take place at home, as drivers with off-street parking will take advantage of available utility interconnection and low residential rates.[93] However, given that many Con Edison customers lack a garage or other off-street parking in which to charge their vehicles, home charging may be limited in much of Con Edison's service area. Further, the dense urban nature of much of Con Edison's service territory will be conducive to a prevalence of level 2 and quick charging for all vehicle types. Table 7 summarizes the basic assumptions for these chargers:

Table 7: EV Charger Assumptions

Charging Type	Assumptions
Level 1	120-V AC, 12-16 amp, 1.4-1.9 kW
Level 2	208/240V AC, 30-80 amp, 7.2 - 19.2kW
Quick Charging	DC power inverter, 208-600V AC, 25-150 kW

EVSE developers and hosts will determine the nature of public charging in the Company's service area. EVSE developers will likely look at driver travel patterns, vehicle charging profiles, vehicle registration distribution, and other key data that it requires to understand the nature of charging infrastructure needs.[94]

d. the type(s) of vehicles charged at a typical location (commuter car, bus, delivery truck, taxi, ride-share, etc.);

The Company expects light-duty vehicles to be the predominant class of EVs in the service area. This will include a mix of privately-owned, commercial and municipal fleets, for-hire transportation network vehicles, and taxi cabs. The Company assumes that these light-duty vehicles will charge at private and public charging locations. Con Edison proposes to support these sectors through DPS Staff's proposed Make-Ready Program.

The Company also expects a growing mix of medium- and heavy-duty EVs as manufacturers introduce competitive vehicles. These vehicles typically would be part of commercial fleets, such as delivery trucks, transit buses, school buses, coach buses, etc. These fleet vehicles will likely use private charging.

e. the number of vehicles charged at a typical location, by vehicle type;

While the Company can forecast the range of vehicles needed to comply with ZEV, it is difficult to answer how many chargers will be installed at specific individual locations to support those vehicles. As a source of general information, the National Renewable Energy Laboratory's *National Plug-in Electric Vehicle Infrastructure Analysis*[95] counts the current number of chargers and vehicles to estimate how many chargers are typical of public charging locations and how many vehicles those chargers support, and forecasts the infrastructure needed to support further EV adoption.

[93] *Id*.
[94] There are a few public studies on current and forecast public EVSE needs. *See, e.g.*, National Renewable Energy Laboratory, *National Plug-in Electric Vehicle Infrastructure Analysis.* https://www.nrel.gov/docs/fy17osti/69031.pdf.
[95] *Id.*

f. the charging pattern by vehicle type (frequency, times of day, days of week, energy per charge, duration per charge, demand per charge);

Generally, Con Edison does not collect or forecast charging patterns by vehicle type. The Company's EV-related system and network coincident peak demand forecast assumes an average charging usage per vehicle based on previous studies and a vehicle charging rate equal to the weighted average of current registered EVs.

Con Edison collects charging pattern data through the SCNY program, which offers incentives to eligible EV drivers for installing and activating a free connected, plug-in car device from FleetCarma and charging in Con Edison's service territory at off-peak times. For each charging session, the device records:

- Start date and time
- Duration of charging session
- Charging power level (kW)
- Total charging energy (total electricity consumed in kWh)
- 15-minute interval charging energy (kWh)
- Charging loss (electricity lost due to charging efficiency in kWh)
- Starting and ending state of charge
- GPS coordinates of where the charging session occurred

The Company also expects to observe baseline load profile data of public DC quick charging stations and public curbside Level 2 charging through its demonstration projects. As noted earlier, those projects are under development. Additionally, station data for the DCFC charging stations that receive the DCFC per-plug incentive from Con Edison is collected, anonymized, aggregated, and reported publicly.

a. the number(s) of charging ports at a typical location, by type;

The Company does not forecast the number of chargers at a typical location in its planning scenarios. For reference, the National Renewable Energy Laboratory's *National Plug-in Electric Vehicle Infrastructure Analysis* identifies assumptions on the number of charging ports at a typical location.[96]

b. the energy storage capacity (if any) supporting EV charging at a typical location;

The instances of energy storage applications installed in Con Edison's service territory specifically to support EV charging are very limited.

c. an hourly profile of a typical location's aggregated charging load over a one year period;

The Company does not currently forecast the hourly profile of a location's aggregated charging load over a one-year period.

d. the type and size of the existing utility service at a typical location;

The type and size of the existing utility service vary based on the location.

e. the type and size of utility service needed to support the EV charging use case;

[96] *Id*.

Existing service for residential and commercial customers may potentially support Level 1 EVSE. Quick charging and/or deployments of several Level 2 EVSE may require a service upgrade and/or grid reinforcement. The appropriate level of service will likely become clearer as the Company receives more service requests at different locations and in different design configurations. To date, service requests for quick charge stations have ranged between 50 kW and almost 1.5 MW. Additionally, market availability of technology may drive utility service requirements.

2) Describe and explain the utility's priorities for supporting implementation of the EV charging use cases anticipated in its service territory.

The Company's priorities for supporting EV adoption are to expand customer options and access to EV charging, in part through developing make-ready infrastructure for EVSE, and encouraging off-peak vehicle charging. Based on the experiences of the demonstration projects and pilots, the Company can further assess where it can make the largest positive impact.

Con Edison's activities prioritize market segments based on the Company's analysis of TCO for several EV types and end uses specific to Con Edison's service area. Among other insights, the analysis illuminated end use cases with the most near-term economic potential (e.g., transit buses, passenger vehicles) and which cost drivers affect end use TCO (e.g., access to charging).

Alongside private charging by customers who have access to charging station, publicly accessible EVSE serves as an enabler for the many vehicle owners without access to off-street parking and private EVSE. For example, quick charger hubs, analogous to conventional fueling stations, reduce the "range anxiety" challenge to EV adoption. The Company is supporting public charging through the BIR and Per Plug Incentive, which provide discounts for publicly accessible quick charging stations and a quick charge demonstration project in partnership with developers. The demonstration project will provide valuable data on the quick charge business model, such as utilization, operations, economics, and customer acceptance. It will also help the utility understand the engineering and planning needs, from a network perspective, to install EVSE, and how to align locations best for utility infrastructure with those that maximize EVSE utilization. Finally, customer access to charging will be expanded significantly through both the existing Company make-ready program along with the anticipated statewide Make-Ready Program introduced by DPS staff in the January 13, 2020 whitepaper.

Further insights related to EV charging will come through the curbside charging demonstration project in partnership with the NYC DOT and AddEnergie, the EVSE network provider. These parties will identify and equip dedicated EV parking locations with chargers across New York City. Chargers will be available for public use and city fleet vehicles. The demonstration project will test the charging business model, provide data on charging behavior patterns of fleet and private EV owners, and increase public exposure to EVs.

Additionally, the Company encourages off-peak charging, which limits the impact of new EV charging loads and limits customers' exposure to higher charging costs. Con Edison offers TOU rates to incentivize off-peak charging, including a one-year price guarantee for EV charging loads. The SCNY program, discussed above, provides incentives for eligible EV drivers for installing and activating a free connected, plug-in car device from FleetCarma and charging in Con Edison's service territory at off-peak times.

These activities are consistent with the EV Readiness Framework. Under the Framework, the Joint Utilities proactively support EV adoption, while helping achieve and, where possible, accelerate the long-term potential of transportation electrification. The Joint Utilities have prioritized charging infrastructure planning, streamlining charging infrastructure deployment in New York.

3) **Identify and describe all significant resources and functions that the utility and stakeholders use for planning, implementing, monitoring, and managing EV charging at multiple levels in the distribution system.**

a. **Explain how each of those resources and functions supports the utility's needs.**

Capacity maps identifying transformer loading can provide developers with some information on network locations for siting EV charging stations. Company tariffs, and incentives like SCNY, which are now available to all vehicle classes, encourage good system utilization. For example, the SCNY structure for transit buses allows them to operate their fleet and provides incentives for avoiding charging during demand response events. The Company also supports V2G and battery integrated fast charging that can improve the system impacts of EVs.

b. **Explain how each of those resources and functions supports the stakeholders' needs.**

See response to 3a above.

4) **Identify the types of customer and system data that are necessary for planning, implementing, and managing EV charging infrastructure and services and describe how the utility provides those data to interested third-parties.**

The Company's requirements for customer data for planning EV infrastructure and services include vehicle types, consumer driving ranges and locations, and driving and charging patterns. The Company is collecting this type of data through SCNY for customers enrolled in the program. The Company may share aggregated anonymized data from the program with third parties, including the public, to inform charging patterns in the service area, subject to the applicable privacy standard. The Company will also collect additional, anonymized charging data from participants in the statewide per-plug-incentive program.

For system planning purposes, the Company collects new customer charging load information via a "load letter" submitted through the project center process. The process is similar for any customer load request. The load letter provides key information to identify any necessary system reinforcements and/or excess distribution facilities needed to deliver the service request. Sharing this customer specific data is generally of minimal use to third parties.

To help developers identify sites where it may be easier to install charging, the Company provides an EV charging capacity map. In the networked underground system, the map shows four levels of transformer capacity, ranging from less than 200 kVA to more than 1,000 kVA. This tool provides guidance but does not replace a site work analysis that considers additional physical and electrical factors.

Additionally, the Joint Utilities have identified a subset of the higher priority data that will be required for planning, implementing, and managing EV charging infrastructure and services, including:

- *Customer load profile* - The utility will need to know the customer load profile, including charging capacity pre-installation of EV charging infrastructure to help understand the impact on the customer as well as system-level impacts.
- *Likely EV charging demand* - In workplace or other non-residential types of EV charging, the utility would need to know the anticipated charging demand (e.g., how many EVs are likely to be charging, and at what level, such as Level 2 charging versus DC fast charging). This will help characterize the charging capacity required at the facility. For a residential installation, Con Edison would need to know the level of charging that the customer is seeking, namely Level 1 or Level 2. Note that it is unlikely, at this time, that the utility plays a substantive role in deploying Level 1 charging infrastructure.

- *Distribution asset load profile* - The utility will need to know the load profile on the nearest substation or similar distribution asset to understand the likely impact that may arise from increased load attributable to EV charging. This will enable the utility to update its asset management strategy for that substation or feeder.
- *Potential location of EV charging infrastructure* - To the extent that implementation of EV charging infrastructure is inclusive of installation, the layout of the proposed installation, namely the location of the physical hardware, will help determine the associated costs. More specifically, the trenching and cutting costs associated with the installation of EVSE at existing facilities can vary significantly depending on the location of the planned installation relative to the point of connection with utility service.

5) By citing specific objectives, means, and methods describe in detail how the utility's accomplishments and plans are aligned with New York State policy, including its established goals for EV adoption.

Con Edison's objective is to support development of EV infrastructure in the Company's service area, and the primary means of support is to encourage charging stations and incentivize customers to charge off-peak. These combined goals are consistent with the goals of the State's Charge NY program. In addition, ZEV compliance is the foundation of the EV load forecast to align system planning with State policy goals. As described above, the Company has several efforts underway to encourage EVSE infrastructure development and off-peak charging.

6) Describe the utility's current efforts to plan, implement, and manage EV-related projects. Information provided should include:

a. a detailed description of each project, existing and planned, with an explanation of how the project fits into the utility's long range EV integration plans;
b. the original project schedule;
c. the current project status;
d. lessons learned to-date;
e. project adjustments and improvement opportunities identified to-date;
f. next steps with clear timelines and deliverables;

The Company describes its demonstration and other projects in the following tables.

Table 8: SCNY

Description	Con Edison's SCNY program encourages off-peak EV charging through enrollment payments, behavioral incentives, and access to real-time usage dashboard to monitor EV statistics. The program will help Con Edison understand charging behavior and EV driver response to incentives and was expanded to offer incentives to medium and heavy-duty vehicles, including buses. The Company partnered with FleetCarma to leverage their technology and analytics capabilities. The EV user plugs a free monitoring device into the vehicle's diagnostic connector and allows users (and the Company) to know where, when, and how much energy an EV consumes during charge events. Payment incentives are then calculated based on the EV behavior, with increased earning opportunity when avoiding charging during summer (June 1 to September 30) peak hours between 2:00 p.m. and 6:00 p.m. on weekdays.

Schedule	SCNY started on April 2017 and was expanded in the most recent rate plan.
Status	As of June 1, 2020, approximately 3,000 EVs are actively enrolled in the program.
Lessons learned	The Company worked with car dealerships to assist EV buyers and owners with installation of the FleetCarma device to decrease technology challenges for enrollment. Con Edison also sought to create rules and technology that would allow the inclusion of new vehicle classes and vehicles that are not compatible with the FleetCarma device.
Adjustments/Improvements	The program expanded the eligibility criteria for the SCNY program for light-duty vehicles to include medium- and heavy-duty vehicles, including buses.
Next Steps	The program will continue to add new participants and explore ways to improve the customer experience.

Table 9: School Bus V2G Demonstration

Description	The School Bus V2G demonstration project is designed to examine the technical and operational viability of using school buses as both a grid resource and transportation asset. Key tests include proving that electric school buses function well for transportation purposes, are reliable as grid assets, and that using them as grid assets does not cause excessive wear and tear on the equipment. The five buses have been performing as transportation since September 2018, serving White Plains public schools. Project partners will park and perform V2G for Con Edison from National Express's Northern White Plains depot from June to August (buses' summer period) over 8 hours at an aggregate 65 kW (13.2 kW per bus). This demonstration project will produce a new revenue stream for the bus operator, which can improve TCO of electric school buses. It also has the potential to foster a long-term supply of energy storage for the grid.
Schedule	A total of three buses will discharge for summer 2020. This will allow all of the project discharging goals to be accomplished by the end of the demo.
Status	The V2G technology development is complete. Project partners overcame several technical challenges with inverter integration. The buses can charge and discharge on a schedule. All site work is complete. Three vehicles have been shipped to Montreal for upgrading and maintenance work so that they can commence V2G discharge. The work is being done in Montreal and not on-site because of COVID-related travel restrictions.
Lessons learned	Phase 1's primary goal was to determine whether the electric buses function well in providing transportation. The bus is meeting expectations. Phase 2 has

	demonstrated that the V2G can be compatible with the SIR process, using either off-board or on-board inverters.
Adjustments/Improvements	The use of onboard inverters as opposed to off-board inverters has required site design changes, including the addition of a relay and contactor common in CHP distributed generation. However, because the use of one onboard inverter replaces the work of two inverters (one for vehicle charging and one for discharging), it reduces cost and onsite space requirements.
Next Steps	The remaining buses will be retrofitted over an upcoming school holiday and the V2G capability will be tested in 2020.

Table 10: NYC Curbside Level 2 Charging

Description	Con Edison partnered with the NYC DOT and AddEnergie to implement a plan to provide Level 2 EV charging to drivers across the City's five boroughs with the goal to increase visibility and access to EV chargers. The demonstration includes 60 dual-charger posts for a total of 120 EV plugs, where 20 chargers are exclusive to NYC fleet vehicles and the rest will be open to the public. Publicly available EV charging enables EV ownership by customers that lack off-street parking. The millions of curbside parking spots offer great potential to increase EV charger access. Stations are planned to be in service in 2020-2021.
Schedule	Installation of curbside chargers is expected to begin in 2020. The project is scheduled to run through at least 2021.
Status	Con Edison and AddEnergie have agreed to cost and revenue sharing terms in their partnership agreement. Con Edison and DOT signed a demonstration agreement in September 2019 to allow for installation of curbside chargers in public rights-of-way for a three-year term of operation with DOT option to extend to four years.
Lessons learned	N/A
Adjustments/Improvements	N/A
Next Steps	The completion of design and fabrication of the integrated charge post and charger product for the demonstration.

Table 11: EV Charging Hub

Description	Con Edison will support development of chargers available for public use and in high enough concentration to minimize customer wait times and increase utilization in an effort to improve the EV business models and catalyze investment in infrastructure. Con Edison will contract with a business partner to provide EV Charging Hubs at Company sites in Brooklyn and Queens. Both sites under consideration can accommodate up to 18 EVSE-equipped parking stalls. Con Edison will provide the general site conditions (make-ready costs), while the

	business partner will install, own, and operate DCFC and/or Level 2 EVSE, and necessary support equipment, to serve EV customers.
Schedule	The demonstration contract is expected to be issued by the end of 2020.
Status	In March 2020, Con Edison issued an RFP for an EV Charging Hub at its Nevins St. location in Brooklyn.[97]
Lessons learned	N/A
Adjustments/Improvements	N/A
Next Steps	Con Edison expects to select the winning bidder in summer 2020 and execute a contract by year-end 2020.

7) Explain how the Joint Utilities are coordinating the individual utility EV-related projects to ensure diversity of both the EV integration use cases implemented and the technologies/methods employed in those use cases.

The Joint Utilities EVSE stakeholder engagement group coordinates individual utility EV initiatives and initiatives from other EV stakeholders. The Joint Utilities harmonize strategies through several activities in the EV proceeding, including the Per Plug Incentive, the EV Readiness Framework, engagement on EV capacity maps, and the response to the DPS Staff's make-ready whitepaper proposal. Through these and other stakeholder engagement meetings, the utilities collaborate on different ideas and models to support EVs, as appropriate for their individual customer base and service areas.

8) Describe how the utility is coordinating with the efforts of the New York State Energy Research and Development Authority (NYSERDA), the New York Power Authority (NYPA), New York Department of Environmental Conservation (DEC), and DPS Staff to facilitate statewide EV market development and growth.

Con Edison has collaborated with State agencies, authorities, and other stakeholders for years on EVs and has been engaged in the EV space. In addition to the fleet testing and development of electric products from a multitude of manufacturers, Con Edison served as the East Coast technical service center from Maine to Florida for Toyota's introduction of the electric RAV4. The Company worked to develop some of the first fast chargers ever used for over-the-road EVs in the Manhattan facility and were involved in the development of the American National Standards Institute Standardization Roadmap for EVs and numerous efforts by industry stakeholders in response to solicitations in the electric transportation space. The Company has closely coordinated its commitments and efforts with NYSERDA, NYPA, DEC, and DPS Staff.

Con Edison continues to coordinate directly with stakeholders to support EV adoption, including regular meetings with government, non-profit, and industry stakeholders to share information, project updates, and creativity. The Company also coordinated with NYSERDA on a demonstration project to provide financing for the five electric school buses in White Plains. Finally, the Company will participate, both individually and with the Joint Utilities, in the proceeding.

[97] https://www.coned.com/-/media/files/coned/documents/business-partners/business-opportunities/electric-vehicle-project-partners/charging-hub-rfp.pdf

2.6. EE INTEGRATION AND INNOVATION

Context and Background

Energy efficiency policy has continued to evolve since the last DSIP, highlighting the critical role EE plays in helping to meet the State's environmental policy objectives, including carbon emissions reduction and supporting distribution system and customer needs. As formalized in the Commission's *Order Adopting Accelerated Energy Efficiency Targets* ("Accelerated Efficiency Order") and the CLCPA, the State established a goal of reducing customer energy usage by 185 TBtu statewide by 2025.[98] As part of that effort, the Commission's *Order Authorizing Utility Energy Efficiency And Building Electrification Portfolios Through 2025* ("NENY Order") directs an incremental 35.8 TBtu utility-driven EE saving, with corollary goals of achieving 3 percent annual reduction in electricity sales by 2025 and 1.3 percent of natural gas sales, an aggregate reduction of 3.6 TBtu through heat pump deployment, and the continued provision and enhancement of programs for LMI customers.[99]

In line with these goals, Con Edison plans to invest over $1.5 billion by 2025 to greatly increase its annual EE savings, including aggressively pursuing reductions in overall energy use. As part of this effort, the Company will provide easier access to programs and information for customers and building owners who want to reduce their use of fossil fuels and manage their energy use. Utility actions will facilitate the growth in EE and building electrification through utility programs and enabling the development of a robust, dynamic EE marketplace for third-party products and services.

Con Edison has provided EE product training programs to more than 1,000 independent contractors and expects to continue to engage market partners through similar programs that leverage incentives, increase product knowledge, and provide access tools to work directly with customers to deliver EE. Additionally, the Company has long relied on competitive solicitations as a central procurement approach of its EE programs, and continues to diversify its portfolio in support of market-based outcomes, including expanding its delivery channels and moving upstream in the supply chain to encourage vendors and retailers to stock and promote energy efficient equipment, which allows the Company to reach more customers.

The Company's existing suite of programs offers a strong foundation for continued progress. The Company is evolving and expanding its programs to promote heat pumps, integrate non-pipeline solutions, and incorporate program best practices to increase customer participation and achieved savings. The Company takes diverse approaches to savings, including:

- Driving EE implementation by incentivizing market participants at different points in the supply chain (e.g., providing incentives to customers, retailers, developers and/or contractors to cost-effectively increase adoption).
- Providing energy audits.
- Sharing educational materials about energy efficient products and services.

Con Edison also works closely with NYSERDA and the other New York utilities to facilitate increased adoption, maximize value to customers, advance market-based initiatives, and support complementary or reinforcing efforts.[100]

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[98] Comprehensive EE Proceeding, Order Adopting Accelerated Energy Efficiency Targets (issued December 13, 2018)("Accelerated EE Order").

[99] Comprehensive EE Proceeding, Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025 (issued January 16, 2020)("NENY Order").

[100] See, for example, see the Statewide Heat Pump Program Implementation Program filed by the Joint Utilities at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={4DCD9A46-A766-4AEC-9D11-B042B4905251}

Demonstration projects also test market-oriented approaches to EE. For example, the Building Efficiency Marketplace demonstration project, completed on June 30, 2019, used a web-based portal (Efficiency Project Portal) to engage commercial customers with information on their building's energy consumption, potential savings, and demand reduction opportunities, and streamlined connections with EE partners. Similarly, the Connected Homes demonstration project connected residential customers via an online marketplace (Con Edison Marketplace) with cost-effective EE products and services, such as LED lightbulbs, smart thermostats, and smart power strips, offering instant rebates where applicable. See Section 1.5 for additional details.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Significantly increased program achievements and exceeded rate case targets in 2019, saving 558 GWh, which is equivalent to the electricity consumed by over 51,100 U.S. households in a year, and achieving 128 MW of incremental peak reduction.
- Launched 7 new electric EE programs that achieved 350 GWh of energy savings and 47 MW of peak reduction.
- Achieved energy savings from 750 affordable multifamily buildings and distributed LEDs to more than 60,000 customers through local food bank partners.
- Developed processes that result in a more robust sales pipeline, including development of multiyear partnerships with large commercial customers and collaboration with NYSERDA to leverage joint efforts to achieve more savings.
- Continued to expand target markets by focusing on different levels of the vertical supply chain.
- Reorganized customer marketing team to target wider customer segments to achieve greater savings.
- Successfully leveraged lessons learned from REV demonstration projects to engage customers and motivate incremental energy savings.

As its EE and peak reduction goals continue to increase, the Company is driving additional efforts and new innovations. For example, the Company is focused on identifying and engaging customers who are intense energy users. Customer segments, such as hospitals, schools, and the banking sector, are some of the areas where Con Edison sees significant potential for additional energy savings through long-term partnerships. Con Edison's Strategic Energy Partnership ("SEP") connects each SEP customer with a designated Con Edison representative to support EE initiatives, including helping to navigate program offerings. SEP customers can secure incentive rates for Con Edison's commercial and industrial ("C&I") and/or multifamily programs over longer terms and for multiple EE projects.

The Company also works to introduce new efficient products, services, and program models as technologies develop, economic trends shift, and customer preferences and behavior patterns change. In 2018, the residential electric portfolio transitioned from a downstream rebate program to an upstream model, where incentive funds flow through the distributor to customers. The transition upstream is designed to capture the multiplier effect of resources being inserted higher in the supply chain and to lower administrative costs by reducing the application processes for contractors and program administrators.

An upstream program model also engages distributors and contractors, who are in the position to encourage customers to choose EE equipment. For example, the Retail Lighting Program is designed to increase market share of ENERGY STAR® LED lamps within the Con Edison territory. Through coordination with manufacturers and retailers, Con Edison is making discounted ENERGY STAR® LED lamps available to its customers by providing incentives directly to lighting manufacturers, who, in turn, offer instant discounts to customers purchasing eligible lamps at participating retailers.

The Company employs a host of strategies and operational improvements to better serve customers in a more innovative and market-oriented manner. This includes giving customers multiple options and opportunities to reduce their energy use based on their unique needs. Examples for residential customers include accessing rebates and incentives through market partners, shopping directly through the Online Marketplace, managing energy and demand through programmable thermostats and Wi-Fi-enabled air conditioners, and benefiting from market-based partnerships between Con Edison and midstream and upstream retailers and manufacturers.

HVAC MOVES UPSTREAM

The Company's residential HVAC program moved to an upstream model by engaging distributors and contractors who often help navigate residential customers through the process of upgrading HVAC. Each participating distributor has an allocation of incentive funds to be used throughout the program year.

The program launched in March 2018 with 19 distributors and over 150 participating contractors.

The Company continues to refine its portfolio to serve all customers, including a focus on LMI customers. In 2019, the Multifamily program reached approximately 750 affordable multifamily buildings. The Company also partnered with food banks to distribute LEDs to approximately 60,000 customers. In coordination with the statewide LMI EE effort, the Company is exploring additional strategies to expand its programs for this customer segment.

The Company's EE programs also seek to increase customer engagement and choice. The Company provides customers with actionable insights and the ability to efficiently manage their energy needs, while creating broader system and grid benefits. For example, the Company provides energy audits, educational materials, access to information on efficient products and services, and promotion of controllable technologies. As customers become more savvy energy consumers, the Company is taking steps to facilitate animation of a robust market of third-party actors. The Company has provided training programs to more than 1,000 independent contractors and will continue to engage market partners through such programs so they can best leverage Company incentives, education, and tools.

Con Edison coordinates with NYSERDA and works closely to leverage pilot offerings, furthering the reach of EE investments. This partnership helps develop new markets and achieve synergies to increase effectiveness, while also delivering the energy savings needed to achieve policy goals. Con Edison is working closely with NYSERDA to complement the Company's EE and DM programs, as well as initiatives piloted by NYSERDA to facilitate development of the market for increased adoption, maximize value to customers, and advance market-based initiatives. Through collaboration, the Company aims to transform markets and improve EE adoption beyond what uncoordinated efforts could achieve individually.

For example, Con Edison and NYSERDA are collaborating to co-design, co-develop, and co-manage a Pay for Performance ("P4P") pilot program. This unique collaboration seeks to utilize complementary efforts to test a new EE business model. It underscores both organizations' efforts in supporting the State's clean energy and REV goals. The transformative element of this pilot is the measurement of actual meter-based energy savings, through a technology-agnostic measure mix and market pricing instead of deemed savings for specific EE measures. The P4P pilot will measure energy savings by calculating site-based, weather-normalized, metered energy savings and comparing an

existing conditions baseline to post-retrofit utility meter data. Con Edison is implementing EE interventions for small business customers, beginning in Staten Island and Westchester. NYSERDA has made available for this pilot approximately $10 million from the Clean Energy Fund for performance payments through the next three years based on savings measured at the customer meter.

To continue the portfolio's development, build upon successes, and prepare for the future, the Company introduced an ongoing Test and Learn ("T&L") strategy in the 2016 Energy Efficiency Transition Implementation Plan ("ETIP") filing, described as a systematic method of identifying, designing, and implementing new technologies, programs, initiatives, and campaigns. The Company uses the T&L strategy to identify new measures and delivery mechanisms for existing offerings, and to identify and test new programs and initiatives before full-scale implementation. As a T&L initiative reaches maturity, the Company will evaluate its long-term viability and potential for success in the marketplace, after which the initiative will be incorporated into the broader portfolio of EE programs, or retired or retooled, as appropriate. A recent program that came through the T&L process is the Smart Kids program, which delivers LEDs, faucet aerators, and showerheads to fifth graders across the service territory and is paired with an in-classroom educational lesson plan on energy. This increase and diversification of customer participation channels allows for an increased reach of services provided to customers across the service territory.

The Company also greatly expanded the behavioral Home Energy Report program after the successful REV demonstration project in 2016. A Home Energy Report intends to motivate customers to use less energy and save money on monthly bills by providing customer-specific energy usage information, neighbor comparisons, and personalized energy saving advice. This program also acts as another touchpoint with customers, allowing them to take control of their usage through educational tips through email and printed mailers. This program currently reaches 1.1 million residential customers throughout the service territory.

Finally, the Company is constantly seeking to more efficiently use available financial resources by driving down costs where possible. Recent success in achieving cost efficiencies include administering portions of the C&I initiative internally, targeting new customers at different levels of the vertical supply chain, developing a robust multi-year sales pipeline, leveraging REV demonstration projects including the Online Marketplace, developing multiyear partnerships with large commercial customers, and expanding the T&L framework are discussed in the 2016-2018 and 2017-2020 ETIPs.

Future Implementation and Planning

Summary of Future Actions

- Participate in ongoing stakeholder processes related to the future of EE in New York.
- Explore new and innovative approaches to enable competitive markets and new EE products and services, such through the New York State Clean Heat Initiative.
- Expand Evaluation, Measurement, and Verification ("EM&V") efforts using AMI data.
- Continue partnership with NYSERDA to expand EE savings.
- Expand offerings for LMI customers through the statewide LMI EE effort.

Con Edison is growing its EE services and offerings to meet the State's ambitious policy goals, spur and drive continued innovation in the market, and create system benefits. Additionally, the Company continues to explore new and innovative approaches that seek to enable competitive EE markets and effect market transformation through a focus on different parts of the supply chain. Further, the Company is exploring new channels and new "go-to-market" strategies to deliver new energy solutions and services to meet customer expectations. Solicitations for market-based NWS include the consideration of EE as part of a portfolio of options that are designed to enable deferral of infrastructure needs on the distribution system. The Company expects that EE will both continue to be a solution considered for future NWS and provide marginal deferral and environmental benefits when implemented in non-NWS areas.

The Company continues to emphasize integration of new technology and evaluation methods in its EM&V efforts. The Company has begun incorporating AMI interval consumption data, where available, into their program analyses and plans to continue to expand testing new methods, such as advanced EM&V to document the verified impact of programs with a higher degree of granularity. These new methods are in line with Company goals to get more real-time feedback on programs through standardizing quality assurance/quality control across its portfolio, targeting M&V on new technologies and focusing more on rolling evaluation. Additionally, the Company, along with Staff and the Joint Utilities, worked to develop new evaluation standards, which culminated in Staff's issuance of the Gross Verified Savings Guidance in August 2019. The Company continues to implement these new EM&V requirements, which complement existing efforts.

Con Edison will actively participate in the ongoing stakeholder processes related to the NENY Order and use information obtained from that process to help inform EE plans and portfolio development efforts. The Company holds an annual stakeholder forum in May to solicit feedback and other potential modifications to its EE programs, and will fully participate in the State's performance management and improvement process.

Risks and Mitigation

Con Edison is integrating EE as part of the core utility business and supports the goals and priorities of the NENY Order. The goals represent a significant ramp-up that will become more challenging as certain lower-cost, higher-benefit measures, such as efficient lighting, are no longer available due to baseline changes or have reached market saturation. Additionally, heat pumps, especially ground-sourced, are a relatively new technology option for many customers in Con Edison's service territory. Therefore, significant time and resources may be required to build customer awareness and adoption of heat pumps. Lastly, due to COVID-19, there have been work stoppages across the Company's EE programs in 2020 and further uncertainties extend beyond 2020. For example, there may be new heating, ventilation and air conditioning ("HVAC") requirements to increase the flow of outdoor air into buildings, which may increase the HVAC energy usage.

To overcome these challenges in meeting EE goals in light of COVID-19 and other risks, the Company will be exploring new strategies for EE programs, including remote energy audits, additional strategic partnerships with large energy users, investments in new energy saving technologies and market channel strategies, and a pivot toward deeper savings such as heat pumps, smart energy management systems, and energy efficient HVAC systems.

The Company will continue to work to reduce costs and expects in the short term to benefit from those efforts in some of its programs. However, despite efforts to reduce unit costs, the Company recognizes that as lower-cost measures and programs such as lighting reach saturation, and as the Company works with customers to achieve greater and deeper levels of savings per residential or commercial building, the per unit cost of energy saved may increase over the medium to long term.

Stakeholder Interface

The Company will continue to partner with NYSERDA and coordinate with the Joint Utilities to facilitate EE market development and growth. The Company regularly communicates and coordinates with NYSERDA and has developed a "co-invest, co-save" model to pursue and enhance partnerships on programs, in order to offer complementary and non-duplicative efforts and programs that result in enhancing EE adoption and transforming EE markets. This coordination is achieved through regular communication and meetings between specific EE and DM personnel at all levels, including at the program manager and other SME level. The Company also communicates with other electric utilities to exchange lessons learned, coordinate where it can result in meaningful increases in EE adoption, and avoid overlap of EE programs and demonstration projects. Finally, Con Edison is working with NYSERDA to create innovative, market-stimulating partnerships that take advantage of each entity's strengths. In coordination with NYSERDA, Con Edison is investing more than $175 million to support EE and DM programs for LMI customers as part of a statewide framework for LMI programs.

Additional Detail

This section responds to the questions specific to EE integration.

1) **The resources and capabilities used for integrating energy efficiency within system and utility business planning, including among other things, infrastructure deferral opportunities as part of NWAs, peak and load reduction and/or load or energy shaping with an explanation of how integration is supported by each of those resources and capabilities, or other shared savings / benefits opportunities.**

Con Edison's EE programs play a significant role in reducing system peak, minimizing demand growth, and deferring large utility investments. The EEDM group, which runs the EE and DM programs, is within the larger Customer Energy Solutions ("CES") organization, which also includes groups leading procurement of NWS, demonstration projects, and distribution planning, among others. There is close collaboration among the groups to leverage EE as a resource, including targeting EE temporally and spatially to help meet system needs. Section 3.1 provides more detailed discussion of the CES organization.

These groups coordinate with other groups across Con Edison to integrate EE into other business planning processes. For example, EEDM provides volume and peak reduction forecasts to the relevant user groups within Con Edison for budget and capital project/system expansion planning purposes. Appendix A describes in detail how the Company uses these forecasts as load modifiers, reducing the system forecast.

2) **The locations and amounts of current energy and peak load reductions attributable to energy efficiency and how the utility determines these.**

Historically, Con Edison has treated EE as a load modifier in the load forecast. Through the BQDM program and other NWS projects, Con Edison is deploying EE to target identified local distribution system needs. For targeted projects (e.g., NWS projects), the Company understands when and where it can realize EE savings.

For more generalized programs, the Company tracks program participation down to the customer premises, where applicable. The Company uses this information to review and improve the effectiveness of existing programs and inform future program design. As the Company pursues upstream and midstream delivery channels[101] to reach additional customers, it captures customer participation data at a higher level, such as by vendor or local store, as opposed to

[101] Examples are providing incentives directly to manufacturers, vendors, and retailers.

individual end-user. The Company is currently developing and testing the methods and models that it can use to attribute savings to programs for which the Company does not currently have end-user participation data.

3) **How the utility develops and provides its short and long-term forecasts of the locations, times, and amounts of future energy and peak load reductions achievable through energy efficiency.**

Appendix A details how the Company distributes expected energy savings from EE and DM programs across the electric networks in the forecast using planned program growth, historic program achievements, historic consumption data, and customer demographic information. The Company then converts these energy savings to peak demand savings using annual hourly load curves, which vary with the measures and specific customer segment related to each program. The Company applies a geographic uncertainty factor to the expected demand reductions to reflect the uncertainty of where it will realize the future savings from system-wide programs.

Beginning with the 2018 forecast, the EE forecast shifted from a bottom-up approach to a more top-down approach that aligns with State policy goals and assumes sufficient funding will be available to meet the goals. Con Edison distributes the system savings among programs based on portfolio expectations given current trends. For the current forecast, the Company annually projects incremental EE program savings into the future as far out as the programs have funding.

For DM and DR programs, forecast data comes from an internal strategy team tasked with developing a vision of the Company's EE portfolio in future years based on expected changes to measure mix, cost-effectiveness, and savings calculations. For DR programs, the Company applies discount factors to enrolled MWs for network forecasts based on the size and diversity of enrollments in each individual network.

4) **How the utility assesses energy efficiency as a potential solution for addressing needs in the electric system and reducing costs.**

As noted above, the Company's EE programs reduce overall system peak and demand growth. Recent efforts, through BQDM and other NWS projects, are directing EE measures to areas of the grid where they can address localized system needs, including the use of incentive adders to drive additional EE participation in NWS areas. For example, the Company is pursuing 4 MW of EE savings as part of the Water Street NWS portfolio to meet near-term system needs. Sections 2.13 and 2.14 discuss the process of identifying potential NWS candidates as part of the capital planning process and building NWS portfolios that are cost-effective per the BCA Handbook.

5) **How the utility collects, manages, and disseminates customer and system data (including energy efficiency project and load profile data) that is useful for planning, implementing, and managing energy efficiency solutions and achieving energy efficiency potential.**

Sections 2.8 and 2.11 describe how the Company's investments in AMI and GBC are making more granular customer data available. These same datasets are useful in planning, implementing, and managing EE solutions. Additionally, the Company uses prior program participation data to identify, target, and evaluate potential program structure and marketing efforts.

Section 2.7 describes the system data that is available and how to access it. System data that is relevant to planning, implementing, and managing EE includes network share of consumption data, as well as network and system peak times and load shapes.

Con Edison collects project-specific information, such as the installed measure, customer type, and customer address. Some evaluation efforts may collect EE project-specific and load profile data as part of their operations. In the future, Con Edison expects to use AMI data to improve in this area.

6) **How the utility's accomplishments and plans are aligned with New York State climate and energy policies and incorporate innovative approaches for accelerating progress to ultimately align with a new 2025 energy efficiency target called for in Governor Cuomo's 2018 State of the State Address.**

The Company has exceeded its recent EE and DM program targets through a suite of products and services offered to customers of all sizes and business types. In 2019, the Company achieved 558 GWh of energy savings, growing at approximately 48 percent CAGR for the last three years. The Company also achieved 128 MW of peak reduction in 2019.

