**Janet M. Audunson, P.E., Esq.**
Assistant General Counsel

June 30, 2020

**VIA ELECTRONIC DELIVERY**

Honorable Michelle L. Phillips
Secretary
New York State Public Service Commission
Three Empire State Plaza, 19th Floor
Albany, New York 12223-1350

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

**Case 16-M-0411 – In the Matter of Distributed System Implementation Plans**

**NIAGARA MOHAWK POWER CORPORATION d/b/a NATIONAL GRID – 2020 DISTRIBUTED SYSTEM IMPLEMENTATION PLAN ("DSIP") UPDATE**

Dear Secretary Phillips:

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or the "Company") hereby submits its 2020 DSIP Update in accordance with the Commission's April 20, 2016 *Order Adopting Distributed System Implementation Plan Guidance* in Cases 14-M-0101 and 16-M-0411 directing the Company to file an individual DSIP on a biennial basis.

Please direct any questions regarding this filing to:

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Thank you.

Respectfully submitted,

*/s/ Janet M. Audunson*

Janet M. Audunson, P.E., Esq.
Assistant General Counsel

Enc.

cc: Carol Sedewitz, w/enclosure (via electronic mail)
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**National Grid**

# Distributed System Implementation Plan Update

# of

# Niagara Mohawk Power Corporation

# d/b/a National Grid

Case 16-M-0411
DSIP Proceeding
June 30, 2020


# Table of Contents

# Acronyms

**$3V_0$:** Zero-Sequence Voltage
**ADA:** Advanced Data Analytics
**ADMS:** Advanced Distribution Management System
**AEO:** Annual Energy Outlook
**AMF:** Advanced Metering Functionality
**AMI:** Advanced Metering Infrastructure
**AMR:** Automated Meter Reading
**API:** Application Programming Interface
**ARI:** Active Resource Integration
**B2G:** Building-to-grid
**BCA:** Benefit-Cost Analysis
**BCP:** Business Continuity Plans
**BTM:** Behind-the-meter
**C&I:** Commercial and Industrial
**CAGR:** Compound Annual Growth Rate
**CCA:** Community Choice Aggregation
**CCVT:** Coupling Capacitor Voltage Transformer
**CEAC:** Clean Energy Advisory Council
**CEATI:** Centre for Energy Advancement through Technological Innovation Inc.
**CEF:** Clean Energy Fund
**CEI:** Customer Energy Integration
**CEMP:** Customer Energy Management Platform
**CESIR:** Coordinated Electric System Interconnection Review
**CHP:** Combined Heat and Power
**CIP:** Capital Investment Plan
**CISO:** Chief Information Security Officer
**CLCPA:** Climate Leadership and Community Protection Act
**CNI:** Critical National Infrastructure
**CO2:** Carbon dioxide
**Commission:** New York State Public Service Commission
**Company:** Niagara Mohawk Power Corporation d/b/a National Grid
**COO:** Chief Operating Officer
**COSO:** Committee of Sponsoring Organizations
**CS:** Customer Solutions
**CSOC:** Cybersecurity Operations Center
**CVR:** Conservation Voltage Reduction
**CxP:** Customer Experience
**DA:** Distribution Automation
**DCFC:** Direct Current Fast Charger
**DER:** Distributed Energy Resource
**DERMS:** Distributed Energy Resource Management System
**DG:** Distributed Generation
**DLM:** Dynamic Load Management
**DLRP:** Distribution Load Relief Program

| | |
|---|---|
| **DMD:** | Download My Data |
| **DMS:** | Distribution Management System |
| **DOE:** | U.S. Department of Energy |
| **DPAM:** | Distribution Planning and Asset Management |
| **DPI:** | Deep Packet Inspection |
| **DPS:** | Department of Public Service |
| **DR:** | Demand Response |
| **DRMS:** | Demand Response Management System |
| **DRV:** | Demand Reduction Value |
| **DSA:** | Data Security Agreement |
| **DSCADA:** | Distribution Supervisory Control and Data Acquisition |
| **DSIP:** | Distribution System Implementation Plan |
| **DSM:** | Demand Side Management |
| **DSP:** | Distributed System Platform |
| **DTT:** | Direct Transfer Trip |
| **EAM:** | Earnings Adjustment Mechanism |
| **EDI:** | Electronic Data Interchange |
| **EE:** | Energy Efficiency |
| **EIA**: | Energy Information Administration |
| **EIC:** | Engineering, Installation and Commissioning |
| **EJ:** | Environmental Justice |
| **EJP:** | Excelsior Jobs Program |
| **ELF:** | Electric Load Forecast |
| **ELR:** | Energy Limited Resource |
| **EM&V:** | Evaluation, Measurement and Verification |
| **EMS:** | Energy Management System |
| **EPA:** | Environmental Protection Agency |
| **EPRI:** | Electric Power Research Institute |
| **EPS:** | Electric Power System |
| **ERT:** | Encoder Receiver Transmitters |
| **ESA:** | Efficiency Services Agreement |
| **ESB:** | Electric System Bulletin |
| **ESCOs:** | Energy Service Companies |
| **ESR:** | Energy storage resource |
| **ESS:** | Energy Storage System |
| **ETIP:** | Energy Efficiency Transition Implementation Plan |
| **EV:** | Electric Vehicle |
| **EVCS:** | Electric Vehicle Charging Station |
| **EVSE:** | Electric Vehicle Supply Equipment |
| **EVSE&I:** | Electric Vehicle Supply Equipment and Infrastructure |
| **EZR:** | Empire Zone Rider |
| **FAN:** | Field Area Network |
| **FERC:** | Federal Energy Regulatory Commission |
| **FLISR:** | Fault Location, Isolation, and Service Restoration |
| **FY:** | Fiscal Year |
| **GBC:** | Green Button Connect |

**GBD:** Green Button Download
**GFOV:** Ground Fault Overvoltage
**GHG:** Greenhouse Gas
**GHz:** Gigahertz
**GIS:** Geographic Information System
**GPS:** Global Positioning System
**GW:** Gigawatt
**GWh:** Gigawatt hour
**HAN:** Home area network
**HC:** Hosting Capacity
**HCA:** Hosting Capacity Analysis
**HES:** Head-end collections system
**IAM:** Identity Access Management
**ICAP:** Installed Capacity
**ICE:** Internal Combustion Engine
**IEEE:** Institute of Electrical and Electronics Engineers
**IOAP:** Interconnection Online Application Portal
**IoT:** Internet of Things
**IPWG:** Interconnection Policy Working Group
**IS:** Information Systems
**ISO:** International Organization for Standardization
**ISO-NE:** Independent System Operator – New England
**ISOs:** Independent System Operators
**IT:** Information Technology
**ITWG:** Interconnection Technical Working Group
**IVR:** Interactive Voice Response
**JU:** Joint Utilities
**KPI:** Key Performance Indicator
**kV:** Kilovolts
**kVAR:** Kilovar
**kW:** Kilowatt
**kWh:** Kilowatt hour
**kWh/mi:** Kilowatt hour per mile
**LBMP:** Locational-Based Marginal Price
**LED:** Light-emitting diode
**LMI:** Low- to moderate-income
**LMP+D+E:** Locational Marginal Pricing + Distribution Value + Environmental
**LMP+D:** Locational Marginal pricing + Distribution Value
**LSRV:** Locational System Relief Value
**LTC:** Load Tap Changer
**LVMs:** Line voltage monitors
**L2:** Level 2
**M&C:** Monitoring and Control
**M&V:** Measurement and Verification
**MADC:** Marginal Avoided Distribution Capacity
**MCOS:** Marginal Cost of Service

**MDIWG:** Market Design and Integration Working Group
**MDM:** Meter Data Management
**MDMS:** Meter Data Management Services
**MIWG:** Market Issues Working Group
**MTPA:** Metrics Tracking and Performance Assessment
**MVD:** Multi-Value Distribution
**MVT:** Multi-Value Transmission
**MW:** Megawatts
**MWh:** Megawatt hours
**nCAP:** New Customer Application Portal
**NEM:** Net Energy Metering
**NENY:** New Efficiency: New York
**NERC:** North American Electric Reliability Corporation
**NESC:** National Electric Safety Code
**NG:** National Grid
**NIMO**: Niagara Mohawk Power Corporation
**NIST:** National Institute of Standards and Technology
**NPCC:** Northeast Power Coordinating Council, Inc.
**NPV:** Net Present Value
**NWA:** Non-Wires Alternatives
**NY:** New York
**NYBEST:** New York Battery and Energy Storage Technology Consortium, Inc.
**NYC:** New York City
**NYISO:** New York Independent System Operator
**NYPA:** New York Power Authority
**NYS:** New York State
**NYSDEC:** New York State Department of Environmental Conservation
**NYSERDA:** New York State Energy Research and Development Authority
**NY-SIR:** New York Standardized Interconnection Requirements
**NZC:** Net-zero carbon
**OMS:** Outage Management System
**PCC:** Point of Common Coupling
**PLC:** Power Line Carrier
**PMI:** Power Monitors, Inc.
**PMO:** Project Management Officer
**POCs:** Points of Control
**PTR:** Peak Time Rewards
**PV:** Photovoltaic
**QA/QC:** Quality Assurance/Quality Control
**REV:** Reforming the Energy Vision
**RFI:** Request for Information
**RFP:** Request for Proposal
**RFS:** Request for Solutions
**RIM:** Rate Impact Measure
**RTU:** Remote terminal unit

| | |
|---|---|
| **SaaS:** | Software as a Service |
| **SCADA:** | Supervisory Control and Data Acquisition |
| **SCC:** | Social Cost of Carbon |
| **SCT:** | Societal Cost Test |
| **SDL:** | Secure Development Lifecycle |
| **SD-WAN:** | Software-defined wide-area network |
| **SEEP:** | System Energy Efficiency Plan |
| **SI:** | Smart inverters |
| **SME:** | Subject Matter Expert |
| **SPOC:** | Single Point of Contact |
| **SRC:** | Security Resilience Committee |
| **SSO:** | Single sign-on |
| **T&D:** | Transmission and distribution |
| **TOU:** | Time-of-Use |
| **TVP:** | Time-varying pricing |
| **UBP-DERS:** | Uniform Business Practices-Distributed Energy Resources Suppliers |
| **UC:** | Use Case |
| **UER:** | Utility Energy Registry |
| **UTC:** | Utility Cost Test |
| **UXP:** | User Experience Portal |
| **VAR:** | Volt-Amp Reactive |
| **VDER:** | Value of Distributed Energy Resource |
| **VGS:** | Verified Gross Savings |
| **VTOU:** | Voluntary Time-of-Use |
| **VVO:** | Volt/VAR Optimization |
| **WAN:** | Wide-area network |
| **ZEV:** | Zero-Emission Vehicle |

# Executive Summary

Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid" or the "Company") is pleased to provide its 2020 Distributed System Implementation Plan ("DSIP") Update advancing the objectives of the New York State Public Service Commission's ("Commission") Reforming the Energy Vision ("REV") Proceeding.[1]

In 2019, New York State passed the nation-leading Climate Leadership and Community Protection Act (the "Climate Act" or "CLCPA") to achieve 100% zero-emission electricity by 2040 and 85% emission reductions below 1990 levels by 2050 which means:

- Solar, wind, and other renewable resources, combined with energy storage and other zero-emission technologies, will deliver affordable and reliable electricity.
- New clean heating and cooling technologies, such as electric heat pumps and smart thermostats, combined with other energy efficiency measures, will save New Yorkers energy and money.
- Zero-emission transportation options will be prevalent improving air quality and achieving cleaner communities.
- A clean energy economy will create access to clean energy solutions and new economic opportunities.

As an energy distributor, National Grid is a key partner to NY state in enabling this future. National Grid's vision is to be at the heart of a clean, fair, and affordable energy future with a focus on optimizing performance by finding a better way and making it happen for our customers. In this 2020 DSIP Update the Company presents its progress and plans on a host of actions it is taking in support of the clean energy goals set forth in the State Energy Plan and the Climate Act.

The 2020 DSIP Update aligns with National Grid USA's Northeast Decarbonization Pathway with a commitment to exceed customer expectations, enable growth and prosperity in the communities we serve, and make possible an affordable, sustainable, and secure energy system for tomorrow. Bringing this energy vision to life, will require a proactive, customer-centered, mission-driven approach.

The Company's DSIP plans are based on the following four clarifying principles:

- **Enable the energy transition for all** by supporting the achievement of the Climate Act's targets, delivering and enabling cost-effective clean energy solutions, improving our ability to integrate a greater portfolio of DERs, and delivering a future DSP model.

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

*Figure ES-1: National Grid Commitments*


- **Deliver for our customers efficiently** by improving our processes and systems, ensuring choice and control over their energy services, enabling a high degree of situational awareness, lowering energy costs through optimizing our network, and enabling a thriving market for new and innovative services.
- **Cultivate an efficient, reliable, and resilient grid** that can adapt to the evolving paradigms of two-way power flows, optimize system performance and network resiliency with fewer and shorter power outages, and improve reliability, responsive demand, and customer participation.
- **Maximize the effectiveness of performance incentives** in driving these important outcomes.

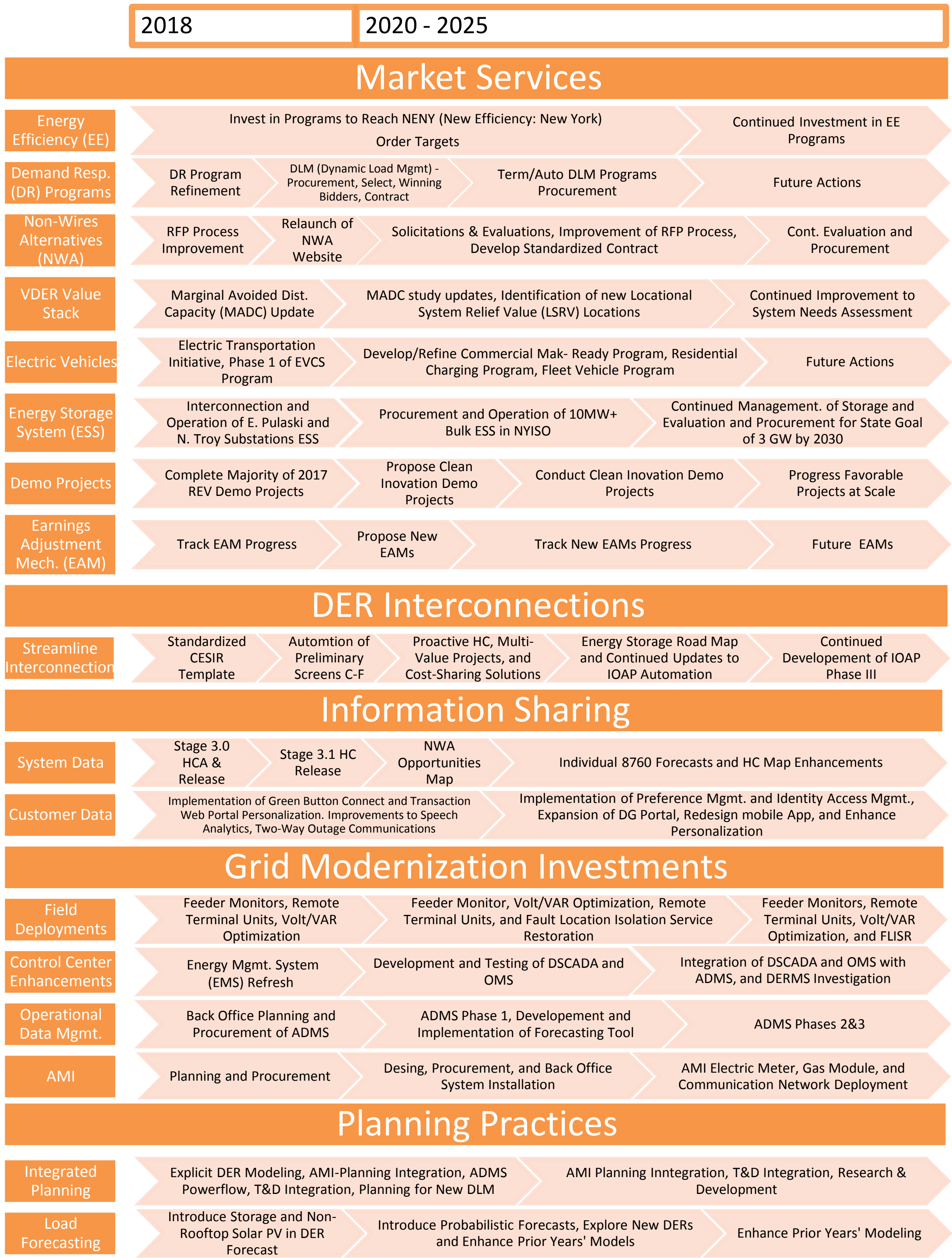
To deliver on National Grid's vision and the goals of the Climate Act, National Grid will continue to pursue foundational investments that will enable the Company to modernize the grid, improve efficiency, animate markets, and enhance the reliability and resiliency of the electric system. National Grid is well positioned to "green" the grid and progress the role of the Distributed System Platform ("DSP") provider as directed in the Commission's REV Track One Order.[2] In this role, the Company continuously seeks opportunities to incorporate services that enable third-party providers of distributed energy resources ("DER") to deliver value to both customers and the electric system.

The Company's progress and plans presented in this document exemplify how National Grid has embraced its role as DSP provider. Figure ES-2 below depicts key progress made to date as well as the Company's current plans through 2025. Some of the major investment areas the Company is proposing includes proactive spending in increasing system hosting capacity, Multi-Value Projects that address grid asset and reliability issues while enabling increased delivery of renewable energy, an Active Resource Integration pilot project to integrate distributed generation ("DG") in constrained areas via development of curtailment capabilities, an Electric Vehicle "make-ready" program and the deployment of Advanced Metering Infrastructure ("AMI"). Implementation of the activities set forth in this five-year plan are dependent on future rate case review and approval. National Grid's current Three-Year Rate Plan[3] is in effect through March 31, 2021. The Company is currently anticipating filing a new rate case with the Commission

[2] *Id*., Order Adopting Regulatory Policy Framework and Implementation Plan (issued February 26, 2015) ("REV Track One Order").
[3] Cases 17-E-0238 *et al*., *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service*, Order Adopting Terms of Joint Proposal and Establishing Electric and Gas Rate Plans (issued March 15, 2018) ("Three-Year Rate Plan Order").

around or about July 31, 2020 which will include the effects of COVID-19 and customer affordability.

*Figure ES-2: Key Progress and Plans*



**National Grid's 2020 DSIP Update**

This 2020 DSIP Update provides detailed information about National Grid's planned DSP implementation over the five-year period ending June 30, 2025.

This 2020 DSIP Update will:

- Report on DSP actions and progress since National Grid's 2018 DSIP Update;[4]
- Describe plans for developing and implementing necessary tools, policies, processes, and resources to achieve the next five-year plan;
- Identify and describe how DER developers and other third parties can access available tools and information to help them understand National Grid's system needs and potential business opportunities;
- Provide useful links to information and live data so stakeholders have access to the latest information; and
- Describe upcoming new programs, projects, and procurements to enable greater levels of DER.

Development of this 2020 DSIP Update has benefited from a collaborative process with the Joint Utilities of New York,[5] Department of Public Service ("DPS") Staff, and numerous other stakeholders. The Joint Utilities work collaboratively to progress the DSPs as consistently as possible across the state while recognizing the inherent differences of each of the utility's systems.

The format of this 2020 DSIP Update is structured to be responsive to the detailed guidance provided in the 2018 DSIP Update Guidance[6] and is consistent with the format of the 2018 DSIP Update, with some areas streamlined for easier review. Each of the topical sections represented in Table ES-1 includes a discussion on context and progress made since the 2018 DSIP Update, as well as the Company's plans for the next five years. Detailed responses to specific inquiries are provided in a Question and Answer format in Appendix B. Additionally, updates on DSIP Governance, Marginal Cost of Service ("MCOS") studies, and the Benefit-Cost Analysis ("BCA") Handbook are presented in this 2020 DSIP Update.

[4] Cases 16-M-0411 *et al.*, *In the Matter of Distributed System Implementation Plans* ("DSIP Proceeding"), Niagara Mohawk Power Corporation d/b/a National Grid – 2018 Distributed System Implementation Plan Update (filed July 31, 2018) ("2018 DSIP Update").

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

[6] DSIP Proceeding, Department of Public Service Staff Whitepaper – Guidance for 2018 DSIP Updates (filed April 26, 2018) ("2018 DSIP Update Guidance").

*Table ES-1:Topical Sections*

| | | |
|---|---|---|
| **Topical Sections** | **1** | Integrated Planning |
| | **2** | Advanced Forecasting |
| | **3** | Grid Operations |
| | **4** | Energy Storage Integration |
| | **5** | Electric Vehicle Integration |
| | **6** | Energy Efficiency Integration and Innovation |
| | **7** | Distribution System Data |
| | **8** | Customer Data |
| | **9** | Cybersecurity |
| | **10** | DER Interconnections |
| | **11** | Advanced Metering Infrastructure |
| | **12** | Hosting Capacity |
| | **13** | Beneficial Locations for DERs and Non-Wires Alternatives |
| | **14** | Procuring Non-Wires Alternatives |

As the energy landscape evolves, so will National Grid's DSIP plans. There are multiple efforts and regulatory proceedings underway that may influence the implementation of this plan. For a list of regulatory proceedings that may influence the path forward, please refer to Appendix A. Throughout this evolution National Grid will stay engaged and work with stakeholders to ensure the DSP continues to provide value to customers and is sufficiently flexible to accommodate adaptive goals and paths forward that adjust to changing technology, policy, and consumer preferences in a cost-effective fashion.

# 1 Progressing the Distributed System Platform

## Introduction

The capabilities of the DSP are expected to continuously evolve, therefore making it necessary that the Company's DSIP be flexible enough to accommodate adaptive goals and paths forward. Through this evolution, the DSP must ensure that customers receive value for what they pay for and utility service remains affordable. Achieving these objectives will require innovative plans that are developed collaboratively with stakeholders and new partners. To foster a consistent approach within New York State, National Grid actively participates in numerous working groups with the Joint Utilities to progress many of the efforts discussed herein. This 2020 DSIP Update presents the significant progress National Grid had made since it assumed its role as the DSP provider in 2016.