As described above, Con Edison is implementing its 2019-2020 ETIP/System Energy Efficiency Plan, which was updated to reflect heat pump program budgets and targets approved in NENY Order.[102] Additionally, the Company actively engages with stakeholders to improve program design and implement programs that cost-effectively meet the needs of customers and communities. As agreed to in the Joint Proposal, the Company plans to host an annual stakeholder forum each May to solicit stakeholder feedback to the Company EE programs. The Company's current and planned REV demonstration projects and NWS, as well as innovative EE, system peak reduction, and EV programs, align with the shared goals of the Company, Commission, and stakeholders. These efforts will result in a more efficient consumption profile while continuing to provide reliable, safe, and sustainable energy service.

7) **A description of lessons learned to date from energy efficiency components of REV Demonstration Projects with specific plans for scaled expansion of successful business model demonstrations. In addition, provide a description of each hypothesis being tested as part of energy efficiency components of ongoing Demonstration Projects and the anticipated schedule for assessment.**

The REV demonstration projects with significant EE components are Building Efficiency Marketplace and Connected Homes.

Building Efficiency Marketplace

The Building Efficiency Marketplace demonstration project was completed on June 30, 2019. This project was designed to examine how Con Edison could leverage interval meter data analytics to enable targeting and multi-channel engagement of commercial customers with high potential for EE savings and demand reduction. The project consisted of a web-based portal (the "Efficiency Project Portal") used to engage Quartile 1 C&I customers with information on their building's energy consumption, potential savings, and demand reduction opportunities.[103] Once a customer identified ECMs, the Energy Insights Marketplace helped streamline connections with EE partners. Even though the market research showed high levels of customer satisfaction with the platform, the challenges to monetize services, combined with the "high-touch" outreach required for customers to complete the identified ECM, made the long-term operation of this project cost and effort prohibitive. As such, the Company decided to close out this project. However, several of the key components of the project are now available to a larger population of customers. The Company started to offer Energy Insights to all C&I customers with smart meters and implemented high-touch white glove service through its SEP program, thus continuing a personalized offering to this customer class.

Connected Homes

The Connected Homes demonstration project was designed to facilitate DER residential adoption and promote market animation, proactively connecting customers with cost-effective EE products and services, as well as DG and EV offerings. The demonstration project met the REV goals of empowering customers to make more informed energy choices, developing new partnerships, unlocking new revenue streams, and achieving energy savings. Connected Homes

[102] Comprehensive EE Proceeding, NENY Order.
[103] Quartile 1 refers to the top 25 percent of energy consuming customers by kWh at a portfolio level.

used data analytics to match customers with specific DER solutions via an online marketplace (Con Edison Marketplace). On the Marketplace, customers can compare energy-saving products by energy score, price, and reviews. Customers can also apply for Con Edison appliance rebates, purchase small items such as LED lightbulbs, smart thermostats, and smart power strips, and receive instant rebates where applicable. Additionally, customers have access to a solar concierge service that simplified the experience of evaluating and installing solar, including options for community solar for renters and multi-family homes.

The Con Edison Online Marketplace platform proved to be "utility ready" and has scaled into an ongoing program within the EEDM group as of January 1, 2020. See Section 1.5 for additional detail on energy savings achieved.

8) Explain how the utilities are coordinating on energy efficiency to ensure diversity of both the models demonstrated and the technologies/methods employed in those applications.

The Joint Utilities have pursued a variety of REV demonstration projects focused on developing a better understanding of how to effectively deploy innovative EE programs. While the utilities are developing and implementing these EE demonstration projects independently, they have learned collectively from the different aspects of products and services that the projects have addressed, including online portals to connect customers with energy products and services, expansion of SHRs with accompanying home energy reporting capabilities, building efficiency initiatives, and incentive programs for demand reduction.

As part of their continuing coordination efforts, the Joint Utilities participate in a working group to share information regarding development and testing of new EE programs and strategies. These coordination efforts address topics such as distribution channel marketing, home energy reporting, online energy marketplaces, and SHRs. This coordination will inform current and future EE efforts, and help the utilities design a diverse portfolio of projects targeting a broad range of customers.

9) Describe how the utility is coordinating and partnering with NYSERDA's related ongoing statewide efforts to facilitate energy efficiency market development and growth.

The Company is working with NYSERDA to create innovative, market-stimulating partnerships that take advantage of each organization's strengths. This includes, but is not limited to, a pilot P4P program that leverages meter-based energy savings measurement, innovative project financing, and upstream incentives for heat pump technologies. The Company will continue this close coordination with NYSERDA and other stakeholders to facilitate EE market development and growth.

The Company has also developed a "co-invest, co-save" model with NYSERDA to pursue and enhance partnerships on programs, in order to offer complementary and non-duplicative efforts and programs that result in enhancing EE adoption and transforming EE markets. The Company achieves this coordination through regular communication and meetings between specific EE and DM program managers and other SMEs.

The Company also continues to work closely with NYSERDA, including through participating in NYSERDA's innovation sprints and providing solicitation information to NYSERDA's REV Connect portal.[104] The Company is also closely coordinating with NYSERDA on achieving the State's heat pump and LMI program objectives. For example, as the Company is implementing its heat pump program, NYSERDA is supporting the program through heat pump workforce programs and quality control/assurance development.

[104] https://www.nyserda.ny.gov/All-Programs/Programs/REV-Connect

2.7. DISTRIBUTION SYSTEM DATA

Context and Background

The REV initiative emphasizes the role of system data in facilitating market development and greater DER adoption.[105] Con Edison is committed to sharing system data in a user-friendly way that is updated to reflect the evolving needs of developers and third parties. Con Edison's 2016 Initial DSIP served as the first vehicle for sharing system data for these purposes and has expanded from there. The 2016 DSIP included extensive discussion on then-current practices and presented several datasets the Commission identified as essential for improving the transparency of utility planning and operations and aiding market growth. The Company's 2018 DSIP continued sharing system data by providing load and energy forecasts and information on how to access additional data sources.

Since the Initial DSIP, Con Edison has made available significant amounts of system data through the Company's online data portal, which is accessible through the DCX web interface and linked from the Joint Utilities system data portal (under Hosting Capacity maps). This data provides greater transparency into areas of the Company's system that present high value for DER interconnection, greater insight into areas with potentially lower interconnection costs, and greater visibility into system characteristics and needs, all of which respond to developer requests and foster DER market development.

Con Edison, in collaboration with the Joint Utilities, continues its commitment to expand accessibility and improve presentation of system data on the Joint Utilities' website and the utility online portals to better support stakeholder data needs. The details on new system data included in the hosting capacity map are described in Section 2.12.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

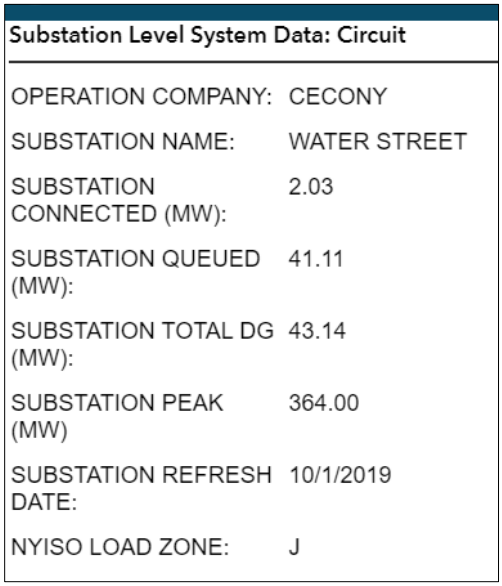
- Continued to update online data portal to provide expanded levels of Con Edison system data.
- Worked with the Joint Utilities to maintain a central portal for utility system data.
- Increased the system data available through the hosting capacity map, which provides a single point of reference for relevant system data, including 8,760 load forecasts at the network level and queued and connected DG.
- Continued discussions with stakeholders to identify the range of system data currently available and to better understand who is using the data, for what purposes, and how often, in order to prioritize future enhancements.

[105] System data broadly includes grid information such as load data, real and reactive power consumption, power quality, reliability; information on planned capital projects, beneficial locations, and hosting capacity; and other system characteristics.

Con Edison currently provides extensive system data as part of the hosting capacity maps and the Joint Utilities system data portal. Interested parties can locate the hosting capacity map through multiple channels, including Con Edison's DSP website,[106] the Joint Utilities' website,[107] and internet searches. Con Edison's DSP website is the entry point to the Company's hosting capacity map, which allows users to access relevant system data by location.

Using the hosting capacity map, a developer can view and download 8,760 load profiles for a particular network from 2018-2020, which gives the developer an indication of the duration of peak and off-peak periods. The hosting capacity map also provides substation-level data requested by stakeholders, including substation name, queued and connected DG, substation peak, data refresh data, NYISO load zone, as Figure 15 shows below. This data provides greater transparency into locations on the distribution system where DER integration may have higher value relative to other locations, greater insight into areas with potentially lower interconnection costs, and greater visibility into system characteristics and needs, which fosters market development.

Figure 15: Substation Level System Data



Substation Level System Data: Circuit	
OPERATION COMPANY:	CECONY
SUBSTATION NAME:	WATER STREET
SUBSTATION CONNECTED (MW):	2.03
SUBSTATION QUEUED (MW):	41.11
SUBSTATION TOTAL DG (MW):	43.14
SUBSTATION PEAK (MW)	364.00
SUBSTATION REFRESH DATE:	10/1/2019
NYISO LOAD ZONE:	J

Third parties can also access system data from a central portal maintained by the Joint Utilities. The central portal includes company-specific links to an expanded range of useful information, including:

- DSIPs
- Capital investment plans
- Planned resiliency and reliability projects
- Reliability statistics
- Hosting capacity
- Beneficial locations
- Load forecasts
- Historical load data
- NWS opportunities
- Queued and installed DG

[106] https://www.coned.com/en/our-energy-future/our-energy-vision/distribution-system-platform
[107] http://jointutilitiesofny.org/system-data/

- SIR pre-application information

Con Edison has engaged stakeholders to understand their current and future needs regarding access to system data. Based on feedback, Con Edison has found that stakeholders are generally satisfied with the level of system data currently available as it relates to their current needs, and that the most incremental value in making enhancements is in further refining data visualization, formats, and accessibility.

Future Implementation and Planning

Summary of Future Actions

- Work with the Joint Utilities Information Sharing Working Group to continue focusing on updates to and consistency of individual utility data portals, as well as refining and/or expanding system data use cases to better meet stakeholder needs.
- Work with the Joint Utilities to evaluate the system data requested as part of the Energy Storage Order, the Strategic Use of Energy Related Data proceeding, or other relevant initiatives.
- Coordinate with the Joint Utilities and stakeholders to advance the definitions and implications of basic and value-added data.

Con Edison will continue to enhance accessibility and presentation of system data. Section 2.12 on hosting capacity discusses how the Company is leveraging the hosting capacity maps to provide a more comprehensive, granular, and useful view of the factors influencing project success, including overlaying visualization of LSRV and NWS solicitation areas with hosting capacity data. This is part of the Company's efforts to facilitate DER deployment and improve the information available for developer analysis and business use cases. Con Edison also released EV capacity data in June 2020.

Con Edison will continue to engage in the Information Sharing Working Group, which is focusing on updates to and consistency of online portals and refining and/or expanding system data use cases to better meet stakeholder needs, as well as discussing the additional datasets requested as part of the Energy Storage Order and the Strategic Use of Energy Related Data proceeding.[108,109] The DPS Staff's recent whitepapers[110] in the Data Proceeding together propose a statewide approach to "useful access to useful energy data." DPS Staff recommends "establishment of a 'Data Access Framework' that clearly defines the process for access to customer energy-related data and standardizes the necessary privacy, cybersecurity, and quality requirements for data access,"[111] and establishment of a statewide data platform, the Integrated Energy Data Resource, which would contain both utility and non-utility data to support the market need for customer and system data in support of REV and CLCPA goals. Con Edison looks forward to participating in the evaluation of these whitepapers.

[108] Energy Storage Proceeding, Energy Storage Order, pp. 84-86.
[109] Case 20-M-0082, *Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data*, Order Instituting Proceeding ("Data Proceeding")(issued March 19, 2020).
[110] Case 20-M-0082, *Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data*, Department of Public Service Staff Whitepaper Regarding a Data Access Framework ("Data Access Framework") and Department of Public Service Staff Whitepaper Recommendation to Implement an Integrated Energy Data Resource (together referred to as "Data Proceeding Whitepapers") (issued May 29, 2020).
[111] Data Access Framework, pp. 1-2.

The Joint Utilities will also continue engaging stakeholders on business use case discussions, as needed. These discussions provide a forum for further dialogue around potential value-added information, such as improved access to more refined datasets the Company can develop through analysis or analytic applications. This may offer a more valuable alternative to stakeholders compared to directing business developers to the basic data resources, where they need to derive the required information on their own. The Information Sharing Working Group will continue to coordinate with stakeholders to advance the definitions and implications of basic and value-added data.

Risks and Mitigation

The Company will work with stakeholders to meet their system data needs, while maintaining security. The Company has adapted existing tools for data creation and exchange. The scoping of future systems, such as GIS and DERMS, includes the collection and sharing of system data. Integrating these systems and bringing them to full functionality is a complex process that could be subject to delays during implementation. The Company is investing significant time and resources at the outset of project scoping to understand the use cases and build a detailed project plan that includes risk management.

The Company also recognizes the risks associated with malicious software attacks and maintains a comprehensive cybersecurity program as outlined in Section 2.9 of this filing. This program is designed to protect Company computers, servers, business applications and data, and high-value networks from unauthorized access and control from both external and internal threats.

Stakeholder Interface

The Joint Utilities have demonstrated the ability to work collaboratively with stakeholders to understand their data needs and take actions that add value for customers. The Joint Utilities have pursued many initiatives that have substantially increased data access, granularity, types, and DER market support.

The Joint Utilities Information Sharing Working Group will continue to engage stakeholders on the use cases for system and customer data, identify additional datasets to share, and respond to stakeholder requests to improve ease of access to system information. Moving forward, the stakeholder process will aim to achieve a detailed understanding of the problems stakeholders are trying to solve and common goals, as well as incorporate lessons learned from previous data initiatives.

Additional Detail

This section responds to the questions specific to distribution system data.

1) **Identify and characterize each system data requirement derived from stakeholder input.**

Throughout 2017 and 2018, Con Edison, as part of the Joint Utilities System Data Working Group, engaged stakeholders in one-on-one discussions to better understand use cases and determine any existing gaps in system data or areas of future improvement. These discussions revealed that stakeholders were generally satisfied with the data elements Con Edison's system data portal currently provides; most inquiries focused on the ability to download the data and its presentation rather than the content itself.

Stakeholders expressed a preference for geographic representation to more readily identify potential beneficial locations, as opposed to raw datasets available on a website. Once developers focus on a geographic area, they want to

be able to access all relevant system data for that location. In response, Con Edison linked system data elements to the associated data pop-up boxes that the hosting capacity maps display when navigating substation, network, and feeder levels. Many developers and third parties found that the ability to layer multiple elements of information, such as NWS areas and available hosting capacity, can help fine-tune and accelerate searches for beneficial locations.

In 2019, the Joint Utilities and NYSERDA explored two additional use cases regarding EV loading capability maps, which Con Edison is currently developing for release in 2020. Information specific to the evolution of the hosting capacity maps and the stakeholder process is included in Section 2.12.

2) Describe in detail the resources and methods used for sharing each type of distribution system data with DER developers/operators and other third parties.

Con Edison currently provides extensive system data as part of the hosting capacity maps and the Joint Utilities system data portal. Interested parties can access the data portal and hosting capacity maps through the DCX web interface,[112] the Joint Utilities' central data portal website,[113] and internet searches. The hosting capacity home page[114] provides background information on calculation methods and site use instructions.

Table 12 summarizes the data available in the hosting capacity platform and, for each data element, the format in which users can download or export it.

Table 12: Format of Available System Data

Data	Format
24-hour peak and minimum load duration curves (by network)	PDF
8,760 hourly load forecast data (by network)	Excel file
Substation weather-adjusted peak for prior year	Hosting Capacity data box
Aggregated DG values available for both queued and installed projects by substation and feeder	CSV file

Additionally, the Company's 2020 DSIP shares load and energy forecasts, including DER forecasts.

3) Describe where and how DER developers and other stakeholders can readily access, navigate, view, sort, filter, and download each type of shared distribution system data.

See response to 2) above.

4) Describe how and when each type of data provided to DER developers/operators and other third parties will begin, increase, and improve as work progresses.

[112] https://www.coned.com/en/our-energy-future/our-energy-projects/distribution-system-platform
[113] http://jointutilitiesofny.org/system-data/
[114] https://www.coned.com/en/business-partners/hosting-capacity

Con Edison's hosting capacity map currently provides:

- Network and non-network hosting capacity analysis.
- Network-level 24-hour peak load and minimum load duration curves.
- 8,760 hourly load forecasts at the network level.
- Substation connected and queued DG.
- Aggregated DG values for both queued and installed projects by substation and feeder (overhead).
- Weather-adjusted peak for prior year.

Based on stakeholder feedback, stakeholders are generally satisfied with the level of system data currently available. They expressed that the most incremental value is in further refining data visualization. Con Edison and the Joint Utilities will continue to engage stakeholders to understand and meet evolving system data needs. For example, the Company refined hosting capacity at the sub-circuit level and provide more granular system data in NWS solicitations. Additionally, the Company recognizes the need to incorporate data use cases into the future of grid planning tools (i.e., DERMS), so as to refine accuracy and continue to reduce the effort needed to produce the data.

5) **Identify and characterize the use cases which involve third party access to sensitive distribution system data and describe how the third party's needs are addressed in each case.**

As discussed above, Con Edison provides a wealth of system data to assist DER developers in opportunity identification, business planning, and project scoping. The available data appears to be largely meeting developer needs, making the provision of sensitive distribution system data, such as utility planning models, unnecessary. Further, this proprietary data requires significant expertise and experience to properly interpret and apply. Should a third party require specific sensitive distribution system data or models for legitimate business purposes, Con Edison may provide that data to the requesting third party under the terms of a Non-Disclosure Agreement ("NDA"). For example, Con Edison provided models to academic institutions under an NDA to facilitate their participation in the NY-SUN program.

6) **Identify each type of distribution system data which is/will be provided to third parties and whether the utility plans to propose a fee.**

Third parties can also access system data from a central portal maintained by the Joint Utilities. The central portal includes company-specific links to an expanded range of useful information, including:

- DSIPs
- Capital investment plans
- Planned resiliency and reliability projects
- Reliability statistics
- Hosting capacity
- Beneficial locations
- Load forecasts
- Historical load data
- NWS opportunities
- Queued and installed DG
- SIR pre-application information

Within the hosting capacity map, Con Edison provides:

- Network and non-network hosting capacity analysis
- Network-level 24-hour peak load and minimum load duration curves
- 8,760 hourly load forecasts at the network level
- Substation connected and queued DG
- Aggregated DG values for both queued and installed projects by substation and feeder (overhead)
- Weather-adjusted peak for prior year

At this time, the Company has not identified additional types of distribution system data that it would offer for a fee.

7) Describe in detail the ways in which the utility's means and methods for sharing distribution system data with third parties are highly consistent with the means and methods at the other utilities.

The Joint Utilities maintain a central system data portal with links to utility-specific web portals with available system data. The Joint Utilities' website (https://jointutilitiesofny.org/system-data/) includes utility-specific links to an expanded range of useful information. This Joint Utilities web portal, in addition to hosting the links to the enhanced utility-specific web portals, has increased access to and improved the usability of useful stakeholder-requested information.

Through the business use case work undertaken in 2017, and in response to stakeholder comments, the Joint Utilities are evolving the system data effort to focus more on user experience, data presentment, and potentially more analytic information presentment. The discussions around business use cases have identified the volume of requested information that is already publicly available, but previously may not have been easily accessible. As a result, the Joint Utilities have enhanced the accessibility and similarity of the information provided, with the understanding that granularity may vary across utilities. In parallel, the Joint Utilities have been able to delve into the specificity of the information requested by developers and the business reasons behind the requests, and subsequently have made progress in providing additional information that is of greater value to developers.

The Joint Utilities Information Sharing Working Group will continue focusing on updates to and consistency of individual utility data portals, as well as refining and/or expanding system data use cases to better meet stakeholder needs.

8) Describe in detail the ways in which the utility's means and methods for sharing distribution system data with third parties are not highly consistent with the means and methods at the other utilities. Explain the utility's rationale for each such case.

See response to 7) above. The utilities have worked together to be consistent in the datasets and formats available to third parties.

2.8. CUSTOMER DATA

Context and Background

Customer data is a powerful tool that customers, DER developers, and other third parties can use to support market development. Customer data access is critical to meeting the clean energy goals set forth in the CLCPA and enabling the market animation and customer choice envisioned under REV.

Improving data access for customers by providing more granular and timely usage and cost data improves energy literacy and empowers customers to make better energy choices. Additionally, improved access to customer data can help DER developers and third parties tailor their products and services and conduct well-informed business prospecting. Finally, access to customer data can help local governments, State agencies, and academic institutions analyze the impacts of policies, track emissions, and create action plans. For these reasons, Con Edison supports easier access to more comprehensive data for customers and third parties with the appropriate privacy and cybersecurity protections.

Customer data can be customer-specific or aggregated, such as at the building or community level. Through stakeholder engagement, Con Edison and the Joint Utilities have identified the main customer data elements of interest to date, and pursued a course that provides useful information to support specific business cases while balancing customer privacy concerns. As described below, Con Edison continues to actively explore ways to enhance its data sharing tools and improve access to customer data to support market animation.

GREEN BUTTON CONNECT MY DATA (GBC)

GBC is a nationwide protocol that provides a process for customer authorization, data transfer, and standardized data formatting for sharing energy-related data with third parties.

Third parties that register with the Company to receive data this way—and successfully complete the technical onboarding process—are automatically listed as eligible in the "Share My Data" feature in My Account.

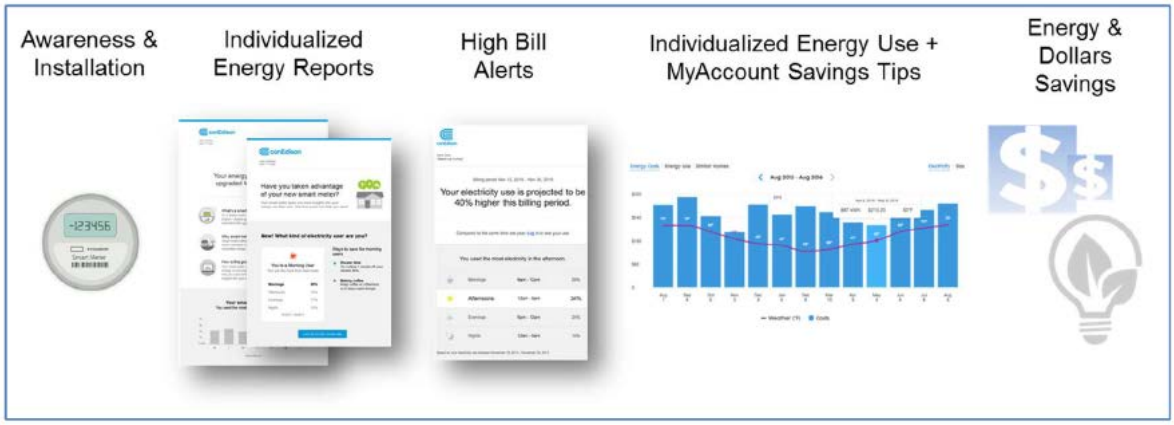
Once a customer provides proper authorization, the exchange of data with the third party is fully automated.

At Con Edison, the growth in types of customer data and methods for sharing has been tied closely to the deployment of AMI, which increases data granularity and improves the latency of data measurements. For example, Con Edison's customers with smart meters can view 5 or 15-minute interval usage data online with a 45-60 minute latency (i.e., the data is presented online within 45-60 minutes of the interval's end). The machine-to-machine data transfer process to share this near-real time interval data with third parties called GBC has become an important tool in sharing large volumes of information as AMI is implemented. The Company implemented the GBC protocol in its "Share My Data" platform, which was launched in December 2017.[115]

As of June 1, 2020, the Company had installed over 2.65 million smart meters, enabling customers to access and download their near-real time energy usage (i.e., 45-60 minutes after the interval ends). By giving customers convenient access to more granular and timely data, and providing energy reports, savings tips, and ways to share their data with third parties, the Company is empowering customers to make informed choices and adopt clean energy solutions that can reduce their monthly bill, as illustrated in Figure 16.

[115] https://www.coned.com/en/accounts-billing/share-energy-usage-data/share-my-data

Figure 16: AMI Customer Engagement



As described in detail in the following section, Con Edison provides a wide range of customer-specific data to customers and third parties through multiple data sharing mechanisms and platforms. For aggregated customer data, the Company continues to work with the Joint Utilities and other stakeholders to find a balance between sharing customer data, particularly energy usage information, and providing sufficient anonymity to maintain customer privacy. This is relevant in the context of individual requests for aggregated data – e.g., data requested by a Community Choice Aggregation ("CCA") Administrator, or a building owner – and also public access to aggregated data through the Utility Energy Registry ("UER") platform developed and maintained by NYSERDA, available at https://utilityregistry.org.

The Company's ongoing efforts in the customer data space are informed by continued collaboration with the Joint Utilities through the Information Sharing Working Group, which is a combination of the previous Customer Data Working Group and System Data Working Group. Additionally, the Company is participating in the Strategic Use of Energy-Related Data proceeding noted above. The DPS Staff's whitepapers[116] in the Data Proceeding together propose a statewide approach to "useful access to useful energy data." DPS Staff recommends "establishment of a 'Data Access Framework' that clearly defines the process for access to customer energy-related data and standardizes the necessary privacy, cybersecurity, and quality requirements for data access,"[117] and establishment of a statewide data platform, the Integrated Energy Data Resource, which would contain both utility and non-utility data to support the market need for customer and system data in support of REV and CLCPA goals. Availability of data under Staff's proposed approach may further enable analytics and attract investment in cleaner energy solutions, which can produce value for customers and the grid. Con Edison will continue to engage with DPS Staff and stakeholders in the development of privacy and cybersecurity standards and protocols, as well as the provision of system and customer energy data in a cost-effective manner that is most useful to both customers and the market. Con Edison looks forward to participating in the evaluation of these whitepapers.

[116] Note 111, *supra*.
[117] Data Access Framework, pp. 1-2.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Provided easier access to expanded range of customer-specific data through implementation of GBC Phase II and III on the Share My Data platform, allowing third parties to access and download customers' near-real time energy usage (i.e., 45-60 minutes after the interval ends), service classification, ICAP tag, total electric and gas bill costs, billing history, account number, and service address, in addition to usage and meter number.
- Proposed and received approval for new data privacy standards and requirements that attempt to balance meeting clean energy objectives with customer protection.
    - Whole Building T&C – approved on January 2, 2020
    - Uniform DSA – approved on October 17, 2019
- Worked with DPS Staff and NYSERDA to develop and upload aggregated UER datasets.

The Company continues to increase the breadth and granularity of customer data available and expand methods of accessing data. Ongoing investments in AMI, Share My Data, My Account, and the Value Stack Web Portal are resulting in more data being available in a format that is more usable to customers and third parties, thus supporting market animation. The Company also continues to provide guidance and support to third parties on how to register for data access and receive data through secure, machine-to-machine processes including Share My Data and Electronic Data Interchange ("EDI").[118] For building benchmarking, the Company continues to support a web service to automatically import building data directly into Energy Star Portfolio Manager®, which is the EPA's online tool for benchmarking energy and water consumption with similar buildings nationwide.[119] Lastly, to facilitate public access to aggregated customer data the Company provides semi-annual data to the NYSERDA UER platform for its service territory.

Customer-Specific (Non-Aggregated) Data

Con Edison provides a wide range of customer-specific data to customers and third parties through multiple data sharing mechanisms and platforms. Customers can access their account, billing, and usage data through the online My Account portal, or by calling the Company and requesting up to two years of billing statements. My Account also includes the option for customers to download their usage data to a spreadsheet via the Green Button Download ("GBD") tool. Additional detail on upgrades to My Account were included in the 2018 DSIP.

Third parties are able to access customer-specific data via Share My Data and EDI, which has historically been the mechanism for sharing data with energy service companies ("ESCOs") for purposes of retail access and was extended to DER providers by the Commission in late 2017.[120] Additionally, in Q3-2020, the Company plans to launch a new option for third parties to request access to customers' accounts (and corresponding usage and billing data) via the My Account

[118] https://www.coned.com/en/business-partners/access-customer-data

[119] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

[120] Case 15-M-0180, *In the Matter of Regulation and Oversight of Distributed Energy Resource Providers and Products* ("DER Oversight Proceeding"), Order Establishing Oversight Framework and Uniform Business Practices for Distributed Energy Resource Suppliers (issued October 19, 2017) ("UBP-DERS Order"), p. 28.

portal, subject to customer consent. A Value Stack Web Portal will also be launched in Q3-2020 to facilitate easier access to credit and subscriber-related information for DG customers receiving service under the VDER Value Stack tariff. All customer data sharing with DER providers is subject to the Uniform Business Practices for DERs ("UBP-DERS").

Share My Data

As required by the Commission,[121] the Company implemented the GBC protocol for sharing interval usage data with DER providers and launched its Share My Data platform in December 2017, and then expanded the data elements available via Share My Data in 2018 and again in June 2020. Share My Data allows customers to authorize registered third parties to access their energy and account data through an automated process in machine-readable format. As of June 2020, the datasets available include account number, meter number, service address, energy or net energy usage data (kWh, net kWh, Ccf), reactive power (kVAR), service classification, ICAP tag, total electric and gas bill costs, and billing history. Third parties can access 15-minute interval data for electric residential customers with smart meters and 5-minute interval data for electric commercial customers with smart meters.[122] Share My Data provides third parties with up to 24 months of electric usage data in near-real time, defined as 45-60 minutes after an interval ends. For third parties interested in gas consumption, Share My Data provides up to 24 months of gas usage data in 60-minute intervals. Gas usage intervals are sent by smart meters to the Company's meter data systems once every 24 hours. As a result, gas usage is not available on a near-real time basis via Share My Data.

The Share My Data onboarding process includes completing an online registration form, Data Security Agreement ("DSA"), and self-attestation, as well as completing technical onboarding on the system. After completing the onboarding, the third party is listed as a DER provider option in the Share My Data page on My Account and is ready to be authorized by a customer to receive their data. As of June 1, 2020, 4 third parties are live on the Share My Data platform, 13 are actively onboarding, and 195 have expressed interest in learning more.

Based on stakeholder feedback, the Company launched Phase III of GBC on the Share My Data platform in June 2020, which added account number and service address to the existing datasets. The provision of additional datasets beyond Phase III will depend on customer and third-party feedback, continued evolution of New York's statewide data sharing standard in the Strategic Use of Energy Data proceeding, changes to national GBC specifications, and technological developments.

APIs for ESCOs and Large Customers

As of 2019, Con Edison offers a supplemental data exchange option[123] for interested ESCOs to access their customers' usage information, using the same RESTful APIs developed for the Share My Data platform as a foundation. These APIs are currently available to ESCOs, subject to onboarding and testing, and include all of the datasets available to third parties through Share My Data. The Company plans to offer similar data access via APIs for large customers beginning Q1-2021.

Electronic Data Interchange ("EDI") for DER Providers

As noted above, authorized DER providers can choose to receive customer data through EDI transactions if they prefer. To help DER providers navigate the technical and procedural requirements of EDI data access, the Company established

[121] Con Edison 2015 Electric Rate Case, AMI Order.
[122] Customers with legacy electric interval meters are also able to share their 15-minute interval data using GBC.
[123] ESCOs continue to have access to customer data via EDI and a dedicated web portal.

a process for authorizing DER providers and launched a webpage that describes the testing and authorization process that must be properly completed to access customer data through EDI.[124] Testing includes the exchange of connectivity information, submission of a statement of EDI readiness, connectivity testing, and transaction set testing.

Third-Party Access to My Account

Since 2018, the Company has learned from stakeholders that Share My Data and EDI both involve a level of technical sophistication that may not be feasible or necessary for some third parties to provide services to their customers. During this same time period, the Company also identified new customer data use cases for third parties that provide bill monitoring and payment services to utility customers. In response to this feedback, the Company developed a new platform for third parties to view customer data and account information via its My Account portal.

Beginning in Q3-2020, Con Edison customers will be able to grant permission to third parties to view their information in My Account and have the same transaction capabilities as the customers themselves.[125] In order to utilize this new feature, third parties must establish My Account profiles with the Company, subject to multi-factor authentication, and then complete an email based consent process where each customer authorizes the third party to view its account(s). Similar to Share My Data, customers will be able to change their third party authorizations for My Account at any time.

Value Stack Web Portal

In Q3-2020, the Company will begin rolling out a new web interface for all DG customers that are compensated via the Value Stack tariff, inclusive of individual customers with onsite generation, Remote Net Metering hosts, and CDG hosts. The Value Stack Web Portal will allow these customers to easily access their site-specific credit statements, which outline how their net injections onto the Con Edison grid translate into a monetary Value Stack credit every month. DG customers will also be able to view how their Value Stack credits are applied to satellites/subscribers; review, export and print historical statements; and have their DG project information readily available. Additionally, CDG hosts will have the ability to upload subscriber lists and allocations for their CDG projects via the new web portal and receive real time confirmation that the accounts provided are valid and eligible to receive Value Stack credit allocations. Overall, this portal will allow DG customers to perform self-service more efficiently and reduce the amount of time spent requesting information from and corresponding with the utility about their Value Stack compensation.

Aggregated Customer Data

Aggregated customer data is available by whole building, municipality, and zip code, subject to the Commission's privacy standards for aggregated data, discussed below. To date, the primary use cases for aggregated customer data in Con Edison's service territory are whole-building benchmarking, including compliance with Local Laws 84 and 133 requirements in New York City, CCA program development data, community planning, and GHG reporting at the municipal level.

Each year, Con Edison provides New York City's largest building owners (i.e., larger than 25,000 square feet) and their authorized agents with aggregated building usage for purposes of complying with the City's benchmarking laws. Con Edison offers a web service for building owners or their authorized agents to automatically import aggregated whole-building data into Portfolio Manager®. After a building owner creates an account and requests property-specific

[124] https://www.coned.com/en/business-partners/become-electronic-data-interchange-certified-distributed-energy-resource-supplier

[125] With the exception of changing customer contact information.

information via the Company website,[126] Con Edison will automatically upload the building's energy consumption via Portfolio Manager® Data Exchange, which feeds into the benchmarking tool. This service is intended to minimize the level of effort required to comply with New York City Local Laws 84 and 133. For CCA, the Company provides a central landing page[127] that outlines the information municipalities or the CCA administrator issuing the RFP must provide to receive the Commission-approved CCA data set, and the process to receive the data.

Owners of smaller New York City buildings and all Westchester buildings (or their agents, with a letter of authorization) are also eligible to request whole-building usage data, subject to Commission-approved privacy standards.[128] Also, monthly municipal and zip code-level data sets are developed twice a year for public access through NYSERDA's UER. The UER is an online platform developed by NYSERDA that provides streamlined public access, subject to privacy standards, to aggregated monthly customer data for electricity and natural gas, segmented by residential, small commercial, and other by municipality, zip code (for New York City), or county (depending on location). Third parties can leverage UER data in combination with system data to develop and better target innovative products and services. Semi-annually, Con Edison supplies the UER with four years of monthly data, available at https://utilityregistry.org.

Privacy Standards and Protocols for Sharing Customer Data

Con Edison considers the protection of customer information, including PII and confidential customer usage and account data, an important and serious responsibility. For customer-specific data, the Company does not share information without customer consent to third parties except where required by Commission order, such as with a CCA Administrator, or data shared with utility contractors and vendors to carry out utility EE programs or fulfill other Company business.

For access to customer-specific data via Share My Data or EDI, the Company requires parties (e.g., GBC vendors, demand response aggregators, rate consultants) to execute a DSA and complete a technical onboarding and testing process prior to receiving customer data. The DSA includes a self-attestation form that is designed to expeditiously identify any material gaps in a third party's cybersecurity controls. The most recent Commission-approved DSA was filed by the Joint Utilities on January 8, 2020 in Case 18-M-0376.[129] A slightly different variation of the DSA is also used in conjunction with CCA data requests to protect customer-specific data, as required by the Commission.[130] It should also be noted that the Joint Utilities' proposal for a modified DSA for governmental entities is under development in Case 18-M-0376.

[126] https://www.coned.com/en/commercial-industrial/aggregated-building-energy-consumption-data. For additional information on whole-building data please see the Company's electric tariff, PSC No. 10, Leaf 128 and the Company's Gas tariff, PSC No. 9, Leaves 118-118.1.

[127] https://www.coned.com/en/business-partners/become-a-supply-partner/community-choice-aggregation. For additional information on CCA data please see the Company's electric tariff, PSC No. 10, Leaves 130-130.1 and the company's gas tariff, PSC No. 9, Leaves 118.1-118.3.

[128] See Leaf 128 of Con Edison's electric tariff (PSC No. 10) for the specific terms of our aggregated whole-building data offering.

[129] Cases 18-M-0376, *et al*., *Proceeding on Motion of the Commission Regarding Cyber Security Protocols and Protections in the Energy Market Place* (filed January 8, 2020). The form is also available on the Company's website at https://www.coned.com/-/media/files/coned/documents/business-partners/business-opportunities/business-energy-pro/data-security-agreement-and-self-attestation.pdf

[130] Cases 14-M-0224, et al., *Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs*, Order Approving Community Choice Aggregation and Utility Data Security Agreement with Modifications (issued October 19, 2017).

Con Edison and the Joint Utilities continue to support the Commission's efforts to clarify the appropriate statewide terms and conditions ("T&C") for third parties using the GBC protocol, in both the Comprehensive EE proceeding[131] and also in the new proceeding on Strategic Use of Energy-Related Data, discussed below.[132] The Joint Utilities submitted a status report in October 2019 identifying GBC T&Cs that protect the privacy and cyber security of utility, customer, and third-party systems, including a signed DSA, self-attestation, and technical onboarding process.[133]

The Company continues to collaborate with the Joint Utilities, stakeholders, and DPS Staff to strike a balance between advancing the State's clean energy objectives and protecting customer privacy and data security, using actual data user needs and requests to inform proposed privacy standards. As Con Edison and the Joint Utilities continue to make more customer data available, the Company shares the Commission's interest and long-standing policy of protecting the confidentiality of customer information and carefully evaluating disclosure exceptions on a case-by-case basis.[134] The protection of customer information, including (but not limited to) energy usage data, account numbers, assistance program participation, and PII, is part of each utility's core responsibilities and commitment to its customers.

Data Security and T&C for Customer-Specific Data

The Company gives customers choices in how their information is used and disclosed to third parties, as outlined in the Con Edison Privacy Statement.[135] Specifically, customers may unsubscribe from the list of customer information that the Company shares with third parties, unsubscribe directly from any emails sent to them by other third parties, or call the Company at 718-802-6079 to unsubscribe. The Company does not share customer-specific data without customer consent to third parties except where required by Commission order, such as with CCA, and when data is shared with utility contractors and vendors to carry out utility EE programs or fulfill other Company business.

In the Share My Data platform, customers control which third parties have permission to receive their data, what information is received, and how long the data is made available to individual third parties. Customers utilizing Share My Data can also opt to receive a monthly report with the names of third parties accessing their account information and the number of times the third party has accessed their information through the platform.[136]

Data Privacy Standards for Aggregated Data

The Commission adopted a 15/15 privacy standard for general aggregated datasets, including data provided for purposes of community planning and CCA programs. A 15/15 standard requires that an aggregated data set may be shared only if it contains at least 15 customers, with no single customer representing more than 15 percent of the total load for the group. The Commission acknowledged that the 15/15 standard is conservative and directed the Joint Utilities to track all aggregated data requests and be prepared to report on the number of requests that do not clear the

[131] Note 53, *supra*.
[132] Note 110, *supra*.
[133] Comprehensive EE Proceeding, Joint Utilities Status Report on Green Button Connect My Data (filed October 15, 2019).
[134] Cases 07-M-0548 *et al*., *Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio,* Order on Rehearing Granting Petition for Rehearing (issued December 3, 2010), pp. 3-5, 17-21.
[135] https://www.coned.com/en/conedison-privacy-statement
[136] This functionality is not available on the EDI platform.

15/15 standard.[137] To date, the number of aggregated data requests outside of benchmarking-driven requests in the New York City area has been very limited.

On April 20, 2018, the Commission issued the *Order Adopting Utility Energy Registry*,[138] directing the utilities to submit for the UER aggregated data for each zip code (for New York City), municipality, and county in their respective service territories, with customers grouped into three categories: Residential, Small Commercial, and Other. The same Order directed the utilities to provide this data subject to an aggregation standard of 15/15 for Residential customers and 6/40 for the Small Commercial and Other groupings. The Commission is currently considering changes to the UER privacy standards in the UER proceeding.[139]

Also on April 20, 2018, the Commission adopted the Joint Utilities' proposed 4/50 privacy standard for whole building data aggregations[140] and directed the utilities to file proposed uniform T&C for building data. The Joint Utilities filed proposed T&C on June 19, 2018, [141] which the Commission approved with modifications on January 2, 2020. [142] Con Edison has implemented these T&C as part of its building benchmarking program.

Future Implementation and Planning

Summary of Future Actions

- Complete AMI deployment, which will enable access to near-real time data (i.e., 45-60 minutes after the interval ends) for 100 percent of customers with AMI meters and their authorized third parties using GBC by the end of 2022.
- Consider additional Share My Data datasets as need arises based on stakeholder feedback.
- Launch Third Party Access to My Account and Value Stack Web Portal tools in Q3-2020.
- Engage stakeholders, in collaboration with the Joint Utilities and the Information Sharing Working Group, to continue expansion of the statewide data sharing best practices.
- Continue to provide aggregated community-level data to NYSERDA in support of the UER.
- Participate in the proceeding on Strategic Use of Energy-Related Data and adjust data sharing methods and/or policies as required by the Commission.

The Company will continue to enhance its data-sharing capabilities based on stakeholder feedback while complying with approved customer data protections and actively participating in customer data-related proceedings, in particular the new comprehensive proceeding to assess the Strategic Use of Energy-Related Data.[143] The Company anticipates this effort will bring together data policy discussions occurring across several proceedings and enable greater consistency across the state on data sharing mechanisms, privacy standards, and T&C. In addition, Con Edison will continue to collaborate with the Joint Utilities and stakeholders as part of the Joint Utilities' Working Groups, including the

[137] DSIP Proceeding, DSIP Order, pp. 26-27.
[138] Cases 17-M-0315 *et al.*, *In the Matter of the Utility Energy Registry,* ("UER Proceeding"), Order Adopting Utility Energy Registry (issued April 20, 2018).
[139] UER Proceeding, Notice Soliciting Comments on the Utility Energy Registry Status Report (issued January 10, 2020).
[140] DSIP Proceeding, Order Adopting Whole Building Energy Data Aggregation Standard (issued April 20, 2018).
[141] DSIP Proceeding, Joint Utility Aggregated Whole Building Data Terms and Conditions (filed June 19, 2018).
[142] DSIP Proceeding, Whole Building T&C Approval Letter (issued January 2, 2020).
[143] Note 110, *supra*.

Information Sharing, Integrated Planning, DER Sourcing, and EVSE Working Groups, to identify and evaluate additional customer datasets to support customer choice, the development of DER markets, and broader REV objectives.

Risks and Mitigation

The implementation of any future phases of GBC or other data sharing protocols and mechanisms could be affected by system integration issues, cybersecurity risks, and changing priorities. The Company is monitoring the national GBC protocol as well as its own data sharing to address any potential issues.

With the increase in data sharing, there is also the risk of security breaches. As discussed in Section 2.9 on cybersecurity, to protect individual customer data, the utilities will follow current practices, which require express customer authorization for data to be released to other than utility contractors or vendors or by law or Commission order. The Joint Utilities have also developed a common Cyber and Privacy Framework to manage cybersecurity risks that apply to the expanded data sharing in the evolving DSP environment. [144] The framework focuses on people, processes, and technology as being the foundation for comprehensive cybersecurity and privacy governance program.

Additionally, the Company manages data security risks by requiring all parties utilizing or accessing utility systems to sign the DSA, an agreement between the utility and third party that governs the exchange of customer data. The DSA T&C include, but are not limited to, a statement that the third party has received the customer's consent to access the data and the notice requirements when there is a data security incident. The DSA also includes a data self- attestation, whereby third parties attest to meeting the data security procedures and requirements listed.

The Commission's UBP-DERS Order also lays out the terms under which the Joint Utilities are expected to share customer data with DER providers.[145] The Company has incorporated these requirements into its tariffs.

Stakeholder Interface

Con Edison will continue to engage with stakeholders through the Information Sharing Working Group to provide updates on customer data sharing mechanisms, implementation updates, and gather their feedback on processes or new data requests. In addition, the Company, as part of the Information Sharing Working Group, remains open to have one-on-one stakeholder meetings to explore any additional use cases that are relevant to advancing DER market development.

Additional Detail

This section responds to the questions specific to customer data.

1) Date Types, Description and Management Processes

a. Describe the type(s) of customer load and supply data acquired by the utility.

Con Edison acquires customer load (use) and supply injection data by capturing information that the customer meter(s) measures and records. As of this filing, these can be legacy interval, AMI, and/or register-read meters. However, as noted in Section 11, the Company is on track to convert all of its meters to AMI by June 2022. As explained in response to Question 1(b), there are differences in the type and granularity of the customer load and supply data the Company acquires based on customer type and metering configuration. In some cases—generally C&I customers—the Company

[144] DSIP Proceeding, Supplemental DSIP, pp. 148-160.
[145] Note 120, *supra*.

will also acquire additional data, such as demand (kW) and reactive power (VAR) data, as required for billing under the applicable tariff.

b. Describe the accuracy, granularity, latency, content, and format for each type of data acquired.

All utility meters meet the metering performance requirements and specifications outlined in the Official Compilation of the Rules and Regulations of the State of New York 16 Part 92, which establishes the guidelines for testing and maintaining electricity meters to promote a high degree of metering performance.

Table 13 describes the granularity and latency of energy usage data acquired by Con Edison at the time of this filing based on customer and type of meter at the premise.

Table 13: Energy Usage Data Available by Customer and Meter Type

Customer and Meter Type	Energy Usage Data
All electric and gas customers with non-interval meters	Monthly energy usage (kWh, kW, Ccf)
Electric commercial customers with smart meters	5-minute energy usage data (kWh)
Electric residential customers with smart meters	15-minute energy usage data (kWh)
Electric customers with legacy interval meters	15-minute energy usage data (kWh)
All gas customers with smart meters	1-hour energy usage data (Ccf)

c. Describe in detail the utility's means and methods for creating, collecting, managing, and securing each type of data.

As described above, customer load and supply data collected by the utility depend on the customer and type of meter on the premises. Meter data is collected through an MDMS and is stored in EDAP. Details regarding Con Edison's privacy standards are outlined above and again below in the response to 2b. For additional information regarding Con Edison's cybersecurity program, please refer to Section 2.9 of the DSIP.

2) Data Uses, Access and Security

a. Describe the means and methods that customers and their properly designated agents can use to acquire their load and supply data directly from their utility meters without going through the utility, should they want to.

The Company provides several methods for customers and their properly designated agents to acquire a customer's data automatically, without a written or verbal request to the Company. These include the My Account, EDI transactions, and Share My Data for properly designated agents. The Company also offers pulse output metering to customers for a fee, as described in its electric tariff (PSC No. 10, General Rule 17.2(i), Leaf 124). The pulse output from the meters is used in conjunction with customer recorders and building energy management systems for customers or their agents to obtain real-time energy data without going through the utility systems.

b. Identify and characterize the categories of legitimate users beyond customers and their properly designated agents who will be provided access to each type of data.

For customer-specific data, the Company does not share information without customer consent to third parties except where required by Commission order, such as with NYSERDA, or shared with utility contractors and vendors to carry out utility EE programs or fulfill other Company business. For aggregated customer data, third-party access is based on the type of data being provided, and it must pass a privacy screen before it is shared. The Company and the Joint Utilities have been submitting aggregated customer data to NYSERDA for the publicly available UER platform. The information is intended to, at a minimum, aid in community energy planning and CCA program development. Other types of aggregated data are only shared with certain parties, such as aggregated whole-building data, which is only shared with a building's owner or their designated agent, and CCA data, which is only shared with CCA Administrators and/or municipalities and their contracted ESCO(s).

c. For each type of data, describe how its respective users will productively apply the data and explain why the data provided will be sufficient to fully support each type of application.

Since 2016, the Joint Utilities have proactively engaged with stakeholders to share proposals for providing aggregated customer data consistent with privacy standards, as well as their progress in improving the type of data and the process for accessing customer-specific data with proper customer authorization. The Joint Utilities look forward to continued dialogue with DPS Staff and stakeholders on the value and use of customer data in the new proceeding on Strategic Use of Energy-Related Data.

d. For each type of data, describe in detail the utility's policies, means, and methods for securely providing legitimate users with efficient, timely, and useful access to the data. Include information which thoroughly describes and explains the utility's approach to providing customer data to third parties who would use the data to identify and design service opportunities which benefit the utility and/or its customers.

Currently, there are several channels that Con Edison uses to share customer-specific data with customers and their authorized third parties, subject to proper security to interact with Company systems. These include historical utility bills (upon request with a letter of consent from the customer), My Account, Share My Data, EDI, Value Stack Web Portal, Secure File Transfer Protocol, and File Transfer Protocol with PGP encryption.

With respect to aggregated customer data, the UER is a publicly available online tool administered by NYSERDA that allows users to view historic monthly aggregated energy data for municipalities or by zip code in New York City and counties throughout New York State. Separately, CCA data and aggregated whole-building data are made available to requestors according to the terms and timelines specified in the Company's tariff.[146] If a CCA administrator has designed a CCA program to include an EE or DER offering, additional aggregated data, if available, may be provided to support the CCA program design.

e. Describe how the utilities are jointly developing and implementing uniform policies, protocols, and resources for controlling third party access to customer data.

The Joint Utilities are actively working through numerous processes to develop and implement uniform policies and approaches in response to the Commission and stakeholder requests through the use case conversations with DER

[146] Leaves 128 and 130 of Con Edison's electric tariff (PSC No. 10).

developers. Since the 2018 DSIPs, the Joint Utilities have collaborated in the Customer Data Working Group, now the Information Sharing WG, to advance several customer data efforts, including:

- Whole building aggregation privacy standard and T&C
- DSA and SA, as part of the Cyber Security Proceeding[147]
- GBC T&C
- Working with DPS Staff and NYSERDA on development of the UER and appropriate privacy standards
- Soliciting feedback from stakeholders to inform future customer data needs and means of accessing that information.

As outlined in the Supplemental DSIP, in addition to complying with the regulations established by the Commission regarding third-party access to customer data, the Joint Utilities have "developed a common approach to managing these new cybersecurity and privacy risks in the evolving REV environment," which includes the Joint Utilities Cybersecurity and Privacy Framework.[148]

f. Describe in detail the utility's policies, means, and methods for rigorously anticipating data risks and preventing loss, theft, or corruption of customer data.

In coordination with the Joint Utilities, Con Edison has developed and implemented a process to manage risks associated with third-party access to customer data. Parties utilizing or accessing utility systems to obtain customer-specific data must sign the DSA, an agreement governing the exchange of customer-specific data. The DSA terms and conditions include, but are not limited to, a statement that the third party has received the customer's consent to access the data and the notice requirements when there is a data security incident. The DSA also includes the Data Self-Attestation, whereby third parties attest to meeting the data security procedures and requirements listed.

The Commission's UBP for DERS also lays out the terms under which the Joint Utilities are expected to share customer data with DER suppliers via EDI and other platforms such as Share My Data. The Joint Utilities have all incorporated these requirements into their tariffs and created processes for DER suppliers to begin receiving customer data via EDI, at a minimum.

As aggregated data use cases have been identified and developed, aggregated data privacy policies and standards have evolved. To inform the development of these policies and standards the Joint Utilities have conducted benchmarking, met with stakeholders, developed terms and conditions for whole building data, and measured the pass/fail rates of potential privacy standards against sample data. The efforts have produced three aggregated data privacy standards that are applied to specific use cases. Each privacy standard consists of a two-part test, a customer count threshold and a usage threshold, as described above.

[147] Case 18-M-0376, *Proceeding on Motion of the Commission Regarding Cyber Security Protocols and Protections in the Energy Market Place.*
[148] DSIP Proceeding, Supplemental DSIP, pp. 148-160.

g. Identify each type of customer data which is/will be provided to third parties at no cost to the recipient, and the extent to which the practice comports with DPS policies in place at the time, as appropriate.

As outlined in the Supplemental DSIP, the Joint Utilities developed a common framework for defining the basic level of customer data that would be provided at no cost to third parties. Consistent with the Commission's direction in REV,[149] the Joint Utilities proposed that basic data for non-interval metered customers includes cumulative kWh, net kWh, and the maximum recorded kW (if a demand meter is present) and for interval metered customers includes energy use (kWh, net kWh, kW, kVAR) at interval specific to the customer's meter, as well as cumulative kWh, minimum/maximum kW, and kVAR.[150] As Commission policies have evolved, Con Edison, with the Joint Utilities, has adjusted the scope of customer data that are or will be provided to third parties at no cost.

On October 19, 2017, the Commission adopted the UBP-DERS.[151] Consistent therewith, the Company provides at no charge electric and gas consumption history through EDI. The customer data to be provided free of charge includes the customer's service address, account number, energy usage, and usage type, and meter number(s).

Also in 2017, the Commission redefined basic data as data "retained and stored by way of the utilities' enterprise systems and is not readily or reasonably available by other means, but the provision of that data is essential for fundamental customer/provider relationship (e.g., billing) or provides broad system-wide benefits."[152] In addition, in 2018, the Commission directed utilities to provide historical aggregated monthly usage data to NYSERDA's UER on a semi-annual basis at no charge.[153] The data is arranged into Residential, Small Commercial, and Other groupings with the potential to combine groupings if the aggregated data does not pass the approved privacy standard described above. In addition to usage data, total ICAP and a customer count of CCA ineligible customers are provided for each aggregation. As stated above, UER data will be provided by NYSERDA to the public free of charge.

As specified in the Company's tariff, a building owner or an owner's authorized agent can request aggregated whole building data. Aggregated whole building data requested for compliance with New York City's benchmarking law is uploaded directly to the EPA's Portfolio Manager. Aggregated data requested for purposes other than local law compliance must pass the 4/50 privacy standard and is provided directly to the building owner or their agent. Con Edison ceased charging for aggregated whole-building data in 2017.

h. Identify each type of customer data which the utility proposes to provide to third parties for a fee and the extent to which the practice comports with DPS policies in place at the time, as appropriate. For each data type identified, describe the proposed fee structure and explain the utility's rationale for charging a fee to the recipient.

In the REV initiative, the Commission allowed utilities to charge for information beyond basic customer data and stated utilities may "continue to charge ESCOs and other vendors for providing monthly customer data for a period in excess of

[149] REV Proceeding, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (issued May 19, 2016) ("REV Track Two Order"), p. 142.
[150] DSIP Proceeding, Supplemental DSIP, p. 121.
[151] DER Proceeding, UBP-DERS Order.
[152] UER Proceeding, CCA Data Fees Order, p. 19.
[153] *Id*.

24 months. Utility charges may also be assessed for data that is more granular and/or more frequent than the basic data described below."[154]

In the Supplemental DSIP, the Joint Utilities further defined value-added data as going beyond basic data by having one or more of the following characteristics:

- Is not routinely developed or shared.
- Has been transformed or analyzed in a customized way (i.e., aggregated customer data).
- Is delivered more frequently than basic data.
- Is requested and provided on a more ad hoc basis.
- Is more granular than basic data.[155]

Following the Supplemental DSIP the Commission redefined the categories of customer data on multiple occasions, as explained in part (g) above. The Company currently has tariff provisions to charge $0.80 per account for CCA data, as approved by the Commission in 2017.[156]

i. Describe in detail the ways in which the utility's means and methods for sharing customer data with third parties are highly consistent with the means and methods at the other utilities, and the extent to which these practices comport with DPS policies in place at the time, as appropriate.

As discussed in the Supplemental DSIP, the Joint Utilities are committed to establishing a statewide standard around customer data and "plan to enhance their respective customer data platforms to address data sharing needs in a consistent manner."[157] Additionally, as noted above, each of the Joint Utilities makes customer data available to DER providers through EDI transactions in compliance with the UBP for DERS.

For aggregated customer data, the utilities are coordinating on a unified approach for reporting whole building benchmarking data using Portfolio Manager®, and all the utilities are submitting monthly aggregated zip code or municipality data to the NYSERDA UER.

j. Describe in detail the ways in which the utility's means and methods for sharing customer data with third parties are not highly consistent with the means and methods at the other utilities. Explain the utility's rationale for each such case.

See response to i) above. The Company has worked with the Joint Utilities to align the datasets and formats available to third parties.

[154] REV Proceeding, REV Track Two Order, p. 140.
[155] DSIP Proceeding, Supplemental DSIP, p. 121.
[156] UER Proceeding, Order Establishing Community Choice Data Access Fees (issued December 14, 2017), p. 22.
[157] REV Proceeding, Supplemental DSIP, p. 141.

3) **Green Button Connect Capabilities**

a. Describe where and how DER developers, customers, and other stakeholders can readily access up-to-date information about the areas where customer consumption data provided via Green Button Connect (GBC) is available or planned.

The Company has developed several webpages where DER developers, customers, and other stakeholders can readily access up-to-date information about Share My Data. Additional information is available at https://www.coned.com/en/accounts-billing/share-energy-usage-data.

b. Describe how the utility is making customers and third parties aware of its GBC resources and capabilities.

The Company is making customers and third parties aware of GBC and its capabilities through the targeted energy forums being held in support of AMI customer engagement and via information on the Company's website.

c. Describe the utility's policies, means, and methods for measuring and evaluating customer and third-party utilization of its GBC capabilities.

As part of its AMI reporting requirements,[158] the Company is tracking and reporting on the number of customers who share their data via Share My Data in the reporting period, plus the number of customers who continue to share their data based on elections made in the prior reporting period. As part of the 2019 Joint Proposal, Con Edison committed to report information on the number of third-party companies that apply to receive data via Share My Data and the progress of third-party companies through the various stages of on-boarding process, including technical testing.[159]

[158] Con Edison 2016 Electric Rate Case, Joint Proposal, pp. 35-36.
[159] Con Edison 2019 Rate Case Proceeding, Joint Proposal, p. 101.

2.9. CYBERSECURITY

Context and Background

Cybersecurity and the prevention of security breaches and cyber events are essential responsibilities and priorities of the Joint Utilities. The Supplemental DSIP outlined a common and comprehensive approach to managing cybersecurity risks in the evolving REV environment. The Joint Utilities Cyber and Privacy Framework focuses on people, processes, and technology to maintain data security. [160] The Framework requires the implementation of an industry-approved risk management methodology and an alignment of control implementations with the control families in the NIST SP 800-53 revision 4. The Joint Utilities periodically assess the need for updates to the Framework. The current version, initially published in the Supplemental DSIP, remains relevant with no updates required.

The cybersecurity industry continues to evolve, as does technology. The trend is for former best practices to become essential components of a cybersecurity program over time. As an example, several years ago, many companies viewed cyber insurance as optional and discretionary. Now cyber insurance is considered essential, with the question being how much cyber insurance coverage is sufficient. It is the same with technology. Multi-factor authentication used to be a voluntary protection and now it is considered a baseline requirement.

The Joint Utilities are working together to keep pace with evolving cyber needs. For example, the Joint Utilities use vendor risk forms to assess the cyber-preparedness of its partners and vendors. After an incident related to ESCOs and an EDI provider, the Joint Utilities undertook an effort to improve the cybersecurity posture of ESCOs and EDI providers as these entities "touch" utility systems, as discussed in Section 2.8.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Collaborated with the Joint Utilities to share lessons learned and maintain the Joint Utilities Cyber and Privacy Framework.
- Participated in the North American Electric Reliability Corporation's ("NERC") GridEx V, which is a sector-wide grid security exercise designed to simulate a cyber/physical attack on electric and other critical infrastructures across North America.

In the Supplemental DSIP, the Joint Utilities committed to maintain active individual cyber and privacy management programs and participate in industry Working Groups, including the New York State Security Working Group. Con Edison maintained a leadership role within that group over the last two years, serving as the previous Chair. The Company is also involved in several other industry efforts to share best practices and intelligence, including collaboration with the Edison Electric Institute, American Gas Association, the U.S. Department of Energy, the U.S. Department of Homeland Security, Northeast Power Coordinating Council, Inc., Electricity Information Sharing and Analysis Center, and New York City. The Company is also coordinating with the NERC and actively participated in NERC's GridEx V, which is a sector-wide grid security exercise designed to simulate a cyber/physical attack on electric and other critical infrastructures

[160] DSIP Proceeding, Supplemental DSIP, pp. 148-160.

across North America. The Company also participated in the development of NERC CIP-013-1 (Supply Chain Risk Management).

The Joint Utilities have also agreed to share lessons learned and advancements in security technology among themselves and continue to meet to discuss multiple security topics.

Future Implementation and Planning

Summary of Future Actions

- Maintain coordination with the Joint Utilities and other industry cybersecurity activities.

As noted above, the Joint Utilities periodically assess the need for updates to the Framework. The current version continues to satisfy needs, with no updates required at this time.

Risks and Mitigation

The Company has robust cybersecurity protections already in place and is continuously monitoring and responding to emerging cybersecurity risks.

Stakeholder Interface

As noted above, Con Edison is engaged in a number of industry efforts to share best practices and intelligence and participates in national, regional, and local security exercises. Section 2.8 discusses the protection of customer data and the vetting of third parties who seek access to customer data.

Additionally, the Company meets with Staff quarterly at the NYS Security Working Group and meets annually to evaluate privacy protections. The Company also provides a cybersecurity update as needed either specifically for cyber or as part of the Company's risk discussions and communicates with Staff via phone as needed. The Company is willing to establish a more frequent cadence of cybersecurity updates should Staff find that valuable.

Additional Detail

This section responds to the questions specific to cybersecurity.

1) **Describe in detail the utility policies, procedures, and assets that address the security, resilience, and recoverability of data stored and processes running in interacting systems and devices which are owned and operated by third-parties (NYISO, DER operators, customers, and neighboring utilities). Details provided should include:**

   a. **the required third-party implementation of applicable technology standards;**
   b. **the required third-party implementation of applicable procedural controls;**
   c. **the means and methods for verifying, documenting, and reporting third-party compliance with utility policies and procedures;**
   d. **the means and methods for identifying, characterizing, monitoring, reporting, and mitigating applicable risks;**
   e. **the means and methods for testing, documenting, and reporting the effectiveness of implemented**

security measures;

f. **the means and methods for detecting, isolating, eliminating, documenting, and reporting security incidents; and,**
g. **The means and methods for managing utility and third-party changes affecting security measures for third-party interactions.**

Con Edison recognizes the increased cybersecurity supply chain risks, especially with regard to data the Company's vendors and partners store and process. The Company has built robust processes to mitigate this risk through Data Security Self-Attestations, vendor risk assessments, cybersecurity requirements within terms and conditions, architecture reviews, cybersecurity insurance mandates, and the use of Defense in Depth and Defense in Breadth strategies for vendor system implementations. In addition, Con Edison built strong partnerships with third parties and implemented tools and processes to identify, alert, and respond to potential vulnerabilities and immediate cybersecurity concerns.

2) **Describe in detail the security, resilience, and recoverability measures applied to each utility cyber resource which:**

   a. **contains customer data;**
   b. **contains utility system data; and/or,**
   c. **Performs one or more functions supporting safe and reliable grid operations.**

The Company adheres to strict standards for the protection of system and customer data and will continue to actively mitigate growing risks in part through careful attention to cyber and privacy practices. The Company maintains a Cybersecurity and Privacy Program to manage cybersecurity risk to an acceptable level, in line with the REV Cybersecurity and Privacy Framework the Joint Utilities developed and published in the Supplemental DSIP. The Cybersecurity and Privacy Framework focuses on people, processes, and technology as the foundation for a comprehensive cybersecurity and privacy governance program. The Framework requires the implementation of an industry-approved risk management methodology and an alignment of control implementations with the control families in the NIST SP 800-53 revision 4. The Joint Utilities periodically assess the need for updates to this framework. The current version, which the Supplemental DSIP includes, remains relevant with no updates required.

3) **For each significant utility cyber process supporting safe and reliable grid operations:**

   a. **Provide and explain the resilience policy which establishes the utility's criteria for the extent of resource loss, damage, or destruction that can be absorbed before the process is disrupted;**
   b. **Provide and explain the recovery time objective which establishes the utility's criteria for the maximum acceptable amount of time needed to restore the process to its normal state;**
   c. **Provide and explain the plan for timely recovery of the process following a disruption; and,**
   d. **Describe each process, resource, and standard used to develop, implement, test, document, and maintain the plan for timely process data recovery.**

Con Edison has developed incident response and recovery plans, which it practices on a regular basis for its key processes, systems, and departments.

4) **Identify and characterize the types of cyber protection needed for strongly securing the utility's advanced metering resources and capabilities. Describe in detail the means and methods employed to provide the required protection.**

AMI devices add potential risk to the Company as they are outside the Company's physical security controls, and applicable mitigations were put in place to account for the devices, systems, and overall data flow in this design. The standards described above were implemented, as well as the following requirements for applicable components:

- All information is transmitted through an encrypted network.
- The Company follows standards for smart meters set by the National Institute of Standards and Technology.
- Smart meters do not collect, store, or transmit any personal information.

The Company also reviewed the AMI vendor cybersecurity practices to ensure compliance with standards.

5) **Identify and characterize the requirements for timely restoring advanced metering resources and capabilities following a cyber disruption. Describe in detail the means and methods employed to provide the required recovery capabilities.**

The Company's response to 3) highlights that Con Edison has developed incident response and recovery plans, including for AMI, which it practices on a regular basis for key Company processes, systems, and departments.

2.10. DER INTERCONNECTIONS

Context and Background

Bringing DER online quickly and cost-effectively is a critical component to increasing DER deployment. Hosting capacity maps are useful tools to help developers with initial project screening and decision-making, but it is greater automation of the interconnection process that will drive enhanced value by quickly advancing viable projects to interconnection by passing the State-developed screens or using screening results to quickly verify the need to perform a Coordinated Electric System Interconnection Review ("CESIR"). Greater automation is part of the Commission's vision under the REV initiative for utilities to streamline their interconnection processes for DG projects, increase the transparency of their interconnection approval process, and prepare for greater amounts of DG and storage deployment.[161]

To define the process improvements necessary to streamline the interconnection process, the Commission and NYSERDA engaged EPRI to assess interconnection procedures in the *New York Interconnection Online Application Portal Functional Requirements* ("IOAP Report"),[162] which served as an initial reference guide for increasing the automation of the online portal. The IOAP Report includes a three-phase roadmap for achieving increased automation:[163]

- Phase 1: Automate Application Management
- Phase 2: Automate SIR Technical Screening
- Phase 3: Full Automation of All Processes

The goal of Phase 1 is to automate the application management portion of the process, including application submittal, validation, tracking, and approval. The second phase focuses on automation of the SIR technical screens for projects above 50 kW, including but not limited to review of the point of common coupling, certification status of specified equipment, and compatibility of the line configuration with the interconnection type. Phase 2 specifically requires integration of multiple utility systems, such as billing, CIS, work management systems, and load-flow software programs, to allow for the push and pull of data in common formats between systems. This phase also requires the ability to calculate SIR screens A to F based on utility data and return a pass or fail determination.[164] Finally, Phase 3 calls for automation of all processes, including the integration of the interconnection process into the broader distribution system planning process.

Process improvements occur within the context of the SIR.[165] Established by the Commission in 1999, the SIR provides an evolving framework for processing applications to interconnect DG systems to the state's investor-owned utilities' electric distribution systems. In the 2018 SIR Update, the Commission formalized several changes including:

- Incorporating process flows including the configuration of storage projects.
- Extending the timelines for making certain interconnection payments to allow developers to address local permitting requirements.

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[161] REV Proceeding, Track One Order, pp. 88-89.
[162] EPRI, *New York Interconnection Online Application Portal Functional Requirements* (issued September 2016) ("IOAP Report"). http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/dcf68efca391ad6085257687006f396b/$FILE/EPRI%20Task%201%20Memo%20Report_Final%209-9-16.pdf
[163] *Id.,* pp. 13-17.
[164] *Id*., p. 24
[165] New York State SIR. http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DCF68EFCA391AD6085257687006F396B

- Enhancing information sharing related to construction schedules.
- Requiring insurance provisions in the Standard Contract.[166]

In December 2019, the Commission further modified the SIR to:

(1) Add a new Section 1.H. to the SIR Application Process, entitled "Modifications," to provide a process by which an applicant may modify a proposed project without it being removed from its current queue position, and to add definitions of "Modification" and "Material Modification" to the SIR Section III, Glossary of Terms;

(2) Revise screens in the SIR Appendix G, Preliminary Screening, to include appropriate secondary network screens for how to interconnect projects on a utility's secondary network system and add definitions of "Network" and "Spot Network" to the SIR Section III, Glossary of Terms;

(3) Revise Screen H, Voltage Flicker Test, of the SIR Appendix G, Preliminary Screening to more accurately reflect expected system performance regarding voltage fluctuation; and

(4) Revise Appendix K of the SIR, the ESS Application Requirements / System Operating Characteristics / Market Participation addressing Energy Storage Application Requirements, to better collect needed and useful ESS application data.

The Joint Utilities provided significant support in developing the October 2018 and December 2019 SIR revisions. To promote statewide standardization, the Joint Utilities collaborated with the ITWG and Interconnection Policy Working Group ("IPWG") to identify and vet changes to the SIR and develop technical guidance documents that expand its applicability to additional technologies and clarify process steps and requirements. The ITWG's role is to promote consistent standards across the utilities to address technical concerns affecting the DG community and interconnection procedures. The IPWG's role is to explore non-technical issues related to the processes and policies relevant to the interconnection of DG in New York.

[166] SIR Proceeding, Order Modifying Standardized Interconnection Requirements (issued April 19, 2018). Subsequently, the Commission issued a clarification of the SIR, followed by an Order Modifying Standardized Interconnection Requirements. SIR Proceeding, Order Granting Clarification (issued July 13, 2018). SIR Proceeding, Order Modifying Standardized Interconnection Requirements (issued October 18, 2018).

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Implemented series of process improvements in PowerClerk® in response to developer feedback, including enabling online payments and messaging within the PowerClerk® platform.
- Engaged developers through the DER Forum and focus groups to understand user experience and identify potential additional improvements.
- Launched new preliminary screens for the secondary network, allowing more projects to bypass detailed engineering review.
- Realigned internal staff to support greater consistency, efficiency, and accountability, including consolidating departments and assigning dedicated SMEs.
- Supported development of SIR revisions that facilitate interconnection of energy storage, increase flexibility for developers, and clarify interconnection process steps.
- Developed several technical documents and templates to clarify and formalize aspects of the interconnection process.
- Imported all legacy DG projects on record into PowerClerk®.
- Worked with developers to implement smart inverter functions to enable greater solar PV to be installed into the underground network.
- Strengthened partnerships with EPRI, NYSERDA, NY-BEST, and the City University of New York, including co-hosting Con Edison's first annual Energy Storage Day in 2019.

Building on the significant strides over the last few years to streamline and improve the transparency of the interconnection process, the Company continues to refine and enhance the process in response to developer feedback and user experience.

Interconnection Process Improvements

The Company continues to leverage the PowerClerk® interconnection software, the Company's ongoing interconnection experience, and developer feedback to identify potential process improvements and create innovative solutions. In response to developer feedback received as part of focus groups convened in 2018, the Company made additional enhancements to the PowerClerk® platform and supporting back-office systems. These enhancements now allow for:

- Greater visibility into the approval process through milestone tracking and automated emails.
- Additional flexibility to pay online with electronic payments.
- More user-friendly experience through intra-system messaging, bypassing the need to use an external email application.

In June 2019, Con Edison invited 12 DER development firms, representing solar PV, battery, fuel cell, and CHP to a DER Focus Group to again provide feedback based on their ongoing experience with the interconnection process. At that forum, Con Edison presented on the improvements made since the 2018 Forum and asked developers to provide their number one wish for overall process improvement. Their responses included:

- The ability to upload new versions of documents instantly to PowerClerk® without having to wait for the originals to be denied;
- Greater access to engineers earlier in the process to reassure their clients of feasibility of the project; and
- A way to skip preliminary steps and go directly to the CESIR process for projects identified as interconnections likely to require upgrades, which should have a shorter turnaround time.

Con Edison has reviewed and updated instructions to upload documents in PowerClerk® in response to developer feedback, as well as encouraged more preliminary review and concept meetings for developers with Con Edison staff. Developers have also been given guidance of steps required to decline a preliminary analysis and move to CESIR once the application has been approved. Additionally, in February 2020, Con Edison launched new preliminary screens for the secondary network, consistent with the December 2019 SIR update. Because the initial preliminary screens were designed strictly for the overhead system, projects interconnecting on the Company's network system would fail upon submission, requiring a detailed engineering review per the SIR process. The implementation of the network screens allows projects to advance without a detailed engineering study when the screens are "Passed." As of June 1, 2020, 4.9 MWs have been approved to be interconnected from 52 applications since the February 3, 2020 implementation, thus streamlining the process for developers and the Company.

Continued collaboration will help Con Edison continue to identify and implement improvements. The Company is constantly reviewing opportunities to incorporate developer feedback into PowerClerk® and customer program management system ("CPMS") functionality, and updates the developer community of these improvements via periodic webinars and meetings hosted by Con Edison, as well as at the IPWG meetings. Additionally, Con Edison continues to work with DPS Staff and the ITWG to update screens as appropriate, as well as resolve challenges associated with automating the interconnection process, including the preliminary and supplemental screens as part of IOAP Phases 2 and 3. As the screens are finalized and no longer subject to frequent changes, the Company can explore additional automation, consistent with DPS Staff guidance and technical capabilities.

Since the last DSIP filing, the Company also realigned its organizational structure to consolidate interconnection support functions and assigned additional SMEs to increase the Company's ability to respond to interconnection requests. The organizational alignment within the engineering and project management groups supports more streamlined and consistent communications with developers while progressing projects through a more efficient process as aligned in the SIR.

Technical Guidance and Standardization

Con Edison is leveraging its experience of interconnecting DER to support ongoing learning and standardization. For example, the Company continues to participate in the ITWG and IPWG and coordinate with the Joint Utilities on interconnection issues.

Since filing the 2018 DSIP, the Joint Utilities, as part of the ITWG, developed several technical documents addressing ITWG priorities, including treatment of energy storage, and clarifying and formalizing aspects of the interconnection process:

- Technical guidance matrix for integrating DER.
- Standardized preliminary screening template.
- Standardized CESIR template.

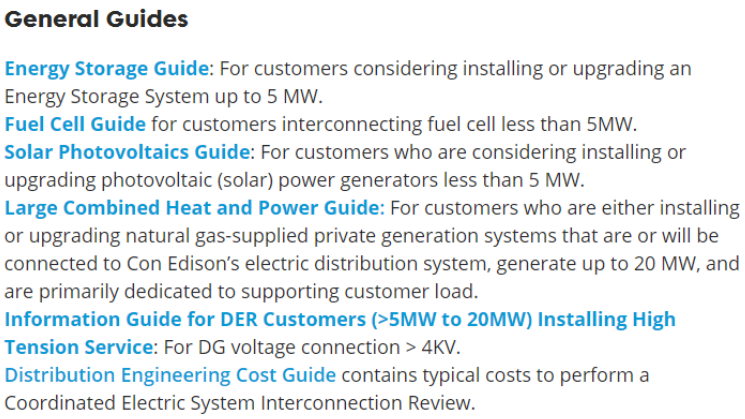
Additionally, in support of the SIR revisions, the Joint Utilities developed the following:

- Interim Solar + Storage Guidelines.
- Material Modifications Guidelines.
- Supporting documentation to update the preliminary and supplementary screens accordingly (e.g., network screens, voltage flicker).