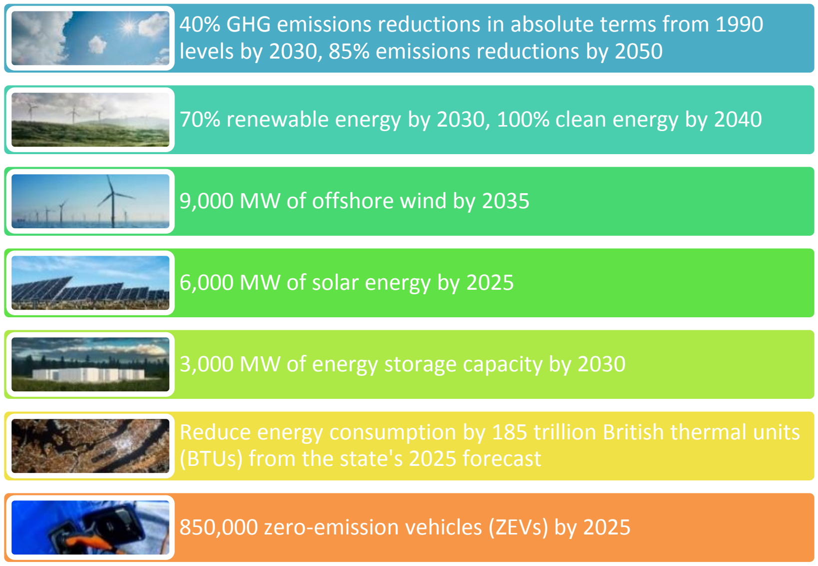
## Long-Term Vision for the DSP

### *Summary*

The Commission's REV effort is progressing a comprehensive energy plan for New York that considers system efficiency, reliability and resilience, market animation, utility business models, empowering customers, and reducing greenhouse gas ("GHG") emissions. Efforts in these areas have served as a critical starting point for the DSP providers to expand distribution-level investments to enable more active participation of customers and DER in the New York energy marketplace.

Since the 2018 DSIP Update, 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. 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 the electric sector, and more broadly the NY State economy, toward net-zero GHG emissions over the coming decades. National Grid will play a significant role in achieving the clean energy transition for New York State, including functions at both the transmission and distribution levels.

*Figure 1-1: Summary of CLCPA Goals plus Zero-Emission Vehicles Target*

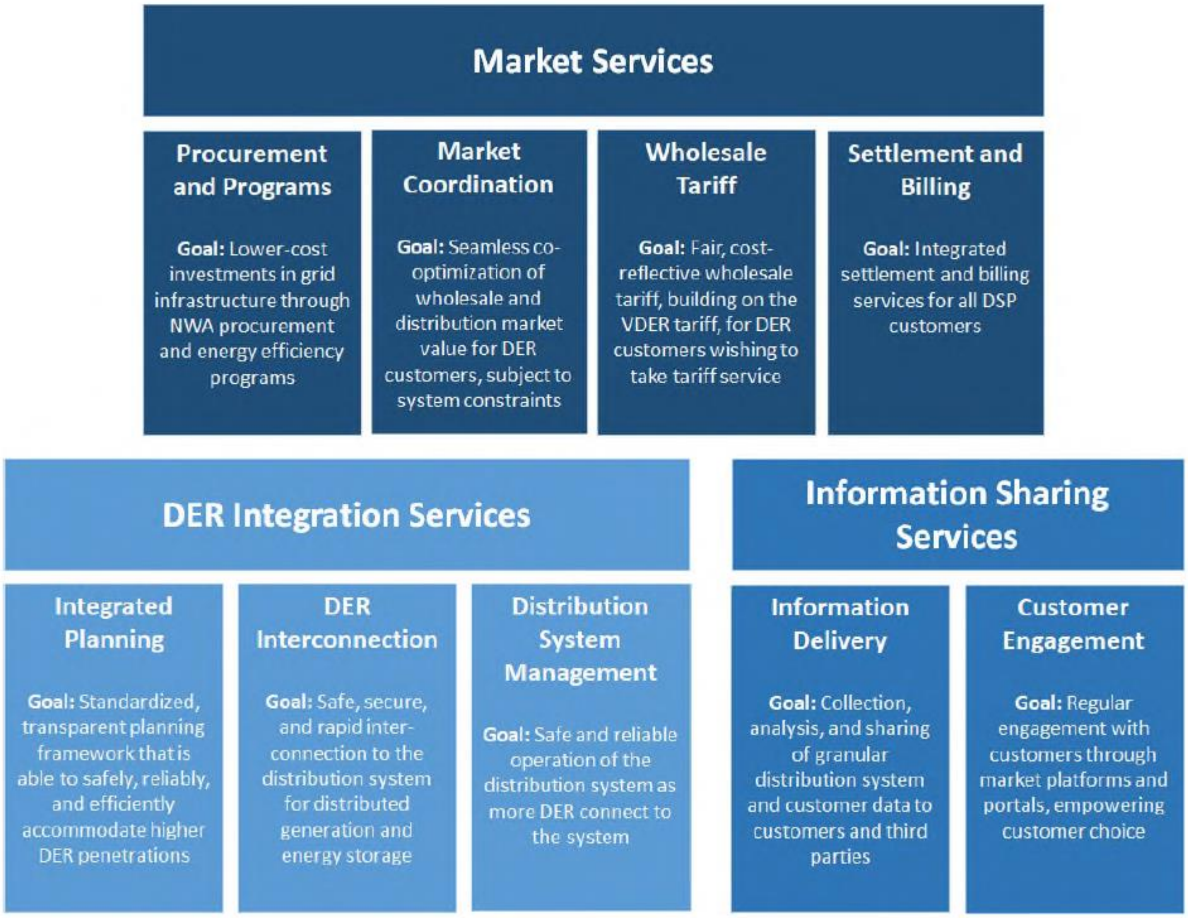



The CLCPA places an increased emphasis on large-scale renewables, beneficial electrification, and serving disadvantaged communities. The Company's vision is adapting accordingly. While National Grid has long supported and planned for growth in renewable generation at both the transmission and distribution 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 energy resources such as solar photovoltaics ("PV") and wind. Achieving these targets will require significant investments in transmission and distribution networks to deliver that clean energy to customers. Electrification and decarbonization of much of the state's transportation and space heating is expected to provide a significant portion of the state's carbon reduction. Large-scale electrification will put upward pressure on electricity demand, especially in the winter. The DSP provider must continue to enhance its capabilities to be able to more dynamically manage these loads and deliver increasing amounts of renewable generation in a manner that is safe, reliable, and efficient.

At the distribution level, National Grid's 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, DSP providers 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 stage investments to develop a DSP that manages a fully integrated grid.

National Grid has made progress in enhancing its capabilities to provide services in all three areas as shown in Figure 1-2 below and details are provided throughout this 2020 DSIP Update.

*Figure 1-2: National Grid's Long-Term Goals for DSP Functions within Each Core DSP Service Area*



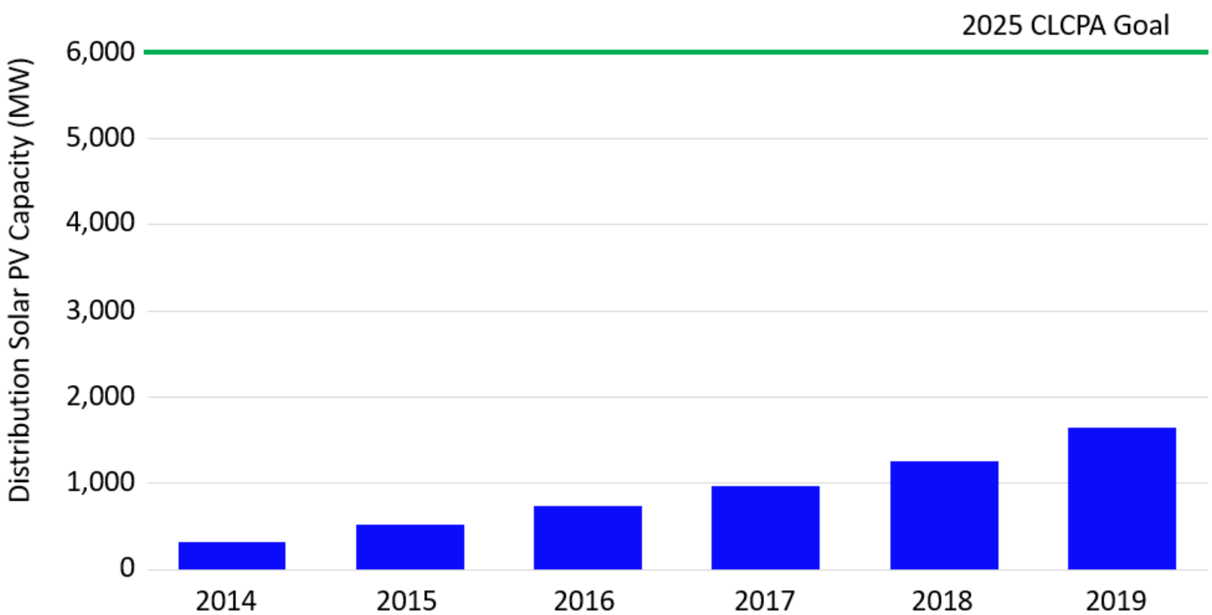

### *Watershed State Clean Energy Goals Emphasize the Importance of DSP Capabilities*

The CLCPA set a number of targets for specific technologies that will impact the resource mix in New York and enable a cleaner energy future. National Grid's DSP vision recognizes these targets and enabling investments to achieve them will continue, leveraging the DSP building blocks already implemented or in progress. Implementing the plans presented in this 2020 DSIP Update will create benefits for distribution customers, as well as support expanded bulk system transmission capacity and market opportunities where growth will need to occur to attain most targets.

Figure 1-3 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 Joint Utilities' collective efforts to streamline interconnections, 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 the New York State Energy Research and Development Authority ("NYSERDA")[7] and illustrated in Figure 1-3, there will need to be accelerated growth of distribution-level solar PV to meet the CLCPA goal by 2025. To enable this accelerated growth rate and achieve the CLCPA goal, investments will be needed to account for the significant increase in solar PV penetration and enhance flexibility to operate an increasingly dynamic distribution system. Similarly, the recently enacted Accelerated Renewable Energy Growth and Community Benefit Act[8] 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 state in which it generates 28% of its electricity from renewable sources[9] on the way to the CLCPA's target of 70% by 2030. National Grid's vision for the DSP therefore incorporates this evolving understanding of the need to continue supporting ever more advanced distribution system DER integration and operation, with enhancing capabilities to integrate and manage renewable generation resources across all system levels.

*Figure 1-3: New York's Progress Towards CLCPA Goal of 6,000 MW of Solar PV by 2025*




Advanced DSP capabilities will also help achieve the state's goal of 850,000 zero-emission vehicles ("ZEVs") by 2025. While the Company's efforts to advance electric vehicle ("EV") demonstrations, pilot projects, and charging infrastructure awareness have helped lead to New York State's light-duty EV deployment growth to nearly 50,000 vehicles, the current pace of EV adoption will need to increase to achieve the CLCPA target. National Grid will play a key role in

[7] New York State Energy Research and Development Authority, *Toward a Clean Energy Future: A Strategic Outlook 2020-2023* (2020), *available at* https://www.nyserda.ny.gov/-/media/Files/About/Strategic-Plan/strategic-outlook.pdf
[8] *Available at* https://www.nysenate.gov/legislation/bills/2019/s6599
[9] U.S. Energy Information Administration ("EIA"), New York Profile Analysis, *available at* https://www.eia.gov/state/analysis.php?sid=NY

developing EV charging infrastructure and creating broad customer awareness of transportation electrification benefits. The DSP will serve as the platform to provide efficient price signals for EV loads consistent with other DER programs. The Joint Utilities continue working with DPS Staff and other stakeholders on approaches to create flexibility and nimbleness to ensure that future transportation electrification programs achieve State goals, support the diverse interests of EV charging service providers and EV charging site hosts, and provide benefits to all utility customers.[10]

Beyond these two technology types, the DSP will also need to expand investments in other areas to achieve all the goals. Enhanced energy efficiency ("EE") and demand response ("DR") programs will drive lower levels of consumption and lower system peaks improving 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. Advanced clean heating and cooling efforts, including air-source and ground-source heat pumps, may grow winter electric system loads while increasing the summer peak less than would otherwise have occurred with the widespread use of less efficient air conditioning technologies.

Given the forthcoming growth across these clean energy technologies, the Company believes enhanced flexibility – a longstanding focus of DSP enablement efforts – is critical to achieve CLCPA targets. In particular, the future grid will leverage enhanced flexibility of load and DER to manage constraints on the transmission and distribution 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 clean energy resources with the goal of optimizing system and customer value.

The DSP envisions using markets to procure new products and services at lower costs to customers than the alternatives, while shifting investment risk, including for clean energy investments, away from customers to other market participants. Markets are thus an important element in achieving the State's clean energy goals at the least possible cost for customers.

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

One of the three core aspects of the DSP is DER integration services, which the Joint Utilities define (see 2018 DSIP Update) 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.[11]

[10] *See* Case 18-E-0138, *Proceeding on Motion of the Commission Regarding Electric Vehicle Supply Equipment and Infrastructure* ("EVSE Proceeding").
[11] *See* DSIP Proceeding, *supra* note 4.

**National Grid will continue to provide secure, safe, and rapid integration of DER, and will enable dynamic network management and interface with DERs.**

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 DERs 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 2020 DSIP Update, the Company is taking near-term steps to enable this type of active network management and deliver cost savings to the DER supplier while simultaneously providing the DSP with greater operational flexibility.

National Grid envisions a more robust planning process that preserves system safety and reliability while ushering in a clean energy future. The DSP will maximize system benefits of an increasing number of DERs while enabling the evolution of a more harmonized planning process across the transmission and distribution ("T&D") interface to effectively account for the anticipated impacts of clean energy resources interconnected and operating at all levels of the system.

National Grid also envisions a more dynamic operation of the distribution system in which local constraints may be addressed with traditional T&D assets or DERs such as storage and dynamic load, responding to dispatch, operational control, or price signals for real and/or reactive needs. The Company has taken steps to prepare for this increasingly dynamic grid, including analyzing monitoring and control ("M&C") and operational system requirements and coordinating with the New York Independent System Operator ("NYISO") to define operational coordination processes needed to facilitate DER wholesale market participation, especially with those DER seeking to participate in both NYISO wholesale markets as well as provide distribution services.

### *Sharing Useful, Market-Enabling Information that Enhances Customer Value*

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

**National Grid strives to expand information services within the guiding principles of security and customer privacy and the objectives of enhancing customer value and attaining the CLCPA's goals.**

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, National Grid envisions the need for more uniform information and access across the

New York utilities which may potentially be achieved through more standardized data formats and presentment on individual utility data portals, such as has been done with Company-specific hosting capacity maps in response to stakeholder input.

National Grid is supporting the achievement 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 Green Button Connect ("GBC"), and expansion of data availability associated with non-wires alternatives ("NWA") opportunities, as well as its proposal to implement AMI throughout the service territory. 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 marketplace buyers and sellers. The Company believes that through these efforts it 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*

**National Grid 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.*, traditional net energy metering ("NEM"), and Value of Distributed Energy Resources ("VDER") Phase One NEM and Value Stack), demand-side management programs, and direct contracting with resources (*i.e.*, NWA solutions). 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 the most 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 suppliers 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 distribution market pricing signals and enable National Grid to add distribution market services that offer value to customers.

Forthcoming integration of DERs into the NYISO wholesale markets will serve as a major step toward realizing the DSP market vision. As DERs 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 of this 2020 DSIP Update, 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.

Markets and compensation mechanisms evolve. 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 ("REC") procurements, off-shore wind solicitations, the DPS-led Market Design and Integration Working Group ("MDIWG") and VDER. National Grid, as part of the Joint Utilities, remains an active participant in these processes. The Company is focused on advancing its vision of promoting pathways to market value for energy resources, delivering value to customers through a least cost low-carbon energy mix, and achieving price parity for consumption and injection of electricity so as to guide investments to the most 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. National Grid's grid modernization plans are discussed in Section 2 and summarized in Figure 2.3.1. The Company is currently implementing, or planning to implement, key investments (*e.g.*, AMI, Advanced Distribution Management System ("ADMS"), grid automation, etc.) to further enhance its needed operational capabilities for this future.

## DSP Progress

Aligned with the vision above, National Grid has made significant progress in developing foundational capabilities which support the continued evolution of the DSP. On-going DSP implementation efforts are focused on grid modernization, DER integration, information sharing, and market services. Combined, these efforts benefit customers and market participants by providing information that facilitates informed market choices; stimulating DER deployment by defining a more accurate valuation of DER; and implementing planning and operational methodologies that integrate DER.

**DER Integration**

DER integration is the foundation of many of the shared goals of the state, stakeholders, and utilities under REV. Several key DER integration initiatives have been implemented and progress through June 2020 is represented in Table 1-1 below.

*Table 1-1: DER Integration Actions and Results*

| Actions | | Results |
|---|---|---|
| Improved forecasting methodologies | → | Plan the future grid in a cost-effective manner that facilitates increasing levels of DERs while safeguarding future reliability |
| Released Stage 3.0 of the hosting capacity displays which added sub-feeder level granularity and existing DERs | → | Provides stakeholders with additional detailed information to create a more streamlined DER interconnection process |
| NY-SIR* updates:<br>• Standardized CESIR template<br>• Standardized preliminary screening template<br>• Proposed storage metering configurations<br>• Technical guidance matrix for integrating DER<br>• Interim PV+ESS Guidelines<br>• Material Modifications Guidelines<br>• New preliminary and supplementary screens (*e.g.*, network screens, voltage flicker)<br>• Updates to interconnection rules for energy storage systems | → | Provides greater certainty, transparency, and uniformity to developers in the interconnection process across New York |

*****NY-SIR is the New York Standardized Interconnection Requirements

**Information Sharing**

Sharing useful information with customers and developers is central to achieving the REV objectives and is a fundamental aspect of the DSP. Expanded information sharing, including more granular customer data and system data, will facilitate DER market development and deployment by signaling where DER can provide the greatest value to customers and the grid, aiding in the development of new DER offerings, and building business cases to support the investment decisions of third parties and customers.

An area of emphasis has been on developing business use cases for customer data and system data to identify and prioritize stakeholder data needs. The Joint Utilities, as part of the Customer Data and System Data working groups, hosted discussions about business use cases with stakeholders to clarify what data is being used, how it is being used, and what additional datasets would provide more value to third parties and customers. Objectives of the one-on-one interviews between the Joint Utilities and third-party developers included:

- Inform stakeholders from the DER development community of each of the Joint Utilities and utility data portals and identify the data available;
- Work with stakeholders to better understand how currently available utility system data is being used and what additional data or refinements to data or data access might be valuable;

- Gain a better understanding of which types of data – either currently available or additional – are most important to developers for specific projects; and
- Formulate the discussion around developer use-case examples.

As enhanced data sets become available the Company posts the information to the National Grid System Data Portal for access by stakeholders.

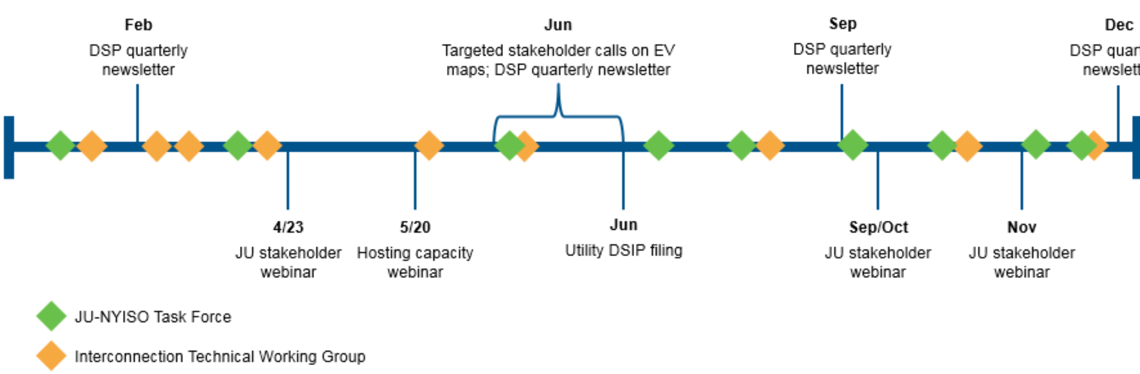
Since 2018 the Company has conducted multiple stakeholder sessions per Figure 1-4a below.

*Figure 1-4a: National Grid Stakeholder Engagement*

| 2018 | 2019 |
|---|---|
| • 2 Advisory Group webinars<br>• Newsletters (released every 2-3 months)<br>• Multiple EV WG activities: EV WG stakeholder session on Readiness Framework, presentations at Staff workshops, DCFC Proposal webinar (Nov 2018)<br>• Information Sharing Stakeholder Sessions:<br>  • Targeted stakeholder calls for business use cases | • Newsletters (released every 2-3 months)<br>• Polled Advisory Group members on their priorities for JU DSP stakeholder engagement<br>• Conducted Stakeholder DSIP Survey soliciting feedback regarding the value obtained from the 2018 DSIPs, as well as potential modifications for future DSIPs<br>• Stakeholder webinar on December 11, 2019: Shared results of the survey and plan for 2020 DSIPs<br>• Stakeholder Conference on Energy Storage Solicitation Implementation Plans: March 29, 2019<br>• DER Sourcing: May 29, 2019<br>• Hosting Capacity<br>  • September 17, 2019<br>  • October 23, 2019 |

Going forward the Company, alongside the Joint Utilities, plans to continue its stakeholder collaboration activities per Figure 1-4b below.

*Figure 1-4b: 2020 Stakeholder Engagement Timeline*



Through June 2020, several key information sharing initiatives have been implemented, which are summarized in Table 1-2 below.

*Table 1-2: Information Sharing Actions and Results*

| Actions | | Results |
|---|---|---|
| Updated individual utility data portals including system data, Locational System Relief Value ("LSRV"), NWA, and Hosting Capacity stage 3.0 | → | Improved data access and granularity to increase value of data driven by stakeholder and developer feedback |
| Established statewide terms and conditions for the use of aggregated whole building data shared with owners or agents | → | Developed common statewide approach which facilitates business opportunities for third parties while maintaining customer data security and privacy |
| Implementation of GBC, or similar; and proposed GBC terms and conditions | → | Increased data access through easier and more granular mechanisms to share customer data for customers or authorized third parties, and established terms and conditions for use of such data to maintain customer privacy |
| Began submitting Utility Energy Registry ("UER") bi-annual data reports to NYSERDA | → | Increased data access by sharing aggregated zip code or municipality monthly energy usage data to the publicly available UER |

**Market Services**

In the current stage of DSP evolution, the market services aspect of the platform seeks to enable DER greater access to market value through advances in the "3 P's" of programs, procurement, and pricing.

*Table 1-3: 3 P's of Market Services*

| Three P's | Description |
|---|---|
| Programs | Distribution-level utility tariff-based DER programs, such as DR and EE, to increase customer adoption of DER and deliver system benefits. |
| Procurement | Competitively sourced contract-based NWAs provide compensation to resources to defer or decrease traditional system investment. NWAs composed of dispatchable technologies or portfolios of technologies can deliver benefits for all customers through least cost solutions. |
| Pricing | Open enrollment tariffs encourage DER adoption by offering specified compensation available to all eligible resources. Compensation may be based on retail rates as in NEM, or on more accurate values, as in the VDER Value Stack. |

Progress has been made in each of these areas. Through June 2020, several key market services initiatives have been implemented, which are summarized in Table 1-4 below.

*Table 1-4: Market Services Actions and Results*

| Actions | | Results |
|---|---|---|
| Identified and developed NWA opportunities and continued stakeholder engagement by hosting both Joint Utilities and Company-specific webinars | → | Developing projects and portfolios of DER solutions that provide value to customers; streamlining the NWA solicitation process across the Joint Utilities; and increasing stakeholder awareness and experience |
| Formalized dispatch and communication protocols and roles and functions between the DSP, NYISO, DER aggregator, and DER owner | → | Enables DER to access more value through wholesale markets while preserving system safety and reliability |
| Enabled dual participation for DER and energy storage resources | → | Provides opportunity for DER to access value for both distribution-level services and wholesale markets |
| Expanded implementation of advanced customer programs for demand-side management (*e.g.*, EE, DR) | → | Allows for greater DER market participation and increases DSP flexibility to meet system needs |
| Defined suitable, unused, and undedicated utility land as directed by the 2018 Storage Energy Order;[12] developed a mechanism for standardizing the valuation of unused utility land to be included in BCA Handbooks and NWA opportunities | → | Creates visibility for bidders into the potential use of utility land, if available for NWA, delivering value to customers through lower-cost solutions |
| Initiated procurement of at least 350 MW of energy storage utilizing NYSERDA's bridge incentive funding, catalyzing expanded storage deployment | → | Supports the state's ambitious clean energy goals; RFP results announced in May 2020 |
| The Joint Utilities collaborated with NYSERDA on EE statewide implementation plans for heat pumps and low- to moderate- income ("LMI") customers | → | United vision and plan for increasing EE efforts, plans filed in March (heat pumps) and May 2020 (LMI), and stakeholder conferences held on LMI |
| Explained Allocated Cost of Service ("ACOS") methodologies at technical conferences and through filed descriptions in Case 15-E-0751 | → | Increased clarity for customers and other stakeholders on costs allocated on a shared and local basis for the purpose of creating Standby Rates |
| Explained marginal cost of service ("MCOS") studies filed as proposed basis for value to the distribution system in Case 19-E-0283 | → | Provide a more accurate compensation for DER, including EE, Dynamic Load Management ("DLM"), and DER on the Value Stack Tariff for avoided distribution value |
| Developed EV direct current fast charging ("DCFC") infrastructure incentive programs using a similar approach across the Joint Utilities | → | Encourages deployment of public DCFC stations to facilitate wider adoption of EVs |

[12] Case 18-E-0130, *In the Matter of Energy Storage Deployment Program*, Order Establishing Energy Storage Goal and Deployment Policy (issued December 13, 2018) ("2018 Energy Storage Order").

# Innovation and Demonstration Projects

National Grid enables innovative solutions through a variety of forums, including engagements with colleges and universities, participation in research efforts with the Electric Power Research Institute ("EPRI"), and numerous demonstration projects.

Learning by doing is a key element of the Company's innovation plan and National Grid's REV demonstration projects illustrate its commitment to innovation in support of REV. Since 2016, National Grid has been actively engaged in six REV demonstration projects; Clifton Park Demand Reduction, Potsdam Community Resilience, Fruit Belt Neighborhood Solar, Schenectady Smart City, Distributed Generation Interconnection, and Distributed System Platform. Detailed reports containing the scope, status, and lessons learned for each project are filed with the Commission.[13] These projects offer an opportunity for the Company to test new technologies and innovative business models at pilot scale and utilize lessons learned to help develop new offerings, at scale, based on the most successful demonstrations.

National Grid continues to consider new pilot projects that align with REV objectives, enhance the Company's capabilities as the DSP, and advance state policy goals. The Company is considering three Clean Innovation Pilot projects that aim to deliver long-term benefits to customers and developers and support the state's energy goals as follows.

**Syracuse Net-Zero Carbon ("NZC") Building-to-Grid ("B2G")**

This project is a collaboration between the Company, NYSERDA, and the Syracuse Housing Authority to develop a new, affordable, all-electric, net-zero energy multifamily building in the City of Syracuse. The project would develop building-to-grid ("B2G") software, communication, and integration to a business management system and DER. The project has a proposed start date in 2021. The project would demonstrate the viability and benefits of net-zero energy residential development, examine the technical and commercial operation of multi-lateral energy flows on the distribution system, and mitigate load increases to National Grid's Temple Substation (an LSRV location). The project would also directly benefit the residents of the buildings, who will see lower energy costs while the Syracuse Housing Authority will gain key lessons learned for future development.

**Active Resource Integration ("ARI")**

Building on the Buffalo Niagara Medical Campus DSP REV Demonstration Project, this project would test the ability to increase the amount of solar PV integrated into the system in constrained areas via development of curtailment capabilities and a DG-flexible load marketplace. The benefit would be to enable greater DER penetration with reduced upfront costs. The proposed project is planned to start in 2021.

[13] *See* REV Demonstration Projects, *available at* http://www3.dps.ny.gov/W/PSCWeb.nsf/All/B2D9D834B0D307C685257F3F006FF1D9?OpenDocument

**Distributed Communications**

This project aims to investigate a variety of industry communications protocols and compare them with the different communication mediums and functions in the Tier 3 telecommunications space. Additionally, the project aims to investigate low-cost M&C equipment capabilities and integrate the outcomes with the other proposed Clean Innovation Projects and assess the ability for greater levels of integration of DER with distribution automation ("DA") schemes such as Volt/VAR Optimization/Conservation Voltage Reduction ("VVO/CVR") and Fault Location, Isolation, and Service Restoration ("FLISR"). The project scope consists of a research and investigation effort, followed by laboratory testing and physical pilot deployments to the ARI and Syracuse B2G projects. The proposed project is planned to start in 2021.

# 2 DSIP Update Topical Sections

# 2.1 Integrated Planning

## Context and Background

The electricity delivery system continues to become more complex with the integration of increasing quantities of variable renewable generation. Moreover, the drive to decarbonize through electrification of heating and transportation will increase load on the system. The result is a significant increase in data, variability, and the need for new and improved ways to conduct planning to maintain safety, reliability, service quality, and affordability.

Integrated planning is a cyclical process that progresses through a series of steps: system monitoring, modeling and forecasting, risk assessment, solution development, prioritization and budgeting. Each step in the process considers all possible variables to the extent practical and possible.

National Grid's Capital Investment Plan ("CIP"), released annually, is a major output of the Company's integrated planning process. The CIP presents all major capital expenditures the Company plans to conduct over the next five-year period. The CIP also identifies NWA opportunities for DER to support grid needs. The Company posts the CIP on its System Data Portal.[14]

## Current Progress

National Grid continues to promote a "One System – One Model" structure to integrate system data, data management, and long-term planning. A centralized data repository that is an accurate digital representation of the entire grid and all its assets is critical to effectively manage the complex grid of the future. The Company has made significant progress regarding integrated planning and this section highlights some key areas of progress made to date.

**Data Enhancements**

The Company has made a series of investments and process changes so that the Geographic Information System ("GIS"), which underpins the system model, is accurate and can incorporate new technologies being interconnected. In 2019, National Grid undertook a survey to identify new data requirements and changes to existing data fields that would be required within GIS in the next five years. Several key areas were identified that include:

- Energy storage assets (both Company- and third party-owned);

[14] *Available at* http://ngrid-ftp.s3.amazonaws.com/DSIP/Docs/National_Grid_UNY_-_5_Year_TD_Capital_Investment_Plan_2020.pdf

- Smart inverter functions and settings based on Institute of Electrical and Electronics Engineers ("IEEE") 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems 2018 ("IEEE 1547:2018") definitions;
- EV chargers, especially DCFC chargers; and
- Customers participating in the Company's DR and EE programs.

In addition to tabular data, the Company is enhancing GIS models by embedding digital images of assets for visual reference. Projects like this GIS update deliver a more complete picture for planners to perform integrated system studies and identify opportunities for DER to support the grid.

The Company continues to increase the level of grid observability via grid sensors, remote terminal units ("RTUs"), and smart reclosers. As of this 2020 DISP Update, approximately 90% of National Grid's feeders now have some level of real-time monitoring available where the data is stored in an OSIsoft® PI Historian for use in future planning and interconnection studies.

**Advanced Forecasting**

A key application of enhanced data is through the forecasting process and associated integration within the planning process. As described in detail in the Advanced Forecasting chapter, the Company is now leveraging feeder-level detailed forecasts with base, low, and high DER probability levels in planning studies. The detailed forecasts allow planners to hone into specific areas and feeders and plan upgrades to accommodate future renewable projects.

**Software Planning Tools & Studies**

National Grid is investing in software tools and developing processes to facilitate an integrated planning approach that will support the identification of NWA and energy storage opportunities across its T&D system. For example, the Company is using EPRI's Storage Valuation Estimation Tool (StorageVET®)[15] software to analyze potential storage solutions for both T&D systems that incorporate grid needs and participation in the NYISO markets to maximize DER value. The Company is also using new Quanta software to study specific T&D pockets with high forecast levels of renewable generation planned. This T&D pocket study adds distribution feeder information to the integrated Transmission and Sub-Transmission power flow models originally developed for use in National Grid's Marginal Avoided Distribution Capacity ("MADC") study.

The Company's approach to the competitive procurement of energy storage dispatch rights, as mandated by the 2018 Energy Storage Order, is a strong example of integrated planning. National Grid identified locations based on the integrated value to mitigate local grid needs while participating in the NYISO wholesale market (*i.e.*, "Dual Participation"). This integrated planning study approach resulted in the production of a very detailed RFP with clearly defined requirements that in-turn aided bidders' development of higher quality proposals.

[15] StorageVET® is a publicly available, open-source, Python-based energy storage valuation tool.

Most recently the Company took an integrated approach to the development of plans for DA and specifically VVO/CVR and FLISR. This approach considered many variables which were assessed and used in performing a BCA to help rank and determine optimal locations for deployment. Additional details are provided in Appendix B.

As part of its integrated planning efforts, National Grid is currently revising its Planning Criteria with respect to hosting capacity, resiliency, and VAR limits. In developing this revision, the Company is considering modeling DG explicitly in the CYME power flow model, which allows for a more accurate representation of DG for interconnection and integrated planning studies. Looking ahead, the Company is investigating how best to model smart inverter functions. This work is being done in conjunction with the Joint Utilities' Smart Inverter roadmap currently under development, as described in more detail in the DER Interconnection and Grid Operations Topic Sections.

As the number of studies and relevant variables increases, National Grid is developing greater levels of automation in its integrated planning processes. For example, the Company uses software scripts to automate and simplify the extraction of the OSIsoft® PI Historian data for system data and to auto-scrub the detailed forecasts to check for internal inconsistencies. Automation can improve both internal and external processes. For example, the Company procured CYME Server which supports power flow model version control and multi-user access. Externally, consistent with the DG Interconnection Online Application Portal ("IOAP") roadmap, CYME Server helps provide an auto-analysis of Screens A-F of the NY-SIR process, which speeds up the time to complete DG interconnection studies while increasing efficiency for interconnection planning engineers.

National Grid's Hosting Capacity Analysis ("HCA") is another example of integrated planning that requires input from multiple sources and various software tools. In producing the hosting capacity maps the Company used the EPRI DRIVE Version 2.0 module to perform nodal analysis in support of the release of HCA Stage 3.0 in October 2019. The Hosting Capacity chapter offers more depth on the topic.

**COVID-19 Impacts**

National Grid has developed a 2020 feeder-level forecast that incorporates changes to customer behavior resulting from COVID-19 mitigation measures, such as the closing of non-essential businesses and dramatic increase in the work-from-home population. These forecasts (multiple COVID scenarios were produced) are being used as an alternative scenario for planners to consider. As a result, planning may be identifying and solving newly identified needs in two areas: 1) overloads in highly residential areas due to increases in residential loading; and 2) solar reliability concerns in highly commercial and industrial ("C&I") areas that may see a reduction in daytime minimum loading.

# Future Implementation and Planning

Over the next five years National Grid plans to continue along its "One System – One Model" vision with increased integration and centralization of data and utilization of new software tools, analysis, and automation.

**Data Enhancements**

A key enabler of integrated planning will be the rich data AMI offers. Granular AMI data will improve load and DER forecasts enhancing both planning and operations. Leveraging AMI data will require new tools and processes. For example, the Company plans to procure a software module to help integrate AMI load data into the CYMDIST software tool to update its load models. As described in more detail in the AMI chapter, it is expected the data from AMI will play a key role in integrated planning.

Data generated by EV charging infrastructure will increase in volume over the five-year term of this 2020 DSIP Update, likely increasing its value and importance to planning and forecast development. The Company currently has access to data from both the Level 2 ("L2") and DCFC stations that it supports under its Electric Vehicle Charging Station ("EVCS") Program. In addition, under the DCFC Per-Plug Incentive program, the Commission has placed detailed data requirements regarding charging behavior on utilities and station operators. Most recently, DPS Staff proposed that EV charging stations supported through utility make-ready programs be prepared to share similar data.[16] Upon the issue of a Commission order in the EVSE Proceeding, the Company expects to use data made available through the make-ready program to improve forecasting and power flow modeling as well as for planning studies.

In alignment with National Grid's "One System - One Model" vision, it is crucial to have an authoritative GIS model to serve as the single source of truth for the electronic representation of the grid. GIS underpins the CYME models in use today and ADMS in the near future.

**Advanced Forecasting**

As described in the Advanced Forecasting Section of this 2020 DSIP Update, National Grid plans to integrate AMI data to expand on the probabilistic forecasts of DER and load with greater temporal and geospatial granularity. Subsequently, the integrated planning process will apply these forecasts to grid studies and continue to provide a feedback loop for continued enhancement. Increases in winter peak load from the electrification of heat will further impact forecast development. The Company expects to refine the probabilities assigned to each forecast scenario to improve its probabilistic forecasts.

[16] *See* EVSE Proceeding, Department of Public Service Staff Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment (filed January 13, 2020) ("EVSE&I Whitepaper"), pp. 1-2.

**Software Planning Tools and Studies**

As renewable generation and storage capacity increases on both bulk and local systems, it is increasingly important to consider both systems simultaneously, which can occur in software and in other study processes. For example, significant amount of DG in areas with minimal electricity load can potentially create adverse impacts on the transmission system. As described in the DER Interconnection chapter, the DSP providers are developing cross-queue coordination to account for generators interconnecting under the NY-SIR and those in NYISO-led processes. National Grid has begun an investigation into building and applying integrated T&D models and will determine the practicality and requirements to roll them out across its service territory. The Commission's May 14, 2020 Transmission Planning Order issued pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act[17] highlights the need to conduct integrated planning to help meet CLCPA goals.[18] The Company will be working with the other members of the Joint Utilities to file process proposals and rate making topics per the requirements of the Transmission Planning Order.[19]

National Grid's System Data Portal, which is designed primarily to provide information to external stakeholders, has also provided value within the Company. For example, planners can combine hosting capacity maps with detailed forecasts to test the impact of proposed planning criteria changes for hosting capacity criteria thresholds. Going forward, the Company will continue to consider the value of future hosting capacity map enhancements to integrated planning to help DER developers identify locations to interconnect.

The Company plans to revise the MADC study using an updated integrated T&D model along with the latest long-term forecasts. The results of the revised MADC study will identify and value locational constraints in the Company's service territory which may inform development of future LSRV locations, the Term- and Auto-DLM programs (see Energy Storage Integration chapter), targeted EE, and locations for the proposed Load Factor EAM (also addressed in the Energy Storage Integration chapter).

In concert with the Joint Utilities, National Grid plans to release a draft Smart Inverter roadmap in 2020 for stakeholder review and comment. This roadmap will provide a pathway for smart inverter implementation across New York in a manner that integrates prioritizes needs and capabilities with consideration of risks to help integrate DER into grid. The roadmap envisions a coordinated roll-out of each smart inverter function to benefit both the grid and its customers. Ts planning will need to consider smart inverter functions, the software tools used today by planners, including CYME DIST and Advanced Systems for Power Engineering, Inc. ("ASPEN"), will also need similar updates. The modeling will be essential to identify impacts on loading, voltage, reliability, and protection as part of interconnection studies and area planning studies. The Company is also

[17] Case 20-E-0197, *Proceeding on Motion of the Commission to Implement Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act*, Order on Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act (issued May 14, 2020) ("Transmission Planning Order").
[18] *Id*., pp. 5-9.
[19] *Id*., pp. 9, 10.

progressing to contract for a VVO/CVR-Smart Inverter project with NYSERDA[20] to validate and test the modeling and simulation of smart inverters that should provide insight into the modeling requirements.

National Grid's approach to NWA identification continues to evolve. In alignment with the 2018 Energy Storage Order, the Company plans to take a more integrated approach to identifying new opportunities for NWAs whenever they can provide customer value. For example, through integrated T&D modeling and analysis, NWAs that can solve transmission and/or distribution needs may be identified, thereby creating new opportunities for DER. Also, increasing NWA value through dual participation in the NYISO market will be considered.

National Grid has conducted integrated planning, research, and development with EPRI, Centre for Energy Advancement through Technological Innovation International Inc. ("CEATI"), NYSERDA, and DOE National Laboratories and expects to continue and expand on these engagements over the course of the next five years. Key topic areas include:

- Transmission Planning
- Bulk System Renewables and DER Integration
- Integration of DER
- Distribution Operations and Planning
- Energy Storage and DG
- Distribution Systems
- Power Quality
- Strategic Options for Integrating Emerging Technologies and Distributed Energy
- Strategic Asset Management

The plans and processes described above will allow T&D system planners to evaluate DER system impacts and opportunities in greater detail and improve integrated system planning. See Table 2.1-1 below with a general timeline for the plans described previously.

*Table 2.1-1: Integrated Planning Future Projects/Initiatives*

| **Future Project/Initiative** | **2018-2020** | **2020-2025** | **2025 +** |
|---|---|---|---|
| Probabilistic Forecasts | | | |
| AMI/Planning Integration | | | |
| Explicit DER Modeling | | | |
| ADMS Power Flow | | | |
| T&D Integration | | | |
| NWA | | | |
| R&D | | | |

[20] *See* NYSERDA Electric Power and Transmission and Distribution ("EPTD") Future Grid Challenge Program Opportunity Notice ("PON") 4128, Round 2 of 2, *available at* https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt000000HL3dSEAT

## Risk and Mitigation

Risks to National Grid's plans for integrated planning include potential schedule delays in the delivery of the associated technology projects. Effective management of the growing levels of data also remains a challenge. To manage/mitigate these risks the Company has project managers tracking progress against our plans and continues to expand its IT support team to help manage the integration of increased levels of data.

# CLCPA Alignment

Integrated planning is a key component of the DSP's role in meeting the CLCPA goals. Integrated planning offers the DSP the tools to appropriately value DER and design a system that supports the requisite resource mix.

National Grid continues to expand tools developed through integrated planning to help developers and customers interconnect DER in beneficial locations. For example, hosting capacity maps can help identify areas with lower expected interconnection costs while integrated planning efforts result in new NWA and LSRV opportunities to leverage DER to support the grid with increasingly clean energy resources.

# Integrated and Associated Stakeholder Value

As indicated in the title of this chapter, integration is a key component of the planning process, which continues to increase in importance. The ability to integrate greater levels of information and more accurate data into the planning function allows National Grid to better plan, leverage DER, and maintain a safe and reliable grid for the benefit of customers. Through an integrated planning approach, the Company can identify potential projects focused on increasing hosting capacity.

## Stakeholder Interface

National Grid's integrated planning initiatives will continue to be influenced significantly by interactions with stakeholders through various Joint Utilities' working groups such as Information Sharing, Integrated Planning, NWAs, Smart Inverter Strategy, the Interconnection Technical Working Group ("ITWG"), and the Interconnection Policy Working Group ("IPWG").

# 2.2 Advanced Forecasting

## Context and Background

Load forecasts are an essential component for many activities. These include reliability planning for the T&D systems, financial planning for pricing and rates, supply procurement, and strategic planning to meet DER and other regional and state policy initiatives. Historically, the forecasting process was simpler in that as the economy grew, so did load. However, today, the proliferation of DER and technologies that can manage customer loads have created a need for more advanced forecasting techniques.

Both short- and long-term load forecasts will be required to integrate DER into system planning and operations, in aggregate as well as at the feeder and substation levels. At the system level, forecasts provide important information to ensure that: i) capacity planning and procurement obligations to the NYISO are met; ii) regional planning for FERC and North American Electric Reliability Corporation ("NERC") are met; iii) National Grid procures sufficient energy and load products to serve its customers; iv) overall strategic DER programs are designed and targets are met; v) system performance metrics are achieved; and vi) load requirements are appropriately translated into rates and pricing. At the distribution level, proper forecasting of load and DER at the feeder level is critical to reliability planning, evaluating interconnection requests, and performing NWA analysis.

National Grid's system load and DER forecasts are developed in layers that allow users to consider impacts both before the impacts of DER ("gross") and after the impacts of DER ("net"). The annual peak load forecasts incorporate projected economic and demographic impacts as well as anticipated technological advances and policy objectives. Current forecasts consider projected customer load growth, EE measures, solar PV generation, EVs, energy storage, and DR programs over a fifteen-year horizon. The most recent system peak load and DER forecast for National Grid can be found on the Company's System Data Portal.[21]

Since 2018, National Grid has also generated feeder level forecasts and publishes 8760-hour feeder level forecasts for all radial distribution feeders on its System Data Portal.[22] Planners utilize the feeder level forecasts in various local area planning assessments, NWA evaluations, and the Company's MADC study to quantify the value of DER in targeted locations.