The guidelines above are available on the DPS' Distributed Generation Information website.[167] The following Con Edison-specific guidelines are available on Con Edison's website, as shown below.[168]

- Developed cost guidance document containing typical costs to perform a CESIR.
- Issued interconnection requirements for DER to high tension non-network distribution.
- Implemented the customization of network protector microprocessor relay settings for distributed generation.

Figure 17: Company-specific Interconnection Guides



While energy storage is one focus for the ITWG, Con Edison intends to continue actively supporting the ITWG's broader goal to facilitate entry of all DER types and working collaboratively with DPS Staff and stakeholders to provide greater predictability of interconnection costs to customers. The Company is actively interconnecting customer-sited microgrids, including a recent battery, solar, and fuel cell microgrid. Additionally, the Company developed engineering specifications for interconnecting microgrids to utility distribution systems. Microgrids currently in development will be interconnected under the specification, with the experience informing future iterations. Con Edison successfully commissioned two customer microgrid interconnections in the past two years—one was formerly operating off-the-grid for several decades and the second is a newly built development. As it receives inquiries for potential microgrid projects, the Company is prepared to continue providing guidance and technical assistance for future microgrid interconnections.

Smart Inverters

The Company has continued to share its experiences through demonstration projects and integrate new technologies through site-specific proposed solutions with customer applications, including smart inverters. Generally, smart inverters provide an economical solution to interconnection, particularly voltage impacts. DG and other DER can increase local voltages on distribution systems, which can impact utility voltage regulators and capacitor banks and complicate utility programs that control voltage profiles on circuits. Smart inverters manage voltage by dynamically

[167] http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DCF68EFCA391AD6085257687006F396B?OpenDocument
[168] https://www.coned.com/en/save-money/using-private-generation-energy-sources/specifications-for-private-generation

regulating the power factor, which helps to maintain line voltage. For some scenarios and control modes, the smart inverter control may need to limit the production of active power for short periods to avoid impacting the voltage on the distribution system. In these scenarios, the DER developer can choose to operate within these limits, or the developer can choose to oversize the inverter to avoid curtailing generation.

The Company worked with developers in Northeast Queens and Brownsville Brooklyn to implement smart inverter functions to enable greater solar PV on a project to be installed into the underground network to align with minimum spring and fall loads, protect network transformer reliability, and maintain safe operating voltages for neighboring non-DG customers.

Details of the project (the Northeast Queens PV 33 building residential project and study) are included as a case study in the EPRI whitepaper, *Voltage Regulation Support from Smart Inverters*.[169] To counteract high voltages, the PV inverters were required to operate with a volt-VAR control mode, where under high-voltage conditions, each inverter will draw reactive power at a fixed percentage of its nameplate rating. Use of smart inverters also limited the number of potentially impacted network protectors that would have required upgrades. Without the smart inverter capability, the DG units would not have been allowed to connect to the system as proposed, and alternative methods to accommodate interconnections would have required much more expensive system upgrades.

Con Edison also participates in the Joint Utilities' Smart Inverter Strategic Initiative and corresponding SIIWG to build a common understanding of smart inverter capabilities and use cases, examine potential value propositions for smart inverter implementation, and outline a shared approach to smart inverter integration. The core objectives of the SIIWG are to benchmark the state of the industry, standardize smart inverter requirements and functionalities in New York State, and inform changes as necessary to interconnection requirements. The SIIWG is examining research studies, modeling, simulations, filed demonstrations, communication protocols, and cybersecurity issues, which will inform the development of a roadmap for facilitating smart inverter benefits. The roadmap will represent a common Joint Utilities' approach to integrating smart inverters by addressing:

- Standardization of smart inverter requirements and functionalities in New York State.
- Prioritized use cases, relevant owners/actors, and value of those use cases.
- Defined functional settings for new smart inverters by utility/system type or via locational need.
- Policy guidance within the SIR that requires smart inverter functions for utilities at no added cost.
- Implementing autonomous "Do No Harm" settings.
- Remote access for changes to settings and response to reliability or power quality events.
- Access to monitoring, verification, and control elements.
- Functional settings that could enable a new set of grid services.
- Potential need for changes to interconnection rules.

The Joint Utilities plan to share this roadmap with external stakeholders, such as the ITWG, IPWG, and NYISO, in 2020 to review the proposed targets, milestones, overall approach, and to solicit input on the direction. The roadmap will help inform the ITWG and other interconnection stakeholder engagements. Additionally, the Joint Utilities will support broader education, training, and coordination on the topic of smart inverters with internal stakeholders, including the Monitoring & Control, ISO-DSP, and Integrated Planning Working Groups.

Con Edison is also engaged with two projects funded under NYSERDA Program Opportunity Notice ("PON") 3770, "Smart Inverter Settings Guidance for High Performing Smart Grid Applications" and "Increasing DER Value and Utilization for

[169] EPRI, *Voltage Regulation Support from Smart Inverters* (November 27, 2017). https://www.epri.com/#/pages/product/000000003002012033/?lang=en-US

NYS through 'Learning' Smart Inverters," where Company SMEs serve as project advisors. The former project will focus on the key factors in considering smart inverter settings, review and compare the latest industry standards for settings, and provide a systematic approach to determine settings for several common inverter functions. For the latter, the objective is to study the ability for an inverter to learn grid parameters, such as impedance, timing and magnitude of steady-state low or high voltages, and voltage signature during fault conditions. In addition to understanding these parameters, the project will seek to apply these learnings to inverter reactive power applications.

Future Implementation and Planning

Summary of Future Actions

- Adapt the interconnection process to accommodate new technologies and configurations.
- Refine the interconnection process through ongoing innovations in the PowerClerk® platform.
- Conduct annual focus group to hear from developers on what is working well and where there is room for improvement.
- Engage in, and provide technical guidance to, the ITWG and IPWG to vet and influence potential changes to the SIR.
- Coordinate with the ITWG on aspects of the construction schedule to improve reporting and transparency.
- Participate in relevant regulatory proceedings.
- Participate in EPRI P174 working group (DER Integration Working Group) on interconnection issues with projects that assess interface devices, analytics, system studies, monitoring, special applications, and maintenance for effective interconnection and integrated operation of distributed generation resources.
- Remain engaged in NYSERDA PON 3770, which is studying the ability for an inverter to learn grid parameters, such as impedance, timing and magnitude of steady-state low or high voltages, and voltage signature during fault conditions.
- Facilitate the interconnection process and site preparation for Nevins Street ESS and EV charging stations as part of the "Make-Ready" project.
- Integrate interconnection information into DERMS for further alignment into operating systems and ultimately participation in transactive markets, providing faster access to information and assets to multiple value streams.

Con Edison's future efforts focus on adapting the interconnection process to accommodate new technologies, such as energy storage, and continuously refining the interconnection process through innovations in the PowerClerk® platform (as available and permitted by the SIR), internal process reviews, and ongoing dialogue with developers. Specific to storage, the Joint Utilities are working with DPS Staff and industry to address energy storage topics such as:

- Relay and control scheme requirements.
- Metering requirements and ability to support required tariffs.
- Energy storage modeling changes.
- Fast tracking eligibility.
- Hybrid solar + storage requirements.
- Monitoring and control mechanisms.

Additionally, the SIR is expected to continue to evolve as interconnection applications increase, further experience is gained, and utility and developer needs evolve. Potential modifications to the SIR are vetted in the ITWG and IPWG. Con Edison and the Joint Utilities will remain engaged with these Working Groups, with outstanding items for ITWG discussion including smart inverter technology, voltage flicker, and energy storage metering. Similar to the technical decisions developed for anti-islanding and M&C, the ITWG will post future requirements online.

The Company is also committed to advancing the use of smart inverters to improve interconnection. As previously noted, the Company has several initiatives underway to test smart inverter functionality in a real-world environment, and understand and develop guidance around smart inverter settings, with the goal of applying this information to expand smart inverter deployment. The Company will also remain engaged in the Joint Utilities Smart Inverter Initiative Working Group.

To further facilitate DER interconnection, the Company is considering opportunities to develop make-ready interconnection points as a platform service. Con Edison recognizes that ESS paired with EV charging stations has the potential to provide additional operational value and societal benefits to the grid and customers through multiple value streams. As part of the "make-ready" concept, the Company will facilitate the interconnection process and site preparation while providing a point of common coupling so a third party can dock their ES and EV charging equipment and operate it within the parameters stipulated by the utility.

"Making ready" the Nevins Street ESS and EV charging stations is part of the Joint Proposal in the most recent rate case, in which the Company agreed to facilitate third-party ownership of 10 MW/40-60 MWh of ESS and a portfolio of DCFC and Level 2 Chargers.[170]

Lastly, Con Edison will explore the opportunity to use PowerClerk® for the transfer of relevant system and interconnection data, such as kW, kVA ratings, and DER technology type, to the utility DERMS database. Once approved as an available asset by PowerClerk®, the DERMS may integrate the new interconnection into the existing DER portfolio for further alignment into operating systems and ultimately participation in transactive markets, providing faster access to information and assets to multiple value streams. As an initial step, the Company successfully imported nearly 16,000 legacy DG projects into PowerClerk®, resulting in all DG projects on record being documented in the portal.

Risks and Mitigation

As noted above, Phase 3 of the IOAP roadmap involves automation of all processes capable of automation and the integration of the interconnection process into the broader distribution system planning process. One factor that could affect this timing is the technical issue of creating the system integration and functionality necessary to fully automate all processes. Another potential issue is the ability of automated processes to provide the same assurances that the equipment being interconnected will not impact system reliability or safety. Finally, changes to IOAP technical screens may impact the timeline of automation improvements.

Stakeholder Interface

Con Edison will continue to engage as part of the IPWG and ITWG and seek regular feedback from developers on the interconnection process and tools. In addition, the Company convenes a focus group or developers' workshop at least annually to hear from developers on what is working well and where there is room for improvement and also consider more frequent informal sessions to address emerging issues.

[170] Con Edison 2019 Rate Case Proceeding, Joint Proposal, p. 85.

Con Edison also partners with other organizations to reach a broad audience on issues relevant to interconnection. For example, in May 2019, in partnership with NY-BEST and NYSERDA, the Company hosted the Con Edison Energy Storage Day, which drew over 200 people. The event consisted of panel discussions, presentations, and an Ask an Expert session with City and State interconnection representatives and Con Edison SMEs.

Additional Detail

This section responds to the questions specific to DER interconnections.

1) **A detailed description (including the Internet address) of the utility's web portal which provides efficient and timely support for DER developers' interconnection applications.**

Con Edison maintains a dedicated website for customers applying for interconnection of private generation resources, which provides the necessary resources for DER interconnection applications (https://www.coned.com/en/save-money/using-private-generation-energy-sources/applying-for-interconnection). This web portal provides viewable references with hyperlinks to the appropriate forms and documentation according to the DG size thresholds in the SIR. For example, a link to the SIR is provided for all systems below the 5 MW threshold, as well as a flow chart and links to the application portal for systems below 50 kW and between 50 kW and 5 MW. In addition to the necessary interconnection application documentation and guidelines, the website provides example materials, such as a copy of the customer authorization letter, standardized contract, and the DG documentation checklist. The DG application portal, PowerClerk®, links to reference materials and a tutorial of how to use the PowerClerk® portal, as well as contact information for the appropriate parties at Con Edison to address any questions or concerns.

2) **Where, how, and when the utility will implement and maintain a resource where DER developers and other stakeholders with appropriate access controls can readily access, navigate, view, sort, filter, and download up-to-date information about all DER interconnections in the utility's system. The resource should provide the following information for each DER interconnection:**
   a. **DER type, size, and location;**
   b. **DER developer;**
   c. **DER owner;**
   d. **DER operator;**
   e. **the connected substation, circuit, phase, and tap;**
   f. **the DER's remote monitoring, measurement, and control capabilities;**
   g. **the DER's primary and secondary (where applicable) purpose(s); and,**
   h. **the DER's current interconnection status (operational, construction in-progress, construction scheduled, or interconnection requested) and its actual/planned in-service date.**

The Commission website itself also includes a range of information on DER interconnections and is updated monthly.[171] The information currently available on the Commission's website includes:

- DER type and size
- DER developer
- Connected substation and circuit
- DER's current interconnection status (operational, construction in-progress, construction scheduled, or interconnection requested)
- Actual in-service date

[171] http://www3.dps.ny.gov/W/PSCWeb.nsf/All/286D2C179E9A5A8385257FBF003F1F7E?OpenDocument

Each of the Joint Utilities provide the following information to DPS on a monthly basis. Due to customer privacy and competitive development concerns, utilities file redacted and unredacted versions of the report, with only the redacted version posted online.

- DER location
- DER owner
- DER operator

Each utility does not generally collect the following information during the interconnection process:

- Phase and tap
- DER's remote monitoring, measurement, and control capabilities
- DER's primary and secondary (where applicable) purpose(s)

The Company is open to exploring collecting and disclosing additional information, with appropriate customer consent, if requested by developers and other stakeholders.

3) The utility's means and methods for tracking and managing its DER interconnection application process to ensure achievement of the performance timelines established in New York State's Standardized Interconnection Requirements.

The Company's CPMS tracks the timeliness of each application and will begin also using tools in PowerClerk® for similar alerts beginning in late 2020 or early 2021. CPMS uses built-in timers associated with each task in the SIR to track the progress of an application and generates automatic reminder emails if an application appears pending, which alerts Company personnel to outstanding items. To effectively manage the application status of each interconnection relative to the SIR timelines, Con Edison also maintains an internal dashboard to track project status through each step of the SIR.

4) Where, how, and when the utility will provide a resource to applicants and other appropriate stakeholders for accessing up-to-date information concerning application status and process workflows.

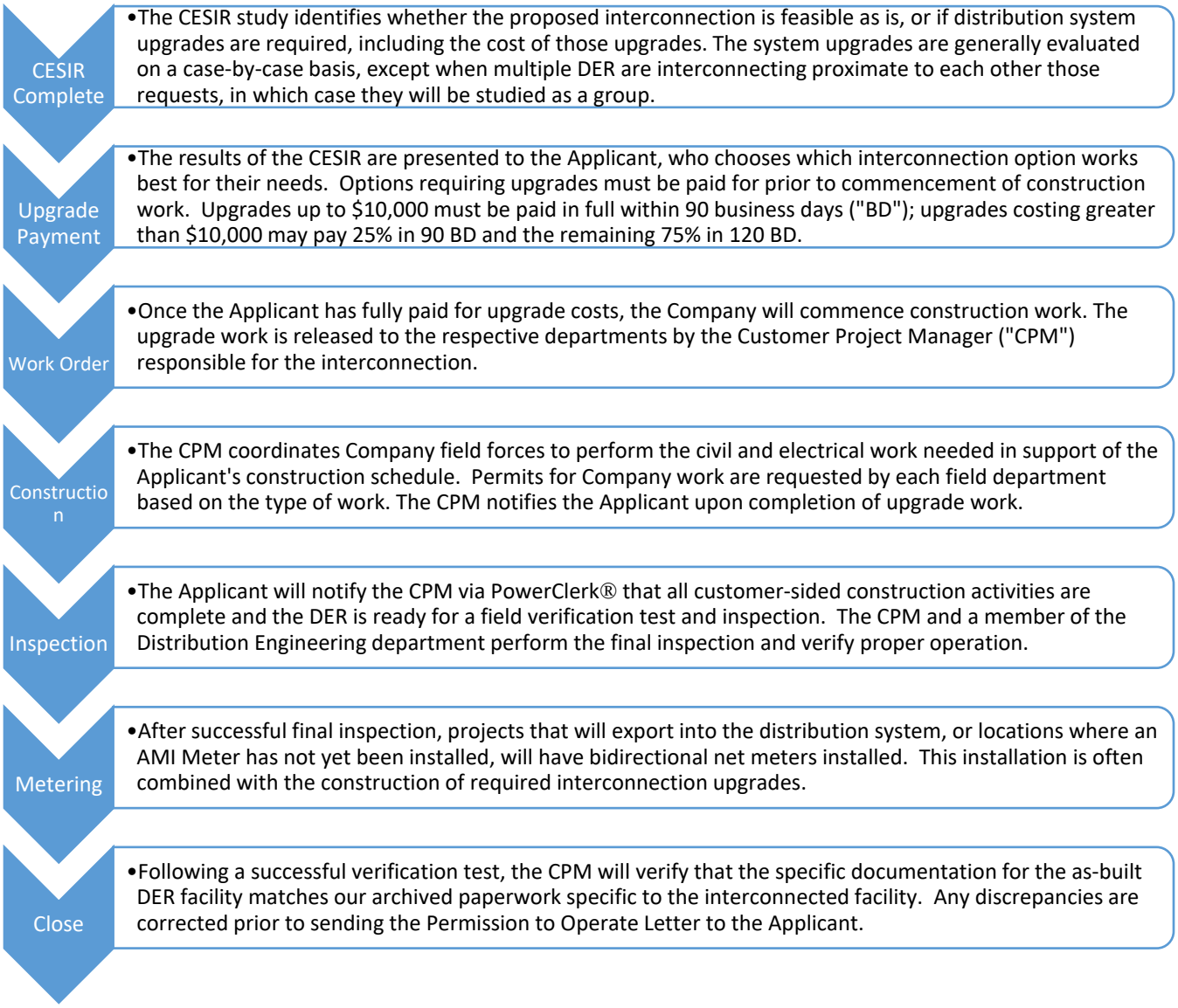
Con Edison provides up-to-date information to applicants via the IOAP and PowerClerk®. The IOAP provides greater accessibility and transparency and is more user-friendly for applicants seeking information on their current application status. General process workflows are on the Company's interconnection web portal.[172] Con Edison limits the sharing of details of specific applications and their application status to the applicant to protect privacy.

5) The utility's processes, resources, and standards for constructing approved DER interconnections.

The Company manages construction for interconnections requiring upgrades to the utility system. This could include creating a new service for FTM type interconnections, upgrading a service for increased hosting capacity, installing SCADA controllers to monitor and control export onto the distribution system, or upgrading network protector relays to allow for increased export onto Con Edison's secondary network distribution system. Figure 18 shows the general process.

[172] https://www.coned.com/-/media/files/coned/documents/save-energy-money/using-private-generation/simplified-process-flow-chart.pdf?la=en

Figure 18: Process for Managing Construction for Interconnection Upgrades



6) The utility's means and methods for tracking and managing construction of approved DER interconnections to ensure achievement of required performance levels.

Con Edison has identified the tracking and managing of system upgrades related to DER interconnection as an emerging need, driven by the increase in DER interconnections. To better coordinate DER installations with system upgrades, the Distributed Energy Services group was created to manage both the interconnection process and the system upgrades resulting from that process.

7) Where, how, and when the utility will provide a resource to DER developers and other stakeholders for accessing up-to-date information concerning construction status and workflows for approved interconnections.

See response to 4) above.

2.11. ADVANCED METERING INFRASTRUCTURE

Context and Background

On November 16, 2015, Con Edison filed a detailed business plan for the deployment of AMI and associated communications network and back office IT systems to manage the two-way communications enabled by AMI.[173] On March 17, 2016, the Commission approved this plan, which includes the rollout of approximately 4.7 million advanced electric and natural gas meters.[174] AMI provides customers with the information necessary to help manage their energy usage, control costs, and become more active energy consumers. The robust communications network, implemented ahead of meter deployment, provides a critical link to communicate with the smart meters, and also may allow operators to dispatch and control certain resources as DER markets develop and supporting IT infrastructure is built out.

The Company also filed its AMI Customer Engagement Plan on July 29, 2016 describing how the Company will engage customers and third parties and help them to understand and take advantage of the benefits of investments in AMI and DCX.[175] The engagement plan activities are intended to facilitate greater customer participation in the Company's DR programs, provide for other energy management opportunities offered through innovative value-added products and services by third parties, and increase access to EE tools. For example, the new website design developed as part of DCX offers customers additional data visualization and comparison tools to understand energy usage, such as detailed energy usage and billing information.

A highlight of the Customer Engagement Plan is the implementation of GBC, which allows customers to share more granular customer data with authorized third parties in a machine-readable format. The Company's GBC initiative is discussed in greater detail in Section 2.8 on Customer Data.

Implementation Plan, Schedule, and Investments

Current Progress

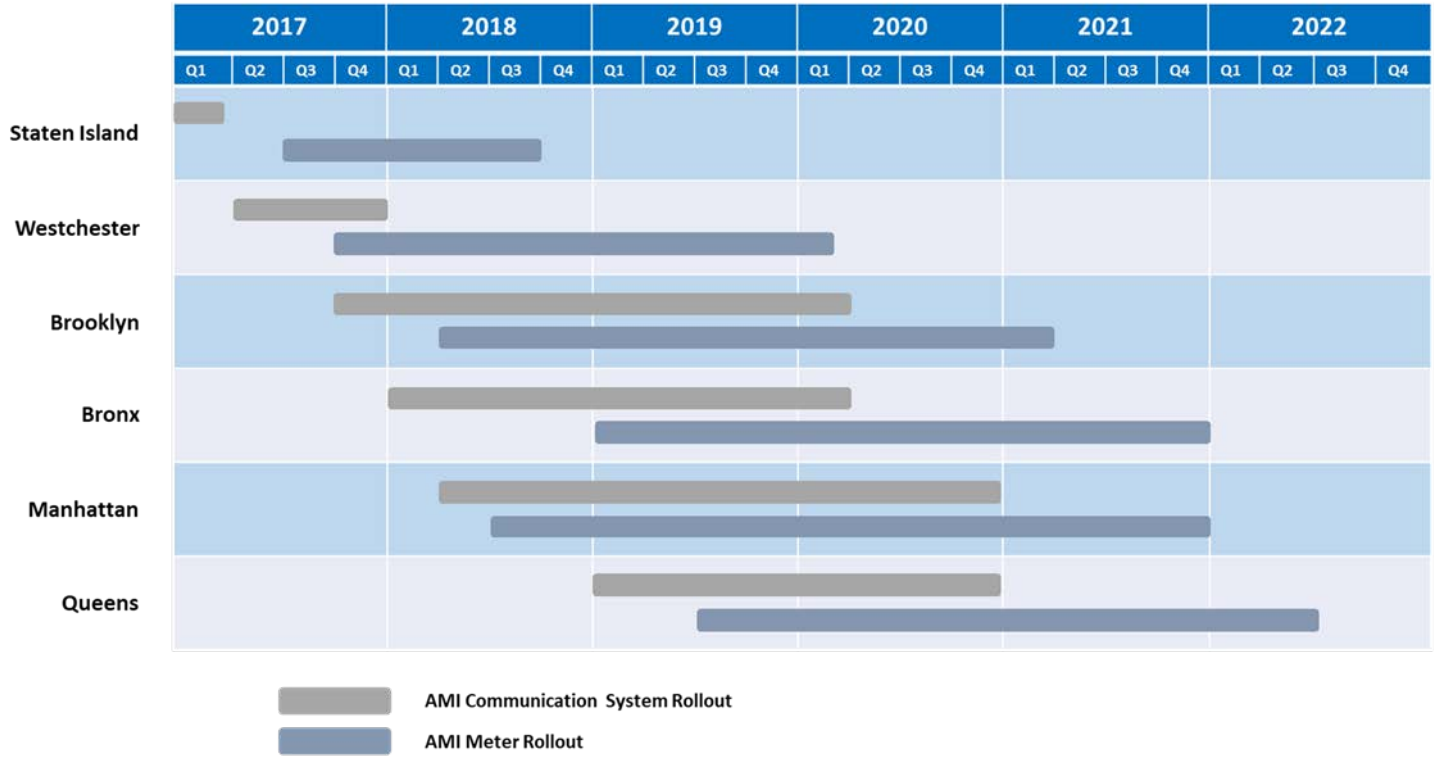
Summary of Achievements

- Successfully implementing AMI Business Plan, including installation of over 2.65 million electric and gas smart meters as of June 1, 2020.
- Leveraging AMI capabilities, including sharing of more granular data, integration of manual ping functionality from the OMS and natural gas detectors, and capability to study transformer loading, and capability to study voltages of entire networks to implement CVO.
- Proactively monitoring MTA NYC subway meters using STORM IT monitoring dashboard.
- Implemented CVO in 28 networks as of June 1, 2020, across Staten Island, Westchester, Manhattan, Bronx, and Brooklyn.

[173] Con Edison 2015 Electric Rate Case, AMI Business Plan (filed November 16, 2015).
[174] Con Edison 2015 Electric Rate Case, AMI Order.
[175] Con Edison 2015 Electric Rate Case, AMI Customer Engagement Plan (filed July 29, 2016).

Con Edison's AMI meter rollout plan maximizes initial deployment success, allows a measured and controllable installation process across multiple boroughs, addresses impacts on people and processes, and yields initial benefits to customers. This rollout plan, which Figure 19 presents below, also accounts for the deployment of the AMI communications network ahead of meter installations to allow smart meters to be commissioned quickly.

Figure 19: Current AMI Rollout Plan



As shown in the chart above, AMI mass deployment is completed in Staten Island and Westchester County. Brooklyn, Manhattan, Bronx, and Queens deployment is currently underway. CECONY has deployed a total of 2,161,242 electric smart meters and 491,383 gas smart meters as of June 1, 2020. The Company halted AMI meter installation due to the COVID-19 pandemic and has developed mass meter deployment restart plans. CVO implementation has also been impacted by the pandemic. The implementation of CVO will resume after meter deployment resumes. Additionally, Con Edison has not installed meters to "complex billing" customers yet pending build-out of the IT solution to bill these customers. The complex billing IT solution is planned for an August 2020 release, at which point meter deployment for accounts that are billed on complex rates will begin. The Company is targeting to complete the installation of this meter population by the end of 2021.

Summary of Future Actions

- Continue implementing AMI Business Plan, which will deploy a total of 4.7 million smart meters and the communications network to support them.
- Implement the value-added features enabled by AMI, including outage notifications, high bill alerts, enhanced customer data sharing, and pricing pilots.
- Continue to deploy additional value-added sensors on the AMI network as the need arises.
- Continue to improve access to AMI data to add value to end use organizations (control centers, engineering and others).

AMI mass deployment in Manhattan started in July 2018 and will continue through December 2021. Installation in the Bronx and Queens began in January 2019 and July 2019, respectively, and is scheduled to conclude at the end of 2021 and by June 2022, respectively.

Risks and Mitigation

Con Edison is deploying AMI in four logical phases to reduce planning complexity and maximize control of the project. The Company is leveraging best practices to provide an optimal customer experience and reduce risk. Potential implementation risks that could affect the schedule include:

- Meter installation rate slower than projected.
- AMI communication system not installed in time for mass deployment of meters.
- Insufficient inventory of required equipment.

A recent example of a slower than expected meter installation rate is the pause of AMI meter installations due to the COVID-19 pandemic. Con Edison has developed mass meter deployment restart plans. The Company mitigates risks by closely monitoring installation progress and also monitoring available installers and equipment supply to stay on schedule. For the communication system, the Company is closely tracking communications installations.

Stakeholder Interface

As noted above, the Company filed a Customer Engagement Plan describing a range of activities to raise awareness of the benefits of AMI and address customer questions and concerns. [176] Additionally, each customer receives a postcard 90 days before meter installation explaining the benefits of AMI and can view information on features and benefits, installation schedules, accessing data, and frequently asked questions on the Company's website (https://www.coned.com/en/our-energy-future/technology-innovation/smart-meters).

For DER developers, the launch of GBC facilitates the sharing of more granular data available from AMI through an automated process in machine readable format, which supports developers' business planning, marketing, and project scoping.

[176] *Id.*

Additional Detail

This section responds to the questions specific to AMI.

1) **Provide a summary of the most up-to-date AMI implementation plans, including where AMI has been deployed to date.**

The AMI Order approved the Company's proposal to deploy a total of 4,715,000 smart meters across its service territory between 2017 and 2022.[177] As of June 1, 2020, Con Edison has deployed approximately 2.65 million electric and gas smart meters. AMI meter installation began in June 2017 for new business customers and business-as-usual replacements. AMI mass deployment is completed in Staten Island and Westchester County. Brooklyn, Manhattan, Bronx, and Queens deployment is currently underway. Table 14 shows the current AMI communications network and meter deployment schedule:

Table 14: AMI Communications Network and Meter Deployment Schedule

Phase	Region	AMI Communication Network Status*	Anticipated Meter Deployment Completion Date
1	Staten Island	Completed January 2017	August 2018
2	Westchester	Completed December 2017	February 2020
3	Brooklyn	Completed March 2020	March 2021
	Bronx	Completed March 2020	December 2021
4	Manhattan	Anticipated completion end of 2020**	December 2021
	Queens	Anticipated completion December 2020	June 2022

* Completion of communication reflects installation of access points and relays for radio frequency design in order to successfully communicate with all AMI meters.
** Manhattan Socket access point installation started in April 2018 and will continue through the end of 2020.

In addition to the phased AMI implementation plan, Con Edison completed a project to deploy an AMI system throughout MTA facilities in Manhattan, Brooklyn, the Bronx, and Queens. The Company is proactively monitoring MTA NYC subway meters using STORM IT monitoring dashboard. The STORM tool provides the ability to ping, request voltage, and other information at the AMI meter level.

[177] Con Edison 2015 Electric Rate Case, AMI Order.

2) **Describe in detail where and how the utility's AMI provides capabilities which:**

a. help the utility integrate DERs into its system and operations;

The integration of AMI data into system planning provides better information at the grid edge. Smart meters collect usage and voltage information that aids the utility's analysis of its distribution system. An AMI meter provides kWh, kVAr, and voltage information collected every 5 minutes for commercial customers and every 15 minutes for residential customers. This information is delivered every 15 minutes to the Company's AMI systems.[178]

The Company can use AMI data to identify equipment overloads, enable distribution automation, improve the engineering analysis of distribution system equipment, optimize spending on capital infrastructure upgrades, and generate O&M savings. This could help reveal areas of higher demand and lower voltage, where a DER could provide useful capacity. Additionally, for customers installing solar, a bi-directional AMI meter eliminates the need for a second meter and a separate visit for meter work.

b. help DER developers plan and implement DERs;

The Company is building out GBC to facilitate the sharing of more granular data available from AMI, which supports developers' business planning, marketing, and project scoping. Additional discussion of GBC implementation is in Section 2.8 on Customer Data.

c. help DER operators plan and manage operation of their DERs;

AMI will allow customers and operators to view DER output in near-real time, which can facilitate optimization of DER resources and early detection of potential performance issues. When operated by the Company, the DER asset can be leveraged to support system reliability.

d. enable or enhance the utility's ability to implement and manage automated Volt-VAR Optimization (VVO);

CVO is a subset of VVO that involves lowering voltage to reduce line losses and save energy. CVO is a significant benefit of AMI deployment. Optimizing the voltage will reduce the amount of energy required to be purchased by customers to satisfy a given load, thus reducing generation and the associated carbon emissions. The Company has implemented CVO in 28 networks as of June 1, 2020, with full deployment expected by the end of 2022 following meter deployment.

AMI provides Engineering with voltage information from across the system. With approximately 3.6 million new end-points providing voltage data every 15 minutes, Con Edison will have the granular data required for load-curve analysis by circuit, allowing Engineering to determine the optimal voltages of the system. This can be accomplished through manual analysis of AMI meter data and new substation voltage schedules based on this meter data (AMI-Assisted Manual Approach) or through a feedback loop from the smart meters to the substation that allows automatic voltage changes (AMI Feedback-Loop Approach). The AMI Feedback-Loop Approach can also enable VVO schemes to manage voltage levels and reactive power flows through real-time feedback of smart meters. The current plan is to implement the AMI-Assisted Manual Approach. The goal is to use AMI data to develop new voltage schedules after the completion of a region's meter deployment.

[178] This data is provided approximately 30 minutes after the read to allow the usage and voltage reads from every meter to be collected and validated by the information systems.

e. improve the utility's ability to prevent, detect, and resolve electric service interruptions;

AMI will improve the Company's ability to detect and resolve electric service interruptions through integration of AMI data with existing and new tools. Engineering groups can then use the analysis gathered by the distribution grid analysis tools to generate new infrastructure and equipment upgrade plans ahead of periods of high system stress, such as summer heat events.

Detecting and resolving service interruptions will be improved with the meter's built-in functionality of generating alarms and events from a pre-determined set of rules and through integrations with new or upgraded tools, such as an upgraded OMS. The meters will inform and verify customer outages, restorations, voltage conditions, and other power quality conditions that can be used by operators to analyze and respond to an event. The integration of AMI meter data with the OMS will enable operators to proactively identify undesirable conditions, understand the full scope of a large outage quicker, and validate restorations as they occur in a large outage to more efficiently manage the restoration effort. The integration would also allow the Company to detect false outages and direct crews to real outage jobs.

Additionally, AMI provided Engineering groups a transformer analysis tool to study the impact of customers on the transformer. This tool provides AMI data on transformers to see if upgrades are needed during high stress times. The study will help to prevent equipment failure and optimize capital upgrade spending. The initial phase of the rollout to the OMS allowed operators to determine false outages. Enhancements to integrate meter outage and restorations into the OMS are planned for 2021. Further, the Company's MTA AMI application enables the Company to detect outages on the sections of the system serving MTA equipment.

f. improve the utility's ability to implement rate programs which facilitate and promote customer engagement, DER development, and EV adoption;

With fully enabled AMI, all customers will have access to their interval electricity usage data, which may increase their ability to adjust their consumption patterns to reduce their electricity bill. This facilitates customer participation in new rate pilots, such as the IPP and SHR demonstration project, as well as DR programs offered by the Company and the NYISO. Additionally, Con Edison customers can enroll in whole house or dedicated EV TOU rates that promote off-peak consumption.

The Company, with O&R, submitted its AMI Customer Engagement Plan[179] on July 26, 2016, which included a pricing pilot intended to identify how innovative pricing structures can enhance customer benefits from AMI deployment in a cost-effective manner. Con Edison's IPP targets mass market (SC-1) and small commercial (SC-2) customers with AMI in Westchester County, Staten Island, and Brooklyn. The pilot is testing seven time-variant, demand-based rates designed to provide customers with greater control over their energy costs, as well as testing the impact of demand rates on customer acceptance, satisfaction, bill amounts, and energy-use behaviors. Additionally, the pilot will collect data to help estimate customer benefits and inform future mass market rate design. Con Edison began enrolling Wave 1 customers in Staten Island and Westchester County in April 2019 and Wave 2 customers in October 2019. Information on the current status of the IPP is included in Section 1.5.

Con Edison is also implementing the SHR REV demonstration project, pursuant to the REV Track Two Order.[180] The SHR demonstration project seeks to understand how alternative rate structures can provide price signals to residential customers and customer-sited DER to deliver greater control over energy use to customers. Participants are provided with home energy management technologies to help them maximize savings on the SHR rates. The SHR pilot will evaluate the changes in load in response to the dynamic, time-varying rates and gauge customers' engagement with

[179] Note 176, *supra*.
[180] REV Proceeding, REV Track Two Order, p. 156.

the rates and home energy management technologies. Information on the current status of the SHR demonstration project is included in Section 1.5.

3) Describe in detail how the AMI enables secure communication with and among devices at customers' premises to support customer engagement, energy efficiency, and innovative rates.

As previously mentioned, AMI will offer customers greater visibility into their energy consumption through near-real time and/or prior day data presentment. The Company analyzes the data and sends out high bill alerts and potential cost savings opportunities on a personalized basis. The Company is studying alternative solutions for providing real-time usage data without compromising security and privacy or introducing other technology risks.

4) Describe where and how DER developers, customers, and other stakeholders can access up-to-date information about the locations and capabilities of existing and planned smart meters.

The Company continues to proactively communicate the benefits of AMI to customers. For example, the Company sends a postcard to customers 90 days before meter installation explaining the benefits of AMI. Additionally, the AMI rollout plan is publicly available through the Company's website[181] and was promoted through extensive outreach activities, as described in previous sections.