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[21] *Available at* http://ngrid-ftp.s3.amazonaws.com/DSIP/Docs/National_Grid_UNY_-_Peak_Load_Forecast.pdf
[22] *Available at* https://ngrid.portal.esri.com/SystemDataPortal/NY/index.html

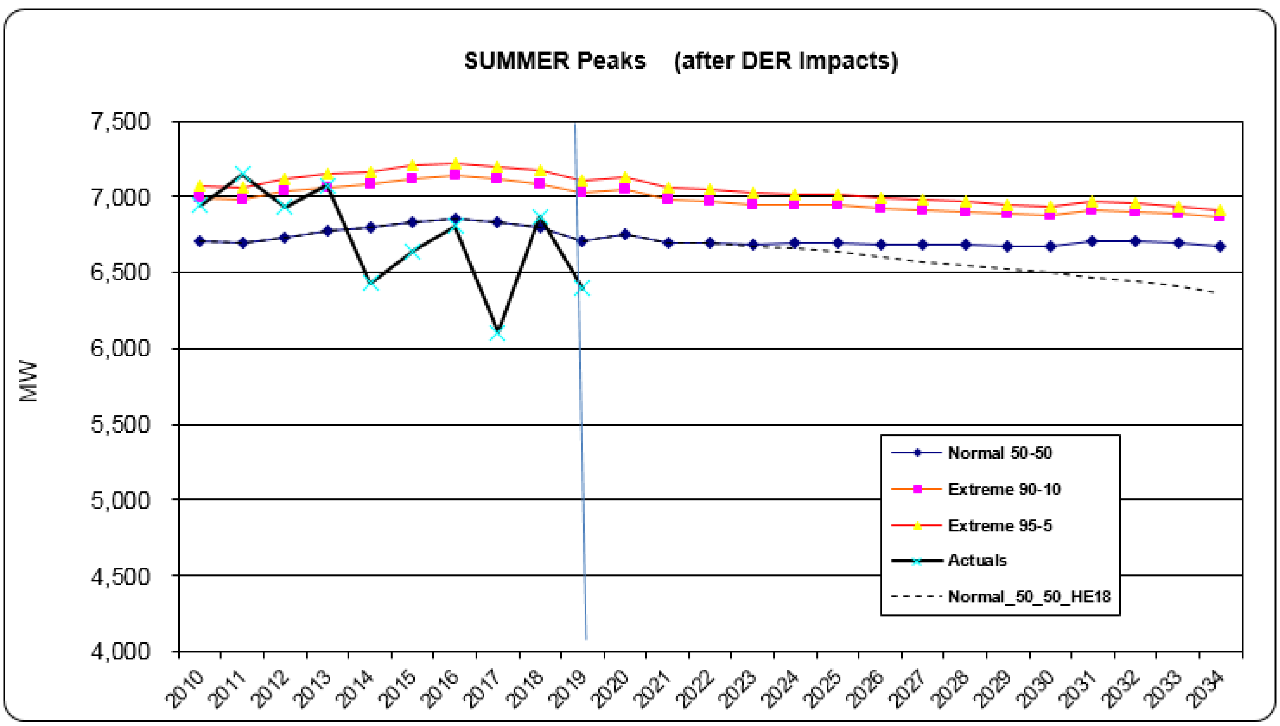
# Current Progress

In National Grid's previous DSIP filings the Company laid out its multi-year plan to develop more granular forecasts considering inputs from a top-down, system-level perspective (*e.g.*, program level and policy goals) along with inputs from a bottom-up perspective *(e.g.*, customer demographics and location specific impacts). The Company continues to pursue the multi-year plan and has made significant progress to date.

The system-level forecast incorporates macro-economic and policy-based perspectives and is valuable for transmission planning as well as assessing the broad impacts of state policies, large programs, and market drivers. System-level forecasts assess the impact on overall system peak demand for each DER type. Utilizing a layered approach, the forecast provides loading projections with and without the impacts of the DERs, in aggregate, and individually for each DER type.

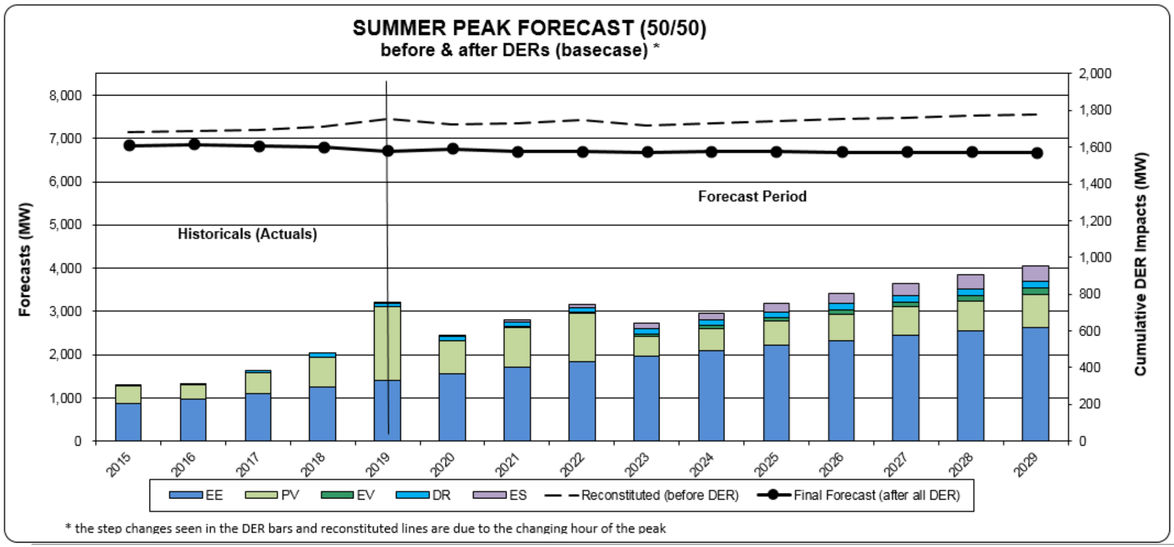
Figure 2.2-1 shows the results of the most recent (2019) system-level forecast for net load under three different summer weather scenarios.

*Figure 2.2-1: National Grid's System-Level Summer Peak Load Forecast with DER Impacts*




The dotted line in Figure 2.2-2 below shows the underlying "gross" load (before DER) and the corresponding "net" load (after DER), as well as the relative impacts of the individual DER types. This graphic clearly demonstrates how DER have, and will continue to, successfully lower peak demand at the system level.

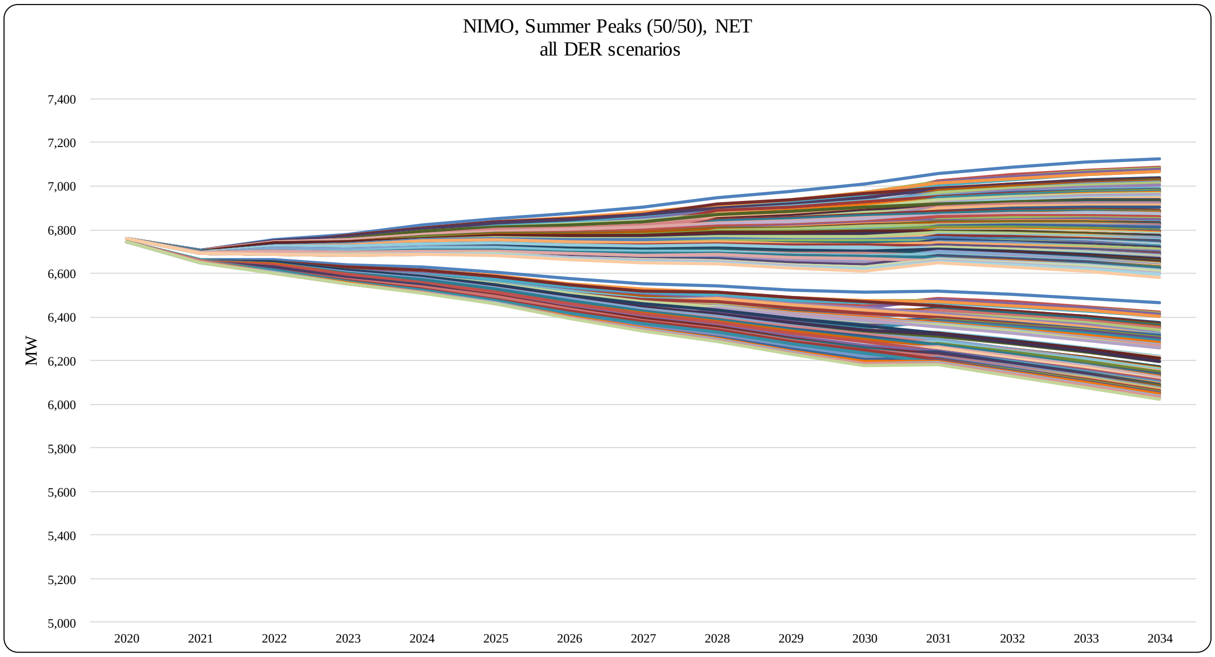
*Figure 2.2-2: National Grid's System-Level Summer Peak Forecast (with and without DER)*




Additional details on National Grid's long-term forecast can be found on the Company's System Data Portal under the Company Reports tab.

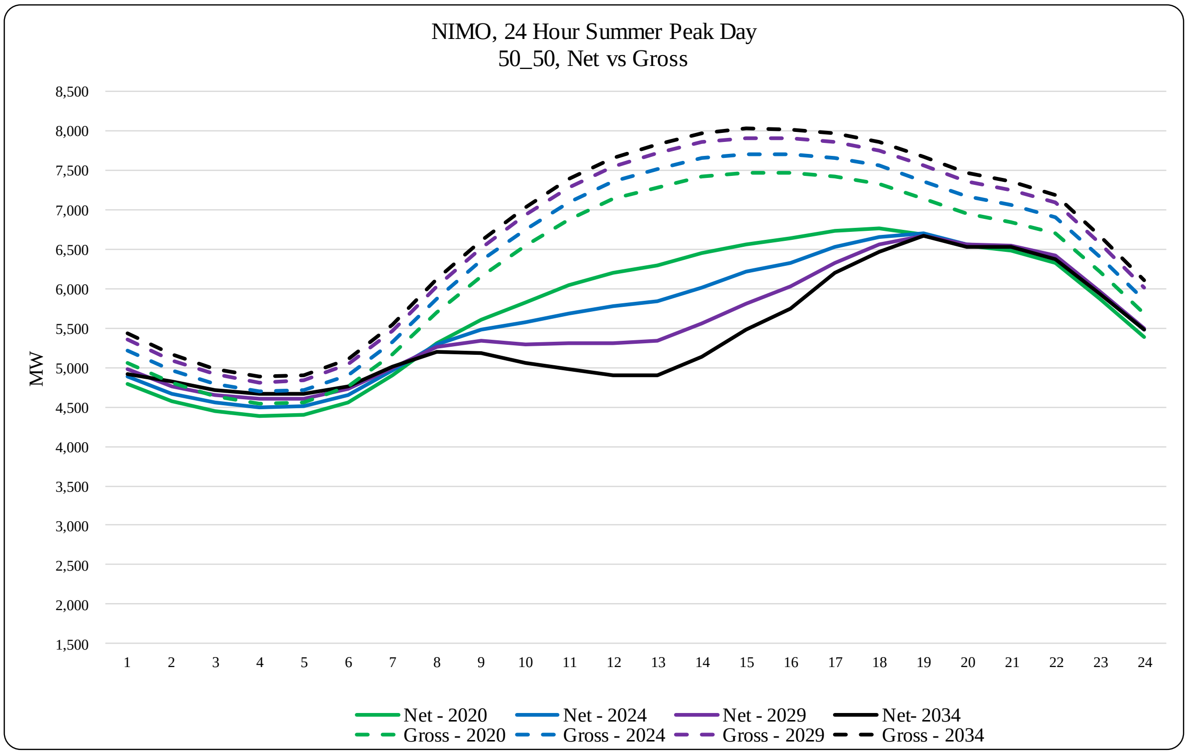
In 2019, National Grid began producing multiple DER scenarios for both the system- and feeder-level forecasts in order to provide additional information to planners. The scenarios were informed by historical data, policies, customer load impacts, regulatory, financial, and market drivers. Figure 2.2-1 above shows the summer peak forecast for the base case scenario. Figure 2.2-3 below shows the summer peak forecast for cumulative DER scenarios. The availability of this cumulative scenario information enhances the planning process by now providing information on what maximum and minimum loads might be considering DER impacts.

*Figure 2.2-3: System-Level Summer Peak for All DER Scenarios*




In addition to forecasting the annual system peak hour, National Grid also creates an hourly load profile for each future peak-day. Figure 2.2-4 below depicts this hourly profile for selected years on summer peak days for the Company's service territory. It shows both the "net" and "gross" loads.

*Figure 2.2-4: National Grid System-Level 24-hour Profile*




Hourly forecasts illustrate not just the changing magnitude of peak loads but are valuable for showing how the timing of peaks changes over time. Examining the timing of loads across the day is invaluable for assessing the impacts of different types of DER.

Forecasts with greater granularity, both temporal and spatial, are necessary to actively manage the DSP. Feeder-level forecasting begins with modeling of existing customer loads and DER at the customer's point of connection with the grid. Complex, feeder-level models that consider equipment configurations and connectivity, customer models, and existing and potential DER adoption are used to create the feeder-level forecasts. These models take into consideration the entire load shapes of each individual customer and each DER scenario. Forecasts with greater granularity, both temporal and spatial, are necessary to actively manage the DSP. Feeder-level forecasting begins with modeling of existing customer loads and DERs at the customer's point of connection with the grid level and then maps those loads to specific feeders in the distribution system model developed in a simulation platform. These feeder-level models are more complex to build as they consider all equipment configurations and connectivity, customer models, and existing and potential DERs, but they are necessary to account for the complexity and heterogeneity in both the feeder and the customer. These models can be more accurate because they take into consideration the entire load shapes of each individual customer and the DER scenarios.

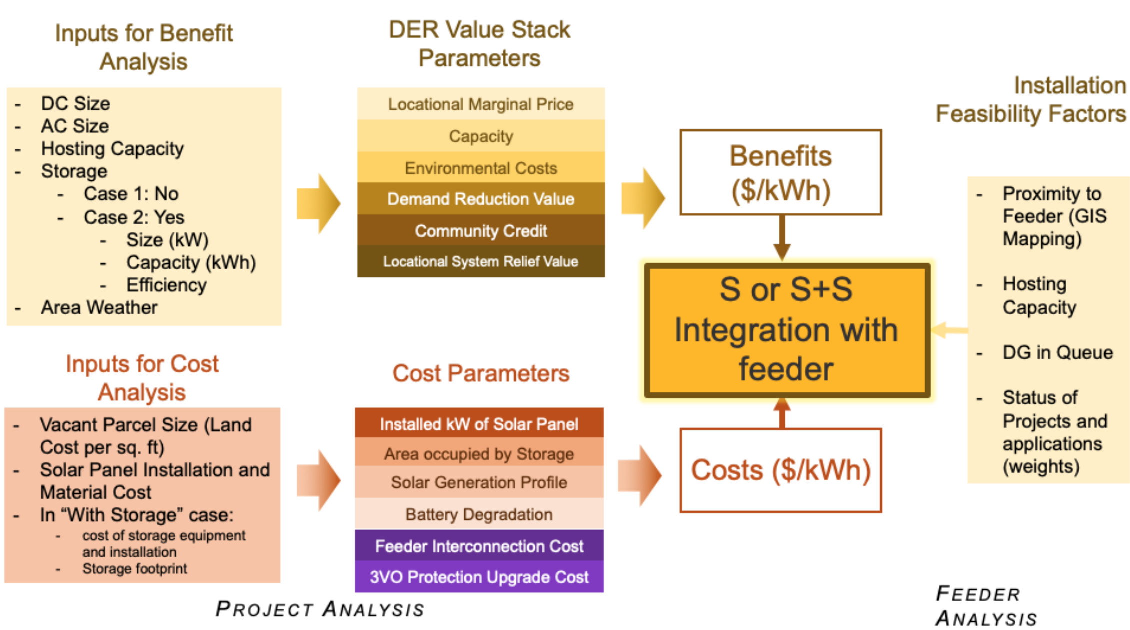
To develop the feeder-level forecasts, National Grid uses in-house modeling combined with a simulation-based modeling environment called GridLAB-D™ which is an open source, agent-based modeling, simulation, and analysis engine that enables detailed power flow solutions for electric distribution systems. Recently the Company has been leveraging its advanced forecasting tools to investigate the impacts of COVID-19 on both the near-term and longer-term loading impacts.

# Future Implementation and Planning

National Grid will continue to enhance and augment its load and DER forecasting methodologies by incorporating additional types of DER and the impacts of the electrification of heating The Company has begun transportation modeling to simulate the EV charging behaviors of both residential and non-residential customers. The transportation modeling approach being employed has been developed based the simulation tool, POLARIS (Planning and Operations Language for Agent-based Regional Integrated Simulation), developed by the DOE.

Additionally, National Grid has recently started working on creating a new forecasting module for non-rooftop solar ("S") and solar plus storage ("S+S") from a new, bottom-up S and S+S module. The objective of this module is to identify all vacant parcels in the Company's service territory which are likely to attract developer interest over the next fifteen years (2020 - 2034) and will eventually result in projects interconnecting to National Grid's distribution feeders. Figure 2.2-5 summarizes the bottom-up methodology for S/S+S project modeling in feeder-level forecasts.

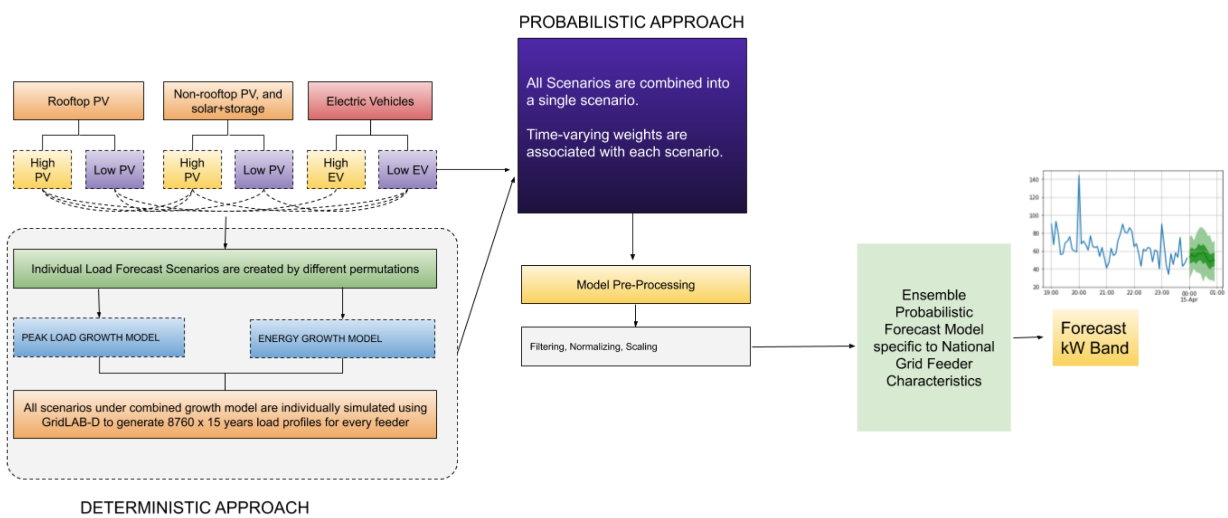
*Figure 2.2-5: Solar and Solar + Storage Module Benefit-Cost Analysis Framework*



Future efforts in forecasting will consider enhanced probabilistic forecasting techniques. The electric demand by load varies with time of the day, type of the day, and season of the year. Variabilities in weather and special events can impact the daily and seasonal patterns of consumption. For example, projected economic growth, proliferation of DER such as electric vehicles, and tax credits that incentivize DER, such as home ownership of solar panels, can impact forecasts. As a result, there is a need to develop and adopt a reliable probabilistic forecast model to predict future energy demands. Such a model will enable higher planning, operational flexibility, and agility.

As discussed earlier, the current forecasting process has added multiple scenarios to provide planners with additional information beyond a single base case. While this is valuable to show how different scenarios might impact loads, these multiple scenarios do not provide any assessment of the likelihood of these DER scenarios materializing. Probabilistic forecasts will provide National Grid planners a more holistic picture of the factors affecting electric demand. Therefore, the Company plans to introduce probabilities, or the likelihood for each DER scenario, in the first step. Probabilistic forecasts will be improved by introducing time-varying probability weights to each DER scenario which enable the study of impacts at the feeder and system level using a forecast model that considers multiple possible scenarios at the same time. In the next five years, National Grid plans to build a robust ensemble model derived from proven theoretical methods to create probabilistic forecasts. Instead of point-value predictions, the probabilistic forecasts will generate a "kW Band" of expected hourly load demand. This "kW Band" is representative of a confidence interval within which the highest possible peak and lowest minimum load demand would occur, and the likelihood of that occurrence. The strategy for introducing an ensemble for probabilistic load forecasting is summarized in the following figure. Figure 2.2-6 also distinguishes the probabilistic forecast approach from the deterministic approach utilized in the Company's 2018 and 2019 Electric Load Forecast ("ELF") at the feeder level.

*Figure 2.2-6: Probabilistic Load Forecast Plan and Comparison with Existing Deterministic Approach*



Over the five-year horizon of this 2020 DSIP Update, National Grid plans to introduce probabilistic forecast methods which will be benchmarked for performance and efficacy against deterministic forecast models.

In summary, National Grid's forecasting process results in forecasts at the Company, NYISO zones, and feeder levels. Temporally, the forecasts range from hourly forecasts to multi-year annual projections. Factors influencing future growth include:

- Policy and Regulatory Drivers
- DER Market Drivers
- DER Technology Drivers
- Incentives & Financing Drivers

Over the horizon of this 2020 DSIP Update, National Grid will continually enhance both the system-level and feeder-level forecasting models. At the system level the forecast model will focus on enhancing the ability to accurately represent regulatory and policy goals, incorporating additional DERs as appropriate. At the feeder level, the more granular models will consider technical, financial, and market adoption studies, as available. This approach can be leveraged across the variety of individual DER models. Each DER component will have its own projection for future growth allowing the Company to assess each DER's impact individually as well as on an integrated basis. This enables the disaggregation of net load so that the contributions of all contributing components can be understood.

The goal of National Grid's Load and DER Forecasting and Analysis initiative is to continue to enhance traditional econometric-based, statistical models with the simulation framework for forecasting load and DER with power system modeling. The Company is working with the DOE to link best-of-breed simulation tools associated with modelling for EVs, ESS, and solar PV.

The data being used in the development of this initiative include:

- Remote Sensing
- Residential and Commercial Demographics
- Vehicle Registrations
- Weather
- Economics
- Spatial information
- Current DER installations
- Customer information
- Meter information
- Assets

High-performance cloud computing, such as Amazon Web Services, has been leveraged in feeder-level forecasts as appropriate to improve the overall computational process.

The timetable presented below represents National Grid's plans for the continued enhancement of its load & DER forecasting models.

*Table 2.2-1: Timeline of National Grid's Plans for Development of Forecasting Models*

| | | | | |
|---|---|---|---|---|
| | **2020** | **2021** | **2022** | **2023** |
| **DER Forecast (bottom-up and top-down)** | Exploring new DERs | Exploring new DERs such as electrified heating | Enhancement of prior year models | Enhancement of prior year models |
| **Probabilistic Models and Forecast ( feeder and system level)** | Introduce probabilistic integration of scenarios | Introduce probabilistic integration of scenarios | Enhancement of prior year models | Enhancement of prior year models |

## Risk and Mitigation

While National Grid is fully committed to the load and DER forecasting development path described, it is not without its challenges. These include:

- Access to data and the quality, volume, computation, and cost of data updates; and
- Integrating and embedding scenario-based and probabilistic forecasting paradigms into existing planning processes

The Company is mitigating these challenges by:

- Making improvements in grid data in alignment with National Grid's "One System - One Model" vision.
- Leveraging high-performance cloud computing, such as Amazon Web Services, to improve the overall computational process and more efficiently handle big data.
- Lessening the cost of data acquisition by:
  - Utilizing publicly available information wherever possible
- Forming a feedback loop between those who use the forecasts (National Grid planners) and those who develop them (National Grid's Advanced Data and Analytics group).

## CLCPA Alignment

The forecasts capture CLCPA goals as a significant variable and are also modeled explicitly in each DER forecast. Considering these scenarios and making information available to utility planners can provide the most value to the distribution system and customers. Forecasting is the initial step that defines National Grid's ability to facilitate the achievement of the CLCPA goals.

# Integrated and Associated Stakeholder Value

Forecasting is an essential step in harmonizing many of the DSP processes discussed throughout this 2020 DSIP Update. For example, forecasts feed directly into the work of integrated planning for many use cases, such as the MADC study, summer preparedness, annual planning, area studies, operations studies, risk evaluation, sensitivity studies, and new customer studies. Furthermore, HCA synthesizes the outputs of system data and forecasting to project levels of DG which can safely interconnect to the distribution system. Similarly, outputs from forecasting directly feed into the work of procuring NWA solutions to identify the type, timing, and size of a system need or the studies which underpin the beneficial locations of DER. By contrast, the impact of EE is an input to the basic load forecasting process.

## Stakeholder Interface

National Grid engages with stakeholders and other New York utilities as part of the Joint Utilities' efforts. In addition, the Company is engaged with other leading-edge forecasting organizations through efforts with EPRI, DOE, and regional Independent System Operators ("ISOs").

# 2.3 Grid Operations

## Context and Background

The Grid Operations update has two main foci: 1) DSP/ISO integration; and 2) the Company's Grid Modernization Plans. Both grid modernization and DSP/NYISO coordination support the increased integration of DER, EV charging, and other REV and CLCPA goals to produce a cleaner, more efficient electricity system. DSP/NYISO coordination covers a range of topics including transmission node mapping, operational coordination and communications, and short-term forecasting. Grid Modernization includes the hardware and software associated with managing the grid, notably, AMI, ADMS, Distribution Supervisory Control and Data Acquisition ("DSCADA"), and Outage Management System ("OMS"). Grid modernization software generally increases distribution system automation which enables programs like VVO/CVR and FLISR.

## Current Progress

### Operational Coordination and Communications

The Joint Utilities and the NYISO have developed the *Draft DSP Communications and Coordination Manual*[23] which defines an initial set of coordination requirements to facilitate DER participation in wholesale markets while maintaining the necessary situational awareness of the T&D systems. Several Joint Utilities / DSP / NYISO coordination meetings were held to identify further requirement details including the future implementation of operational information portals.

The Joint Utilities, as the DSP providers, also developed a *Draft DSP-Aggregator Agreement for NYISO Pilot Program*[24] to close the operating and communication gap between the utility interconnection agreements and tariffs and NYISO tariffs. The document provides information to DER aggregators as to how they will need to interact with the DSP provider to coordinate operations while maximizing the ability of aggregated DER to deliver value across different services.

### Dual Participation

The NYISO allows resources to receive compensation for distribution products and bulk market products, known as Dual Participation, in alignment with FERC's approval of the NYISO tariff.

[23] Joint Utilities of New York, *Draft DSP Communications and Coordination Manual, available at* jointutilitiesofny.org
[24] Joint Utilities of New York, *Draft DSP-Aggregator Agreement for NYISO Pilot Program, available at*: jointutilitiesofny.org

The Joint Utilities and the NYISO are developing the operational processes and procedures to effectuate the Dual Participation construct.

National Grid is currently investigating the possibility of operating the East Pulaski energy storage project[25] in the NYISO market to gain experience with Dual Participation. This investigation will help advance the use of energy storage for local grid and bulk grid wholesale market support.

**Short-Term Forecasting**

The Joint Utilities and NYISO have worked together to more fully understand the methodologies, processes, and use cases for each party's short-term forecasting of load and autonomous DER behavior. The Joint Utilities plan to continue this effort with the NYISO to inform possible opportunities for coordination, including potential avenues for the NYISO to leverage or incorporate DSP data and/or forecasts for operational and market purposes.

**Monitoring and Control ("M&C")**

Through its feeder sensor deployment program National Grid has significantly increased the number of feeders with some form of interval monitoring from 70% to 89%. Commencing in May 2019 the Joint Utilities jump-started a strategic initiative on smart inverters ("SI") to focus on the following key aspects and gain commonality across NY:

- Compile information on individual utility SI pilot projects;
- Industry status on SI (*i.e.*, California Rule 21);
- Gain a common understanding of California Rule 21 and IEEE 1547:2018;
- Determination of use cases, functions, priorities, ability to implement, and any risks;
- Identification of key stakeholders and associated values;
- Development of a roadmap to utilize SI capabilities across NY over the near and long term; and
- Outreach to key stakeholders and presentation of draft roadmap.

The Joint Utilities are currently drafting a roadmap along with a phased SI implementation. National Grid continues to collaborate with the Joint Utilities to identify low-cost M&C solutions such as the Power Monitors, Inc. ("PMI") sensor the Company is currently testing. Several pilots are in process in the National Grid service territory to install M&C at smaller DER locations to support operations.

[25] National Grid's first energy storage project is sited in the Village of Pulaski located in Oswego County. This project consists of a single 2 MW/3 MWh ESS within the existing footprint of the Company's East Pulaski Substation and provides peak shaving to mitigate load at risk exposure. The project was placed in service in November 2018. *See* DSIP Proceeding *et al.*, Order on Distributed System Implementation Plan Filings (issued March 9, 2017) ("DSIP Filings Order"), p. 29, where the Commission directed each utility to deploy energy storage projects that are operating at no fewer than two separate distribution substations or feeders in order to demonstrate progress with the "increasingly prominent role that energy storage technologies are generally expected to play in addressing multiple distribution system needs."

**Energy Management System**

The Company's Energy Management System ("EMS") has recently completed a hardware and software refresh (*i.e.*, upgrade). The EMS platform consists of a T&D SCADA system and various applications including state estimator, load flow, and contingency analysis. These applications are primarily focused on the transmission system model. Similar capabilities for the distribution system will be provided via the ADMS deployment currently underway.

**Advanced Distribution Management System**

An ADMS is control room-based hardware and software that allow for greater visibility, situation awareness, and optimization of the electric distribution grid. National Grid has developed a phased approach for rolling out its ADMS which includes implementing distribution management system advanced applications and upgrading the existing OMS as a module of the ADMS. The ADMS project will implement a distribution-specific SCADA system, DSCADA, dedicated to the management and control of the distribution networks. The resulting DSCADA system will be integrated with the distribution management system applications and OMS on a common operations platform.

To date, the Company has accomplished the following work related to ADMS and associated systems:

- Completed an analysis and scoping effort for the development of the ADMS and DSCADA effort.
- Completed high-level requirements with system design in progress.
- Completed detailed requirements definition for ADMS (OMS, DSCADA, and Distribution Management System ("DMS")) for Phase 1 and Phase 2 which are discussed in more detail in the future implementation section of this 2020 DSIP Update.

Completed preliminary system architecture and hardware design.

**Distribution Automation (VVO/CVR and FLISR)**

In 2019 National Grid deployed an advanced VVO/CVR system as part of its Clifton Park Demand Reduction REV Demonstration Project at two substations that supply eleven feeders. The Company is currently in a measurement and verification ("M&V") stage to assess initial performance results.

The Company is also actively working to expand the VVO/CVR program on the next three substations and twelve feeders.

National Grid has also developed and deployed a FLISR system on several of its sub-transmission lines starting in 2019. The Company is monitoring system performance with plans to expand deployment it on the Company's distribution feeders in the future.

### Distributed Energy Resource Management System

The Company is looking to expand and implement its learning from DSP REV Demo by conducting a Distributed Energy Resource Management System ("DERMS") investigation project to prepare itself for the enterprise-wide implementation of a DERMS platform and associated modules. A DERMS platform will be required to manage the levels of DER predicted in National Grid's forecasts to help manage a safe and reliable grid while maximizing value for all stakeholders. This investigation will consist of a deep dive into many aspects of DERMS (*e.g.*, use cases, functions, IT architecture, cybersecurity, BCA, vendor capabilities, etc.). The investigation will conclude with a full and detailed scope and selected vendor(s) ready to implement a DERMS platform, associated modules, and the integration to legacy systems.

### IT Network

To support the operation of the grid it is critical that the Company maintains a strong Information Technology ("IT") network. To date, the Company and its affiliates has implemented a software-defined wide-area network ("SD-WAN") in 17 locations across the US. SD-WAN is a software-defined approach to managing communication over the wide-area network ("WAN"). SD-WAN provides a low-cost network solution while maintaining security, quality, reliability, and latency requirements. Over the next two years the plan is to deploy SD-WAN throughout the entire network of the Company and its affiliates, with installations at over 500 locations across the US (Massachusetts, New York, Rhode Island) and UK.

### Communications

The Company plans to deploy a multi-tiered telecommunications system to connect core grid-edge components (*i.e.*, smart feeders, smart meters, and smart inverters) with an optimized system from the start.

## Future Implementation and Planning

### DSP/ NYISO Coordination

National Grid will pursue expanded opportunities for DER to be compensated across the full set of values they provide. The Draft DSP Communications and Coordination Manual will facilitate grid and market operations as a result of any market changes and updates. The Joint Utilities will continue to develop the principles and concepts defined in the Draft DSP-Aggregator Agreement, incorporating the details into NYISO and utility distribution tariffs, manuals, procedures, and agreements, as necessary. The Joint Utilities will leverage the results of DSP and NYISO pilot and demonstration projects to inform future refinements.

As part of ongoing efforts to enable the DSP and inform the NYISO's DER roadmap, the Joint Utilities will continue to coordinate with the NYISO on a regular basis to address topics including (1) short-term forecasting (for market and operational purposes) of load and autonomous DER behavior; (2) development of transmission pricing nodes for use in various market products; and (3) development of informational portals for operations and settlement. These continued coordination efforts will directly facilitate the Joint Utilities' efforts to integrate DER in a safe and reliable manner and enable a more seamless market participation framework for DER across wholesale markets and distribution-level services.

**Monitoring and Control**

The Joint Utilities believe that the current M&C standards are not optimal to support grid and market operations under increased DER penetration. As of April 23, 2020, approximately 54% of all DG projects (*i.e.*, approximately 1,400 projects totaling approximately 24 MW) in the Company's interconnection queue are below 500 kW. The DSP will not have real-time monitoring for these small-scale DERs on the system which masks the true quantities of both generation and load. In addition to DG, greater monitoring and accuracy of load is required and is expected that AMI will significantly advance this need.

A challenge to monitoring DG below 500 kW is the cost. As such, National Grid has been working with PMI on a cost-effective solution for smaller DER customers (50 kw to 500 kW) in contrast to the traditional point of common coupling ("PCC") recloser utilized for sites larger than 500 kW. As an alternative, the PMI Eclipse is a secondary monitoring device with a built-in cellular radio to transmit data back to the National Grid control center to allow for more informed decisions while providing the ability to trip the DG breaker if needed to manage the grid. The Company is currently piloting the first location of this device in the Western NY Region and will consider its applicability for wider-scale implementation upon a sufficient demonstration term.

The relationship between DER, Aggregators, DSP providers, and the NYISO drive the M&C requirements. The NYISO has defined requirements for resources participating in the wholesale markets. The Joint Utilities have also established requirements for DER interconnected and not participating in the wholesale market. M&C continues to be evaluated as grid and market operations evolve.

The Joint Utilities are working on a Smart Inverter Initiative and are planning to release a draft version of the Smart Inverter Report and Roadmap in 2020 for stakeholder review and comments. This roadmap will likely set a timeline to implement various SI functions that aims to enable the highest priorities as early as possible. The timeline will also consider the utilities and third-party industries ability to implement those functions considering hardware, software, and resource capabilities, along with consideration of various implementation risks.

**Communications**

As described in the 2018 DSIP Update Report, the Companies Telecommunications Modernization roadmap will be deployed in steps, organized by stacks of network "tiers." Tier 1 is the core network backbone of redundant private fiber and redundant private licensed microwave. Tier 2 is the mid-tier backhaul network of private fiber, private licensed microwave, or private licensed point-to-multipoint at 3.5GHz/5GHz.

National Grid intends to deploy Tier 1 and Tier 2 network modernization initiatives starting in 2021. These include addressing critical and key facilities, replacing analog SCADA equipment to avoid obsolescence, and deploying fiber for tele-protection services.

Tier 3 is the field area network of licensed sub 1GHz point-to-multi-point wireless connectivity for the Company's distributed automation for SCADA, and customer substation connectivity.

**Advanced Distribution Management System**

The ADMS project will be implemented utilizing a phased approach, putting different modules and functionality into service over the period of CY 2021 – CY 2024.

ADMS Phase 1, with a target in service date of the second half of CY 2021, will provide system infrastructure and baseline monitoring functionality leveraging a select set of applications on a predetermined number of feeders to improve situational awareness and operational decision making.

ADMS Phase 2 will expand ADMS functionality for control and automation on a common platform for OMS/Advanced Applications and DSCADA. OMS hardware and software will be refreshed, and functionality will be incorporated into a common model with the DMS applications. DSCADA will be built, implemented, and integrated with the ADMS platform. The target in-service date for this functionality is late CY 2023 through early CY 2024.

ADMS Phase 3 will extend ADMS functionality with full automation, DERMS, and mobile interface features with an in-service date that is beyond 2024.

**Operational Data Historian**

The OSIsoft® PI Historian is an integral part of the EMS and OMS/DMS systems. The PI Historian maintains a history of analog and status data for points monitored through SCADA and is used for operations, planning, and settlement. The PI Historian system will be enhanced to support projects in the roadmap coincident with their deployment (*e.g.*, DMS).

PI applications will be extended to include OSIsoft® PI Vision which will provide added situational awareness to the DSP operations and planning groups.

**Distribution Automation (VVO/CVR and FLISR)**

National Grid plans to expand its VVO/CVR program to high-value locations based on a BCA starting with the highest value locations and continuing to implement the program at locations that have a positive net value throughout the five-year term of this 2020 DSIP Update, and beyond. Initial deployments of advanced VVO/CVR will utilize a dedicated non-ADMS centralized controller that evaluates real-time information from sensors on the primary distribution system.

Following deployment of the ADMS, the Company plans to merge the VVO/CVR schemes to the ADMS to facilitate greater benefits. For example, the integration of AMI can extend the benefits of the VVO/CVR plan by integrating secondary voltage monitoring within the VVO/CVR control algorithms. This is expected to result in an additional 1% of CVR energy-saving benefits. As part of the Company's Clifton Park REV Demonstration Project, National Grid will be conducting an analysis that examines service-level voltage information provided by AMI meters and utilizing that analysis to quantify how much additional voltage headroom is available on the feeders.

Building from the sub-transmission FLISR schemes, the deployment of FLISR technology is planned for 13.2 kV distribution feeders beginning in 2021 with the highest value locations and will continue at cost-beneficial locations over the five-year term of this 2020 DISP Update and beyond. While initial autonomous operation of the FLISR system will have dedicated centralized processing, additional functionality is expected to be available once the ADMS is deployed and FLISR transitions to that platform.

**DERMS**

National Grid believes DERMS is necessary to safely and reliability integrate DER into the grid and thereby maximize the value of DER. The Company plans to conduct a DERMS investigation project to develop system requirements and prepare the Company for a future RFP to evaluate available product offerings. The DERMS investigation will identify core DERMS functionalities, integration requirements between various software modules, and drive alignment with the ADMS implementation.

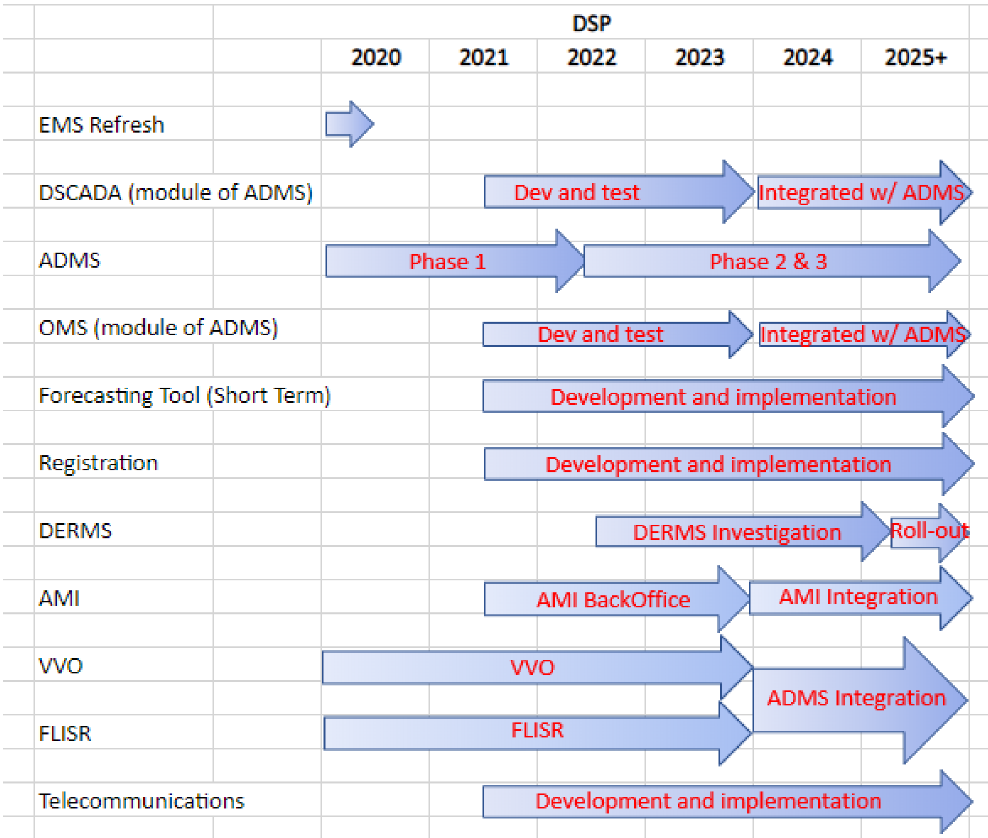
In addition, the Company is planning an ARI pilot project, building from the DSP REV Demonstration Project, to further test DSP functions to integrate DG utilizing flexible interconnection agreements (*i.e.*, curtailment). The project also intends to promote load management to shift load to times of peak renewable generation to increase local hosting capacity.

As mentioned in the Energy Storage chapter of this 2020 DSIP Update, National Grid plans to integrate a third-party power marketer to its operations to help optimize the two bulk energy storage projects sized at 10 MW minimum for which the Company is required to secure dispatch rights per the 2018 Energy Storage Order and the associated participation in the NYISO markets. It is expected the experience gained will help support the Company's DERMS development to bring this power marketer capability in-house in the future.

**Timeline**

Projects and initiatives that will progress during the term of this 2020 DSIP Update are as follows in Figure 2.3-1.

*Figure 2.3-1: Grid Ops Projects/Initiatives Timeline of National Grid*




## Risk and Mitigation

The risks associated with grid operations are related to core DSP functions including increasing DER interconnections and evolving markets. Situational awareness, enabled by M&C, is a top priority in enabling both the market and operations functionality. The mitigating action for this risk is to continue to define an optimal set of requirements, balancing operational needs with developer costs, through the work of the Joint Utilities, NYISO, and DPS stakeholder forums.

There is a risk associated with the timing of major procurements for advanced technology that is mismatched to other regulatory processes. For example, DERMS use cases and the market constructs and products will likely need to mature together. The mitigation for this risk is to ensure investments support strong market concepts and to continue to foster demonstration projects that provide valuable lessons in advance of enterprise-wide procurement and implementation.

## CLCPA Alignment

Through the foundational investments that National Grid has made to date such as monitoring and control capabilities on the distribution system, and future planned deployments and integrations such as ADMS and Power Marketer, the Company is making significant progress and is well poised to support the integration of energy storage to help achieve 1.5 GW by 2025 and 3 GW by 2030. The DERMS Investigation project will help enable the Company's ability to meet NY state's goal of 6 GW of solar by 2025.

## Integrated and Associated Stakeholder Value

Benefit-cost assessments for ADMS, FLISR, and VVO create significant customer value through avoided outages, capacity and energy savings for customers, and avoided/deferred capital system upgrades. Continued collaboration with the NYISO will help to enable DER participation in the NYISO markets. SI functions can help avoid interconnection upgrades and help support the T&D grid. The DERMS Investigation project will ensure that National Grid is in a strong position to make prudent investments on behalf of its customers.

### Stakeholder Interface

National Grid has found the stakeholder interaction valuable in providing and soliciting feedback and guidance on processes and programs under development. The Company participates in a number of forums that actively seeks stakeholder interaction. These include the NYISO-Joint Utilities Working Group, the NYISO governance committees such as the Market Issues Working Group ("MIWG") and the Market Design and Integration Working Group ("MDIWG").

# 2.4 Energy Storage Integration

## Context and Background

The following items are having a significant impact in driving the increase of energy storage in NY:

- The release of the 2018 Energy Storage Order
- Changes to the VDER tariffs and inclusion of energy storage
- NYSERDA Incentive payments[26] for bulk energy storage projects (both standalone and via utility competitive procurements) and for retail energy storage
- Enactment of the CLCPA establishing energy storage goals of 1.5 GW by 2025 and 3 GW by 2030

## Current Progress

National Grid has made significant progress with respect to development of ESS in support of grid needs while enabling opportunities for third-party investments. As described below, the Company is on track with the ESS implementations plans presented in its 2018 DSIP Update.

### Energy Storage Projects

In compliance with the Commission's March 9, 2017 *Order on Distributed System Implementation Plan Filings,*[27] two (2) 2 MW/3 MWh energy storage units have been installed by National Grid, one at the Company's East Pulaski substation and the other at its North Troy substation. The East Pulaski energy storage unit was successfully operated three times during the 2019 summer period to relieve thermal loading on the substation transformer bank. The North Troy energy storage unit is currently energized and online and is expected to support peak load for the summer of 2020. The Company is gaining significant experience with these two (2) energy storage projects and is applying lessons learned, such as integration with control center operations and near-term forecasting capabilities, to future planned storage projects for the benefit of all stakeholders.