[181] https://www.coned.com/en/our-energy-future/technology-innovation/smart-meters

2.12. HOSTING CAPACITY

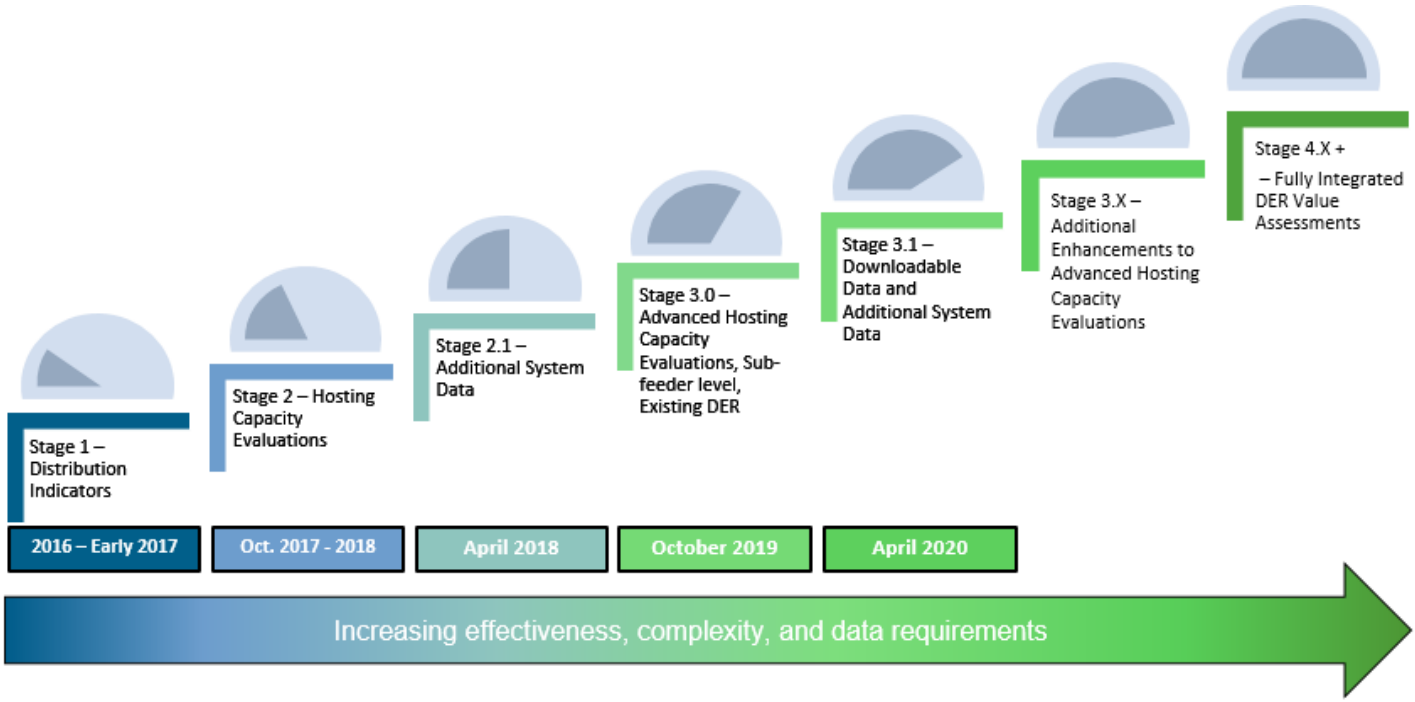
Context and Background

Con Edison continues to advance its hosting capacity capabilities and make additional system data available to third parties. These actions support DER integration and DER market growth by guiding DER investments and marketing activities to areas of the grid where the costs of interconnection are likely to be the lowest, thus allowing prospective interconnection customers to make more informed business decisions prior to committing resources to an interconnection application.

Hosting capacity is defined as the amount of DER that can be accommodated without adversely impacting power quality or reliability under existing control configurations and without requiring infrastructure upgrades to the primary line voltage and/or secondary network system.[182] The Joint Utilities calculate each circuit's hosting capacity by evaluating the potential power system criteria violations as a result of interconnecting large PV solar systems to three-phase distribution lines.[183] The Joint Utilities selected this approach to deliver usable information in a timely manner to the DER developers most active in New York State.

Figure 20 below shows the Joint Utilities' multi-phase approach for developing hosting capacity analysis capabilities, which is paced with the evolution of hosting capacity tools, models, and processes. With each stage comes increased granularity, but also complexity.

Figure 20: Joint Utilities Hosting Capacity Roadmap



[182] EPRI, *Defining a Roadmap for Successful Implementation of a Hosting Capacity Method for New York State*, Report Number 3002008848 ("EPRI Roadmap") (June 2016), p. 2. http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002008848.

[183] This refers to solar generation with an AC nameplate rating starting at and gradually increasing from 300 kW.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Published Stage 3.0 hosting capacity analysis with refreshed data for non-network and network circuits, providing greater geospatial granularity and considering existing DER.
- Convened five stakeholder meetings since the 2018 DSIP to familiarize stakeholders with the Stage 3.0 and 3.1 releases and discuss future release features, including gathering input via a survey.
- Provided additional reference material on using the Stage 3 displays, including release notes, greater detail on analysis criteria and DRIVE settings, FAQs, and an informational video added to the JU Hosting Capacity webpage.
- Published Stage 3.1 update that included additional data pop-up items and common attribute tables with downloadable feeder-level summary data (.csv).
- Collaborated with Scenic Hudson to be able to overlay the hosting capacity displays with their own public maps, aligned with the developer guide use case.
- Continued progression with definition of Stage 3.X and 4.X approach and plan for delivering them.

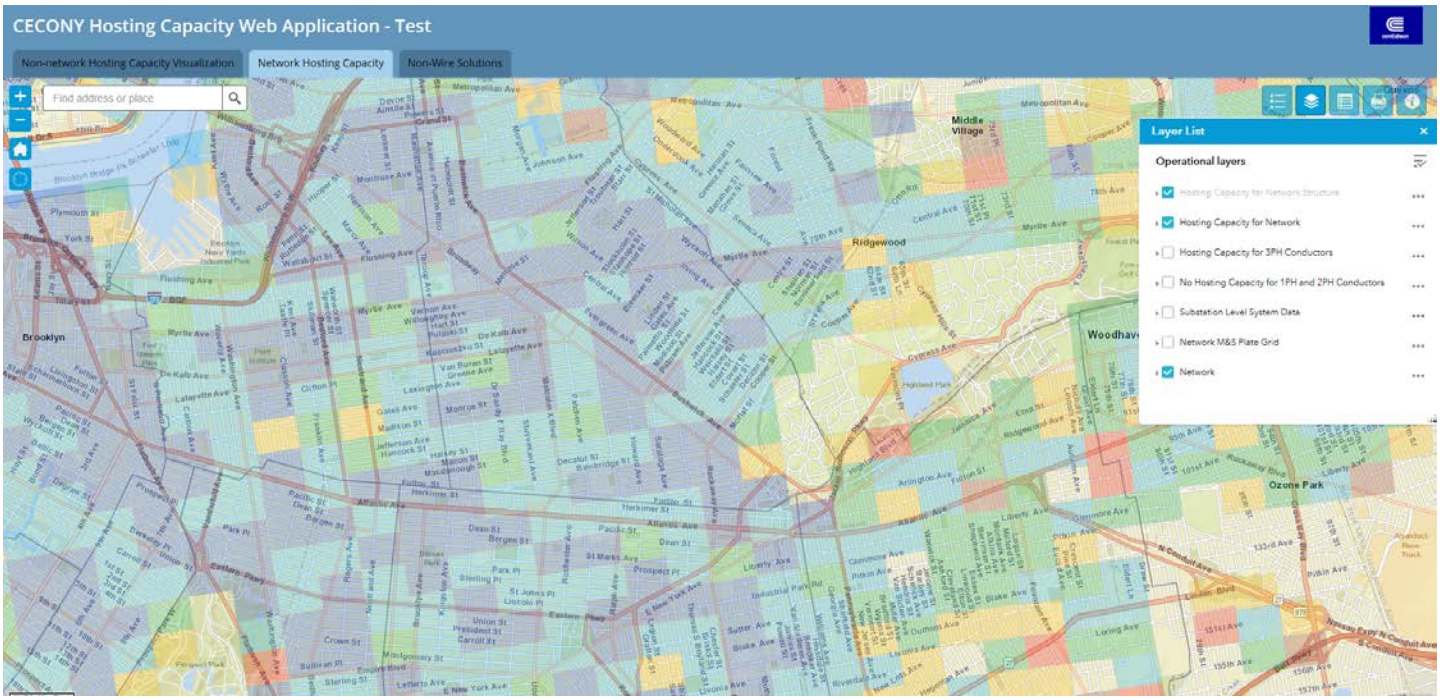
The Company continues to add new functionalities to the hosting capacity platform, with a goal of maximizing the value of the hosting capacity map to developers. In response to stakeholder feedback, on October 1, 2019, Con Edison released its Stage 3.0 hosting capacity analysis, which increased the geospatial granularity of the analysis to display sub-feeder level hosting capacity. The Stage 3.0 map shows changes in hosting capacity along a feeder, using the previous color coding. The sub-feeder hosting capacity is noted as "Local Hosting Capacity for PV" when line segments are selected in the displays. The analysis also explicitly modeled existing PV and other installed DG in the circuit load curves and load allocations, which provides a more accurate view of available capacity.

In April 2020, the Company published a Stage 3.1 update to the displays, which focused on greater transparency of the analysis, better communication of supporting materials, and greater access to the data. This included supporting material on Distribution Resource Integration and Value Estimation ("DRIVE") tool inputs by utility and additional user reference materials on the Stage 3.0 displays; common attribute tables; and downloadable feeder-level summary data (.csv) that includes the data elements currently available in the pop-ups. Responsive to stakeholder feedback, the Company also published additional items to the data pop-ups to provide greater insight into upstream constraints and where unique circuit conditions exists. The additional data pop-up items included annotated notes for additional circuit specific info.

Stage 3 represents continued progress since issuing a static low-voltage network hosting capacity map for network and non-network distribution circuits in June 2016. Since that first map, the Company published a new hosting capacity map on October 1, 2017, which provided a visual representation using color coding standardized across the Joint Utilities of

estimated available feeder-level hosting capacity for non-network circuits at 12 kV and above.[184] Con Edison published hosting capacity on 4 kV overhead circuits in December 2017 and the complete network and non-network hosting capacity map in June 2018. The network map is based on site-specific PVL studies and presents hosting capacity at the service box and secondary service level, making it the only hosting capacity map in the country for network systems.[185] Developers can narrow searches to available customer or project locations, as opposed to receiving high-level distribution network values that may or may not accurately reflect the values observed at the true point of interconnection. Figure 21 provides a screenshot of the entry screen for the map, which contains tabs for non-network hosting capacity, network hosting capacity (selected), and NWS, and allows users to select different layers to display additional data.

Figure 21: Network Hosting Capacity Map

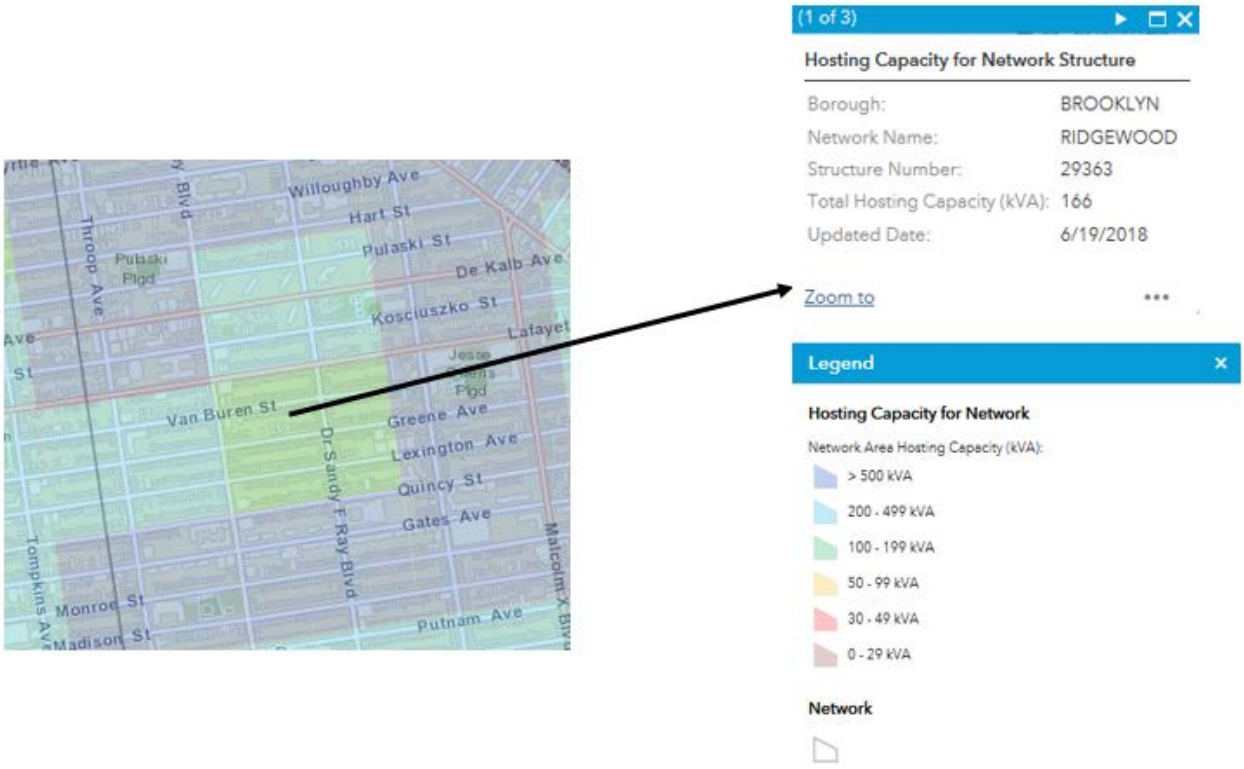


The colored squares visible in Figure 21 above and Figure 22 below provide a view of the main and service ("M&S") plate. M&S plate calculations are based on the locational capacity of distribution transformers that are geographically located in that area. By clicking on the square, a user can access additional data at that level, including hosting capacity and available system data.

[184] http://coned.maps.arcgis.com/apps/webappviewer/index.html?id=ce32722defd04152b16b594c36795490

[185] The Stage 2 analysis was completed using the EPRI DRIVE tool. The DRIVE tool leverages existing circuit models in a utility's native distribution planning software to carry out a streamlined analysis of hosting capacity. Because EPRI's DRIVE tool was designed for analyzing radial (non-network) circuits and is not configured to provide hosting capacity in the Company's low-voltage mesh grid, the Company worked internally to modify the static network maps to present network hosting capacity values on the mesh network.

Figure 22: Network Hosting Capacity View at the M&S Plate Level

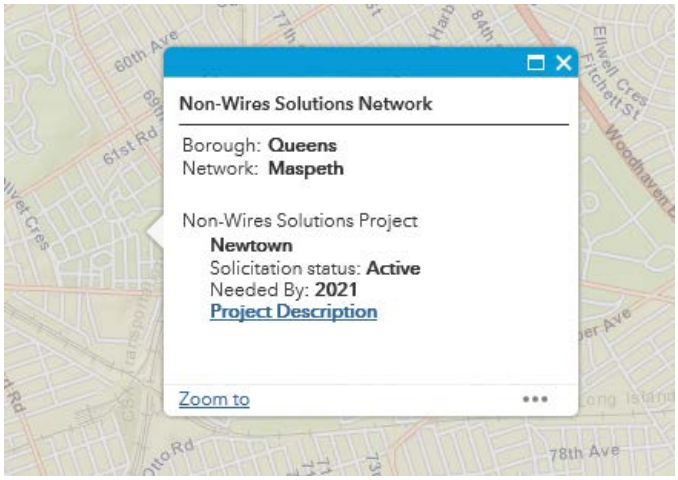


Users can further zoom in on the network area to view hosting capacity for individual structures, as shown in Figure 23.

Figure 23: Hosting Capacity for Individual Network Structures

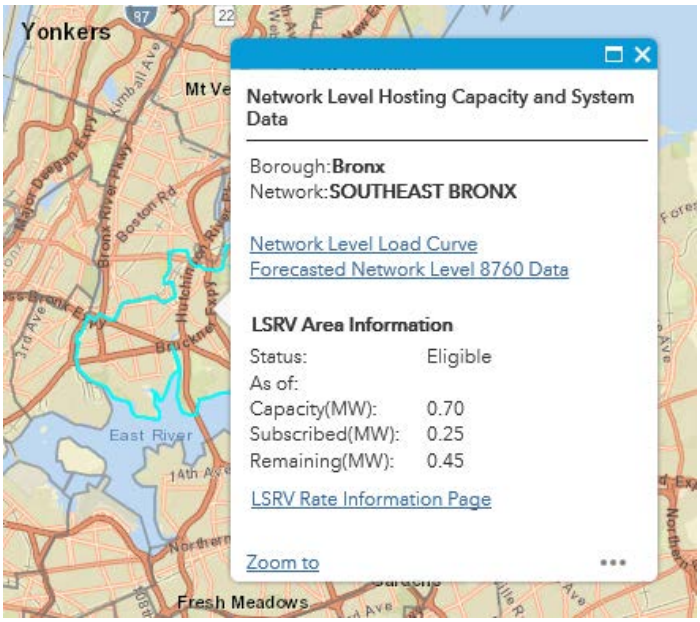
In addition to granular network and non-network hosting capacity, the platform displays areas targeted for NWS and areas with positive LSRV, providing a more comprehensive view of beneficial locations. LSRV information in the system data pop-up boxes includes eligibility status and remaining capacity, as well as a link to the rate information page on the Company's website. As shown in Figure 24 below, the NWS tab of the hosting capacity map displays a NWS-eligible area at the network level, the affected feeders, and the relevant system information, as well as a link to the project description.

Figure 24: NWS View



As shown in Figure 25 below, the Company added LSRV information to the system data pop-up boxes, including eligibility status and remaining capacity, as well as a link to the rate information page on the Company's website.

Figure 25: LSRV View



Providing this multi-faceted view allows developers to more readily see where there is higher potential value to be captured across the Con Edison distribution system, through supplemental LSRV value streams as part of the VDER tariff or NWS payment streams, and compare that to the hosting capacity of those areas for a more complete assessment of business opportunities.

Future Implementation and Planning

Summary of Future Actions

- Refresh hosting capacity analysis and Stage 3.1 data in October 2020 as part of the annual refresh.
- Incorporate feedback from the 2019/2020 stakeholder engagement meetings into decisions for further defining the details and assumptions used in Stage 3.2 and beyond.
- Hold stakeholder engagement and training sessions corresponding with the release of each stage.
- Continue to engage with EPRI on subsequent releases of the DRIVE tool and the additional functionality it will provide.
- Continue to explore avenues to advance the hosting capacity roadmap to enhance the value of the information provided.

The next milestone, scheduled for October 2020, is the annual refresh of hosting capacity analysis and Stage 3.1 data initially released in April 2018. Consistent with the Supplemental DSIP and aligned with stakeholder feedback,[186] the Stage 3.0 release included modeling of existing interconnected DER[187] and sub-feeder level hosting capacity analysis. The evolution to more granular hosting capacity analysis has enabled developers to identify more specific locations along a feeder with higher levels of hosting capacity and potentially lower interconnection costs. For example, while the impact of existing DER on circuit load curves was reflected in the Stage 2 results, the Stage 3.0 release reflects installed DER in the circuit models directly to better reflect their impact on PV hosting capacity. In addition, the increased granularity of data in the Stage 3.0 release will provide more locational-specific sub-feeder level information to better inform developers. The Company is continually advancing our datasets and will continue to refine the data as GIS efforts update our mapping and data infrastructure. Additionally, the Company continues efforts to automate processes and will continue to work toward more frequent updates for calculation and data availability.

Con Edison is committed to consistently improving the presentation and quality of our geospatial environment. The Company, along with the Joint Utilities, is working with Scenic Hudson to exchange hosting capacity information and make geospatial displays available for its community planning tool. Since the initial hosting capacity efforts in 2016, developers and stakeholders have consistently indicated value in geospatial outputs of information. The ability to layer a multitude of attributes allows third parties to better match available values with system and land capacity. This effort helps to meet near term planning needs, as well as help drive future CLCPA goals, allowing communities to take a more active role in their energy planning that leverages values, resources, and environmental justice considerations.

Subsequent Stage 3.X releases will enhance the information provided on the hosting capacity portal. The Joint Utilities are evaluating options to further improve the analysis and will continue to solicit input from stakeholders on the continued development of the hosting capacity roadmap. Possible enhancements in Stage 3.X releases identified thus far include:

- Additional map functionality.
- Forecasted hosting capacity.
- Increased analysis refresh frequency.
- Circuit reconfiguration assessments and operation flexibility.
- Load capacity maps for future incorporation of energy storage and EV use cases.

Consistent with the 2018 DSIP Guidance and subsequent stakeholder sessions, the Joint Utilities will evaluate options for forecasting hosting capacity that take into account the accuracy of such an analysis given the uncertainty in the location, timing, and configuration of DER adoption forecasts; projected changes to individual customer loads; and any upgrades or changes to the utility system. The roadmap for forecasting hosting capacity must incorporate models of future utility system configurations, gross load forecasts, and DER forecasts. Each of these items has its own roadmap and consideration of scenario-based planning, probabilistic, and deterministic approaches. These concepts must be integrated to produce a forecast, and the appropriate level of granularity must be determined before the level of uncertainty rises significantly.

Additionally, Con Edison is committed to evolve hosting capacity to meet changing policy and evolving technologies. As the grid evolves, operating parameters change, and policy direction shifts, hosting capacity will also need to evolve into

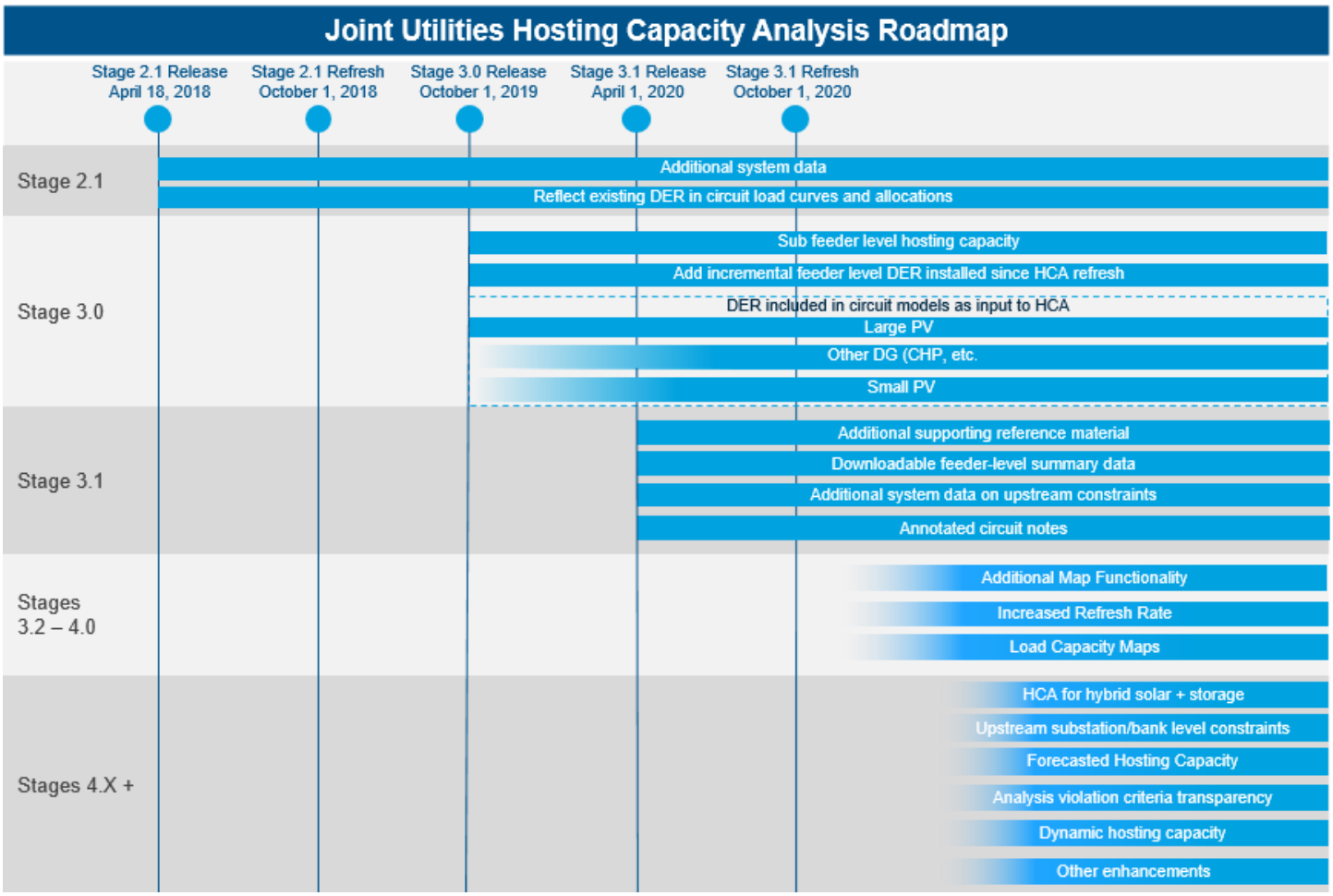
[186] The Joint Utilities captured and summarized a full list of the stakeholder recommendations on Stage 3 and posted it on the Joint Utilities website. http://jointutilitiesofny.org/wp-content/uploads/2017/12/JU-Hosting-Capacity-Stakeholder-Session-2017-11-02-Summary.pdf

[187] The impacts of all existing DER are reflected in the underlying circuit load curves and load allocations of the analysis in Stage 2. This enhancement incorporates the interconnected DER to date into the circuit models used for the hosting capacity analysis with a priority on large PV, which remains the DER technology with the most significant impacts on hosting capacity.

a more integrated planning tool that continues to take additional inputs into account. System constraints that may present challenges to interconnection, such as voltage exceedance, may be mitigated over time as smart inverters and grid edge controls provide greater operational flexibility. Similarly, over time, advancements in integrated planning may allow for a broader range of inputs to hosting capacity calculations, including DER in the queue that may address system constraints at a given location. As a result, what today appears as an area with limited hosting capacity could reflect these broader considerations and increase the available hosting capacity indicated on the map. In this scenario, it is the ability to modify inputs on a more dynamic basis that leads to improved information.

The Joint Utilities are actively coordinating with EPRI and other utilities in North America on the DRIVE tool roadmap in order to evaluate options for including aspects such as upstream constraints and operational flexibility in future Stage 3.2 and beyond releases. The draft roadmap for future hosting capacity analysis stages is presented in Figure 26.

Figure 26: Joint Utilities Hosting Capacity Analysis Roadmap



Risks and Mitigation

The software and calculation tools used for hosting capacity analysis are evolving. The timeline for the development of tools necessary for more advanced analysis and their integration with utility systems could impact the timeline for future releases. Con Edison is continuing to engage with EPRI on the refinement of its DRIVE tool in the continued development of the roadmap.

Stakeholder Interface

The Joint Utilities worked with stakeholders to familiarize them with the hosting capacity maps and solicit input on desired features. The Joint Utilities held five stakeholder engagement sessions since the 2018 DSIP, meeting in September, October, and December 2019, as well as May and June 2020. The series of 2019 engagement sessions corresponded to the release of the Stage 3.0 displays and invited input on future releases. The 2020 engagement session was a follow up to stakeholder items that had been identified in and response to items captured on the Hosting Capacity Survey.

In March 2020, the Joint Utilities sent out a stakeholder survey to solicit additional input from a broader stakeholder audience on proposed enhancements to prioritize future development. Issues identified for future consideration include:

- EPRI DRIVE Utility Inputs, Analyses Used, and Study Parameters Transparency
- Better Communication of Available Reference Materials and Supporting Documentation
- Upstream Substation/Bank-Level Constraints
- Hosting Capacity Analysis Criteria Violation Transparency
- Hosting Capacity Data Validation Efforts
- Circuit Equipment Ratings
- Additional Map functionality (downloadability/filterability)
- Increased Analysis Refresh Rate
- Hosting Capacity Analysis for Energy Storage, Combined Heat & Power, EVs, hybrid solar + storage
- Time-Varying Hosting Capacity (increased temporal granularity)
- Forecasted Hosting Capacity
- Dynamic Hosting Capacity

In the case of hosting capacity analysis for energy storage, input on developer use cases will help inform the appropriate work product that will be most beneficial to stakeholders. This input will be especially important given the broad range of energy storage technologies, applications, and operating characteristics that such analyses could reflect. Similarly, forecasted hosting capacity will likewise benefit from stakeholder input given the level of complexity of the analysis that impacts the accuracy and precision of its results.

The Joint Utilities will continue to engage stakeholders and solicit input on these approaches to further inform the continued expansion of the hosting capacity roadmap, in order to deliver the highest value maps for users. The Joint Utilities plan to hold at least one additional stakeholder sessions in 2020 and will hold at least one meeting annually going forward. Similar to their approach in 2017, the Joint Utilities plan to hold stakeholder engagement sessions corresponding with the release of each stage to provide an update to stakeholders on progress to date and solicit input on future stages.

Additional Detail

This section responds to the questions specific to hosting capacity.

1) **The utility's current efforts to plan, implement, and manage projects related to hosting capacity. Information provided should include:**

   a. **a detailed description of each project, existing and planned, with an explanation of how the project fits into the utility's long range hosting capacity plans;**

Con Edison has an internal hosting capacity project team that is responsible for translating the Joint Utilities' hosting capacity roadmap into work streams and deliverables. The cross-functional team is made up of SMEs familiar with relevant policy goals and standards, distribution planning, and engineering, as well as the mapping and visualization platforms needed to externally present calculated data points. A description of the team's existing and planned projects is below.

Con Edison continues to iterate and refine hosting capacity processes that fall into two main groups – calculation methodology and geospatial visualization. Currently, efforts around calculation include progress toward automation and model/data refinement and cleanup. The Company is confident in our approach to calculation, and additional work on the methodology will include, but is not limited to, the incorporation of additional use cases, as well as evolving technologies that may require a different definition of what a "costly upgrade" may constitute, with the primary example being smart inverter technology. Con Edison's visualization team continues to improve the mapping databases and portal production processes, as these efforts are folded into the longer term roadmap for GIS functionality.

Stage 2.0 Radial Hosting Capacity

Con Edison published a full streamlined hosting capacity analysis for overhead circuits operating at a voltage class greater than 12 kV in October 2017, followed by analysis for 4 kV circuits in December 2017.

In addition to traditional utility load flow modeling, the Company worked on the mapping and visualization platforms necessary to refine the data elements needed to present hosting capacity in a geospatial environment. This is an ongoing effort throughout future stages of hosting capacity analysis.

Network Level Hosting Capacity

Because 87 percent of load is served through underground low-voltage networks, the Company worked through 2017 and into 2018 to develop an approach around network level hosting capacity calculation and the data visualization strategy that leveraged the established overhead color and data schemes to improve the customer experience.

Con Edison's network level map allows the user to navigate different sections of a network by hosting capacity color and view existing and queued DG values. Once users locate a larger geographic area of interest, they can navigate to the street level and observe values at the various points that would be available for interconnection. A user can also search by prospective project address to view these more detailed values. This network level map was released in June 2018.

Stage 2.1 Hosting Capacity

Throughout the 2017 stakeholder engagement sessions for both hosting capacity and system data, developers requested values for queued and connected DG projects, total DG (i.e., sum of queued and connected DG), historical peak load values, and status of 3VO upgrades (i.e., scheduled and completed) at the substation level.[188] During spring 2018, Con Edison, along with the Joint Utilities, prioritized this work as "Stage 2.1" and Con Edison published its available data to the hosting capacity and system data portal in April 2018.

[188] 3VO upgrades are not applicable to Con Edison's network system.

Stage 3.0 Hosting Capacity

On October 1, 2019, Con Edison released its Stage 3.0 hosting capacity analysis, which presented results at the sub-feeder level to increase granularity and considered existing solar PV to improve accuracy. The Stage 3 map shows changes in hosting capacity along a feeder, using the previous color coding. The sub-feeder hosting capacity is noted as "Local Hosting Capacity for PV" when line segments are selected in the displays. The analysis also explicitly modeled existing PV and other installed DG in the circuit load curves and load allocations, which provides a more accurate view of available capacity.

Stage 3.1 Hosting Capacity

The Joint Utilities released Stage 3.1, which makes available downloadable .csv or .xlsx files of feeder-level summary data currently included in the map pop-ups. Con Edison preceded the Joint Utilities in this functionality, incorporating it into a 2018 release. Con Edison made incremental adjustments as part of Stage 3.1, including adding notes on circuit-specific conditions for greater clarity and explanation.

Stage 3.X Hosting Capacity

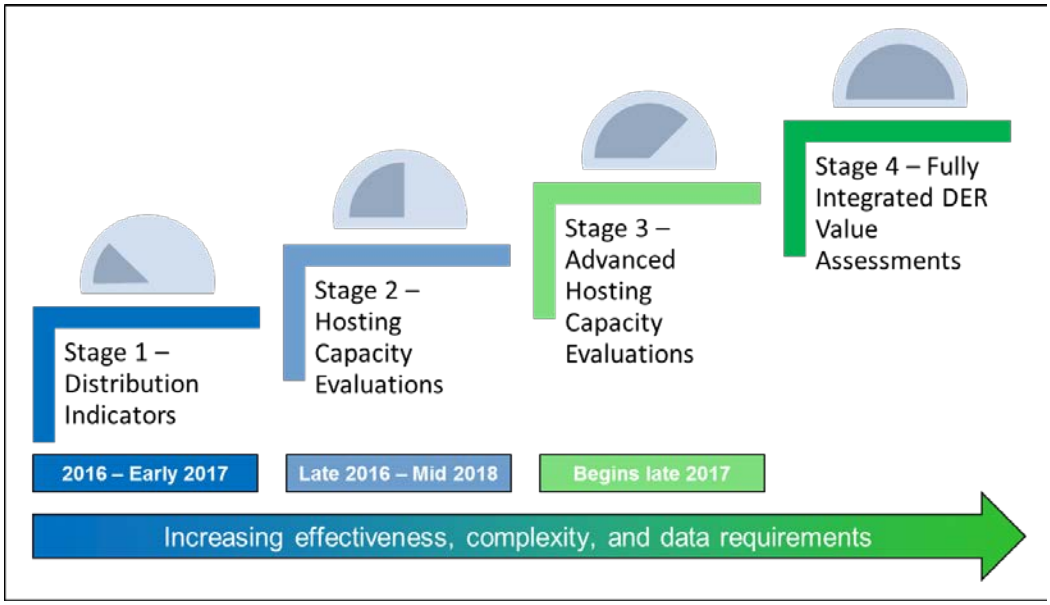
Subsequent Stage 3.X releases will further enhance the information provided on the hosting capacity portal. The Joint Utilities are evaluating options to further improve the analysis and will continue to solicit input from stakeholders on the continued development of the hosting capacity roadmap. Possible enhancements in Stage 3.2 and beyond releases identified thus far include:

- Additional map functionality
- Forecasted hosting capacity
- Increased analysis refresh frequency
- Circuit reconfiguration assessments and operation flexibility
- Load capacity maps for future incorporation of energy storage and EV use cases

b. the original project schedule;

The Joint Utilities adopted a multi-phased approach for developing hosting capacity analysis capabilities that is paced with the evolution of hosting capacity tools, models, and processes. Figure 27 details the original project schedule as included in the Supplemental DSIP.

Figure 27: Original Joint Utilities Hosting Capacity Roadmap from Supplemental DSIP[189]



c. the current project status;

Con Edison has completed Stages 2.0, 2.1, 3.0, and 3.1. The Company, along with the Joint Utilities, is evaluating further refinements based on stakeholder needs and ongoing tool development.

d. lessons learned to-date;

The hosting capacity work streams have created numerous processes for not only the refinement of data, but also the ways in which it is exchanged between systems and utilized for calculations and visualization. Con Edison used lessons learned from Stage 2 to inform the more granular Stage 3 calculations and visualizations at the line segment level. Lessons from Stage 3 implementation, including reconciliation processes between mapping and modeling data, are also expected to inform future hosting capacity development by allowing greater automation, timeliness of updates, and identifying areas in our datasets that will be further refined on the GIS roadmap.

Con Edison has been able to leverage the calculation and visualization tools developed throughout the hosting capacity process, in creating not only secondary screening tools for interconnection, but also applications that can be used by engineers when performing system impact studies as various stages in the SIR process. Additionally, many of our database and visualization learnings were direct inputs into the design and structure of our DERMS pilot efforts. The lessons learned in regard to identifying systems of record and data formats provided a foundation of understanding when determining which DERMS POC modules may be ready for development versus which modules would require initial data refinement.

The consistent use across the Joint Utilities of Esri's ArcGIS tool for displaying hosting capacity has also facilitated additional knowledge sharing on best practices and implementation challenges. [190] Con Edison continues to coordinate with the other utilities on a consistent coloring scheme for each utility's hosting capacity map, making it easier for developers to interpret information for each utility.

[189] DSIP Proceeding, Supplemental DSIP, p. 48.
[190] https://www.esri.com/en-us/arcgis/about-arcgis/overview

Additionally, by engaging directly with stakeholders and monitoring activity within the hosting capacity map, Con Edison learned that while some developers leverage the hosting capacity map to inform business development activities, others rely primarily on the interconnection process to meet business needs. Given the Company's simultaneous efforts to enhance the interconnection process, Con Edison learned that in many cases the timely results achievable through the interconnection process obviate the need for developers to utilize the hosting capacity map.