### VDER Value Stack

Both ESS paired with renewable generation and stand-alone ESS are eligible to receive compensation under the VDER Value Stack tariff providing new revenue streams for third-party storage based on the stacked values storage can provide. For example, in LSRV areas, pairing

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[26] *Available at* https://www.nyserda.ny.gov/All-Programs/Programs/Energy-Storage/Developers-Contractors-and-Vendors

[27] DSIP Proceeding *et al*., DSIP Filing Order, pp. 28-31.

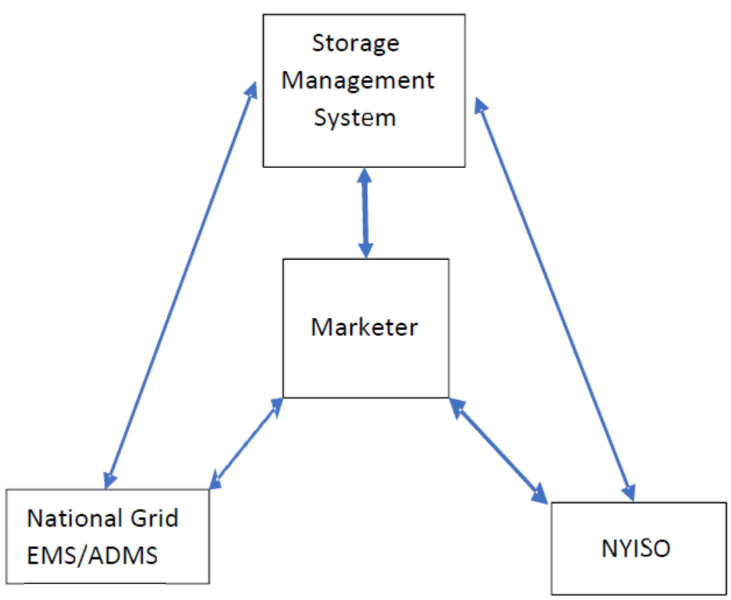
ESS with solar PV helps third parties receive LSRV compensation through the ability to dispatch energy in alignment with the LSRV operational window and associated events called by the utility.

**Bulk Power Energy Storage Procurement of Scheduling and Dispatch Rights**

National Grid released an ESS procurement RFP[28] to meet the 2018 Energy Storage Order mandate to secure dispatch rights to 10 MW of bulk energy storage projects to be in service by December 31, 2022. The RFP specified four potential locations for energy storage and the Company has notified the winning bidders of its intent to proceed with ESS projects at two locations: (1) Old Forge (20 MW/40 MWh), and (2) North Lakeville (10 MW/20 MWh). These projects are designed to maximize the value of storage for National Grid customers by using the ESS to support local distribution needs while also participating in the NYISO wholesale market. Dispatch optimization and state-of-charge management will be controlled to balance and prioritize the two use cases. The Company will implement optimized dispatch through a third-party power marketer service, as depicted in

Figure 2.4-1, so as to leverage industry expertise and increase National Grid's knowledge in developing DSP capabilities related to integrating and maximizing value for stakeholder ESS units. Lessons learned from these ESS projects will increase the Company's capability to maximize the value of future storage projects in ways that support NY state storage goals and benefit all stakeholders.

*Figure 2.4-1: Power Marketer Flow Chart*




[28] Case 18-E-0130, *supra* note 12.

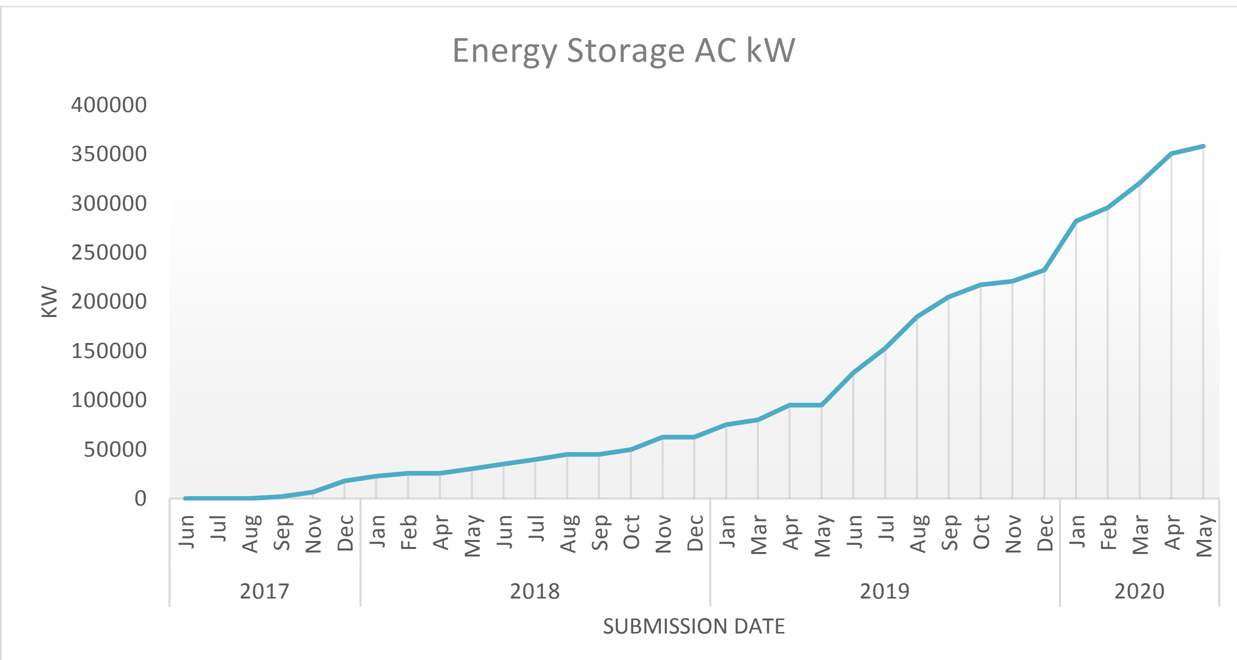
**NWAs**

The Company continues to pursue NWA opportunities through a competitive procurement process which is detailed later in this 2020 DSIP Update. Twelve competitive procurements have been held to solicit proposals for the specific locations. A total of 55 bids have been received, each with ESS as part, or all, of the proposed solution.

**Interconnection of Storage**

In its December 13, 2019 *Order Modifying Standardized Interconnection Requirements*,[29] the Commission adopted an updated version of Appendix K of the NY-SIR, entitled "Energy Storage System (ESS) Application Requirements / System Operating Characteristics / Market Participation" to better collect ESS application data. To complement the updated NY-SIR, the Joint Utilities have started the development of an energy storage interconnection roadmap to further improve the interconnection process. Below figure 2.42 represents the cumulative amount of hybrid energy storage projects requests the company has received.

*Figure 2.4-2: Cumulative amount of hybrid Energy Storage projects -2*




[29] Case 19-E-0566, *Joint Petition for Certain Amendments to the New York State Standardized Interconnection Requirements (SIR) for New Distributed Generators and Energy Storage Systems 5 MW or Less Connected in Parallel with Utility Distribution Systems*, Order Modifying Standardized Interconnection Requirements (issued December 13, 2019).

**Software and Studies**

National Grid has energy storage accounted for in its long-term forecast with base, low, and high scenarios identified to help in planning the grid of the future. The Company has invested in several storage software tools from Quanta Services Inc. to help system planners identify optimal locations and use cases for energy storage across the Company's T&D system that may provide new opportunities for third-party energy storage projects to support grid needs. These tools are being used to conduct studies to identify future storage/NWA opportunities that are specified in National Grid's CIP,[30] future rate case proceedings, and updates to the System Data Portal.

**Industry Collaboration**

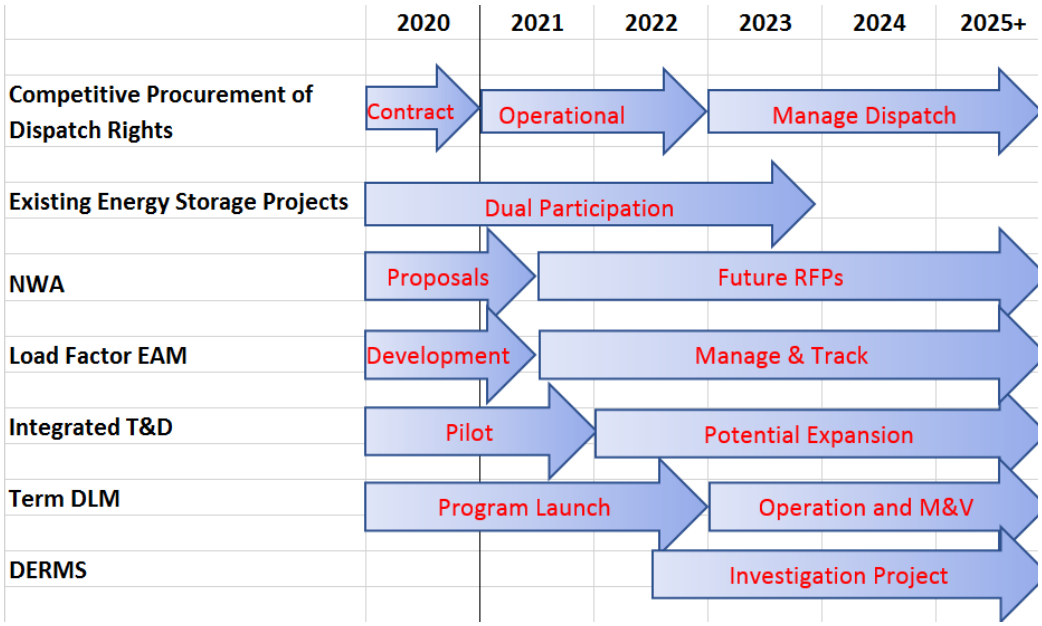
National Grid continues to work closely with industry groups regarding energy storage, including NYSERDA, NYISO, and New York Battery and Energy Storage Technology Consortium, Inc. ("NY-BEST"). For example, the Company has been working closely with NYSERDA and the other Joint Utilities to support the application of the incentive funding for recipients under a utility's bulk energy storage dispatch rights RFP and working with the NYISO to support the development of Dual Participation rules and operation for these energy storage projects.

## Future Implementation and Planning

The Company has significant plans to continue the integration and use of energy storage on the distribution system. Figure 2.4-3 provides an overview of National Grid's five-year plans for storage.

[30] Case 17-E-0238, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service*, Five-Year Transmission and Distribution Capital Investment Plan (FY21-FY 25) (filed March 31, 2020) ("CIP").

*Figure 2.4-3: National Grid's Future Implementation and Planning for Energy Storage*




**Energy Storage Projects Progression**

Going forward, National Grid will operate its East Pulaski and North Troy ESS units as needed to alleviate substation loading constraints due to summer peak loads. In addition, the Company will further evaluate participation of the East Pulaski ESS unit in the NYISO energy storage resource ("ESR") market under Dual Participation rules for the purpose of gaining valuable insights and lessons learned in preparation for the two Bulk Power Energy Storage Procurement projects and other future storage projects.

**Bulk Power Energy Storage Procurement of Scheduling and Dispatch Rights**

National Grid has notified winning bidders of its intent to work with them to finalize contract terms, with contract execution anticipated to occur towards Q4 2020. Following contract execution, the Company will work with the contracted entities though the interconnection process and track construction progress through 2022. Once the energy storage projects are completed and in service, National Grid will manage these bulk energy storage projects in accordance with the contract terms and conditions for dispatch rights, and will work closely with the project owners, selected power marketer, and the NYISO to maximize and track the value of these projects over the seven-year contract term. Experiences gained will enable National Grid to integrate future energy storage projects into the grid while delivering Dual Participation value for stakeholders.

**NWAs**

In the near future, National Grid will be releasing several new NWA RFPs that will likely align well with energy storage solutions. The Company will review and evaluate all proposals received and proceed with NWA solutions that provide cost-effective benefits for customers.

**Load Factor EAM**

The Company has begun the development of a new load factor Earnings Adjustment Mechanism ("EAM") in accordance with the Commission's directives in the 2018 Energy Storage Order. The proposed EAM is based on locations that have declining historical load factors, such as LSRV locations where solar PV is causing the daytime load to drop in comparison to the peak load. In addition, substation transformers with a high loading percentage will be used to determine the ideal locations and will form part of the EAM formulae. Once this load factor EAM is approved by the Commission, National Grid will track drive and progress towards meeting the load factor EAM Key Performance Indicators ("KPIs").

**Integrated T&D**

The Company plans to continue to leverage its energy storage software tools and integrated planning models to continue to identify grid challenges that can be solved by energy storage, thus providing new opportunities for ESS projects, or other NWA solutions. Through this effort National Grid will gain insights into the processes and challenges in conducting an integrated T&D analysis on a wider scale.

**Term-DLM Procurement**

The 2018 Energy Storage Order mandated that the Company expand its DLM procurement to include contracts of up to five years, known as Term-DLM, and create a resource category, Auto-DLM, with higher performance requirements as described in more detail in the Energy Efficiency chapter. National Grid plans to design its procurement so that these resources can provide short-term load relief in areas with forecasted load growth prior to needing a more formal long-term solution such as an NWA solution and where Term-DLM resources could potentially transition to being part of the NWA portfolio solution. In the near term, the Term-DLM program (including Auto-DLM) will fill a similar need to the LSRV component of the Value Stack, providing targeted distribution relief at a premium.

National Grid plans to roll out Term-DLM procurement via RFPs and upon evaluation of proposals, execute contracts with successful bidders. Following this procurement stage, the Company will commence program operation, actively manage the contracted DLM resources, and conduct M&V to ensure that the Term-DLM events called were successful in meeting the local load relief need. This expanded DLM program will provide new opportunities for energy storage projects to support the grid and receive compensation in return.

**DERMS Investigation**

As the number of sited ESS solutions continues to grow so does the need to manage those assets to maximize their value to the grid while maintaining safety and reliability. As such, storage management software will be a key future focus area. National Grid will leverage the power marketer experience to bring this capability in-house as part of the DERMS Investigation project.

## Risk and Mitigation

Figure 2.4-1 below provides a summary of the major risks and proposed mitigation measures for energy storage in regard to NYISO requirements.

*Table 2.4-1: Risk and Mitigation for Energy Storage*

| Risks | Mitigation |
| --- | --- |
| Complexity in prioritizing local grid needs while complying with NYISO rules | Continued close collaboration with the NYISO and testing the East Pulaski ESS unit in the market to gain key lessons learned |
| Navigating new NYISO market products (*e.g.*, NYISO ESR and DER markets) | |
| Integration of energy storage controls and communications | Leverage lessons learned from National Grid's two installed ESS units |
| Ability to island an ESS unit | Conduct testing at National Grid affiliates' ESS units (*i.e.*, Massachusetts) |
| Ability to contribute to the State's energy storage targets. | Conduct integrated T&D studies to identify new opportunities for NWA solution (*i.e.*, energy storage) to support the grid. Meet or surpass the 2018 Energy Storage Order 10 MW minimum requirement for successful roll-out of the Term-DLM program, and continued implementation of NWA solutions, in support of the load factor EAM KPIs. |

## CLCPA Alignment

The Company's plans, including the deployment of NWA solutions, the procurement of energy storage dispatch rights, and the completion of studies to identify new opportunities for NWA energy storage solutions, will help enable the State's goals of 3 GW of energy storage by 2030. In addition, National Grid's has an EAM proposed in its next rate case filing that will incentivize the Company to implement energy storage solutions in locations that improve load factor, for the benefit of customers.

# Integrated and Associated Stakeholder Value

National Grid has been integrating the East Pulaski ESS unit deeper into (i) planning and grid operations processes; and (ii) grid management systems to increase automatic operation. The Company is looking to short-term forecasting tools for day-ahead regional load forecasting to help predict the day-ahead peak load on the East Pulaski substation transformer. In addition, National Grid has integrated monitoring and control for the ESS unit into its EMS which provides the Company's planners and grid operators with real-time visibility to the system status, output, and health, as well as the ability to change settings and remotely control the unit.

Going forward, the Company will continue to incorporate storage into ADMS and the Demand Response Management System ("DRMS"), and drive towards an integrated DERMS platform solution. In addition, Dual Participation and power marketer services, along with coordinated T&D efforts, will increase the integration of energy storage with the T&D system and maximize value for energy storage project owners and National Grid customers.

## Stakeholder Interface

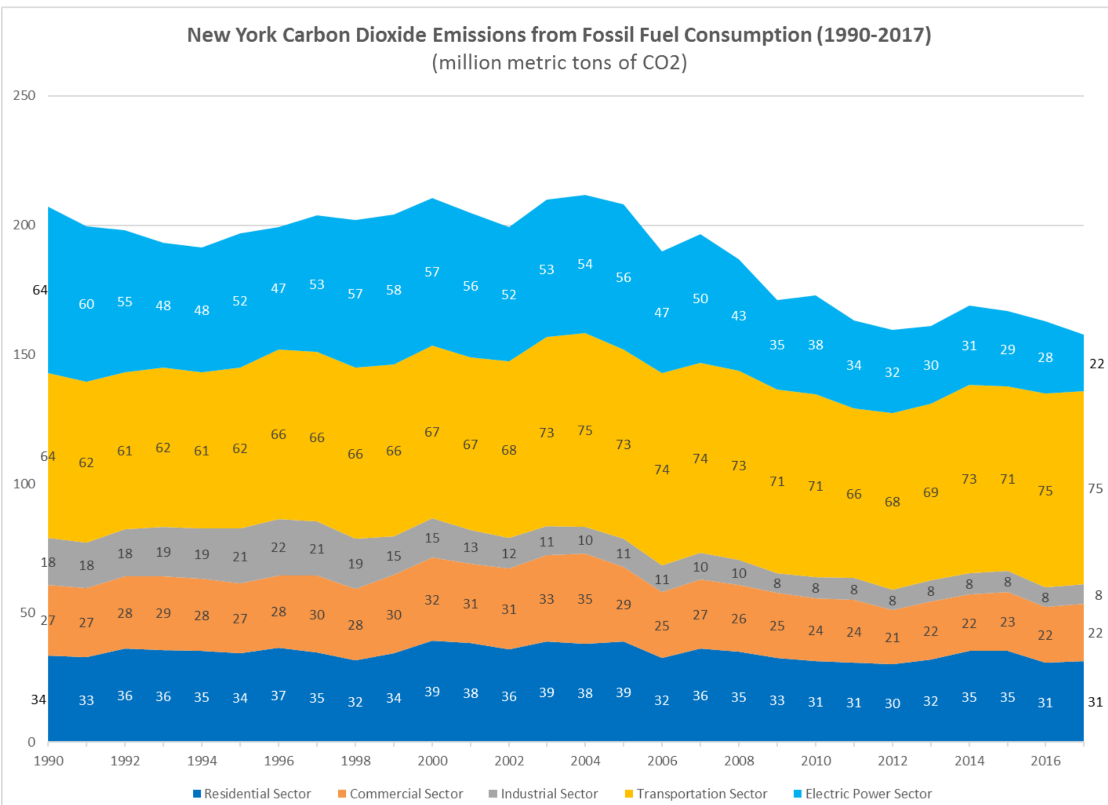
National Grid will continue to collaborate with the Joint Utilities, NYSERDA, and DPS Staff to ensure successful implementation of the 2018 Energy Storage Order directives. Through participation in the ITWG and implementation of the Energy Storage interconnection roadmap, the Company will continue to work with stakeholders to improve the interconnection process while ensuring safety and reliability. Additionally, the Company remains engaged in storage R&D efforts with EPRI, CEATI, NY-BEST, NYSERDA, and the DOE National Laboratories, and will continue to participate in REV Connect efforts to bring third-party solutions to the table. Lastly, new opportunities for energy storage will be made publicly available via National Grid's System Data Portal, CIPs, and other channels.

# 2.5 Electric Vehicle Integration

## Context and Background

New York's EV policies are generally derived from the 2015 New York State Energy Plan,[31] which committed the state to reduce GHG emissions from the energy sector 40% by 2030 with a longer-term goal of decreasing total carbon emissions 80% by 2050. The State Energy Plan was strengthened by the CLCPA, which establishes a state goal of reducing total GHG emissions vs. 1990 levels by 40% by 2030 and 85% by 2050. Transportation accounts for over 45% of New York's CO2 emissions (Figure 2.5-1), and the state solidified its commitment by joining seven other states to collectively target 3.3 million ZEVs as part of a ZEV Memorandum of Understanding ("MOU"). New York's commitment within the ZEV MOU is to have 850,000 ZEVs on the road by the end of 2025. With approximately 47,000 EVs on the road statewide at the end of 2019, this is an ambitious goal that requires significant charging infrastructure to support 850,000 EVs.

*Figure 2.5-1: NY $CO_2$ Emissions from Fossil Fuel Consumption, 1990-2017*




[31] The New York State Energy Planning Board adopted an amendment to the 2015 State Energy Plan on April 8, 2020.

National Grid agrees that EV adoption is critical to meeting these targets. The Company has aggressively supported transportation electrification including: installing charging stations at customer sites across its service territory, building multiple innovative EV projects as reflected in the Company's Three-Year Rate Plan Order, including a uniquely structured EAM for EV growth tied to carbon reductions, and incenting the purchase of new EVs by eligible National Grid management employees.

**National Grid EV/Electric Vehicle Supply Equipment ("EVSE") Information**

The Company estimates that 7,629 light-duty EVs are registered in the National Grid service territory as of the end of December 2019.[32] The following table shows the growth of this statistic over recent years, including the 2015-2019 compound annual growth rate ("CAGR").

*Table 2.5-1: Growth of Light-duty Electric Vehicles Over Four Years in National Grid's Service Territory*

| 2015 | 2016 | 2017 | 2018 | 2019 | CAGR |
|---|---|---|---|---|---|
| 2,378 | 3,231 | 5,098 | 6,364 | 7,629 | 34% |

The following table shows the number of EVSE charging sites and ports in the Company's service territory as listed on the Atlas Public Policy EValuateNY website[33] as of March 19, 2020.

*Table 2.5-2: Charge Points across National Grid's Service Territory*

| | L2 EVSE | DCFC EVSE |
|---|---|---|
| **Sites** | 126 | 27 |
| **Ports** | 1,282 | 126 |

Notwithstanding the possible short-term impacts to EV adoption that may be caused by COVID-19, National Grid continues to believe the EV market is poised for growth over the next several years given the combination of supportive policies, declining vehicle costs, and higher model availability. To support this expected growth and act as a proactive partner in accelerating EV adoption to meet New York State's ZEV and GHG policy goals, the Company has accounted for the state's goals in the Company's load and DER forecasts that are subsequently applied to grid planning to maintain a safe and reliable grid.

The Company presently utilizes scenario-based forecasts which include projections from the DOE's Annual Energy Outlook ("AEO") based on past hybrid EV market growth and a "policy case" scenario based on the assumption that the growth necessary to reach the state's ZEV MOU

[32] *See* Atlas Public Policy EValuateNY for 2019 light-duty EV registrations. The pre-2019 data source was National Grid's subscription to IHSM-Polk light-duty vehicle registration data.
[33] Data from https://atlaspolicy.com/rand/evaluateny/, accessed March 19, 2020, and filtered for National Grid service territory.

target is achieved, which are shown above in Figure 2.5-1. The base-case scenario projects modest EV adoption through 2025 (approximately 15% CAGR 2020-2025), while the "policy case" requires approximately 50% CAGR 2020-2025.[34]

## Current Progress

Since filing its 2018 DSIP Update, National Grid has taken significant steps forward in EV integration, primarily through the implementation of the Electric Transportation Initiative, as well as through enhanced EV forecasting and infrastructure planning.

The Company's focus on electric transportation has resulted in a significant deployment of EV charging infrastructure. The resulting EV Charging Host Program in 2017 ("EVCS") set a target of deploying up to 490 L2 ports in three years based on the approved budget. The program exceeded that goal approximately a year early and, as of Q1 2020, the program had enabled more than 900 L2 ports across approximately 130 customer sites. The EVCS program currently has a waiting list equal to more than 200 L2 ports and the Company receives approximately 30 applications quarterly, as well as ongoing feedback from the vendor community indicating strong interest in continuing this program.

The EVCS program leverages National Grid's existing customer relationships and a trade ally network to generate site host leads. These leads are directed to the EVCS program staff, who provide program details and engage trade ally vendors as appropriate. Vendors typically assist the site hosts through the application and installation processes. While the program has far exceeded its goals, National Grid is actively improving and vetting the process. The EVCS program has evolved since it was first launched in 2018 and lessons learned are continually implemented as participation increases.

The results of Phase 1 of the EVCS program have provided essential knowledge around customer segments interested in EV charging, how to most efficiently engage with trade allies, and insight into charging utilization for each segment. Trade allies such as EV charging installers, and equipment manufacturers have proven to be an invaluable resource to enabling EVSE infrastructure deployment. The trade ally relationships have been nurtured through monthly update calls throughout the first phase of the program, leading to encouraging results: approximately 75% of site hosts to date have been delivered through the trade ally network. Site hosts have appreciated the trade ally willingness to help with all aspects of application and construction through the EVCS program's turnkey solutions approach. The robust trade ally network has also stimulated competition and competitive pricing, leading to lower-cost program deployment.

[34] Notwithstanding the lingering economic hardships from COVID-19 that may dampen this growth.

**Utilization of Phase 1 EVCS Charging Stations:**

Initial charging utilization analysis suggests that retail, university, and office locations see the most regular charging activity. These stations are likely located in high-traffic areas accessible to public charging. Table 2.5-3 provides an overview of charging utilization data within National Grid's EVCS program. The data is analyzed for 31 L2 sites, representing 268 ports, and the data spans from late 2018 through January 2020.

*Table 2.5-3: National Grid EVCS Charging Station Utilization Overview*

| Data | Level 2 |
|---|---|
| Number of sites | 31 |
| Number of ports | 268 |
| Number of charging sessions | 8,725 |
| Total charged energy (kWh) | 122,202 |
| GHG savings (kg) | 59,065 |
| Average kWh charged per site | 3,942 |
| Average kWh charged per port | 456 |
| Averaged kWh charged per session | 14 |

The EVCS program has had success in supporting charging stations across several segments. Table 2.5-4 provides an overview of the utilization data for each segment spanning late 2018 through January 2020. The total and average charge sessions and charging energy suggest some trends in station utilization. Several segments have high regular usage, particularly retail and university sites. This suggests that these stations may be well-situated in high-traffic areas.

The multi-family dwellings segment has seen the lowest number of sessions per port but has seen a relatively high volume of kWh dispensed per session, with an average of 19 kWh per charging session. This seems to indicate that the multi-family segment is a critical location within the EV charging infrastructure and is likely a primary charging location for a significant number of EV drivers who may not have regular access to office, retail, or other charging locations. This segment will continue to play a significant role as EVSE expands throughout the state of New York.

*Table 2.5-4: National Grid Charging Station Utilization Breakdown by Segment*

| Segment | Port Count | Percent of Total Ports | Total Charge Sessions | Total Charged kWh | Sessions per Port | kWh per Port | kWh per Sessio n |
|---|---|---|---|---|---|---|---|
| Municipal | 12 | 4% | 109 | 2,528 | 9 | 211 | 23 |
| Office | 34 | 13% | 2,179 | 48,116 | 64 | 1,415 | 22 |
| Multi-family | 110 | 41% | 414 | 7,772 | 4 | 71 | 19 |
| Industrial | 30 | 11% | 630 | 11,284 | 21 | 376 | 18 |
| Retail | 18 | 7% | 763 | 8,448 | 42 | 469 | 11 |
| Recreation | 20 | 7% | 1,347 | 13,833 | 67 | 692 | 10 |
| University | 44 | 16% | 3,283 | 30,221 | 75 | 687 | 9 |
| **Total** | **268** | **100%** | **8,725** | **122,202** | **33** | **456** | **14** |

**Education and Outreach:**

As a complement to the EV charging investment in its Three-Year Rate Plan Order, National Grid undertook an education and outreach effort, beginning in April 2018. The outreach efforts have been quite successful throughout the National Grid service territory. Current efforts will reach approximately 140,000 people via e-mails and other message channels, projected to be approximately 200,000 by program end. The education and outreach program include initiatives such as EV events (*e.g.*, ride-and-drive), e-mail outreach, internet and traditional advertising, websites, dealer partnerships, and marketing program management, along with other various components. Auto dealership recruitment provided EV resources and inventories for participants and e-mail education, and the National Grid Drive Green website[35] helped increase consumer confidence in EVs and created demand for EVs within dealerships.

As previously mentioned, EV growth forecasts have been incorporated into system planning activities and support accelerated growth in alignment with the state's policy goals. EV growth forecasts also help to identify pocketed areas of interest where EV growth is particularly concentrated and allow National Grid to better understand the need for additional EVSE infrastructure.

## Future Implementation and Planning

The Company plans to address three key areas needed to help meet the state's CLCPA and ZEV goals. These plans include:

- A Commercial/Multi-user "make-ready" program to significantly increase the number of charging ports at multi-user sites such as workplaces, retail locations, and public parking areas in the Company's service territory.

[35] *Available at* https://drivegreen.nationalgridus.com/learn/

- A Residential Program to provide simple, low-cost monthly pricing for EV charging and to increase the availability and ease of networked L2 charger installations at residences. This proposed program would allow the Company to prepare for significant EV adoption and, by influencing customers to charge their EVs off-peak, minimize infrastructure upgrades that may become necessary.
- A Fleet Program to assist fleet operators in electrifying their light-duty and medium-heavy duty vehicles through advisory services, fleet "make ready" infrastructure support, and a dedicated single point of contact at the Company to establish a smooth customer experience.

The goals and objectives of these programs are as follows.

**Commercial / Multi-User "Make-ready"**

Meeting the State's GHG emission reduction and transportation electrification goals require swift and immediate action. Deploying adequate charging infrastructure is a critical enabler of EV adoption. National Grid is proposing to build on the success of the Phase I EVCS Program and meet additional customer demand by continuing to support charging availability through a "make-ready" incentive program in partnership with site hosts, charging station vendors, and third-party operators. The proposed program seeks to enable the deployment of up to approximately 23,500 L2 ports at 3,000 sites as area well as up to approximately 600 DCFC ports at 100 sites during the proposed program period. The ports would be broadly categorized into public-access locations (*e.g.*, grocery stores and retail locations) and non-public restricted-access locations (*e.g.*, workplaces with employee-only parking). Please refer to Table 2.5-5 for approximate targets for each category details.

*Table 2.5-5: National Grid's Proposed Make-Ready Infrastructure Targets*

| Make-Ready Infrastructure Targets | | | | |
|---|---|---|---|---|
| | **L2 Ports** | **L2 Sites** | **DCFC Ports** | **DCFC Sites** |
| **Public** | ~8,000 | ~1,000 | ~600 | ~100 |
| **Non-Public** | ~15,500 | ~2,000 | 0 | 0 |
| **Total** | **~23,500** | **~3,000** | **~600** | **~100** |

In addition to the make-ready infrastructure support, National Grid is proposing to support the deployment of charging station hardware by offering rebates equal to 50% of the average cost of the EVSE for both L2 and DCFC ports for qualifying customers.

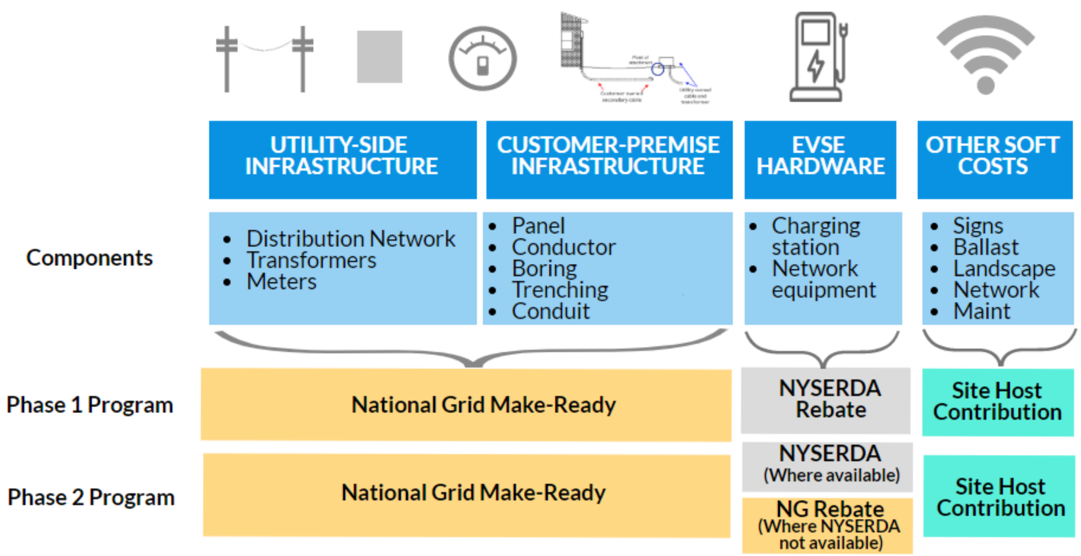
Key aspects of the proposal include the following:

- The Company intends to identify and develop prospective charging sites, working with trade allies, equipment providers, and charging installers to recruit site hosts to the program.

- The Company intends for site hosts to select desired EVSE from a National Grid-developed qualifying equipment list.
- The Company intends for the site host to sign a site host agreement detailing the terms of participation.
- The Company intends to construct new distribution service (if needed) and required electrical infrastructure (*e.g.*, new electrical panel, conduit, and wiring) at the premises for each charging site for qualifying projects.
- The Company intends to create a dedicated single point of contact for DCFC station applications to aid in the deployment and ensure a streamlined customer experience.

Please refer to Figure 2.5-2 below for a representation of the EV charging infrastructure components, estimated costs, and National Grid's proposed program.

*Figure 2.5-2: National Grid's Proposed EV Charging Infrastructure Program: Overview*




The Commercial/Multi-user program addresses the charging infrastructure gap needed to support the State's ZEV goals by directly enabling deployment of EV charging ports. The primary benefit of the proposed program is that it helps reduce economic barriers to installing charging infrastructure by reducing the upfront cost of installing L2 and DCFC make-ready charging infrastructure. Another benefit is that this proposal seeks to reduce the operational barriers for site hosts that do not have the initial desire or prior expertise in installing charging infrastructure. The Company will leverage its experience in deploying infrastructure at scale for the make-ready installations.

**Residential Charging Program**

Approximately 80% of EV charging by residential customers currently happens at home.[36] At-home charging is expected to be an option for a large majority of homes in the Company's service territory because approximately two-thirds of National Grid's residential customers reside in single family homes or 2-4 unit apartments/condos,[37] meaning that the driver is likely to control a parking space and have access to power. Customers indicated that the ability to charge at home ranks as one of the highest priorities when considering purchasing an EV, as borne out by various National Grid customer surveys. In light of this finding, National Grid seeks to reduce the barriers to at-home EV charging while simultaneously encouraging charging behavior that minimizes electric system impacts.

The Company is proposing to accomplish this through the following four offerings:

- A smart-charging plan to simplify and reduce electricity costs through fixed monthly pricing and load management for up to 20,000 customers.
- Rebates for networked L2 chargers for customers participating in the smart-charging program to reduce the initial cost of home charger installation.
- A turnkey installation service for installing networked EV chargers in homes with the option for third-party financing and the convenience of on-bill payments.
- A website to increase EV charging awareness through multi-channel campaigns and an expanded online marketplace for buying eligible home chargers and services.

The Residential programs will be sized based on the EV adoption required to meet the State's ZEV MOU goals. National Grid anticipates that not all EV owners will participate in the various offerings being proposed. The Company used American Community Survey data from the Census on the National Grid housing stock[38] (*i.e.*, percent detached single family homes, 2-4 unit apartments/condos, and 5 + unit apartments/condos) and an ICCT report[39] on at-home charging to determine the number of EV drivers likely to install L2 chargers at their residences.

Smart charging is a mechanism that allows a utility (or a third party) to remotely control and optimize the timing of individual or aggregated charging locations. The benefits of the subscription plan offering are driven by the shift of EV charging to off-peak and include lower EV charging costs for customers, environmental benefits of reduced carbon emissions, reduced energy and generation capacity costs, and reduced infrastructure upgrade costs. These benefits are relative to what would be expected with an equivalent increase in EV load absent the proposed program.

EV charging plans that reduce the refueling costs of EVs may also influence customer decisions to purchase EVs, thereby increasing adoption. Customers have indicated that a residential off-

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[36] *Available at* https://www.energy.gov/eere/electricvehicles/charging-home
[37] Company Analysis of American Community Survey data for the Niagara Mohawk service territory https://www.census.gov/programs-surveys/acs/
[38] Analysis of American Community Survey data for the National Grid service territory *available at* https://www.census.gov/programs-surveys/acs/
[39] *Available at* https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf

peak EV charging rate offering is a key criterion when considering an EV, as borne out by various National Grid customer surveys. The Company anticipates that customers participating in the proposed program may see a reduction in the cost of at-home EV charging of up to 35% as compared to existing residential standard rates, or approximately $167/year, though actual benefits to participating customers will vary and depend upon each customer's driving and charging behaviors and utilization of the program.

The Company research indicates that affordability and consistency are important to customers when paying for transportation expenses. In a survey, Company's customers reported hesitancy to purchase an EV because they are unclear about the true cost of EV ownership, including the cost of electricity to charge a vehicle.[40] A fixed monthly price for EV charging is anticipated to provide greater certainty around transportation costs relative to current residential rate offerings. Additionally, the monthly charging costs are estimated to be less than the monthly refueling costs for a typical internal combustion engine vehicle which currently averages approximately $114 in Upstate New York.[41] This provides a compelling and easy-to-communicate message regarding the program benefits to potential EV owners, supporting increased EV adoption and saving customers' money in their overall transportation and energy consumption.

Non-participating customers will benefit from the shifting of load to off-peak hours that will be encouraged by the program, resulting in lower overall energy procurement costs and a reduced need to upgrade the distribution system, as well as additional environmental benefits. A benefit-cost analysis of EV deployment in New York State prepared for NYSERDA concluded that off-peak charging programs could contribute societal benefits with a net present value ("NPV") of $1,351 per vehicle between 2017 and 2030.[42]

While EVs currently have a low market penetration rate, National Grid needs to prepare now for higher penetration rates in the future. As stated in the EVSE&I Whitepaper, "increasing EV penetration to meet 2025 ZEV targets could increase average weekday demand for electricity in New York by nearly 6,900 MWh, a nearly 2% increase compared to 2016 levels."[43] As the load impact of EVs increases, this smart charging plan shifts EV load to off-peak periods and enables the Company to increase utilization of existing grid assets while minimizing future investment in grid infrastructure. By implementing this program, the Company is helping "ensure that any upgrades or necessary changes are made to maintain the reliability and resilience of the grid while the modern distribution grid accommodates new load and uses."[44]

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[40] Actual benefits to participating customers will vary and depend upon each customer's driving and charging behaviors and utilization of the program.

[41] Monthly average fuel costs for light-duty vehicles in Upstate New York are $114. This is based on 2018 average annual vehicle miles traveled of 11,556 miles and fuel economy of 22.5 miles-per-gallon, *available at* https://www.fhwa.dot.gov/policyinformation/statistics/2018/vm1.cfm, and retail price of gasoline in Upstate New York, as of January 2020, of $2.67/gallon, *available at* https://www.nyserda.ny.gov/Researchers-and-Policymakers/Energy-Prices/Motor-Gasoline/Monthly-Average-Motor-Gasoline-Prices

[42] New York State Energy Research and Development Authority, *Benefit-Cost Analysis of Electric Vehicle Deployment in New York State*, Final Report, Report No. 19-07 (February 2019), p. 68.

[43] EVSE Proceeding, EVSE&I Whitepaper, p. 12.

[44] *Id*.

**Fleet Vehicle Program**

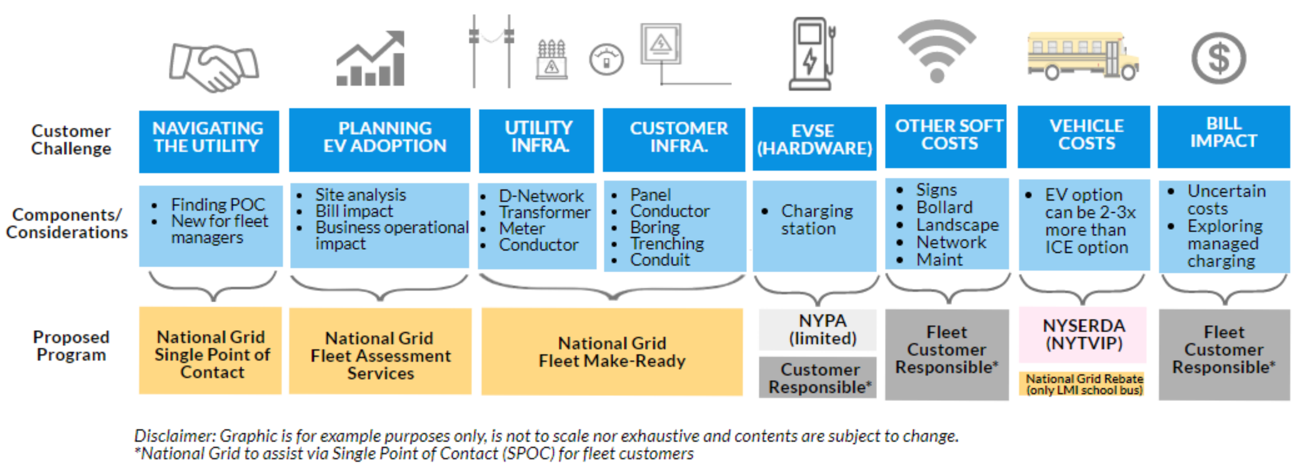
National Grid is proposing a Fleet EV program to enable the market for, and accelerate, light-duty vehicle ("LDV") and medium-heavy duty vehicle ("MHDV") fleet electrification in a cost-effective, efficient, and sustainable manner. It is anticipated that the program will target school, municipal, transit, and small business customers, as well as other commercial, non-residential customers.

The proposed program includes four components:

- Fleet Assessment Services to assist customers in navigating the complex process of planning for large-scale fleet electrification.
- Fleet-Ready Charging Infrastructure Support to help customers overcome the infrastructure cost barrier to deploying a few initial EVs.
- LMI and Environmental Justice ("EJ") Communities Electric School Bus Rebates to assist underserved school districts in electrifying school buses; and
- Dedicated Single Point of Contact ("SPOC") for fleet customers to create a smooth, streamlined customer experience.

A summary of the customer challenges and proposed solutions is shown in Figure 2.5-3.

*Figure 2.5-3: National Grid's Proposed Fleet EV Program Overview*




Electrifying fleets can reduce GHG emissions at least four times more efficiently than passenger vehicles on a per unit basis. However, fleet owners face many challenges when considering electrification, such as: (i) the level of engagement with the utility is higher than most fleet managers have typically experienced; (ii) the planning process is complicated; (iii) the upfront infrastructure costs can be prohibitive; and (iv) the additional costs for the EVSE hardware, soft costs, and vehicles themselves can be higher than for conventional diesel alternatives.

The Company proposes to target the challenges for which the utility is uniquely positioned to address and to collaborate with industry partners to animate the market for fleet electrification in New York by offering the programs and services described below:

- **Fleet Assessment Services:** To assist customers in navigating the complex process of planning for large-scale fleet electrification, National Grid proposes to provide Fleet Assessment Services. The Company anticipates that these could include an electricity bill impact analysis, a site feasibility analysis (such as cost estimates for infrastructure upgrades on both the utility and customer sides of the meter or recommendations regarding alternate sites for charging depots), and a roadmap to electrification. The Company anticipates making the service available to approximately 100 customers at no cost to participants. The program would seek to support both light- duty and medium-heavy duty fleets. The program is estimated to lead to the conversion of approximately 1,200 vehicles from fossil fuels to electric alternatives.

- **Fleet-Ready Charging Infrastructure Support:** For customers interested in deploying a few initial EVs to gain experience with the technology, the Company seeks to deploy a limited amount of "make-ready" support to alleviate the charging infrastructure cost barrier. The program is anticipated to support both light-duty and medium-heavy duty fleets at approximately 50 customer sites. The program would provide charging infrastructure to enable a target of 10 vehicles per customer site with a customer cost share; however, National Grid would request the flexibility to allocate program funding based on actual participation, market conditions, and customer needs in order to enable as many vehicles as cost-effectively as possible. The program is intended to spur EV fleet adoption while limiting infrastructure upgrade costs.

- **LMI and EJ Communities Electric School Bus Support:** National Grid seeks to support underserved school districts' efforts to decarbonize and lower transportation-related particulate and noise emissions in neighborhoods by electrifying school buses. The program would provide rebates to address the significant up-front cost differential between diesel and electric school buses, as well as to provide rebates for the cost of one charger per bus. The Company anticipates providing this support for 25 school buses exclusively in LMI and EJ communities.

- **Dedicated SPOC for Fleet Customers:** The Company recognizes that fleet managers, and others making decisions regarding fleet electrification, may have limited previous experience interacting with the utility. To address this challenge and create a smooth, streamlined customer experience, National Grid seeks to establish a dedicated SPOC within the Company that fleet customers can go to for assistance navigating internal experts such as those in engineering, pricing, and new service groups. It is anticipated that the SPOC would walk the customer through the process, answer technical fleet EV-related questions, and ensure they are aware of the relevant EV offerings that fit their unique needs (such as the other program components listed above), while working closely with any existing customer account representative. The SPOC could also help the fleet customer consider ancillary opportunities such as adding managed charging software, deploying on-site storage for demand charge management, or utilize renewable generation programs to optimize the societal benefits of the electric fleet.