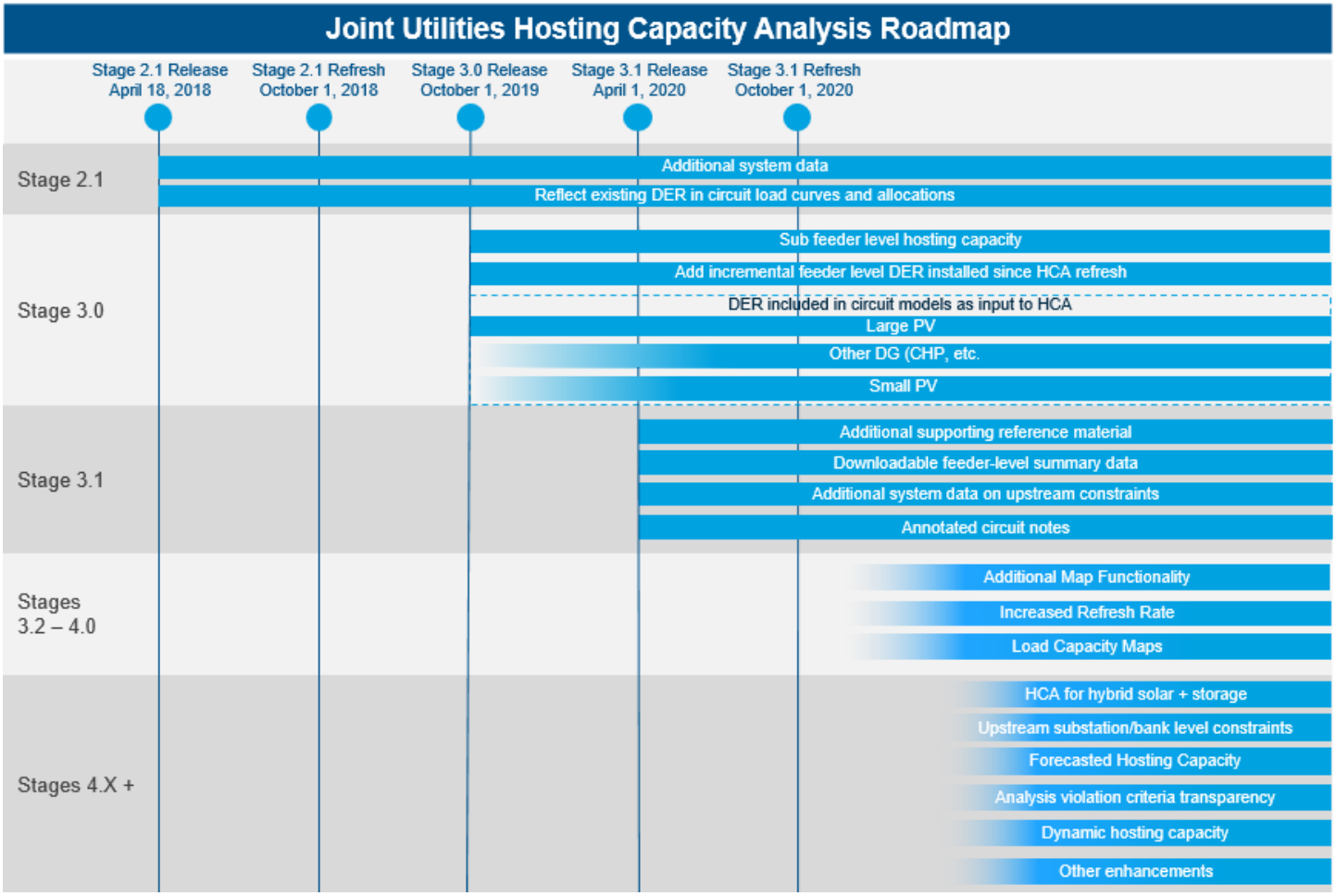
e. project adjustments and improvement opportunities identified to-date; and,

In addition to lessons learned through internal work, Con Edison benefited from stakeholder input. One recurring element from the development community related to the value of data visualization. In response to stakeholder feedback, Con Edison and the Joint Utilities prioritized the analysis and development of sub-feeder level hosting capacity as part of Stage 3.0. This complemented the previous incorporation of NWS, LSRV areas, and various system data elements into the hosting capacity and system data mapping environment. The Company's experience with Scenic Hudson has also expanded potential hosting capacity scope to the extent that third-party community advocates and planners can play an active role in shaping the bounds of hosting capacity. An embrace of CLCPA values means a greater reliance on such stakeholders to provide valuable data and input from community and municipality perspectives, helping to guide projects not only to areas that may have economic value for a developer, but will also meet the energy needs and values of the communities where these project reside in an effort to promote environmental justice.

f. next steps with clear timelines and deliverables

Con Edison will refresh its hosting capacity analysis and Stage 3.1 data by October 1, 2020, per the annual refresh cycle. The Company is working toward future hosting capacity advancements and expects to have the capability to begin evaluating DER system impacts under various operating scenarios by leveraging PV forecast models and DER modeling capabilities that are currently being developed through the Company's DERMS pilot work. The Company will also begin work toward further understanding how PV hosting capacity and EV load capacity methodologies can be leveraged toward the development of study cases for storage. These activities would take place in mid to late 2021 and 2022 and be coupled with overall integrated planning approaches to planning and operating around CLCPA objectives that will see greater levels of DER penetration, resource intermittency, and electrification. Additionally, Con Edison, in coordination with the Joint Utilities, will review options for calculating forecasted hosting capacity and seek to understand its potential use cases. Figure 28 illustrates the current timeline and deliverables.

Figure 28: Joint Utilities Hosting Capacity Analysis Roadmap



2) Where and how DER developers/operators and other third parties can readily access the utility's hosting capacity information.

Information regarding hosting capacity and access to the hosting capacity and system data portal can be found at https://www.coned.com/en/business-partners/hosting-capacity and https://jointutilitiesofny.org/utility-specific-pages/hosting-capacity/ .

3) How and when the existing hosting capacity assessment information provided to DER developers/operators and other third parties will increase and improve as work progresses.

Responding to requests from the developer community, Con Edison has begun work on Stage 3.2 and delivered EV capacity data in the hosting capacity portal. Con Edison also anticipates that, as work progresses to meet these objectives, continued model and data refinement will further clarify existing values.

4) The means and methods used for determining the hosting capacity currently available at each location in the distribution system.

Con Edison, along with the Joint Utilities, employed a streamlined approach to hosting capacity calculations that focused on the siting of larger commercial PV installations. This decision was made to guide developers toward areas on the

distribution system that would be more accommodating to commercial-scale projects. The values produced on a circuit-by-circuit basis can also be valuable to site smaller rooftop solar projects as well.

The Joint Utilities validated and utilized the DRIVE tool to facilitate the calculation of the overhead and radial portions of the service territory. Con Edison created and refined minimum load flow cases based on historically observed values at the area substations and distribution transformers, where applicable. The minimum daytime load is used to most accurately simulate a low-load condition when PV generation is generating at a significant portion of its nameplate capacity in order to determine the hosting capacity limit during "worst case" conditions. These minimum load cases were coincident with peak PV output times between 11:00 a.m. and 2:00 p.m. The resulting datasets from these load flow simulations were exported to the DRIVE tool, where centralized DER was applied until the circuits reached excursion thresholds for voltage, loading, and protection concerns. To support consistency in approach, the Joint Utilities adopted a common set of specifications to inform the analysis.

Con Edison validated the results of the DRIVE tool during the overhead calculation process and worked to incorporate the specification and threshold elements of the tool into the Company's network level hosting capacity analysis. The DRIVE tool is not built to evaluate secondary mesh distribution systems. However, Con Edison was able to incorporate the same thresholds and methodologies into the utility load flow program to produce results consistent with the overhead analysis. The load flow tool builds the same minimum load case (11:00 a.m. to 2:00 p.m.) based on historical interval data that is observed at the distribution transformers. For structures in the network that would accommodate an interconnection application, nearby distribution transformer loads are analyzed and algorithmically distributed to the various sites for analysis against potential PV. The program compares the load flows to the same EPRI values or voltage, load, and protection excursions to determine a maximum hosting capacity value.

5) **The means and methods used for forecasting the future hosting capacity available at each location in the distribution system.**

Consistent with the 2018 DSIP Guidance, the Joint Utilities will continue to evaluate options for forecasting hosting capacity that take into account the accuracy of such an analysis given the uncertainty in the location, timing, and configuration of DER adoption forecasts; projected changes to individual customer loads; and any upgrades or changes to the utility system. When forecasting hosting capacity, the addition of generation at various points on a feeder can significantly impact the circuit-level hosting capacity. Additionally, it is more complex to forecast hosting capacity down to the individual property level as hosting capacity analysis can be sensitive to changes in a single customer's load.

The roadmap for forecasting hosting capacity must incorporate models of future utility system configurations, gross load forecasts, and DER forecasts. Each model has its own roadmap and consideration of scenario based planning, probabilistic, and deterministic approaches. These concepts must be integrated to produce a hosting capacity forecast, and it must be decided what level of granularity is appropriate before the level of uncertainty rises significantly. Going beyond the initial hosting capacity analysis to forecast these values will require an even greater level of complexity on top of a process that already entails high levels of variability in results.

6) **How and when the future hosting capacity forecast information provided to DER developers/operators and other third parties will begin, increase, and improve as work progresses.**

The Joint Utilities continue to hold stakeholder engagement sessions to solicit input from developers on additional enhancements to the hosting capacity portal, including increasing the frequency of updates to the analysis and providing additional information such as forecasted hosting capacity evaluations. The stakeholder engagement sessions in 2018 and 2019 furthered the considerations to providing hosting capacity forecasts and the timing of its release. Forecasted hosting capacity and other additional enhancements will continue to be discussed with stakeholders for inclusion in subsequent releases through 2020 and beyond.

7) The utility's specific objectives and methods to:

a. identify and characterize the locations in the utility's service area where limited hosting capacity is a barrier to productive DER development; and,

Con Edison's experience indicates that the dense urban nature of its load area is a primary factor in considering the capacity to host DG. Given the load density, Con Edison can host a significant amount of DG without hitting system constraints. That said, the urban environment also limits the land and structures available to cost-effectively site larger DG systems. While land and roof space may be more available in Con Edison's outlying suburbs, these areas are often characterized by a distribution design using 4 kV feeder circuits, which can limit hosting capacity. The ongoing VVO program will help increase hosting capacity in these areas by effectively managing system voltages to accept higher levels of PV without hitting high voltage constraints. The Company has completed the installation of VVO controllers and communicating modems at 4 kV unit substations. Con Edison will upgrade pole top voltage regulators with remote M&C capabilities to provide more precise and flexible voltage regulation.

Con Edison's low-voltage meshed grid in its dense urban areas requires separate review given the different constraints involved with limiting hosting capacity. In these areas, the primary constraint involves tripping a local breaker when reverse power flow occurs in a distribution transformer. Con Edison has taken innovative steps in research and design to accommodate this reverse power flow due to PV systems and thus has significantly increased hosting capacity.

b. timely increase hosting capacity to enable productive DER development at those locations.

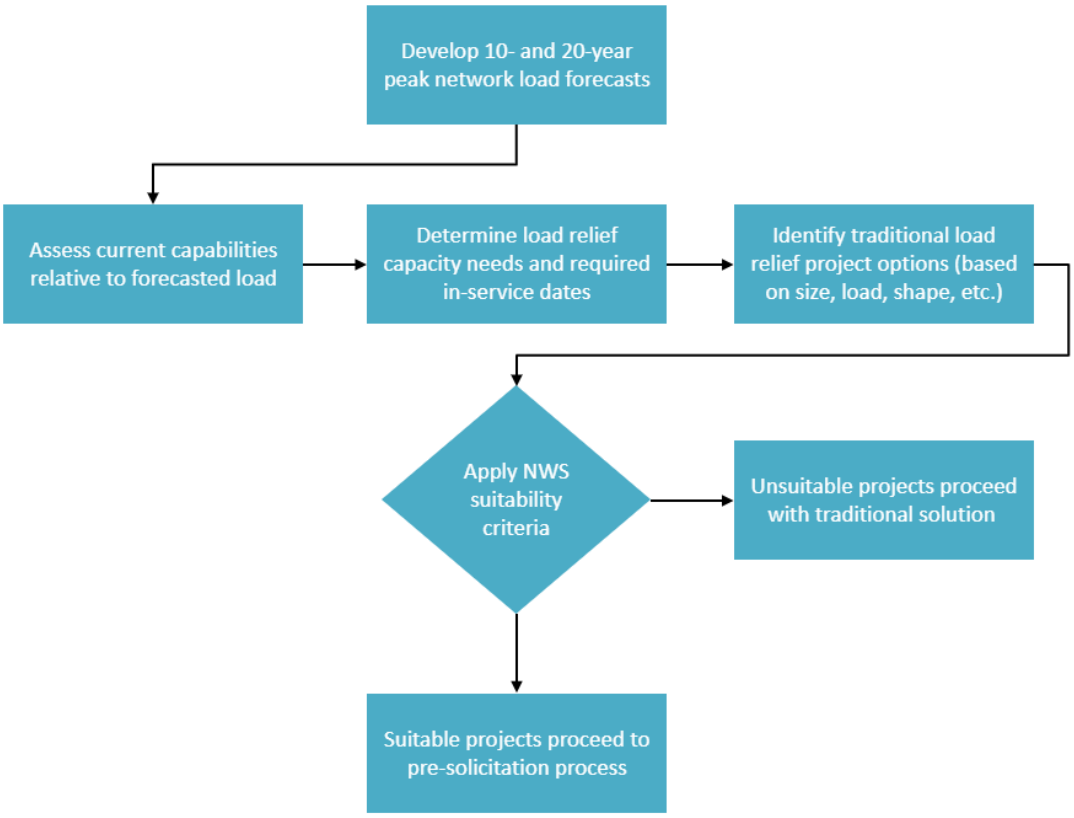
As noted above, VVO is expected to provide advanced voltage management, which will allow for increased hosting capacity in Con Edison's non-network design areas. Additionally, as discussed above, the Company has introduced new design standards in low-voltage meshed designs to allow for bi-directional power flow in these systems typical of dense urban areas. This innovative design change to the network protector relay standards will result in an increase to hosting capacity. The Company has an active program to upgrade protective relays in support of its Grid Modernization Plan. The Company has also begun internal efforts to evaluate smart inverter functionality as a potential solution for monitoring and autonomous control that may alleviate the need for more costly solutions.

2.13. BENEFICIAL LOCATIONS FOR DER AND NWS

Context and Background

Beneficial locations are locations where there is a potential for localized DER deployment to address projected system needs, specifically for load relief, and defer or avoid traditional utility infrastructure investments.[191] Beneficial locations are generally identified through the Company's capital budgeting process. Company planners use load flow modeling, network reliability modeling, and modeling of system performance to assess the current capability of existing distribution and substation assets to meet the forecasted load, based on the design criteria, type of asset, thermal ratings, and local power factors. For assets that are determined to be at risk of becoming overloaded during system peak conditions and under various contingencies, traditional and possibly NWS load relief project options are identified to mitigate the overload.[192] Figure 29 provides a simplified diagram of the NWS identification steps within the capital planning process.

Figure 29: NWS Identification in Capital Planning Process



As shown above, suitable projects are advanced to the solicitation process, where the need is defined in terms of the total MW of load relief required to replace the traditional capacity, the applicable time of day the load relief must be available, and the in-service date(s). This information, along with additional demographic information and project-

[191] DSIP Proceeding, Supplemental DSIP, p. 40.

[192] Other areas of system need identified through distribution modeling include risk reduction programs, new business projects to interconnect new customers, storm hardening or resiliency projects, emergency response and replacement, IT solutions to meet strategic business needs, and public works projects to re-route Company equipment due to municipal right-of-way.

specific detail is included in the NWS solicitation. Based on responses, the Company evaluates the viability of implementing a NWS portfolio to meet the MW needs within the required timeframe and conducts a benefit-cost analysis informed by the BCA Handbook.

If the Company is able to assemble a feasible portfolio to meet the MW need and the NWS passes the Societal Cost Test ("SCT") in the BCA, the Company procures the necessary solutions, files the BCA results, and begins implementation. If any of the suitability criteria are not met, or the Company is unable to assemble a feasible portfolio of cost-effective solutions, the Company pursues a traditional solution.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Identified beneficial locations through annual capital budgeting process.
- Shared information on beneficial locations by: (1) supplying information on past, present, and expected future NWS solicitations on the Company's website, the Joint Utilities website, and REV Connect, and (2) displaying NWS target areas and LSRV zones as part of the Company's hosting capacity maps.

NEWTOWN NWS PROCUREMENT

The Company released two RFPs to defer or eliminate a traditional solution identified for the Newtown area substation.

The first RFP was open to all DER solutions, while the second RFP sought at least 10 MW of energy storage to be operational by May 2021.

From the RFP responses, the Company developed a viable portfolio of cost-effective customer-sided EE and energy storage solutions.

As noted above, the annual capital budgeting process results in the identification of system needs, including projects needed to provide load relief. Con Edison reviews projects in the 10-year load relief program to determine if DER has the potential to defer or avoid the capital project, using the Company's NWS suitability criteria. The suitability criteria assess if the project: (1) is for load relief, (2) has enough lead time to pursue a NWS without foreclosing the opportunity to install a traditional solution if needed, and (3) meets the financial threshold. Con Edison issues competitive market solicitations for projects meeting the criteria to further evaluate viable NWS portfolios. Feasible portfolios undergo a benefit-cost analysis using the Company's BCA Handbook prior to implementation of a NWS.

The suitability criteria are reviewed annually and will be updated as appropriate as experience is gained through procurement and subsequent DER performance. Ongoing experience in the initial phases of NWS solicitations suggest the suitability criteria are generally working well and are effectively directing developers to high potential opportunities. Many of the solicitations have provided adequate options to construct viable portfolios of market solutions for projects satisfying the suitability criteria.

Those solicitations that have not resulted in viable portfolios have also been instructive and helped the Company better understand the real-world challenges of procuring and implementing NWS portfolios. For example, the Company's experience with solicitations for primary network feeder relief projects, where dilution of load relief in a network distribution system affects the viability of a NWS portfolio, provides evidence that lower-cost traditional projects can challenge the economics of NWS and the ability to assemble a sufficient portfolio

of projects. Similarly, recent experience suggests that longer lead times may be required for developers to implement advanced solutions, including energy storage, which highlights the potential challenges of assembling viable portfolios when the system need is more urgent and the need to manage the portfolio to meet lead-time requirements. In this case, the Company is pursuing alternative options for meeting the earliest system needs and working to build a portfolio that includes advanced solutions in later years.

Additionally, year-over-year adjustments in anticipated customer loads and resulting annual forecasts have proven challenging in ensuring successful NWS projects. As was the case with the NWS opportunity associated with the Parkchester cooling project, changes in annual load forecasting can shift the load relief needs causing implementation of a potential NWS project to fall outside of the suitability criteria window.[193] Balancing the necessary lead time required to identify, solicit, and implement a NWS portfolio with changes in load relief needs is an area the Company continues to manage and identify best practices that can improve internal planning processes.

At this time, the Company supports maintaining the current suitability criteria as is. However, the Company will evaluate if raising the cost floor for certain types of traditional projects would facilitate more successful and economical NWS projects. The Company will continue to uphold the principle of identifying NWS candidates with a reasonable expectation of being economic and resulting in a viable portfolio that meets the system needs. This helps build market confidence that a proposed or released solicitation will advance to implementation.

Future Implementation and Planning

Summary of Future Actions

- Continue exploring opportunities for geo-targeting of DM and EE programs to more effectively incentivize DR, DG, and EE deployment in high-value areas.
- Enhance MCOS studies to allow for more granular identification of high-value areas.

The Company will continue to identify beneficial locations through the capital planning process and direct developers to these locations through NWS notifications and the LSRV adder. Additionally, the Company will continue to explore opportunities to leverage its existing utility programs to meet localized system needs. Finally, the Company will continue to refine the MCOS studies to identify high-value areas at a more granular level.

Risks and Mitigation

The identification of beneficial locations and potential NWS candidates is integrated into the annual planning process. The risks around beneficial locations relate more to the dynamic nature of the grid and changes in system needs, often driven by factors outside of the Company's control. This means that beneficial locations tied to specific system needs, particularly load relief needs, are subject to change as load conditions change, which could result in the scaling back or cancelation of NWS projects.

Changes to the policies for valuing DER in beneficial locations could impact the Company's processes, necessitating changes in the identification of beneficial locations. To mitigate this risk, the Company will collaborate with key stakeholders to identify any such situation and plan to address any issues or concerns as they arise. In addition, changes to BCA requirements (e.g., impacting calculation methodology/components) could also change the nature of which

[193] For the Parkchester NWS opportunity, the load relief need decreased and shifted later in the 10-year load relief plan, beyond the 36 to 60-month time window outlined in the suitability criteria. As a result, the Company decided not to pursue the NWS solicitation.

potential NWS projects are selected and the Company's process for selecting them. To mitigate this risk, Con Edison will continue to evaluate how changes to the BCA may impact portfolio make-up and will work with the Joint Utilities to share best practices on NWS procurement and implementation processes.

State and local regulatory policies surrounding the use of natural gas can also impact NWS procurement and implementation. DG systems such as CHP and standalone fuel cells use natural gas to assist building operation and provide the electric grid with reliable load relief. Regulatory decisions to slow or cease natural gas permitting are a risk that impacts availability of certain DG systems to meet timelines to provide load relief needs under active NWS portfolios. The Company will continue to stay aware of changes to policies and account for these potential risks in portfolio development and during implementation of a NWS.

Stakeholder Interface

Con Edison will continue engaging stakeholders through the relevant Joint Utilities working groups, including a focus on DER Sourcing and NWS, Hosting Capacity, Forecasting, and VDER Value Stack. On a more direct level, the Company will continue one-on-one and group communications with NWS bidders to identify opportunities for enhancements in future NWS solicitations.

Additional Details

This section responds to the questions specific to beneficial locations for DER and NWS.

1) The resources provided to developers and other stakeholders for:

a. accessing up-to-date information about beneficial locations for DERs and/or energy efficiency measures;

The Company posts potential NWS candidates and past and present NWS solicitations on the Company's website,[194] on the Joint Utilities website, [195] and through REV Connect. [196] Information on beneficial locations can also be accessed through the hosting capacity map available through the Company's system data portal, where developers can search for an address and see in the pop-up box if that location is eligible for the LSRV adder.[197] Both the NWS and hosting capacity websites are linked from the central Joint Utilities website and easily located through an internet search.

b. efficiently sorting and filtering locations by the type(s) of capability needed, the timing and amount of each needed capability, the type(s) and value of desired benefit, the serving substation, the circuit, and the geographic area.

As noted in response to 1a above, the Company shares information on beneficial locations targeted for NWS through its NWS website and hosting capacity map. The NWS solicitations posted on the Company's website provide extensive detail on the system capability needed, the timing and amount of each needed capability, the serving substation and/or circuit, and the geographic area. The NWS solicitations also provide customer demographic information, including annualized consumption and peak and average billing demand.

[194] https://www.coned.com/en/business-partners/business-opportunities/non-wires-solutions
[195] http://jointutilitiesofny.org/utility-specific-pages/
[196] https://nyrevconnect.com/non-wires-alternatives/
[197] https://www.coned.com/en/business-partners/hosting-capacity

2) **The means and methods for identifying and evaluating locations in the distribution system where:**
   a. **a NWA comprising one or more DERs and/or energy efficiency measures could timely reduce, delay, or eliminate the need for upgrading distribution infrastructure and/or materially benefit distribution system reliability, efficiency, and/or operations; and/or,**

The Company's capital budgeting approach seeks to identify the investments needed to meet customer expectations for safe and reliable service while moderating impacts to the customer bill. Con Edison initiates its annual planning cycle immediately following the summer operating period with the development of forecasts and identification of load relief needs. Planning continues over the next several months with the identification of risk reduction, new business, and other system investments culminating in a proposed capital work plan for the next five-year period. The proposed capital investment plan, available internally in May, continues to undergo an iterative review and optimization process lasting up to six months, during which time projects may be added or deleted based on evolving system needs and priorities. The plan receives formal corporate approval and becomes the final Capital Investment Plan in November, which is then filed with the Commission the following February.[198] During the capital planning process, Company planners use load flow modeling, network reliability modeling, and modeling of system performance to assess the current capability of existing distribution and substation assets to meet the forecasted load, based on the design criteria, type of asset, thermal ratings, and local power factors. For assets that are determined to be at risk of becoming overloaded during system peak conditions and under various contingencies, multiple load relief project options are identified to mitigate the overload.[199]

The Company analyzes load relief needs at an area substation and sub-transmission level over a 10-year window and up to 3 years for distribution level feeders. The load relief projects (also referred to as system expansion projects) identified in the capital planning process are assessed against the NWS suitability criteria to determine suitable NWS candidates. Specifically, the Company reviews the list of projects in the 10-year load relief program and determines if the project meets the NWS suitability criteria, specifically if the project: (1) is for load relief, (2) has enough lead time to pursue a NWS without foreclosing the opportunity to install a traditional solution if needed, and (3) meets the financial threshold.

Figure 30 presents Con Edison's current NWS suitability criteria. [200]

[198] Con Edison 2016 Electric Rate Case & Con Edison 2019 Electric Rate Case, Report on 2019 Capital Expenditures and 2020-2024 Electric Capital Forecast (filed February 28, 2020).
[199] Other areas of system need identified through distribution modeling include risk reduction programs, new business projects to interconnect new customers, storm hardening or resiliency projects, emergency response and replacement, IT solutions to meet strategic business needs, and public works projects to re-route Company equipment due to municipal right-of-way.
[200] On March 1, 2017, the Joint Utilities submitted a compliance filing with individual utility-specific suitability criteria. DSIP Proceeding, Non-Wires Suitability Criteria. Note 48, *supra*.

Figure 30: Con Edison NWS Suitability Criteria

Criteria	Potential Elements Addressed	
Project Type Suitability	Project types include Load Relief or Load Relief in combination with Reliability.	
Timeline Suitability	**Large Project** (Projects that are on a major circuit or substation and above)	• 36 to 60 months
	Small Project (Projects that are feeder level and below)	• 18 to 24 months
Cost Suitability	**Large Project** (Projects that are on a major circuit or substation and above)	• No cost floor
	Small Project (Projects that are feeder level and below)	• Greater than or equal to $450,000

For projects satisfying the criteria, the Company defines the MW need and the time of day over which the relief is required and then determines the total capacity of NWS needed to replace the traditional project(s) and define the date(s) by which the relief is needed, which is a critical input for the solicitation.

Information about the capital project the Company seeks to avoid or defer is provided to the market via competitive solicitation. Based on responses, the Company evaluates the viability of implementing a NWS to meet the MW needs within the required timeframe and conducts a benefit-cost analysis informed by the BCA Handbook.

If the Company is able to assemble a feasible portfolio to meet the MW need and the NWS passes the SCT in the BCA, the Company procures the necessary solutions, files the BCA results, and begins implementation. If any of the suitability criteria are not met, or the Company is unable to assemble a feasible portfolio of cost-effective solutions, the Company pursues a traditional solution.

b. one or more DERs and/or energy efficiency measures could reduce, delay, or eliminate the need for upgrading bulk electric system resources and/or materially benefit bulk electric system reliability, efficiency, and/or operations.

The identification of system needs at the bulk electric level follows the same process as described in the response to 2a above. In certain instances, traditional solutions identified during the capital planning process include both bulk electric and distribution system resources. For example, the Water Street and Plymouth Street NWS solves for a traditional

solution that includes upgrades required at the distribution area substation, as well as at the sub-transmission feeder supplying that substation. To date, there have been no projects that are solely dedicated to the bulk electric system and have satisfied the NWS suitability criteria.

3) Locations where energy exported to the system, or load reduction, would be eligible for:

a. compensation under the utility VDER Value Stack tariff;

DER installed in any location are eligible for compensation under the VDER Value Stack tariff. There is a location-based adder known as the LSRV that is available in a certain area with a pre-determined megawatt capacity available. -If an area is identified for a potential NWS project, the LSRV will remain open only up until the market solicitation closes. Following a decision to pursue either the traditional capital project or the NWS to provide the necessary load relief in a particular area, new DER projects that have not yet locked in their VDER rates will not be eligible to receive LSRV compensation. Projects that have locked in their VDER rates prior to the closure of the NWS solicitation will retain their LSRV eligibility for the 10-year term. Those LSRV locations have been mapped onto the hosting capacity map. Additionally, the Company provides on its website information on the VDER tariff and links to the current and previous tariff sheets, which also list LSRV for eligible locations. [201]

b. utility dynamic load management programs, including the Commercial System Relief Program, Distribution Load Relief Program, and Direct Load Control Program;

The Company's load management programs, including the Commercial System Relief Program ("CSRP"), Distribution Load Relief Program ("DLRP"), and Direct Load Control[202] ("DLC") Program, seek to reduce transmission and distribution capacity costs for all customers. CSRP is dispatched to relieve network peak demand when the day-ahead and same-day forecasted load level is 92 percent or greater of the Company's forecasted system peak, while DLRP is activated to address contingencies at the network level. Table 15 provides an overview of the Company's load management programs.

Table 15: Con Edison Load Management Programs

Program	Purpose	Secondary purpose	Availability
Non-Wires Solutions (including BQDM)	Network peak	Defers or avoids load relief capital projects in targeted networks	Permanent or Dispatchable
DR – DLRP	Network Contingencies	Activated in response to network level contingencies	Dispatchable
Demand Management Program (DMP)[203] (2017-2019)	System peak	Service territory-wide system peak reduction with an emphasis on advanced technology	Permanent

[201] https://www.coned.com/en/save-money/using-private-generation-energy-sources/private-generation-tariffs

[202] Includes thermostats enrolled to participate in Con Edison Demand Response events as part of the Bring Your Own Thermostat (BYOT) program. BYOT participants can be called as part of any CSRP or DLRP event to provide additional Demand Response from residential customers.

[203] As of January 1, 2020, Con Edison's Demand Management Program (DMP) is no longer an active program.

DR - CSRP	Network peak	Activated to relieve distribution network peak loads	Dispatchable
DLC	Supporting peak and contingency DR activity	Enrolled thermostats can be dispatched to support either CSRP or DLRP events and are called using the same criteria and structure.	Dispatchable
SmartCharge New York	System peak	Incentivizes EV charging during system off-peak hours	Permanent

c. and/or, increased value-based customer incentives for energy efficiency measures with load profiles that align with the system needs through utility energy efficiency programs or New York State Energy Research and Development Authority's (NYSERDA) Clean Energy Fund (CEF) programs, while ensuring utility-NYSERDA coordination.

Increased customer incentives based on alignment with location-specific system needs are only considered in areas targeted for NWS. Con Edison and its efficiency vendors engage customers in those areas through direct marketing to make them aware of the additional incentives. Further, the Company continues to coordinate with NYSERDA to align incentive programs for DG and energy storage systems in beneficial locations. Under the BQDM program, Con Edison provided a matching incentive program to NYSERDA's PON 2568 to accelerate load relief from CHP technologies that supported deferment of traditional distribution system upgrades.

2.14. PROCURING NWS

NWS have become a core business function within the capital planning process and remains an important mechanism for bringing DER onto the system. NWS offer opportunities for developers to propose innovative solutions to meet a clearly defined system need, while delivering customer and environmental benefits. To date, market response has been strong, with many proposals testing novel concepts and incorporating advanced technologies. Con Edison continues to learn from its experiences and the collective experience of the Joint Utilities and is pursuing creative options to expand opportunities for NWS.

Implementation Plan, Schedule, and Investments

Current Progress

Summary of Achievements

- Implementing portfolios to defer traditional projects as part of the Plymouth Street, Water Street, Williamsburg, and Newtown solicitations.
- Issued storage-specific RFP and standard contract terms to increase energy storage in Water Street and Newtown portfolios.
- Encouraged developers to propose innovative solutions, including advanced technologies.
- Continued engaging stakeholders throughout the RFP process to share information, improve future NWS solicitations.
- Improved the RFP process in coordination with the Joint Utilities and in response to stakeholder feedback, including adopting a similar structure for RFPs, conducting feedback sessions with vendors to inform future solicitations, and providing earlier notice to market of potential RFPs.

Con Edison is progressing through the lifecycle of NWS projects, with several projects now in the implementation stage. Since first exploring the ability to defer traditional projects through non-traditional solutions under the BQDM program, the Company has established formal processes for the identification of NWS opportunities and, in consultation with the Joint Utilities and stakeholders, has standardized and streamlined the solicitation process, reducing transaction costs and barriers to entry for solution providers. The Company has also gained experience assembling portfolios, including leveraging advanced technologies like energy storage and trying different programmatic approaches, in order to create viable NWS opportunities that meet the system need. As a result, the active NWS projects—BQDM, Water/Plymouth Street, and Newtown—are delivering positive results and building confidence in the performance of NWS as alternatives to traditional investments.

NWS Market Opportunities

Con Edison is working to implement portfolios assembled as a result of 2017 and 2018 solicitations. Specifically, through a NWS portfolio, the Company expects to meet the combined load relief needs of the Water Street and Plymouth Street substations through summer 2021. The Water Street and Plymouth Street NWS portfolio requires 32 MW of relief for the period beginning summer 2019 through summer 2021. To achieve the load relief needed by summer 2019, the Company started implementing EE adder programs in summer 2018 in the two networks supplied by the Water Street

substation.[204] These existing EE programs are leveraged in the early years of portfolio implementation since these standard technologies have the shortest implementation timeline. Additional load relief is expected to come from DG and energy storage.

As indicated in the Company's Q4-2019 NWS report, the Company assembled a cost-effective portfolio of DER to meet the identified need in the Newtown area. This project highlights the need for agility and flexibility in assembling a viable NWS portfolio under evolving system needs. Initially, the area was expected to need about 4 MW of load relief in the year 2022, with the required load relief expected to increase incrementally over the next 10 years. The Company's updated load relief plan showed that the need has advanced, requiring reductions starting in 2021. An alternate traditional project requiring the transfer of 40 MW of load from Newtown Substation to North Queens Substation in 2021 has been identified, replacing an additional transformer and new sub-transmission feeder installation previously identified for the Newtown substation.

The first RFP for Newtown was released July 6, 2018 with an energy storage-specific solicitation announced June 14, 2019, providing market vendors with the opportunity to bid energy storage into the Newtown portfolio and have access to the NYSERDA's energy storage incentive announced in the spring 2019. From these RFP responses, the Company developed a portfolio of customer-sided solutions with EE and energy storage solutions that defer the traditional solution and is proceeding with implementation.

In other cases, such as W. 42nd Street, the Company was unable to assemble a viable portfolio of cost-effective load reduction from the submitted RFP responses in light of changes after the market solicitation in the Company's load relief plan that showed an accelerated and increased load relief need in the network. Given the network size, customer demographics, and load relief need, the market responses were not feasible due to timing constraints and significant penetration of load relief required.

As noted in the Company's NWS quarterly reports, the latest load relief plans have not identified any additional NWS opportunities due to decreases in the load forecast that pushed the need outside of the planning horizon. Part of the decrease in peak load results from projected increases in the Company's EE penetration as a result of the NENY goals.

The Company continues to assess the potential for NWS in other areas, including opportunities presented by the retirement of generating facilities within New York City due to the DEC rule related to NOx emissions.[205]

Best Practices and Process Improvements

Developing and managing solicitations has provided valuable experience that is being leveraged to refine the Company's internal operating procedures and improve the solicitation process for developers and third parties. Process improvements included:

- Extending RFP response time and providing early notice of potential NWS projects to the market where possible.
- Standardizing the format of information to provide in response to market solicitations.
- Allowing bidders to submit clarification questions during specified windows.
- Hosting webinars for interested parties prior to or following RFP release.
- Standardizing data requests to facilitate proposal review, including anticipated revenue streams for energy storage-related responses.

[204] Additional information on active NWS projects are provided in the Company's annual NWS implementation plans and NWS quarterly progress reports filed in Case 19-E-0065. Past quarterly reports are found in Case No. 16-E-0060.
[205] https://www.dec.ny.gov/regulations/116175.html

- Establishing a standard contract for energy-storage assets participating in NWS.

While it is possible to standardize many of the NWS procedures, Con Edison has observed that each NWS is unique in terms of size, nature of the need, and the types of technology solutions to be evaluated, which is driving continued learning. For example, the Company has created internal processes to help develop and analyze portfolios quicker, improving portfolio and BCA analysis tools to more quickly analyze suitable NWS solutions and identify cost-effective portfolios.

Additionally, the Joint Utilities' DER Sourcing Working Group has continued to meet on a bi-weekly basis to share lessons learned and discuss solicitation and contracting topics, including but not limited to availability and potential use of utility property and interconnection cost treatment; contract language regarding DER participation in multiple revenue streams; and commercial and performance requirements and non-performance issues of NWA contracts.

Going forward, the Company may choose to undertake specific research and analytics efforts as it identifies customer-sited projects in order to have more detailed information concerning procurement strategies, nature of load in the targeted areas, and cost-effective opportunities for partnerships with market participants and stakeholders in the area.

Future Implementation and Planning

Summary of Future Actions

- Refine the solicitation process to improve efficiency and create a more uniform, consistent, and predictable market mechanism.
- Refine contracts to account for evolving market conditions and compensation streams for energy storage solutions.
- Continue enhancing communication on the selection and portfolio development process, as well as feedback to vendors to improve likelihood of selection and a successful NWS.
- Explore evolving operational and performance requirements to allow bidders to more readily pursue other revenue streams for DER.
- Provide additional information related to energy storage requirements in NWS areas, interconnection, and market participation.

With continued stakeholder dialogue, sharing experiences within the Joint Utilities, and ongoing experience through present and future rounds of NWS solicitations, the Company expects to further refine and improve the efficiency of its solicitation process. The Joint Utilities continue to share experiences and lessons learned to achieve a consistent set of best practices and improve the solicitation processes to be more efficient and user-friendly. This includes reviewing the NWS suitability criteria as part of the annual planning process and evolving how NWS can address those needs.

The Joint Utilities DER Sourcing Working Group will also continue discussions around the following sample topics identified for 2020:

- Portfolio development (multi-project selection – cost and performance optimization).
- Non-pipes solutions and applicability of NWS electric processes and best practices to natural gas.
- NYISO development of rules for DER participation.
- Availability and potential use of utility property and interconnection cost treatment.

The ongoing Joint Utilities discussions will also include developing utility-specific operational and performance requirements that inform bidders of the specific expectations and services required to meet the system need and allow bidders to explore other revenue streams for the DER, where applicable.

Risks and Mitigation

The identification of potential NWS candidates is integrated into the annual planning process, which occurs on a regular schedule. However, as the case with the Parkchester cooling project, for example, the load can decrease as a result of external factors, which mitigates the need for load relief and can result in the cancellation of the solicitation. Alternately, the load relief need can accelerate, leaving too little time for NWS implementation. As described above, the Company continues to refine its solicitation process to meet evolving stakeholder needs and become more efficient at building portfolios and proceeding with selected vendors.

Misalignment in wholesale market and distribution-level service rules and performance obligations may limit additional revenue streams available to support NWS projects. The Company will continue to coordinate with the NYISO to understand dual participation between wholesale markets and distribution-level services.

Stakeholder Interface

The Joint Utilities hosted one stakeholder session in 2019. The May 2019 webinar focused on updates to the evolving NWS procurement process. During the webinar, the Joint Utilities updated stakeholders on the overall NWA process, including identification of open RFPs and status of awarded projects, as well as lessons learned from awarded and withdrawn RFPs, BCA approaches, and a review of the suitability criteria.

The Company's ongoing presence and strong relationships with stakeholders in NWS areas facilitates the Company's ability to convene formal and informal meetings with local stakeholders. Depending on the type of program implemented, the stakeholders may include elected officials, local chambers of commerce, business improvement districts, local development corporations, not-for profit community-based organizations, government entities such as community boards and the New York City Housing Authority, community housing associations, block associations, and tenant associations. For example, the BQDM community engagement model includes leveraging its relationships with elected officials, community organizations and other community stakeholders within the target areas.

Additional Detail

This section responds to the questions specific to procuring NWS.

1) **How the NWA procurement process works within utility time constraints while enabling DER developers to properly prepare and propose NWA solutions which can be implemented in time to serve the system need.**

Con Edison continues to balance adequate response times and timing to successfully implement the load relief need. During stakeholder engagement sessions in April 2017 and November 2017, stakeholders discussed the time frame for developers to respond to RFPs and generally agreed that additional time would result in higher quality proposals, recognizing that the appropriate response time depends on the type, size, and location of the project. In response, Con Edison extended its RFP response times from the 6 weeks initially allotted in Round 1 to 10 weeks in Rounds 2 and 3. In one-on-one discussions with various RFP respondents, the respondents generally agreed they are given sufficient time to prepare responses.

2) **The NWA procurement means and methods; including:**
   a. **how the utility and DER developers time and expense associated with each procurement transaction are minimized;**

Con Edison has taken a number of steps to reduce the time and expense of the solicitation process. The Company is using its experience from past solicitations to create an efficient, user-friendly experience for developers and further define internal operating procedures. To create a more predictable and repeatable pathway for developers to access the market via NWS, Con Edison is working with the Joint Utilities and stakeholders as part of the DER Sourcing Working Group to establish best practices for developing more uniform and consistent solicitations.

The Company posts early notification of potential NWS areas where applicable on both its website and hosting capacity maps to allow market vendors to begin identifying potential solutions. In addition, the Company has developed standard contracts for load reduction, which is streamlining procurement of resources following selection.

   b. **the use of standardized contracts and procurement methods across the utilities.**

The Joint Utilities continue to share lessons learned and best practices from developing and implementing specific NWS RFPs (including the supporting data) and resultant contract terms and conditions to work toward a more similar approach to procurement within the Company and across the Joint Utilities. Con Edison uses a standard program agreement, including an energy-storage specific agreement, which can be customized for specific solutions, as needed. For example, a NWS contract will clearly state available incentives, approved solutions, and expectations for the intended use of the resource by the utility, as well as operational and commercial requirements including expected performance and corresponding payment terms.

In terms of payment guidelines, the utility must clearly outline payment duration and schedule and include language that holds DER vendors accountable for commercial payment and require bids to include the cost of any necessary security instruments. Through the information sharing across the utilities, the Joint Utilities agreed that contracts should also include clear and consistent use of key terms and descriptions regarding the NWS DER vendor's market participation, regardless of payment cadence. Standard NWS contracts are available on the Company's website.

3) **Where, how, and when the utility will provide a resource to DER developers and other stakeholders for accessing up-to-date information about current NWA project opportunities. For each opportunity, the resource should describe the location, type, size, and timing of the system need to be addressed by the project.**

Current NWS project opportunities are widely publicized to promote broad awareness and advanced notice of upcoming market opportunities. NWS solicitations are available at the following online resources:

- Con Edison website (https://www.coned.com/nonwires)
- Con Edison hosting capacity map (https://www.coned.com/en/business-partners/hosting-capacity)
- Joint Utilities of New York central data portal (http://jointutilitiesofny.org/utility-specific-pages/nwa-opportunities/)
- REV Connect (https://nyrevconnect.com/non-wires-alternatives/)
- Filed with the Commission under the generic REV proceeding (Case No. 14-M-0101) and Con Edison's rate case proceedings (Case No. 16-E-0060 and Case No. 19-E-0065)

4) **How the utility considers all aspects of operational criteria and public policy goals when selecting which DERs to procure as part of a NWA solution.**

One of the key priorities in building a portfolio of NWS is meeting the system need. NWS portfolios that are expected to meet the system need are then evaluated using the BCA Handbook. The technology solutions considered are informed by what the market provides. However, the Company has encouraged innovative solutions in recent solicitations and has been creative in assembling portfolios in both new and active NWS.

The Company defines innovative solutions as solutions that: (1) target customers and uses technologies that are currently not part of Con Edison's existing programs, (2) target generally underserved customer segments, and/or (3) are based on the use of advanced technology that helps foster new DER markets and provides potential future lessons learned. In practice, the Company is receiving proposals and building balanced portfolios that incorporate EE, energy storage, and other DM solutions, thus helping to meet public policy goals. Proposals are generally evaluated using the following criteria:

- Proposal content and presentation
- Cost-effectiveness
- Execution risk
- Respondent qualifications
- Customer acquisition
- Timeliness
- Proposed projects coincidence with the load relief needs
- Reliability and availability of the resource
- Community impact
- Innovation (e.g., underserved customer segment)

Considerations for assembling a NWS portfolio include, but are not limited to, ability of the solutions to meet the identified load relief at the network peak and for the duration of the overload, cost-effectiveness, execution risk of the various solutions, and the ability to achieve a SCT score of 1.0 or greater as required by the Commission. Where the proposals received have been insufficient to meet the need and there is adequate lead time, the Company may pursue other buying strategies. Examples of how the Company has been creative in assembling viable NWS portfolios include providing scoring criteria that rewards innovative solutions and releasing energy-storage specific RFPs.

5) **Where, how, and when the utility will provide DER developers and other stakeholders with a resource for accessing up-to-date information about all completed and in-progress NWA projects. The information provided for each project should:**
   a. **describe the location, type, size, and timing of the system need addressed by the project;**

The Company's NWS website contains the solicitation documents for completed and in-progress NWS projects. Additionally, the Company files quarterly reports and an annual report in Case Nos. 16-E-0060 and 14-E-0302 (BQDM) that provide up-to-date information about completed and in-progress NWS projects. Starting with the Q1-2020 quarterly report, NWS reports will be filed in Case No. 19-E-0065 (latest rate case). [206]

[206] This is the latest quarterly report: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7bCBEAFEDD-2EBD-482A-82CC-A73D33704B11%7d

b. describe the location, type, size, and provider of the selected alternative solution;

Currently, the Company provides updates on the location, type, and size of solutions in its quarterly and annual reports. Solution providers are not publicly identified at this time.

c. provide the amount of traditional solution cost which was/will be avoided;

Con Edison does not provide the cost of the traditional solution. Revealing the traditional solution cost could result in suboptimal procurement results to the detriment of utility customers.

d. explain how the selected alternative solution enables the savings; and,

Con Edison provides information on the expected load reduction for each solution in the annual implementation plans.

e. describe the structure and functional characteristics of the procurement transaction between the utility and the solution provider(s).

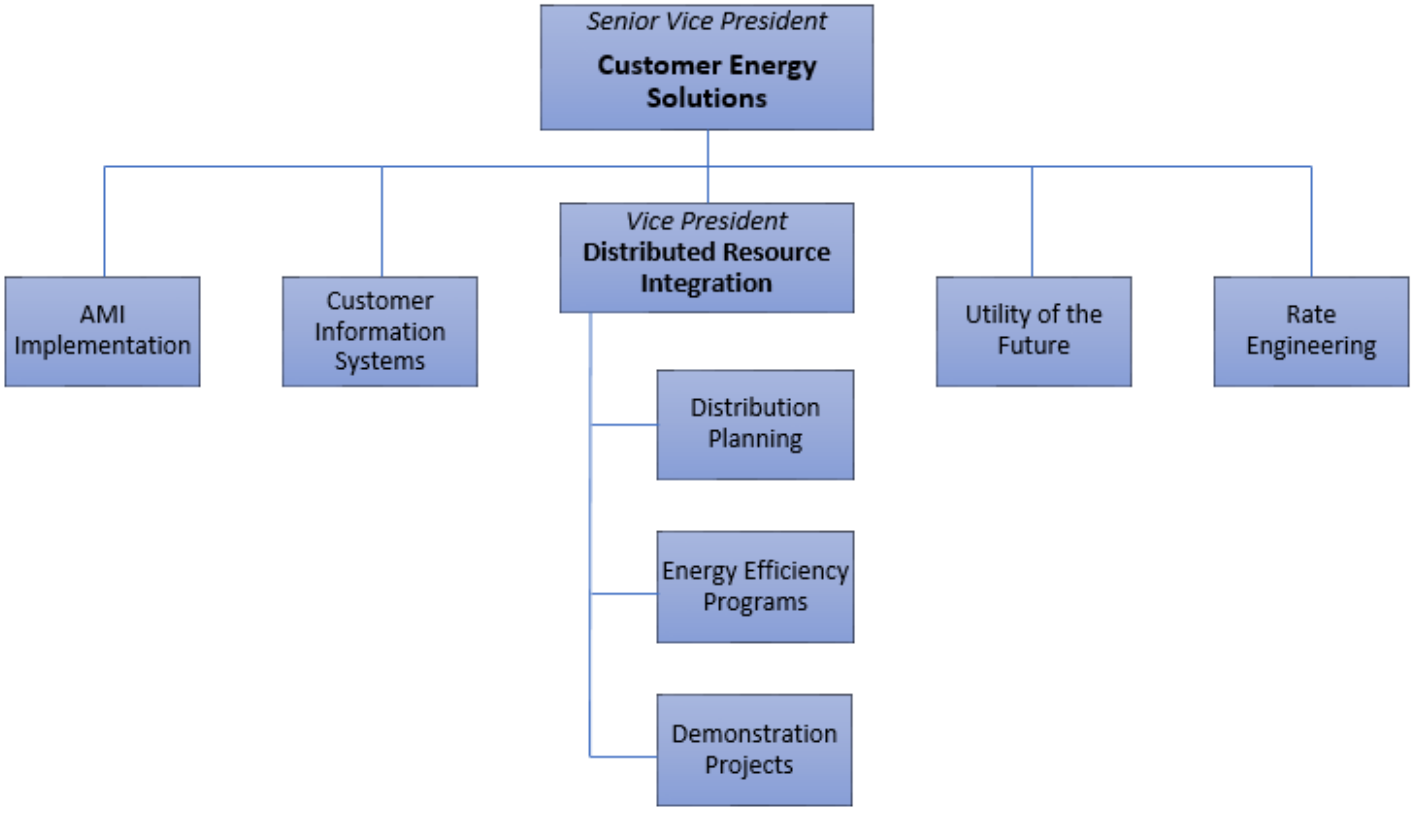
The Company interprets this question to refer to information about the procurement mechanism, such as RFP or auction. This information is available in the solicitation documents available on the Company's NWS website and quarterly and annual reports.

3. OTHER DSIP-RELATED INFORMATION

3.1. DSIP GOVERNANCE

Con Edison's organizational structure brings together policy, business, and technical experts to support more holistic approaches to REV implementation and improve the customer experience. Effective November 1, 2017, realignments in Con Edison's organizational structure resulted in the formation of the CES organization. The CES organization guides the Company's overall clean and distributed energy strategy and is leading the Company to evolve its energy business to become cleaner, adapt its business model to be more innovative, and transform the customer experience to provide best-in-class service. The group is focused on expanding customer choice, enhancing the customer experience, and fostering customer engagement, including integrating DER and other customer-facing technologies and supporting markets for new customer products and services. To improve this focus, the EEDM, Distribution Planning, and Demonstration Projects groups now report to a vice president of Distributed Resource Integration. CES further unites a broader set of functions that influence the customer experience, including AMI implementation, CIS, and rate engineering. Figure 31 shows the business functions that fall within CES and report to the Senior Vice President of CES, who directly reports to the President of CECONY.

Figure 31: CES Organizational Structure



Organizational adjustments are enacted within CES to further align functions and support greater efficiencies, occasionally resulting in the formation of new groups. For example, as discussed in Section 2.10, the Company consolidated interconnection support functions and assigned additional SMEs to increase the Company's ability to respond to interconnection requests. Additionally, the Utility of the Future group's role was expanded beyond policy

guidance leadership to lead Con Edison's first bulk energy storage solicitation. The Utility of the Future team also leads a corporate-wide innovation center of excellence, referred to as the "Innovation Hub," to strengthen the Company's existing capability to identify and facilitate the development of transformative innovation projects and provide governance over innovation project development. The initiative complements and builds upon the Company's existing innovation efforts, REV Demonstration Projects, and Research and Development ("R&D") and creates a new structure for identifying, developing, and scaling innovation activities that fall outside the areas addressed by existing R&D and REV Demonstration activities. Under this initiative, the Company will develop and scale innovative ideas that are technically mature enough to not require further R&D investigation but whose path to customer and commercial success remains uncertain.

These organizational changes demonstrate the Company's commitment to accountability, intra-company coordination, and standardization where possible and where it results in greater efficiency. Through greater institutional coordination and communication, the Company can better disseminate best practices and lessons learned, feeding a culture of continuous improvement.

At the executive level, formal committees provide strategic direction on Company initiatives, including DSP development and grid modernization, and the necessary approvals to proceed. Executives from the relevant business areas participate to exchange information and represent a variety of perspectives to inform decision-making.

This organization and committee structure align the people, processes, and technologies to facilitate DSP development and provides the appropriate oversight and management of DSP-related work streams and functions. Core DSP work streams, such as hosting capacity, DERMS, modernizing protective relays, and SCADA and metering upgrades, are managed by dedicated project managers, who coordinate with the DSP Project Team within Distribution Planning. Key responsibilities of the DSP Project Team include leading cross-functional efforts to manage the DSP budget and appropriate funds, track project progress, and report on DSP achievements and challenges. The DSP Project Team also coordinates with other teams outside of CES, such as Legal and Government Affairs, through regular update meetings. Currently, Distribution Planning has primary responsibility for developing the DSIP, with input from other groups internal and external to CES.

The DSIP serves as a core planning document for the Company, outlining its plans across DER integration, information sharing, and market services over the course of the next five years based on current Company and New York State priorities and objectives. While the Company's DSIP is separate and distinct from its rate case, the DSIP will ultimately serve to inform subsequent rate case filings. The Company's rate case filing builds from the five-year plan within the DSIP and incorporates additional inputs from other regulatory, policy, and litigation processes to prioritize investments for which the Company will seek cost recovery.

Joint Utilities Collaboration

The Joint Utilities are working together to foster common and consistent approaches, tools, and methodologies that will support statewide markets for DER products and services and help reduce transaction costs for third-party providers. The Joint Utilities strive for standardization where possible, recognizing that the utilities are diverse in their service territories, grid configurations, data availability, and the degree of development of existing capabilities. The Joint Utilities also regularly share lessons learned from demonstration projects and ongoing efforts implementing REV.

In 2014, each utility appointed leaders to serve on the REV Leadership Team ("RLT"), which meets weekly to raise awareness of emerging issues, collaborate on shared initiatives, and work toward alignment on the way the Joint Utilities plan for and transition to their new roles as DSP operators. The RLT established two committees—the Regulatory Policy Committee ("RPC") and DSP Steering Committee. The RPC coordinates the Joint Utilities' efforts in policy and rate-related proceedings that fall under the larger REV framework. The DSP Steering Committee discusses

strategic issues affecting the Joint Utilities and makes collective decisions on behalf of the Joint Utilities. The Steering Committee meets twice per month.

For example, to support consistency across the Joint Utilities, the DSP Steering Committee aligned around a common definition of the DSP and a common outline for the 2018 DSIP filings to make it easier for stakeholders to navigate the DSIP filings. The Steering Committee also oversees seven topic-specific implementation Working Groups, which Table 16 lists below. These Working Groups, staffed by utility SMEs, were formed to discuss specific technical details, share best practices, and reach common recommendations on how to implement DSP functions. To support these collaborative processes across the six companies, the Joint Utilities retained a consultant to provide project management office functions and technical expertise, as well as coordination of the implementation working groups and related stakeholder engagement efforts.

Table 16: Current Joint Utilities Implementation Working Groups[207]

Working Groups	
1	Integrated Planning
2	Interconnection
3	ISO-DSP Coordination
4	DER Sourcing/ NWS Suitability Criteria
5	Electric Vehicles
6	Energy Storage
7	Information Sharing

To improve transparency and facilitate information sharing, the Joint Utilities collectively maintain and regularly update their website (www.jointutilitiesofny.org) with valuable resources for interested parties. For example, the utilities post a quarterly summary of current Joint Utilities DSP enablement activities to the website homepage each month to keep third parties informed of efforts to advance DSP implementation. The Joint Utilities enhanced their website by compiling utility-specific links for hosting capacity, system data, EVs, and NWS opportunities. The website also serves as a valuable repository for stakeholder information, providing key policy and regulatory documents, detailing past stakeholder meetings, summarizing inputs that stakeholders have previously provided and next steps for addressing them, and providing links to other resources such as REV Connect. The Joint Utilities welcome suggestions to enrich the website through their email address at: info@jointutilitiesofny.org.

[207] For 2020, the Load and DER Forecasting and Hosting Capacity Working Groups were consolidated into the Integrated Planning Working Group and the Customer Data and System Data Working Groups were consolidated into the Information Sharing Working Group. M&C was merged into other groups like ITWG, Grid Ops Working Group, and the Smart Inverter Strategic Initiative.

3.2. MCOS STUDY

The 2018 DSIP Guidance requires utilities to include a publicly accessible web link to the latest version of the utility's MCOS study. Con Edison's latest approved MCOS study was filed in the DSIP proceeding, Con Edison 2016 Electric Rate Case, and VDER Proceeding and is available by searching for Cases 16-M-0411, 16-E-0060, or 15-E-0751 on the DPS website found here: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx

3.3. BENEFIT COST ANALYSIS

The 2018 DSIP Guidance requires utilities to include a publicly accessible web link to the latest version of the utility's BCA Handbook. Con Edison's current BCA Handbook is available by searching for Case 16-M-0411 on the DPS website. This is the direct link: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-M-0411&submit=Search

APPENDIX A: LOAD AND DER FORECASTS

The forecast data is organized in the sections below as follows:

- System-level forecasts:
  - 5-year peak demand forecast
  - 10-year peak demand forecast
  - 5-year energy forecast
- Network area forecasts:
  - 10-year independent peak demand forecast
- DER forecasts
  - DSM (including EE and DR)
  - DG (including solar PV, CHP, other generation, and energy storage)

SYSTEM FORECASTS

Forecast of System Peak Demand Growth

Every year, following the summer peak season, the Company produces a series of forecasts to guide the next planning cycle, including 5- and 10-year electric system peak demand forecasts and a 5-year system energy forecast. The single electric system peak hour (system-wide and by network load area) developed as part of the peak demand forecast sets the design point for maintaining system reliability.

These forecasts are developed using a hybrid of top-down and bottom-up methodologies, which improves forecasting accuracy by allowing for cross-referencing of meter data and queued projects with overall macro-economic trends. Additionally, by comparing the top-down system-wide peak load analysis to the bottom-up network peak load analyses, the Company can verify the allocations of load in its annual peak load forecast.

The electric peak demand forecast is produced by adding incremental MW demand growth of key customer sectors: residential, commercial, and governmental. Along with sector demand growth, non-sector-specific technology-driven load growth is also added, such as EVs or conversions from steam to electric A/C.

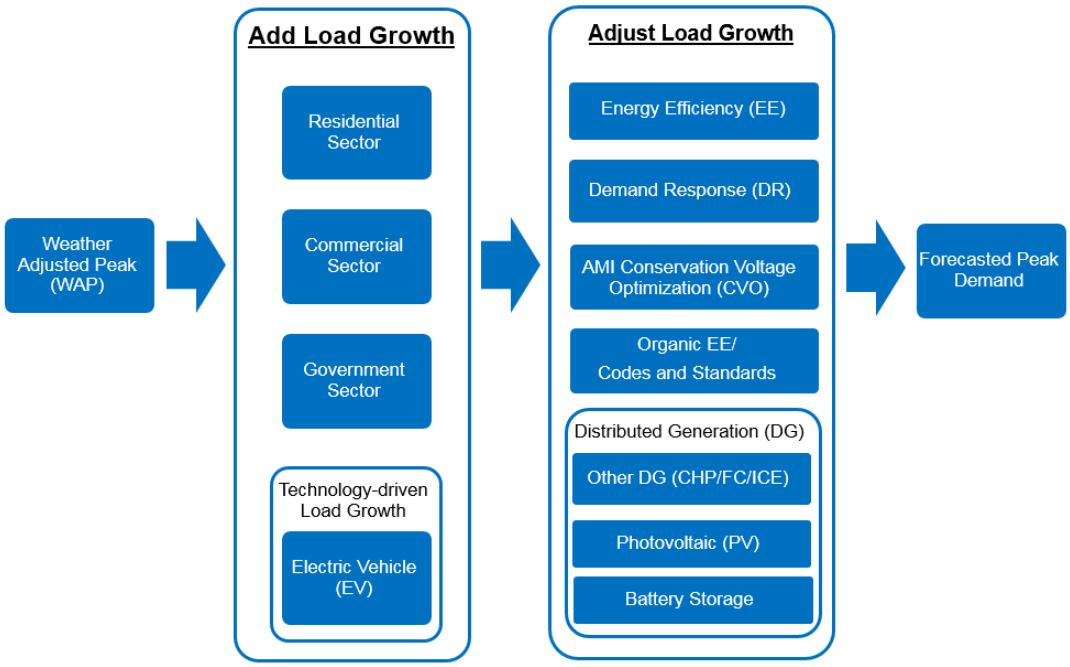
To determine residential sector growth, the residential top-down econometric model considers number of households, real disposable income and gross metro product. To determine commercial sector demand growth, the commercial top-down econometric model considers the number of customers by service classification, the price of electricity, and other macroeconomic measures. Governmental sector demand growth is calculated by aggregating announced projects for the initial years of the system forecast (bottom-up methodology), before switching to a top-down approach.

There are various DER measures that offset demand, such as EE, DR, DG, PV, energy storage, and targeted load relief programs, collectively referred to as negative load modifiers. Organic EE and CVO were added as load modifiers in the fall 2017 forecast. DER are forecasted using primarily bottom-up methodologies by counting projects or program totals for both system and network forecasts. EE and DR forecasts are based on program-level projections based on historical and expected future performance. DG, including all solar, CHP, and energy storage, are forecasted using cumulative historical penetration, known queued projects, and extrapolated future growth rates. The details and underlying assumptions regarding the forecasting of DER will be described in greater detail below in the DER Forecasts section.

The positive load modifiers, EVs and steam to electric A/C, are also forecasted using a bottom-up methodology. EV forecasting is based on current registration data from the Department of Motor Vehicles, expected growth rates based on state goals and consultant studies,[208] and the assumed average kW per vehicle. Steam to A/C conversions are driven by steam chillers reaching the end of their useful lives and being replaced by electric chillers. Incremental load growth from steam to electric A/C is based on the aggregation of all customer conversions and is provided by the Steam Operations team.

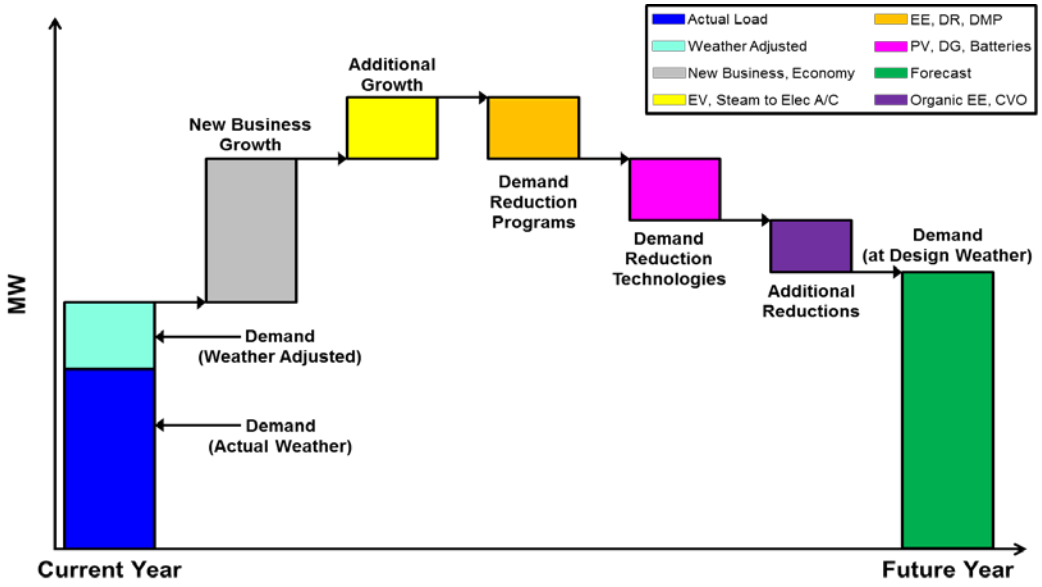
As noted above, the sector forecasts generally use a top-down methodology, which takes a holistic view of macro-economic conditions that influence electric demand. Bottom-up methodologies are generally used when there is sufficient data available to build a forecast. The combination of top-down and bottom-up works well for forecasting demand growth, as it allows cross-referencing of the meter data and queued projects with the overall macro-economic trends. Figure 32 and Figure 33 below show the basic process of producing a system peak forecast.

Figure 32: System Peak Forecasting Process - Summer Peak



[208] M.J. Bradley & Associates, *Plug-in Electric Vehicle Cost-Benefit Analysis: New York* (December 2016), https://www.mjbradley.com/sites/default/files/NY_PEV_CB_Analysis_FINAL.pdf.

Figure 33: Illustrative Process of Adjusting Forecasting (not to scale)



The Company continues to improve the accuracy of its forecasts, with only minor deviations between forecasts and actuals. For example, over the past three years, the difference between the WAP and the forecasted peak for the given year has been below 1.5 percent for the system and below 3 percent for the independent networks. The variance is expected to decrease as more experience with DER is gained, all else being equal.

Five-Year System Peak Demand Forecast

The following five-year system peak demand forecast was issued in October 2019 and covers the years 2020 to 2024. Table 17 shows the overall electric system load growth is forecasted to be nearly flat, with a CAGR of -0.1 percent over the 5-year period, though load growth in many individual load areas is projected to be higher, driven by the resurgence of certain residential neighborhoods in Brooklyn, Queens, and Manhattan. For example, the Company is forecasting 11.5 percent annual growth for 5 years for the Pennsylvania Network due to the redevelopment of the west side of midtown Manhattan. This localized load growth includes one of the largest private real estate developments in the history of the United States, which has led to the creation of a new network, named Midtown West, to alleviate overloads at a substation in the area. Contributing to the development of these mixed-use areas is growth in the hospitality, tourism, health care, and technology sectors.

Table 17: 2019 Electric Five-Year System Peak Demand Forecast (MW) – Summer Peak

		2019	2020	2021	2022	2023	2024
1	**WAP/ Load Growth Forecast**	**13,222**	**13,427**	**13,633**	**13,847**	**14,010**	**14,124**
2	MW Growth:		205	205	214	164	113
3	% Growth:		1.6%	1.5%	1.6%	1.2%	0.8%
4	**Additional MW Growth (Rolling Incremental)**						
5	EV		8	19	39	63	90
6	Steam A/C Conversion		7	14	21	28	34
7	**Load Modifiers (Rolling Incremental)**						
8	PV		-27	-55	-83	-107	-125
9	DG		-32	-63	-78	-87	-97
10	Battery Storage		-2	-37	-50	-53	-59
11	AMI CVO		0	-17	-17	-126	-126
12	Organic EE/ Codes and Standards		-71	-129	-181	-231	-270
13	**Coincident DSM (Incremental)**						
14	Con Edison EE		-79	-84	-86	-76	-72
15	NYSERDA EE		-4	-3	-2	-1	-1
16	NYPA		-4	-2	-1	-1	0
17	BQDM		-1	-2	-2	-2	-2
18	DR		-1	-1	-1	-1	-1
19	Total Incremental DSM:		-89	-92	-91	-81	-76
20	Rolling Incremental DSM:		-89	-182	-273	-354	-430
21	**System Forecast net of both positive and negative modifiers**		13,219	13,184	13,224	13,142	13,140
22	MW Growth:		-3	-35	40	-82	-2
23	**Rounded System Forecast net of both positive and negative modifiers**		**13,220**	**13,180**	**13,220**	**13,140**	**13,140**
24	MW Growth (Rounded):		-2	-40	40	-80	0
25	% Growth:		*-0.02%*	*-0.30%*	*0.30%*	*-0.61%*	*0.00%*

Note: 2019 Demand is Weather-Adjusted

System forecast line item descriptions:

Line 1: Weather adjusted peak (WAP)/Load Growth Forecast: WAP in 2019 and new business load growth forecasts in 2020 and beyond

Line 2: MW Growth: Cumulative growth of residential, commercial, and governmental sectors

Line 3: Percentage Growth: Growth as a percentage of the base

Line 5: EV – The incremental load growth associated with EV charging

Line 6: Steam A/C Conversion – The incremental load growth associated with customers converting steam chillers to electric air-conditioning

Line 8: Photovoltaic (PV) – The cumulative effect of the solar units (PV) coincident with peak hour demand

Line 9: DG – The peak load reduction associated with non-solar generators (*e.g.*, CHP, gas turbines, *etc*.)

Line 10: Energy Storage – The peak load reduction associated with appropriately rated batteries

Line 11: AMI CVO – The peak load reduction associated with appropriately estimated CVO impacts

Line 12: Organic EE/ Codes and Standards – The peak load reduction associated with appropriately estimated Organic EE/ Codes and Standards

Line 13: Coincident DSM (Incremental): Category heading for the below seven lines

Line 14: Con Edison EE: Annual incremental forecasted system coincident demand reductions from Con Edison's EE programs

Line 15: NYSERDA EE: Annual incremental forecasted system coincident demand reductions from NYSERDA's EE programs

Line 16: NYPA: Annual incremental forecasted system coincident demand reductions from NYPA EE/DM projects

Line 17: BQDM: Annual incremental forecasted system coincident demand reductions from the BQDM program

Line 18: DR: Annual incremental forecasted system coincident demand reductions from Con Edison's commercial and residential DR programs. It does not include NYISO DR.

Line 19: Total Demand Side Management (DSM) - Annual sum of peak reduction programs

Line 20: Rolling Incremental DSM – Total sum of new (*i.e.,* not baked into the previous year's WAP) peak reduction programs, including the previous year's

Line 21: System Forecast less DSM, less DG, PV, Battery Storage, and AMI CVO + EVs + Steam A/C – System forecast including all incremental growth and load modifiers

Line 22: MW Growth – Net growth; sector growth plus technology driven growth less DER load modifiers

Line 23: Rounded System Forecast net of positive and negative load modifiers. System Forecast rounded to the nearest 10 MW

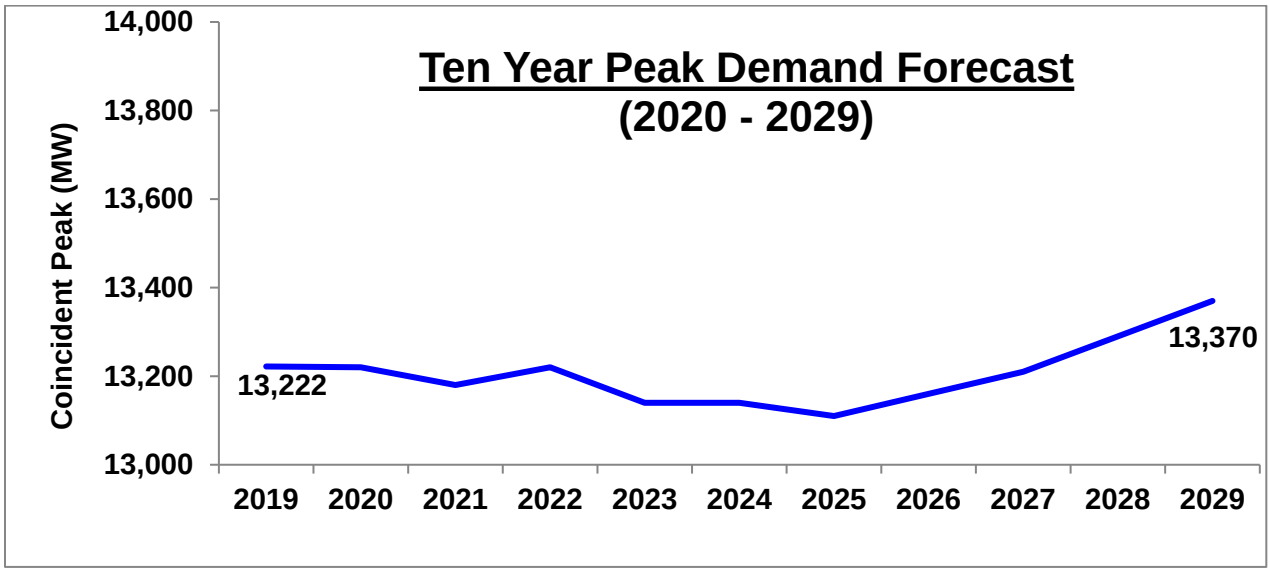
Line 24: MW Growth (Rounded): Net growth rounded to the nearest 10 MW; sector growth plus technology driven growth less DER load modifiers

Line 25: Percentage Growth – Rounded MW Growth as a percentage of the rounded system forecast

10-Year System Peak Demand Forecast

The following 10-year system peak demand forecast was issued in October 2019 and covers the years 2020 to 2029. Figure 34 shows the 10-year CAGR is 0.1 percent, resulting in a 2029 system coincident peak of 13,370 MW. This is a 130 MW increase compared to the 2018 forecast. While EVs and new business growth are contributing to an increase in load, this increase is more than offset by forecasted load reductions from DSM, PV, DG, and energy storage and the addition of organic EE/Codes and Standards and CVO as negative load modifiers. The impact of CVO implementation is estimated using a 1.0 percent reduction of the forecast for the affected borough. This is done both for the system and network forecasts.

Figure 34: 10-Year System Coincident Peak Demand Forecast



5-Year CAGR (2020 – 2024)	-0.1%
10-Year CAGR (2020 – 2029)	0.1%

Five-Year System Energy Forecast

The current delivery volume forecast for Con Edison's service classes reflects an approximate nine percent decline in sales over the five-year period. The primary driver of the decline is EE, particularly the Company's EE programs. Other factors contributing to the decline include continued growth of residential solar and other DG, CVO, and decreases in average use per customer—driven by change in customer behavior and the effects of more stringent codes and standards.

The forecasts of delivery volumes for major service classifications[209] are based on econometric models, whereas the forecasts of delivery volumes for the other service classifications are performed on a deterministic or individual service class basis. The delivery volume forecast for Con Edison customers includes the following adjustments, described in greater detail in the DER Forecasts section:

- Solar Generation – To account for the projected delivery volumes associated with the installation of solar panels by customers who will then generate a portion or all of their energy requirements.
- Standby Service – To reflect the projected delivery volumes from customers who plan to convert a portion, or all, of their existing load to onsite generation and will become standby service customers.
- DSM Programs – To account for expected energy reductions resulting from EE.

Figure 35: Five-Year System Energy Forecast (GWh)

	2020	2021	2022	2023	2024
Con Edison	43,881	42,923	42,232	40,702	40,060
NYPA	9,676	9,471	9,263	9,016	8,770
Recharge New York	718	718	718	718	718
Total	**54,275**	**53,112**	**52,213**	**50,436**	**49,548**

NETWORK LOAD AREA PEAK DEMAND FORECASTS

Con Edison also prepares network load area and radial feeder level peak demand forecasts, which roll up to the substation level. Networks are forecasted both for their independent peaks (termed "Independent Network Peak Forecast"), which may differ from the system peak hour and can vary among networks, and for their coincidence with the system peak (termed "Coincident Network Peak Forecast"). Similar to the system demand forecast, the loads are modified to account for any applicable reductions for DER-related programs and other load growth (EVs and steam A/C to electric A/C). The Network Forecasts are developed in parallel with the System Forecast during the early fall to incorporate the most recent summer experience. However, the Coincident Network Peak Forecast requires some parameters determined in the System Forecast, so it cannot be finalized until after the System Forecast is complete.

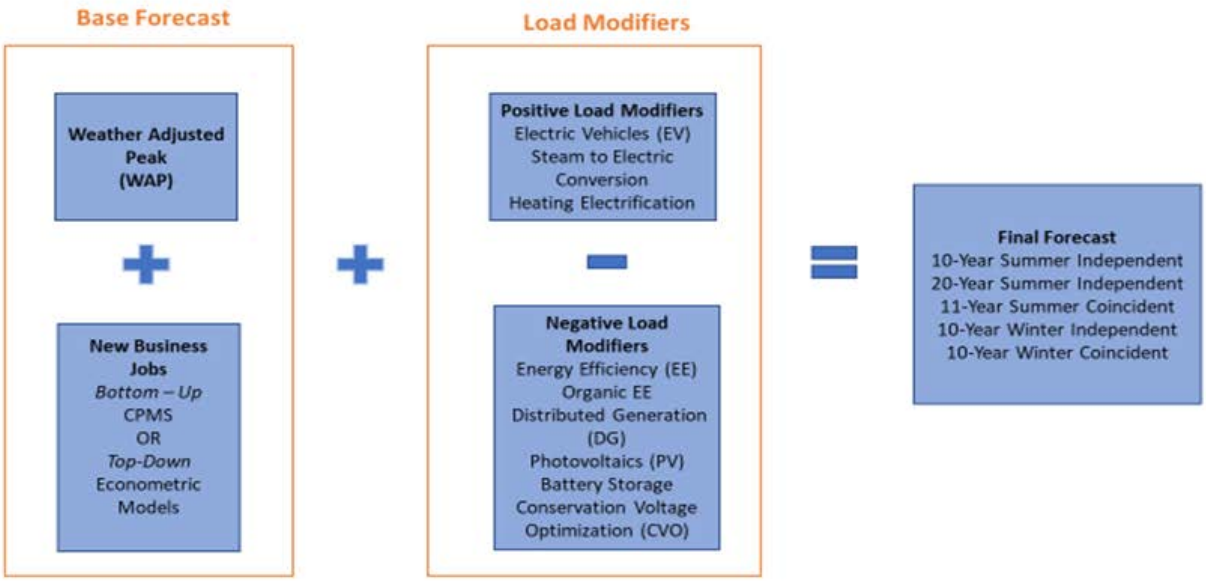
For the Independent Network Peak Forecast, the new business growth for the first five years are developed using a bottom-up approach where the Company has insight on upcoming new business jobs for each sector. This results in a more accurate forecast because the macroeconomic factors used to determine top-down growth cannot be finely parsed across the network and radial areas. Each individual job greater than 200 kVA within the electric service territory is evaluated by the Company's SMEs in the Energy Services and Customer Engineering Departments to determine the total load, the network location, and timeline for when it will come online. In addition, the Company maintains a separate list for non-Energy Service jobs that are initiated outside the typical process. Beyond the fifth year, the top-down approach is applied, with the system level growth allocated to each network based on the network's contribution to the first five years of growth. There are some exceptions in which the bottom-up methodology is still used beyond the fifth year if it results in a higher estimated network growth than the top-down methodology.

[209] SC 1 (Residential), SC 2 (Small Commercial), SC 5 (Railroad Platform and Stations Lightings), SC 6 (New York City Private Street Lighting), SC 8 (Master Metered Apartments), SC 9 (Large Commercial), and SC 12 (Multiple Dwelling Space Heating). NYPA Service Classes are also included in the energy forecast by service class: SC 62 (General Small); SC 66 (Westchester Street Lighting); SC 80 (New York City Street Lighting); SC 91 (NYC Public Buildings); and KIAC (Kennedy International Airport Cogeneration).

The base load for the network forecast is developed by adding the estimated growth to the WAP. The final Independent Network Peak Forecast is developed by adding the net of the load modifiers to the base forecast. Each network's peak hour will inform localized infrastructure investment decisions.

The Coincident Network Peak Forecast, which uses the Independent Network Peak Forecast as a starting point, evaluates the networks' expected load during the system peak hour. Therefore, the Coincident Network Peak Forecast must add up to the System Forecast, minus any transmission losses. The annual coincident growth (or base load) is developed using the annual growth of each network (derived from the Independent Network Peak Forecast), the total system growth minus transmission losses, and the ratio of the independent growth of each network to the sum of all independent growth. Once the base load for the network coincident forecast is developed, it must be verified that the independent forecast is higher than or equal to the coincident forecast. Once verified, the base load will be added to the WAP and load modifiers to develop the final Coincident Network Peak Forecast. Figure 36 provides an overview of the network forecasting process.

Figure 36: Electric Network Peak Demand Forecast Process



As discussed above, system average load growth is near zero; however, there are pockets of higher growth, largely driven by revitalization of certain residential neighborhoods in Brooklyn, Queens, and Manhattan. In total, as Table 18 shows below, there are 20 electric network areas that have compounded annual load growth rates of 1.0 percent or higher per year for the next 5 years, per the Independent Network Peak Demand Forecast, with some networks projecting much higher growth.

Table 18: 2019-2029 Network Area Forecasted Growth Rates

Network Area (excludes radial feeder loads)	5-Yr CAGR	10-Yr CAGR
Pennsylvania	11.7%	6.3%
Borden	7.2%	4.9%
Cortlandt	4.6%	3.4%
Jackson Heights	3.3%	1.6%
Fashion	3.3%	2.3%
Turtle Bay	2.9%	2.4%
Williamsburg	2.7%	1.9%
Borough Hall	2.7%	1.9%
Sutton	2.3%	1.8%
Fulton	2.0%	1.6%
Greeley Square	1.9%	1.4%
Grasslands	1.9%	1.8%
Sheridan Square	1.8%	1.4%
Buchanan	1.6%	1.0%
Madison Square	1.3%	1.0%
Roosevelt	1.3%	0.9%
Prospect Park	1.2%	0.9%
Chelsea	1.2%	1.0%
West Bronx	1.1%	0.9%
Richmond Hill	1.0%	0.6%
Long Island City	0.9%	0.9%
Jamaica	0.8%	0.4%
Grand Central	0.8%	0.8%
Triboro	0.8%	1.5%
Brighton Beach	0.7%	0.6%
Cooper Square	0.7%	0.6%
Hudson	0.7%	0.6%
Cedar Street	0.7%	0.9%
White Plains	0.5%	0.8%
Sunnyside	0.5%	0.7%
Lincoln Square	0.5%	0.5%
City Hall	0.4%	0.5%
Ridgewood	0.4%	0.3%
Flushing	0.4%	0.5%
Granite Hill	0.3%	0.5%
Maspeth	0.3%	0.4%
Canal	0.3%	0.4%

Midtown West	0.3%	0.3%
Plaza	0.3%	0.4%
Bay Ridge	0.3%	0.3%
Beekman	0.1%	0.4%
Harlem	0.0%	0.2%
Washington Street	0.0%	0.2%
Times Square	0.0%	0.2%
Ossining West	-0.1%	0.4%
Fox Hills	-0.2%	0.2%
Central Bronx	-0.2%	-0.1%
Crown Heights	-0.3%	-0.3%
Southeast Bronx	-0.3%	0.0%
Flatbush	-0.4%	-0.2%
Lenox Hill	-0.5%	-0.1%
Kips Bay	-0.5%	0.0%
Yorkville	-0.5%	-0.3%
Washington Heights	-0.6%	-0.3%
Fresh Kills	-0.6%	-0.7%
Rockefeller Center	-0.6%	0.0%
Park Slope	-0.6%	-0.4%
Harrison	-0.7%	-0.4%
Herald Square	-0.8%	-0.3%
Hunter	-0.8%	-0.4%
Rego Park	-0.8%	-0.5%
Central Park	-0.9%	-0.6%
Randalls Island	-0.9%	-0.4%
Woodrow	-0.9%	-0.4%
Columbus Circle	-0.9%	-0.6%
Fordham	-0.9%	-0.7%
Park Place	-1.0%	-0.6%
Empire	-1.1%	-0.6%
Ocean Parkway	-1.1%	-0.6%
Pleasantville	-1.1%	-0.5%
Rockview	-1.1%	-0.5%
Sheepshead Bay	-1.3%	-0.7%
Willowbrook	-1.3%	-0.8%
Riverdale	-1.3%	-0.8%
Freedom	-1.6%	0.4%
Bowling Green	-1.7%	-0.8%
Battery Park City	-1.7%	-1.2%
Elmsford No. 2	-1.8%	-1.1%

Northeast Bronx	-2.3%	-1.4%
Wainwright	-2.7%	-1.5%
Greenwich	-3.4%	-1.3%
Millwood West	-3.8%	-1.5%
Mohansic	-26.5%	-16.4%

The Company also prepares forecasted network-level 24-hour peak load duration curves and network level 24-hour minimum load duration curves, which are available through the Company's hosting capacity maps. Additionally, the Company provides historical 8,760 hour load data for each network as part of the system data pop-ups in its online hosting capacity map.

DER FORECASTS

Increased adoption of DER will introduce new challenges for maintaining forecasting accuracy due to uncertainties associated with the variability of DER output, its evolving correlation with net load, and the impact of geographic diversity on aggregate DER output. These new DER will have locational-specific impacts determined in part by the ways in which penetration rates evolve in each part of the distribution system. As a result, increasing levels of DER will drive the need for forecasting of future net load levels at more granular levels. For example, pairing top-down econometric forecasting approaches with more granular forecasts will enable planners to more accurately evaluate distribution system needs as DER penetration increases. These more granular load forecasts consider economic indicators and analyze load shapes based on the characteristics of individual loads or local areas. The development of these approaches for forecasting both load and DER output will enable more accurate representation of the system at varying load levels to help planners understand when and where constraints may emerge.

Within internal planning processes, DER are organized into one of two subgroups: DSM or DG. DSM includes both EE programs, DM, and DR. The DG group includes subset types of DG, namely PV, CHP or other spinning generators, and energy storage.

DSM Programs

Expected energy savings from EE and DM programs are distributed across the electric networks in the forecast using planned program growth, historical consumption data, and customer demographic information. These energy savings are then converted to peak demand savings using annual hourly load curves, which vary with the measures and specific customer segment related to each program. A geographic uncertainty factor is applied to the expected demand reductions to reflect the uncertainty of where the future savings from system-wide programs will be realized.

Incremental EE program savings are projected annually into the future as far out as the programs are funded or highly likely to be funded. Excluded from the forecast are impacts of codes and standards or naturally occurring EE implemented outside of programs, although these effects are captured in a separate load modifier ("Organic EE/Codes and Standards").

For DM and DR programs, forecast data come from internal program managers who gather information from their implementation contractors and market participants. Future volume and demand reductions are tied to filed and approved program goals and budgets adjusted by historic performance and future performance expectations. For DR programs, discount factors are applied to enrolled MW for network forecasts based on the size and diversity of enrollments in each individual network. DR programs are not included in the volume forecast because the energy savings are both uncertain (programs may or may not be called) and *de minimis* (even if events are called).

Table 19: 2019 Electric System Peak Demand Forecast - DSM Programs (MW)

line	Program	2020	2021	2022	2023	2024
14	Con Edison EE	-79	-84	-86	-76	-72
15	NYSERDA EE	-4	-3	-2	-1	-1
16	NYPA	-4	-2	-1	-1	0
17	BQDM	-1	-2	-2	-2	-2
20	DR	-1	-1	-1	-1	-1
21	Total Incremental DSM:	-89	-92	-91	-81	-76
22	Rolling Incremental DSM:	-89	-182	-273	-354	-430

Table 20: Delivery Volume Adjustments by Service Class - DSM Programs (GWh)

Delivery Volume Adjustments (GWh) – DSM Programs		2020	2021	2022	2023	2024
Con Edison	Total	-428	-876	-1,419	-2,028	-2,728
NYPA	Total	-47	-135	-265	-433	-639
System	Total	-475	-1,011	-1,684	-2,461	-3,367

Table 21 lists the specific programs the forecasts include.

Table 21: DSM Programs Included in the Forecast

EE	DM	DR[210]
Con Edison Electric Programs • Small Business Direct Install • Multifamily • Commercial & Industrial Equipment Rebate • Commercial & Industrial Custom Efficiency • Residential Electric **NYSERDA Clean Energy Fund**[211] • Residential Sector • Multifamily Sector • Commercial Sector	**Con Edison Electric Programs** • BQDM • Targeted Demand Management Projects	**Con Edison Electric Programs** • CSRP – Reservation Payment Option • DLC Program

[210] Excluded DR programs include DLRP and CSRP Voluntary Participation Options, DLRP Reservation Payment Option, and NYISO DR Programs (SCR).

[211] Case 14-M-0094, *Proceeding on Motion of the Commission to Consider a Clean Energy Fund*, Order Commencing Proceeding (issued May 8, 2014).

NYPA Programs • BuildSmart NY		

Note: Only the Electric System Forecast includes a forecast for the BQDM program. The Independent and Coincident Network Forecasts only include installed projects (implicit in the Weather Adjusted Peak), but not future impacts from BQDM (additions and subtractions for expiring temporary measures).

DG

DG is included in demand and energy forecasts. For purposes of forecasting, DG is defined as DER capable of operating in parallel with the grid and exporting power back, including solar PV, CHP, and other rotating generation, fuel cells, and energy storage, which represent the overwhelming majority of DG in the Con Edison service territory.

Solar PV

The forecasting of solar PV, as with other DER, involves determining both the impact of the DER and the future growth rate. To assess the impact of currently deployed solar PV, the Company collects AC nameplate kW capacity and application of PV jobs in the interconnection queue from the interconnection processing system. The Company also analyzes available solar output per hour data and the location of the PV projects. The solar output for each hour is determined by reviewing interval data and is representative of four summer months of data (June 1 – September 30) across a sample set of large PV sites with SCADA data. Figure 37 shows the output curve.

Figure 37: Measured Solar Output Curve Using Sampled Interval Meter Data

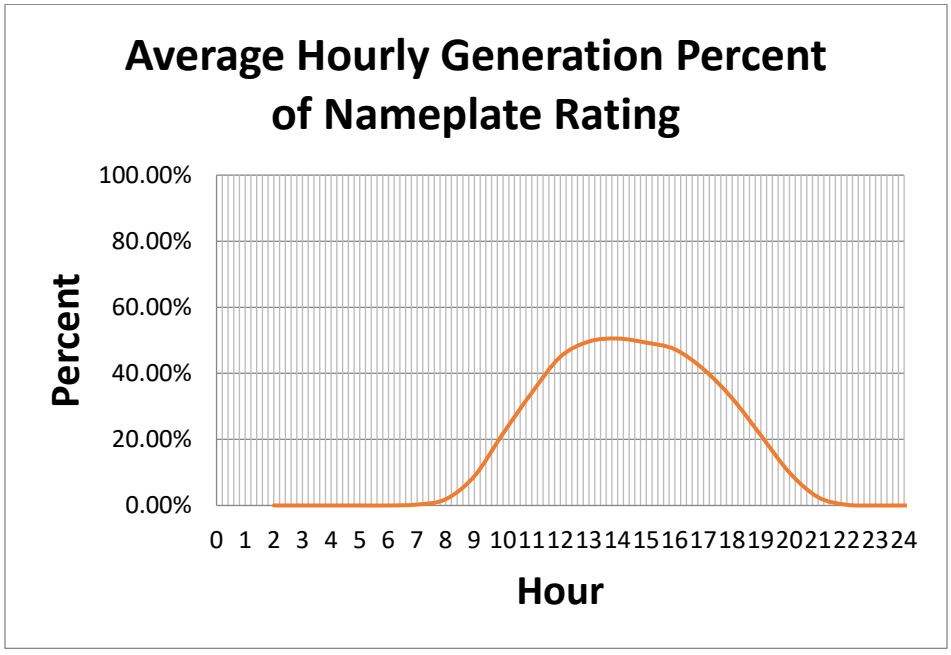


Table 22: Average Summer Solar Output for Large PV (>25 kW) as a Percentage of Nameplate Capacity (AC)

Hourly Solar Generation as a Percent of Nameplate (AC)			
Hour Ending	Average	Hour Ending	Average
0:00:00	0.0%	12:00:00	53.6%
1:00:00	0.0%	13:00:00	54.3%
2:00:00	0.0%	14:00:00	54.2%
3:00:00	0.0%	15:00:00	50.2%
4:00:00	0.0%	16:00:00	44.1%
5:00:00	0.5%	17:00:00	35.2%
6:00:00	0.6%	18:00:00	23.7%
7:00:00	2.0%	19:00:00	11.5%
8:00:00	10.1%	20:00:00	3.0%
9:00:00	24.0%	21:00:00	0.0%
10:00:00	37.5%	22:00:00	0.0%
11:00:00	47.5%	23:00:00	0.0%

The Company identifies where each PV job in the queue is located. Without network information for each PV, it is impossible to determine where PV is most prevalent, and where it has the greatest impact on the grid.

To assess the growth rate of solar PV installations, the initial two years of growth is based on the interconnection queue. For the years beyond the queue, the Company uses a probabilistic approach, including historical growth, cancellation, and decaying rates. For the PV forecast, the Company defined the following assumptions to build the 2019 PV forecast model for Con Edison's service territory:

- Residential customers include any account under 25 kW, and commercial customers include any account over 25 kW.
- Residential jobs go-live an average of 104 days after application date.
- Commercials jobs go-live an average of 530 days after application date.
- The peak occurs after June 1 of each summer.[212]

Twenty-five kW was selected as an approximate divider between residential and commercial projects in order to apply the lead times of large and small PV projects to the forecast. The lead-time assumptions for residential and commercial PV jobs are based on an analysis of average completion cycles of past projects. The analysis indicates residential PV goes

[212] The PV output curve analysis includes the summer months between June and September. By selecting all summer months, it captures uncertainties of weather conditions and pending projects in the queue after June 1 of each summer.

live approximately 104 days after the application date and commercial PV goes live approximately 530 days after the application date. These lead times are expected to decrease as the interconnection process is further streamlined. As additional data is tracked and made available, the assumptions regarding go-live time will be updated and enhanced accordingly.

June 1 was assumed as a representative peak day for purposes of creating the model, which allows PV jobs that are in the queue to be parsed into groups that will go-live that summer or the following summer.

Based on the lead times and interconnection queue, there is sufficient detail to estimate which PV jobs will go-live the next summer. The queue does not contain enough information when the current year forecast is created to estimate how many PV jobs will go-live two summers into the future. Therefore, the number of PV installations for two summers into the future must be extrapolated based on a combination of the interconnection queue used to forecast the current year and long-term growth assumptions.

As shown in line 8 of the System Peak Demand Forecast (and included below for reference), PV is expected to contribute a rolling incremental 27 MW of load reduction in 2020, ramping to a rolling incremental 125 MW by 2024. This is based on the nameplate capacity of the PV, converting to AC, de-rating it to account for coincidence with Con Edison's system peak. The PV forecast is represented as rolling incremental where 2020 is the incremental decrease to system load, and each year thereafter is the reduction of that year and all years dating back to 2020. Over the 10-year period (2020-2029), the forecasted cumulative coincident solar PV MW is 263 MW (730 MW_{AC} nameplate).

Table 23: Electric Five-Year System Peak Demand Forecast – Solar PV (MW)

		2020	2021	2022	2023	2024
8	Photovoltaic (PV) (rolling incremental)	-27	-55	-83	-107	-125
	Coincident PV MW in AC (Cumulative)	-117	-144	-173	-196	-214
	% MW Growth	31%	23%	20%	13%	9%

Table 24 shows that solar generation at the system level is expected to contribute 114 GWh of energy reduction in 2020, ramping up to 379 GWh of reduction in 2024.

Table 24: Delivery Volume Adjustments by Service Class – Solar PV (GWh)

Delivery Volume Adjustments (GWh) – Solar Generation		2020	2021	2022	2023	2024
Con Edison	Total	-109	-169	-234	-300	-365
NYPA	Total	-5	-7	-9	-12	-14
System	Total	-114	-176	-243	-312	-379

CHP and Other Generation

CHP and other forms of rotating generation preceded the wide scale adoption of solar and energy storage. As such they are referred to within Company processes and forecasts as DG, even though they are a subset of DG. All references to DG in this section refer only to CHP and other rotating generations. This includes traditional DG like gas turbines and reciprocating engines, as well as newer technologies such as fuel cells and microturbines.

DG inputs are collected from developers prior to and throughout the interconnection process. The nameplate capacity and details of the go-live timing (looking three years out) are provided through the interconnection process and verified by the Company. Furthermore, for large DG units (and some units below 1 MW), operational performance data may be collected through interval meters or other mechanisms. Long-term growth of DG is extrapolated based on the historical penetration and currently queued projects.

Because non-solar DG units are generally larger than PV projects and are normally dispatched at times of peak load, their impacts on the local grid are greater and depend on several factors. These factors include the size of the DG unit, the redundancy of the local area station, the expected time of go-live, and engineering knowledge of the substation reliability and other local conditions. For the DG forecast, the Company defined the following assumptions to build the forecast model:

- Large DG is defined as having a capacity greater than or equal to 1 MW and small DG as having a capacity less than 1 MW.
- All small DG units are assumed to be on at all times. Therefore, full credit will be taken to reduce load at their stations (and associated networks).
- Large DG units with N-2 redundancy or N-1 redundancy with a spare bank will take full load credit to reduce load at stations (and their associated networks).
- Large DG units with N-1 redundancy without a spare bank will take half of the load to reduce load at their stations (and associated networks).
- All DG jobs in the queue will be assigned with one-year lag of the DG completed/install year (e.g., if the completed year is 2016, credit will be taken in 2017).
- Each DG project had a performance factor applied (75% for large DG and 91% for small DG). The DG system forecast in outer years will be divided into networks based on the network's contribution to the DG queue.

Table 25 characterizes the non-solar DG assumptions that determine load reduction credit. DG for each network is rolled up for the system DG forecast.

Table 25: Determination of Non-Solar DG Demand Reduction Credit

			Station Redundancy	
			N-2 & N-1 with a spare bank	N-1
Size and Quantity of DG	Small (<1 MW)	Small DG	Nameplate capacity with performance factor and one year lag from the job completion date	Nameplate capacity with performance factor and one year lag from the job completion date
	Large (>=1 MW)	Large DG	Nameplate capacity with performance factor and one year lag from the job completion date	50% of nameplate capacity with performance factor and one year lag from the job completion date

Once the DG forecast is determined, the inputs are analyzed so that the system forecast displays the rolling incremental growth (in MW). DG growth from energy storage projects is tracked separately.

In determining the energy forecast load modifier for DG, the Company evaluates only the large (greater than 2 MW) DG units owned by customers taking standby service. The scope prioritizes the standby service rates because of the laborious manual methods to determine the revenues associated with these customers and, as the largest DG units, they have the greatest impact on the energy forecast. The energy forecasting process requires an investigation of the past performance of each unit. For each of the Company's existing standby service accounts, the prior year's usage is reviewed to identify monthly consumption anomalies. For new customers, if available, their past consumption is analyzed to determine the difference between usage and planned on-site generation. In each case, the potential kW generation of the new DG is provided, and applied to historical energy/kW ratio to determine the account-specific monthly energy reduction to be applied to the forecast. These account-specific energy reductions are summed by existing service class to determine the energy forecast modifier.

As shown in line 9 of the system forecast (and included below for reference), non-solar DG is expected to contribute an additional 32 MW of load reduction in 2020, ramping to an additional 97 MW of reduction in 2024. The non-solar DG forecast is represented as rolling incremental, where 2020 is an incremental decrease to the system load and each year thereafter is the reduction of that year and all years prior through 2020. Over the 10-year period, the forecasted cumulative coincident DG MW is 242 MW (381 MW nameplate).

Table 26: Electric System Peak Demand Forecast – Non-Solar DG (MW)

		2020	2021	2022	2023	2024
9	DG (incremental rolling)	-32	-63	-78	-87	-97
	Coincident DG MW (Cumulative)	-137	-168	-183	-192	-201
	% MW Growth	31%	22%	9%	5%	5%

Table 27 shows that DG is expected to contribute 371 GWh of energy reduction in 2020, ramping up to 413 GWh of reduction in 2024.

Table 27: Delivery Volume Adjustments by Service Class – Non-Solar DG (GWh)

Delivery Volume Adjustments (GWh) - Standby Service (DG)		2020	2021	2022	2023	2024
Con Edison	Impact	-329	-329	-329	-329	-329
NYPA	Impact	-42	-79	-84	-84	-84
System	Impact	-371	-408	-413	-413	-413

Energy Storage

Energy Storage is a separate line item in the DG forecast. While storage is still a small component of the forecast, advances in technology will result in many more installed storage devices, particularly batteries, throughout Con Edison territory over time. Energy storage penetration and growth information are derived from the Company's interconnection queue, which provides a near-term view of proposed and under-construction projects. For the 2019 forecast, the Company reviewed existing and queued energy storage projects. Given the early development of energy storage technology in the service territory, the Company used conservative assumptions on energy storage growth.

The Company recognizes that distributed energy storage is a relatively new technology with limited but growing data on technical and market potential in the Company's service territory. The Company has identified factors for adoption that it believes will indicate the future pace of distributed energy storage. These signposts include energy storage pricing (by technology type), installed cost, policy treatment (e.g., NEM, value stack, tax credits), and FDNY and NYC DOB permitting will be used to inform the forecasting process going forward. The Company is evolving toward a probabilistic approach that incorporates historical growth rates of DER technologies with similar characteristics, such as space requirements, as indicative of storage growth patterns. The Company is working with outside experts on a new forecasting tool that will better incorporate new technologies and end-uses, such as energy storage. This new forecasting tool will be introduced in 2020, and will begin with energy storage and building electrification, and will have the architecture and design in place to allow for future extension to EV, Solar PV, and DG/CHP.

Energy storage systems are a flexible resource in terms of the value they can provide. For example, a 10 MW, four-hour (or 40 MWh) battery can discharge in several ways: 10 MW discharged for 4 hours, 5 MW discharged for 8 hours, or different levels of discharge for varying durations. Battery systems could also target a use case that provides more consistent output of intermittent renewable sources or flattening the peaks of load curves of customers with highly variable loads. These systems are most predictable when they discharge in a manner set by program rules. For planning purposes, the Company will view the load reduction from the battery as the amount of discharge it can provide over four hours, in line with the network peak load. Thus, a 500 kW reduction from peak would be a 2 MWh battery discharged over 4 hours. The Company understands that a battery system could discharge in a variety of ways and if an incentive mechanism (e.g., DR or program rules) caused the battery discharge pattern to vary from this standard, then the Company could adjust the amount of reduction the forecast includes.

The Company recognizes that several factors require further study, including storage use and charging method. In general, an energy storage resource serves as a load to the utility when it charges from the grid, and serves as a resource to the utility when it discharges. Charging at off-peak times and discharging at peak times generally leads to less carbon-

intensive supply sources being utilized and serves to flatten the peak and fill in the troughs for the utility, leading to a better overall load factor and better system efficiency. Energy storage would not serve as a load to the utility if it charges using BTM generation (i.e., solar and battery both behind a one-way inverter). The charging of the battery would not increase the load seen by the utility.

Storage use, and its impact on peak load, varies by intended purpose (*e.g.,* customer-peak shaving, DR, direct utility-control) and size of resource. Customer-peak shaving is dependent on the time of the customer's peak, and may not be coincident with utility or NYISO peak. Resources used for customer-specific energy needs may be unavailable at other times.

Other storage uses are measurable and able to be influenced or controlled by the utility (through contracts and/or in real-time). Programs that support a higher level of utility visibility include the REV Demonstration projects (VPP and recently issued RFP for energy storage), discussed elsewhere. These programs are administered by the Company and provide greater visibility and impact to peak demand. BQDM and other area-specific NWS have also provided an opportunity for the Company to control an energy storage unit as part of a larger suite of DM projects. Similar RFPs would guarantee coincidence with the Company's greatest need. Depending on storage capacity, technology, and project economics, utility-owned storage projects may also be capable of bidding into NYISO DR and/or ancillary services markets. The Company expects data from these programs to contribute to peak load and energy use impact studies in the coming years.

As shown in line 10 of the system forecast (and included below for reference), batteries are expected to contribute an additional 2 MW of load reduction in 2020, ramping to 59 MW of reduction in 2024, representing a significant increase from prior forecasts.

Table 28: Electric System Peak Demand Forecast - Battery Storage (MW)

		2020	2021	2022	2023	2024
10	Battery Storage (incremental rolling)	-2	-37	-50	-53	-59

The Company currently does not quantify the specific contribution of distributed energy storage to energy reduction due to the limited number of installations and disparate impacts of storage on energy use based on how the storage is charged. For example, charging from the grid would have a positive (additive) impact to delivered energy, while a resource charging from BTM generation would have no impact on delivered energy. Other factors which could affect energy usage are the load curve of customers who adopt distributed energy storage, as well as their charging cycle and frequency, and capacity utilization of the storage resource.

APPENDIX B: ENERGY STORAGE RESOURCES AS OF JUNE 1, 2020

Table 29: Energy Storage Resources as of June 1, 2020

Year Installed	Network Level Location	Total kW	Total kWh	Battery Chemistry	Co-location
2020	Buchanan	6.6	13.5	Lithium Ion	Hybrid w/ PV
2020	Buchanan	10	27	Lithium Ion	Hybrid w/ PV
2020	Buchanan	10	27	Lithium Ion	Hybrid w/ PV
2020	Buchanan	500	2192	Lithium Ion	Hybrid w/ PV
2020	Cedar Street	5	13.5	Lithium Ion	Hybrid w/ PV
2020	Cedar Street	10	27	Lithium Ion	Hybrid w/ PV
2020	Cedar Street	5	13.5	Lithium Ion	Hybrid w/ PV
2020	Elmsford No. 2	18	36	Lithium Ion	Stand-alone
2020	Elmsford No. 2	250	1096	Lithium Ion	Stand-alone
2020	Elmsford No. 2	250	1096	Lithium Ion	Stand-alone
2020	Pleasantville	5	13.5	Lithium Ion	Hybrid w/ PV
2020	Fresh Kills	1000	1000	Lithium Ion	Stand-alone
2020	Grasslands	10	13.5	Lithium Ion	Hybrid w/ PV
2020	Lenox Hill	200	600	Lead Acid	Stand-alone
2020	Elmsford No. 2	500	2192	Lithium Ion	Stand-alone
2019	Washington Street	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Buchanan	10	10	Lithium Ion	Hybrid w/ PV
2019	Buchanan	27	13.5	Lithium Ion	Hybrid w/ PV
2019	Buchanan	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Buchanan	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Buchanan	8	16	Lithium Iron Phosphate	Hybrid w/ PV
2019	Cedar Street	5	13.5	Lithium Ion	Stand-alone

2019	Elmsford No. 2	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Elmsford No. 2	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Elmsford No. 2	27	27	Lithium Ion	Hybrid w/ PV
2019	Elmsford No. 2	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Granite Hill	8.7	9.8	Lithium Ion	Hybrid w/ PV
2019	Granite Hill	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Granite Hill	8.8	13.5	Lithium Ion	Hybrid w/ PV
2019	Granite Hill	8	16	Lithium Ion	Hybrid w/ PV
2019	Harrison	10	27	Lithium Ion	Hybrid w/ PV
2019	Cedar Street	5	13.5	Lithium Ion	Stand-alone
2019	Lenox Hill	125	300	Lead Acid	Stand-alone
2019	Lincoln Square	125	300	Lead Acid	Stand-alone
2019	Millwood West	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Millwood West	3.8	13.5	Lithium Ion	Hybrid w/ PV
2019	Millwood West	5	13.5	Lithium Ion	Stand-alone
2019	Millwood West	10	13.5	Lithium Ion	Hybrid w/ PV
2019	Millwood West	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Millwood West	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Ossining West	10	27	Lithium Ion	Hybrid w/ PV
2019	Ossining West	10	27	Lithium Ion	Hybrid w/ PV
2019	Ossining West	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Ossining West	17.6	27	Lithium Ion	Hybrid w/ PV
2019	Ossining West	10	27	Lithium Ion	Hybrid w/ PV
2019	Ossining West	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Ossining West	10	13.5	Lithium Ion	Hybrid w/ PV
2019	Pleasantville	5	5	Lithium Ion	Hybrid w/ PV

2019	Millwood West	15	13.5	Lithium Ion	Stand-alone
2019	Richmond Hill	2400	8000	Lithium Ion	Stand-alone
2019	Rockview	10	27	Lithium Ion	Hybrid w/ PV
2019	Rockview	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Washington Street	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Washington Street	10	27	Lithium Ion	Hybrid w/ PV
2019	White Plains	10	13.5	Lithium Ion	Hybrid w/ PV
2019	White Plains	10	13.5	Lithium Ion	Hybrid w/ PV
2019	White Plains	5	13.5	Lithium Ion	Hybrid w/ PV
2019	Richmond Hill	2400	8000	Lithium Ion	Stand-alone
2018	Harrison	10	27	Lithium Ion	Hybrid w/ PV
2018	Buchanan	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Buchanan	6	13.5	Lithium Ion	Hybrid w/ PV
2018	Cedar Street	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Cedar Street	5	13.6	Lithium Ion	Hybrid w/ PV
2018	Harrison	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Elmsford No. 2	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Granite Hill	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Granite Hill	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Harrison	10	27	Lithium Ion	Hybrid w/ PV
2018	Harrison	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Harrison	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Harrison	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Millwood West	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Washington Street	5	13.5	Lithium Ion	Hybrid w/ PV
2018	Harrison	375	750	Lithium Ion	Stand-alone

2018	Harrison	36	72	Lithium Ion	Stand-alone
2018	Millwood West	5	13.5	Lithium Ion	Hybrid w/ PV
2018	White Plains	10	27	Lithium Ion	Hybrid w/ PV
2018	Ossining West	10	13.5	Lithium Ion	Hybrid w/ PV
2018	Pleasantville	10	13.5	Lithium Ion	Hybrid w/ PV
2018	Riverdale	125	232	Lithium Ion	Hybrid w/ PV
2018	Lincoln Square	100	400	Lead Acid	Stand-alone
2018	Sutton	100	400	Lead Acid	Stand-alone
2018	Washington Street	10	27	Lithium Ion	Stand-alone
2018	Washington Street	15	30	Lithium Ion	Stand-alone
2018	White Plains	5	13.5	Lithium Ion	Hybrid w/ PV
2018	West Bronx	18	144	VRLA	Stand-alone
2018	White Plains	10	27	Lithium Ion	Stand-alone
2018	Cedar Street	100	400	Lithium Ion	Stand-alone
2017	Millwood West	15	40.5	Lithium Ion	Hybrid w/ PV
2017	Buchanan	10	27	Lithium Ion	Hybrid w/ PV
2017	Granite Hill	15	30	Lithium Ion	Hybrid w/ PV
2017	Crown Heights	300	1200	Lithium Ion	Stand-alone
2017	Lincoln Square	125	300	Lead Acid	Stand-alone
2017	Millwood West	10	27	Lithium Ion	Hybrid w/ PV
2017	Midtown West	125	300	Lead Acid	Stand-alone
2017	Ossining West	20	54	Lithium Ion	Hybrid w/ PV
2016	Fulton	100	400	Lead Acid	Stand-alone
2016	Pennsylvania	100	400	Lead Acid	Stand-alone
2016	Yorkville	100	400	Lead Acid	Stand-alone
2016	Yorkville	100	400	Lead Acid	Stand-alone

2015	Hudson	300	288	Lithium Ion	Stand-alone
2015	Kips Bay	100	400	Lead Acid	Stand-alone
2015	Ossining West	10	27	Lithium Ion	Hybrid w/ PV
2014	Granite Hill	27.2	64	Lithium Ion	Stand-alone
2014	Harlem	100	200	Zinc-Manganese	Stand-alone
2014	Rego Park	50	150	Lithium Ion	Stand-alone
2013	Bay Ridge	100	200	Lead Acid	Stand-alone
2012	Borden	50	150	Lithium Ion	Stand-alone
2012	Park Place	200	400	Lead Acid	Stand-alone

APPENDIX C: TOOLS AND INFORMATION SOURCES

Tools and Information Sources by Organization

Resource Name and Link	Topic(s) Covered
Con Edison Utilities Links	
Con Edison: Hosting Capacity	• Advanced Forecasting • Distribution System Data • Beneficial Locations for DERs and NWS
Con Edison: Non-Wires Solutions	• Procurement of NWS
Con Edison: Private Generation Energy Sources	• DER Interconnections
Con Edison: Customer Energy Data	• Customer Data
Con Edison: Electric Vehicles	• Electric Vehicle Integration
Con Edison: Smart Meters	• Advanced Metering Infrastructure
Con Edison: Energy Storage	• Energy Storage
Con Edison: Cyber Security Policy	• Cybersecurity
Con Edison: Private Generation	• Beneficial Locations for DERs and NWS
Con Edison: Energy Star	• Energy Efficiency, Integration and Innovation
Con Edison: PowerClerk	• Applying for Interconnection
NY REV and Assorted NY Government Links	
REV Connect: Non-Wires Alternatives portal	• Electric Vehicle Integration
Assembly Bill 288 residential tariff for recharging EVs	• Electrical Vehicle Integration
Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision	• DER Integration
Case 16-M-0411, In the Matter of Distributed System Implementation Plans	• DER Integration
Case 16-M-0412, Benefit Cost Analysis Handbook	• Procurement of NWS

Joint Utilities of NY Links	
Joint Utilities: Utility-Specific NWA Opportunities	• Procurement of NWS
Joint Utilities: Cyber and Privacy Framework	• Cybersecurity
Joint Utilities: Overview of Currently Accessible System Data	• Advanced Forecasting • Distribution System Data
Joint Utilities: EV Readiness Framework	• Electric Vehicle Integration
Joint Utilities: Overview of Currently Accessible System Data	• Advanced Forecasting • Distribution System Data
Joint Utilities: DSP Communications and Coordination Manual	• Grid Operations
Joint Utilities: Draft DSP-Aggregator Agreement for NYISO Pilot Program	• Grid Operations
Other Links	
NERC CIP Reliability Standards	• Cybersecurity
National Institute of Standards and Technology ("NIST") Special Publication (SP) 800-53 revision 4	• Cybersecurity
EPRI: Defining a Roadmap for Successful Implementation of a Hosting Capacity Method for NY State	• Hosting Capacity

List of Related Ongoing Proceedings

- Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (Case 14-M-0101)
- In the Matter of Distributed System Implementation Plans (Case 16-M-0411)
- In the Matter of the Value of Distributed Energy Resources (Case 15-E-0751)
- VDER Working Group Regarding Value Stack (Matter 17-01276)
- VDER Working Group Regarding Rate Design (Matter 17-01277)
- VDER Low Income Working Group Regarding Low and Moderate Income Customers (Matter 17-01278)
- Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure (Case 18-E-0138)
- In the Matter of Offshore Wind Energy (Case 18-E-0071)
- In the Matter of Energy Storage Deployment Program (Case 18-E-0130)

- In the Matter of Utility Energy Efficiency Programs (Case 15-M-0252 and 18-M-0084)
- In the Matter of Strategic Use of Energy Related Data (Case 20-M-0082)
- In the Matter of the Utility Energy Registry (Case 17-M-0315)
- Whole Building Energy Data Aggregation Standard (Cases 16-M-0411)
- Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and Clean Energy Standard (Case 15-E-0302)
- In the Matter of the Regulation and Oversight of Distributed Energy Resource Providers and Products (Case 15-M-0180)
- In the Matter of Proposed Amendments to the New York State Standardized Interconnection Requirements for Small Distributed Generators (Case 18-E-0018)
- Dynamic Load Management Programs (Cases 14-E-0423 and 15-E-0189)
- Proceeding on Motion of the Commission Regarding Cyber Security Protocols and Protections in the Energy Market Place (18-M-0376)
- Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs (14-M-0224)
- Proceeding on Motion of the Commission to Examine Utilities' Marginal Cost of Service Studies (19-E-0283)
- In the Matter of Consolidated Billing for Distributed Energy Resources (19-M-0463)
- Proceeding on Motion of the Commission to Consider Resource Adequacy Matters (19-E-0530)