The program is expected to enable the electrification of more than 1,700 fleet vehicles across light-duty, medium-duty and heavy-duty segments. Additionally, the program would support approximately: (i) 100 customers in developing a roadmap to fleet electrification; (ii) 50 customers with initial fleet make-ready infrastructure cost share; (iii) 12-25 LMI/EJ Community customers with electric school bus purchase incentives, and (iv) potentially hundreds more customers via the dedicated SPOC. Table 2.5-6 provides a summary of National Grid's proposed Fleet EV program.

*Table 2.5-6: Summary of National Grid's Proposed Fleet EV Program*

| | Vehicles Enabled | Participating Customers | Reduction in GHG Emissions |
|---|---|---|---|
| Fleet Assessment Services | 1,150 | 100 | 320,000 |
| Fleet Ready Sites | 530 | 50 | 143,000 |
| LMI/EJ Community E-School Bus Incentives | 25 | 12 to 25 | 7,000 |
| Dedicated SPOC | Varies | Varies | Varies |
| Total | More than 1,700 | More than 162 | More than 470,000 |

## Risk and Mitigation

Meeting the ZEV goals for electrifying transportation within New York comes with several risks. Primarily, these goals are dependent on market adoption rates for new ZEV purchases within the state. As highlighted in the forecasting section, EV growth is projected across three scenarios: a base case, low case, and high case. These three scenarios allow for feeder-level impact assessments associated with ZEV growth.

In addition, the ZEV daily charging profile presents risks to feeder-level ZEV impacts. As outlined above in the proposed residential EV charging program, a majority of ZEV charging will take place at home. If managed charging solutions do not get adopted at the rate expected, the impact of a local charging surge may be greater than expected. The risks from unmanaged charging are forecasted using the simulated-based modeling solution outlined above.

Finally, the types of charging infrastructure deployed may change the magnitude of the impact of EV charging on the distribution system. DCFC adoption levels may increase more than expected, from either new local decision making or new business models, impacting feeder-level capacity planning. This risk is mitigated by continuing simulation-based modeling as well as continued stakeholder and customer engagement to determine any changes to forecasted ZEV charging demand.

## CLCPA Alignment

National Grid's proposed programs support New York's ambitious climate goals adopted in the CLCPA, by focusing on the transportation sector as the largest source of CO2 emissions in New York (approximately 47% in 2017).[45] The Company's proposal creates a holistic approach to enable widespread EV adoption while meeting the State's transportation emission reduction goals.

Ensuring equitable access to the benefits of clean transportation and meeting the State's CLCPA goals will require decarbonizing all aspects of the transportation sector, including light-duty vehicle ("LDV") and medium-heavy duty vehicle ("MHDV") fleets. As stated above, transportation accounts for approximately 47% of CO2 emissions in New York, more than any other sector (see Figure 2.5.1 in Introduction chapter). Some analyses indicate that medium-heavy duty trucks alone account for approximately a quarter of all transportation emissions. Further, MHDV fleet electrification offers the largest emission-reduction opportunity on a per vehicle basis. For example, converting a typical transit bus from diesel to electric provides an annual, well-to-wheel GHG emissions reduction of approximately 80 short tons, compared to approximately four (4) annual short tons of GHG emissions reduction that can be achieved from converting a typical light duty passenger vehicle.

The Company's proposed Fleet EV program is anticipated to create a cumulative GHG emissions reduction of approximately 470,000 short tons. This is equivalent to the CO2 emissions from consuming 52 million gallons of gasoline. Additionally, the program is expected to enable customers to convert their fleets from fossil fuel to electric alternatives more quickly than they otherwise would absent this program, and to ensure that National Grid is prepared to support that conversion through cost-effective grid upgrades.

Some estimates indicate that electric fleet depots, especially transit bus garages, will require upgrades to accommodate multiple MWs of additional demand at a single location. By playing an active role in the initial electrification of fleets, as well as the development of studies to reach large-scale conversion, National Grid can help enable charging solutions which minimize impacts to the grid, while also gaining visibility into long-term load growth at specific locations that may require grid infrastructure upgrades in the future. Utility participation in planning for and implementing the transition to electric fleets can help ensure system reliability and cost-saving opportunities, in order to maximize customer benefits as the transition to electric transportation is achieved.

[45] U.S. Energy Information Administration ("EIA"), *available at* https://www.eia.gov/environment/emissions/state/

Finally, there are numerous fleet customers with presence across the US who have recently purchased bulk orders of EVs and are now deciding where to deploy these vehicles. This offers a critical opportunity for New York State to attract industry by creating a welcoming environment for fleet electrification. National Grid expects that the proposed SPOC for fleet customers will help attract these customers by offering a seamless, streamlined experience for converting the fleets at their facilities in the Company's service territory, thereby further attracting forward-thinking national fleet customers and helping to put the state on a path to meet the CLCPA goals.

## Integrated and Associated Stakeholder Value

National Grid's planned initiatives in this roadmap are designed to enable the market for EVSE and EVs within the Company's service territory. This in turn allows market players such as developers and site hosts to activate and accelerate the deployment of EVSE and EVs in operation in the state. The Company's initiatives may also create opportunities for DR companies and other DER solution providers by creating an environment in which EVs become DERs.

Throughout Phase 1 of the EVCS, National Grid has successfully leveraged its existing customer relationships and a trade ally network to generate site host leads. These leads are directed to the program staff, who provide program details and engage trade ally vendors as appropriate. Vendors typically assist the site hosts through the application and installation processes. While the program has far exceeded its goals, National Grid is actively improving and vetting the process. The program has evolved since it first started, and lessons learned are continually implemented as participation increases.

The Company's Phase 1 of the EVCS program has incorporated the learnings from early pilots and the trade ally network has become an effective approach to enable charging station development. Participants have expressed satisfaction with vendors they have worked with and value their industry experience, program knowledge, and advice. The trade allies receive program training materials from National Grid, are included in regular marketing and recruitment activities, and have experience in the EV charging station development industry.

### Stakeholder Interface

National Grid's proposed programs outlined above, the Commercial/Multi-User make-ready program, Residential charging program, and Fleet program, will advance the Company's ability to continue to define stakeholder requirements for accelerating EV adoption, and to create EV-related products and services to better serve customers. Phase 1 of the EVSC has created many opportunities for interactions with stakeholders across the EV industry and allowed for a robust exchange of feedback, market development, and development of new ideas.

In addition, National Grid will continue to collaborate with the Joint Utilities on common issues across utilities in New York to share information and best practices. New York has shown a strong commitment to enabling clean transportation over the next five years and the Joint Utilities reached a broad set of stakeholders that will continue to grow as National Grid and other utilities begin to expand their EV initiatives and offerings throughout all customer segments in the state.

# 2.6 Energy Efficiency Integration and Innovation

## Context and Background

National Grid recognizes that EE is the least-cost, zero-carbon energy resource for its customers and the State, and that a clean energy pathway starts with EE and comprehensive energy savings solutions. As such, the Company is committed to EE efforts that optimize its electric and gas networks in order to reduce system costs and provide enhanced customer savings.

The Company's EE programs, including DR, continue to align with and support the 2025 statewide EE target of 185 TBtu of energy usage reductions at the customer level. This statewide reduction represents nearly one-third of the total overall state goal of 40% statewide reduction of GHG emissions from 1990 levels by 2030. Recently, the Commission issued the New Efficiency: New York Order ("NENY Order")[46] with significant increases in statewide energy efficiency targets (2021–2025) to meet these aggressive clean energy goals. The NENY EE targets are set to address energy savings in buildings and the industrial sector across all fuel sources. The targets account for the energy and GHG savings that can be delivered through sustaining New York's current EE commitments while also imposing demands for new actions to increase and accelerate EE market activity.

The Company annually files its System Energy Efficiency Plan ("SEEP")[47] that is designed to support the progression of market-based solutions and the penetration of emerging and transformative technologies within the Company's service territory, in support of the Commission's REV Proceeding, NENY Order, and overall modernization efforts. The SEEP provides detailed information on energy efficiency programs,[48] budgets, targets, and evaluation, measurement, and verification strategies. The overall goal is to exceed the current energy savings goals while finding new opportunities to reduce implementation and administration costs. The Company has expanded its EE program offerings, taking a more holistic approach to delivering customer solutions and focusing on providing enhanced value to both the customer and National Grid.

To meet these higher goals, the Company evaluates new tools, technologies, offerings, and business models through EE pilot projects. These pilot projects provide customer insight, strategy

[46] Case 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative*, Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios through 2025 (issued January 16, 2020) ("NENY Order").
[47] *Id*., Niagara Mohawk Power Corporation d/b/a National Grid 2019-2020 Electric and Gas System Energy Efficiency Plan (filed February 19, 2019) ("SEEP"). The 2020-2021 SEEP filing, which was to be filed by June 1, 2020, was extended by the Secretary of the Commission to September 1, 2020.
[48] *See, e.g.*, https://www.nationalgridus.com/Upstate-NY-Home/Energy-Saving-Programs/

work, industry partnerships, technological advancements, and facilitate shaping New York State EE policy development.

In addition to EE programs, National Grid currently operates DLM programs which were created in accordance with directives provided by the Commission in Case 14-E-0423.[49] The current DLM programs are comprised of the Distribution Load Relief Program ("DLRP") Commercial System Relief Program ("CSRP"), and the Direct Load Control Program ("DLC Program"). The DLC program, which includes the **Connected**Solutions Program, was launched in 2016 by the Company. DLRP and CSRP mainly focus on C&I customers while the DLC Program targets residential and small commercial customers. National Grid filed its most recent DLM Annual Report on November 15, 2019 which includes an assessment of its DLM programs for the 2019 capability period and identifies changes planned for the 2020 capability period.[50]

## Current Progress

Table 2.6-1 below shows the current implementation of National Grid's most recent SEEP in gross savings targets resulting from the Three-Year Rate Plan Order.

Beginning April 1, 2018, the Company recovers all EE program costs through base rates, including those in its electric and gas SEEP, along with the costs of the Company's proposed LED streetlight EE program.

*Table 2.6-1: National Grid's Electric EE Savings Target to 2025**

| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|
| **Gross Savings Target (MWh)** | 319,383 | 358,443 | 390,844 | 443,243 | 490,947 | 548,284 |

*2020 values are from the Company's 2019-2020 Electric and Gas SEEP filing in Cases 18-M-0084 and 15-M-0252[51] whereas the 2021-2025 values are from the NENY Order in Case 18-M-0084.[52]

[49] Cases 14-E-0423 *et al.*, *Proceeding on Motion of the Commission to Develop Dynamic Load Management Programs* ("DLM Programs Proceeding"), Order Adopting Dynamic Load Management Filings with Modifications (issued June 18, 2015).

[50] DLM Programs Proceeding, Niagara Mohawk Power Corporation d/b/a National Grid Dynamic Load Management Programs Annual Report for 2019 Capability Period (filed November 15, 2019).

[51] Case 15-M-0252, *In the Matter of Utility Energy Efficiency Programs*, Order Authorizing Utility-Administered Energy Efficiency Portfolio Budgets and Targets for 2019-2020 (issued March 15, 2018) ("ETIP/SEEP Order").

[52] NENY Order, *supra* note 46.

A list of the Company's electric EE and DR programs as of this 2020 DSIP Update is provided below. A more complete description of National Grid's programs can be found in the links below or within National Grid's filed SEEP.

*Table 2.6-2: National Grid's Electric EE and DR Programs*

| Note | Program | Fuel Types | Sector |
|---|---|---|---|
| 1 | Electric Demand Response | Electric | Residential |
| | Multifamily Direct Install | Electric & Gas | Residential |
| | Strategic Heat Pump program | Electric | Residential |
| | Consumer Behavior | Electric & Gas | Residential |
| | Electric C&I Retrofit | Electric | Commercial and Industrial ("C&I") |
| | Electric Small Business Services | Electric | C&I |
| | Small and Medium Business Managed Energy Program | Electric | C&I |
| | Electric Demand Response | Electric | C&I |
| | Portfolio Manager Data Uploads | Electric & Gas | Residential/C&I |
| 2 | Electric Products Program | Electric | Residential |
| 3 | Online Audit Program | Electric & Gas | Residential |
| 4 | Empower Referrals | Electric & Gas | Residential |
| 5 | Energy Affordability Program | Electric & Gas | Residential |
| 6 | E-commerce Market Place - (Residential & SBS) | Electric & Gas | Residential |
| 7 | Tiered Incentive Structure | Electric & Gas | C&I |
| - | Rebate as a Service ("RaaS") aka Instant Rebates | Electric & Gas | Residential |
| - | Pay-for-Performance ("P4P") | Electric & Gas | Residential |
| - | Exploring LMI Housing Incentives | Electric & Gas | Residential |
| - | Streetlight LED | Electric | C&I |

Note: More information is available via the below links:

1) https://www.nationalgridus.com/Upstate-NY-Business/Energy-Saving-Programs/
2) https://www.nationalgridus.com/media/pdfs/resi-ways-to-save/ee7255-uny-electric-heat-and-products-application.pdf
3) https://energyassessment.nationalgridus.com/residential/start/
4) https://www.nyserda.ny.gov/All-Programs/Programs/EmPower-New-York
5) https://www.nationalgridus.com/Upstate-NY-Home/Bill-Help/Energy-Affordability-Program
6) https://marketplace.nationalgridus.com/
7) https://www.nationalgridus.com/Services-Rebates?r=10&page=1&customerType=For+Businesses&locations=Upstate+New+York

National Grid's current EE program portfolio focuses on cost effectiveness, managing programs at the portfolio level by investing dollars in successful, highly efficienct programs while assessing and sunsetting less efficient programs. The Company evalulates and explores new delivery methods such as shifting from downstream offerings to midstream/upstream offerings in order to increase market penetration and customer ease while also lowering costs.

The current Electric Heat Initiative ("EHI"), an electric heat pump program focused on carbon reduction, is funded through National Grid's current rate plan in the Three-Year Rate Plan Order. The primary objective is to increase customer access to high-efficiency electric heat by animating markets for cold-climate air source and ground source heat pumps (replacing older, less efficient and carbon-intensive equipment). The new NY Clean Heat Statewide Heat Pump Program will help achieve even deeper savings to drastically reduce energy consumption, thereby supporting NY's goal to become a national leader in the reduction of GHG emissions.

Evaluation, Measurement and Verification ("EM&V") continues to be an integral part of the EE portfolios. Throughout the 2018-2020 period, National Grid's EM&V team has been conducting EE potential studies, as well as impact evaluations of multifamily, residential, and small business programs. The Company incorporates, as applicable, "real-time EM&V" to provide timely feedback to the program implementation team as the evaluation is proceeding. The EM&V plan also looks at the market to maximize feedback to the EE programs. The Company continues to explore new evaluation methods that utilize automation, smart devices, and/or software solutions.

Within the NENY Order, the utilities were directed to perform BCAs for the Heat Pump and LMI statewide initiatives. The heat pump BCA will roll up into the EE portfolios while the LMI BCA will be standalone. On May 15, 2018, a guidance document was issued by DPS Staff clarifying the BCA filing requirements for all future utility-administered EE portfolio proposals, establishing a common template for documenting and presenting Societal Cost Test ("SCT") analyses.[53] On August 23, 2019, DPS Staff issued guidance around Verified Gross Savings ("VGS") for reporting performance on EE programs that provided details on VGS policy implementation and reporting requirements.[54]

National Grid's relatively new DLM Programs, DLRP, CSRP, and the DLC Program, where the DLC Program includes the **Connected**Solutions Program, have progressed steadily and generally have experienced growth over the last three years.

The DLRP is a contingency program activated for system critical situations (*i.e.*, unforeseen distribution system emergencies wherein stressed electrical equipment may exceed established limits), as defined in the Company's Tariff. This program is focused on designated or identified constrained areas of the service territory, with participation available to customers served at primary and secondary voltages. In 2019, National Grid set the DLRP pricing incentives to $0.00

[53] *CE-07: Utility-Administered Energy Efficiency BCA Filing Requirement Guidance*, issued by the Department of Public Service (dated May 15, 2018).
[54] *CE-08: Gross Verification Savings Guidance*, issued by the Department of Public Service (dated August 23, 2019)

as a placeholder to preserve the program for future use. As such, there have been no participants in the DLRP.

The CSRP is activated for peak-shaving needs when National Grid's electrical system exceeds 92% of the system-wide 95/5 peak forecast, as defined in the Company's Tariff. This program also includes Reservation and Voluntary options for participants. CSRP is a territory-wide program available to customers served from all voltages.

In 2018, CSRP had 306 participants in the capability period, totaling 287.47 MWs of contracted curtailment and 248.48 MW of performed curtailment for the 2018 DR capability period. There were five aggregators and three individual participants.

In 2019, CSRP had 297 participants, totaling 244.76 MWs of curtailment, for the 2019 DR capability period. There were five aggregators and four direct participants. Due to the relatively mild temperatures during the 2019 DR capability period, there were only two events called through the CSRP. One CSRP test event was called on June 27, 2019 and one actual event was called on July 19, 2019. These events resulted in 262.92 MWs and 228.54 MWs of load relief, respectively.

The DLC Program targets primary and secondary voltage customers. The program is activated for system-critical situations or for peak shaving purposes. Through this program, National Grid is able to remotely adjust thermostat settings and/or cycle appliances via a smart plug load control device. The **Connected**Solutions Program connects existing Honeywell, ecobee, Lux, Emerson Sensi,™ Alarm.com, Radio Thermostat, Vivint, and Nest Wi-Fi connected thermostats to National Grid's DRMS. **Connected**Solutions is available to all residential and small commercial customers served at primary and secondary voltage levels. For all DLC Programs there is a one-time sign-up payment of $30 and a $20 yearly incentive that is payable in the second year of participation for the reduction of load during 80% of called events and event-hours.

At the end of the 2019 capability period, there were 5,763 thermostats enrolled in National Grid's **Connected**Solutions Program. Thermostat enrollment in 2019 increased from 3,550 in 2018 and is expected to grow in 2020 and beyond. There were seven (7) events called during the 2019 capability period for the **Connected**Solutions Program. Average participation throughout all seven (7) events has remained steady at around 57% throughout the summer, regardless of the two (2) weekend events that were called. On the device level, the average demand shed per device throughout the entire 2019 capability period is 0.90 kW.

**Demand Response Management System**

National Grid has recently finalized the procurement of a C&I DRMS vendor for a period of three years, beginning with the 2020 capability period. The responsibilities and capabilities of the vendor includes the overall management of administrative aspects of the DLM program, the dispatch of DR events, and curtailment calculations all through a single, integrated system. Aggregators participating in the CSRP will continue to enroll participants directly into EnergyHub, the selected vendor, in the same way they did in the 2019 capability period. This also includes support of the newly proposed Term-DLM resources, including standard and premium auto-DLM resources discussed as described in the following section.

## Future Implementation and Planning

In the near term, customers' interest in EE remains strong, especially in the residential sector as technologies advance and more consumers become aware of EE's benefits. To keep pace, National Grid continues exploring creative new opportunities such as focused DR efforts, community initiatives and partnerships, NWA projects, improved customer segmentation efforts, rate designs, and a continued focus on demonstration initiatives to test new and advanced technologies, all in the pursuit of deeper savings. Technologies like AMI and data sharing capabilities such as GBC will give National Grid and our customers a greater understanding of energy usage and more options to identify and deliver savings. The Company is exploring ways of analyzing customer energy usage and system data to deliver greater benefits from our programs. These activities will be undertaken consistent with the principles and goals of REV and NENY, and are supported by the Company's SEEP, which seek more flexibility in program delivery and management.

National Grid continues to advance energy affordability by developing initiatives focused on energy solutions for LMI customers, driving deeper energy savings in building retrofits and construction, and supporting cost-effective heat pump adoption.

The Company continues to focus on ways to coordinate EE, DR, and NWA procurement to develop programs that lower system needs and costs. National Grid currently delivers EE on a system-wide basis based on customer demand. The Company's EE team works closely with the Forecasting and Distribution Planning team to identify areas of system improvement. A more coordinated effort creates closer collaboration among the Company's Planning groups to communicate localized system needs to design targeted programs.

National Grid recently filed a proposal for a competitive procurement process for Term-DLM resources, including standard and Auto-DLM resources in response to the directive in the 2018 Energy Storage Order.[55] The procurement will enroll resources located in those areas where the Company has identified a need for load relief for both a standard procurement and a premium, or "auto" procurement. This process is expected to be utilized for the 2020 capability period.

National Grid will continue to look for opportunities to bring financing options to EE customers. For example, Metrus Energy's Efficiency Services Agreement ("ESA") is a pay-for performance, off-balance sheet financing solution that allows each participating C&I customer to implement EE projects with a zero upfront capital expenditure. Metrus Energy funds 100% of the project cost

[55] Case 18-E-0130, *In the Matter of Energy Storage Deployment Program*, National Grid's Competitive Procurement Process Proposal for Term Dynamic Load Management (DLM) Resources Including Standard and Premium Auto-DLM Resources (filed January 29, 2020).

while taking the title to the equipment and paying for ongoing maintenance and monitoring. The customer pays Metrus Energy through a service charge for realized savings.

The Company continues to focus on positioning EE as a least-cost system resource. National Grid's load forecast will continue to account for EE in assessing future peak demand impacts. EE is also a suitable means to achieve carbon reduction goals. To support and expand the continued benefits of EE, the Company expects that future SEEPs will include not only EE, but also describe coordination with other DR programs offered by National Grid, changes to rate design, and improvements to LMI programs. National Grid will continue to leverage EE programs to create customer value by contributing to lowering system operating and capital costs. The Company anticipates building on its foundation of successful EE efforts to expand its role in meeting customer energy needs and supporting state and national energy policy over time. These expanded efforts are likely to include pay-for-performance ("P4P") programs, energy as a service, and non-financial incentive programs. National Grid will continue to work with stakeholders to deliver higher levels of cost-effective savings.

Considering the successful delivery of EE programs, as well as an increasing societal value in carbon mitigation, the Company expects customer savings targets to continue to increase beyond 2025. The next generation of National Grid's EE service offerings will require transformative thinking and significant improvement in the capacity to provide independent, high value, and trusted support to customers. Specifically, the drivers of program design will be the delivery of holistic customer solutions that use a single touch point to influence deep and sustained energy cost savings. These changes will only serve to enhance the Company's focus in identifying and meeting customer energy needs while maintaining National Grid's ability to operate reliably.

## Risk and Mitigation

The forthcoming SEEP Guidance documents must align with public policy to increase savings while minimizing financial impact to customers. To achieve triple savings targets there may be a need for increased time and funding. It may be beneficial to review the cost-effectiveness guidelines of the system-wide EE program to align the March 15, 2018 ETIP/SEEP Order and the Three-Year Rate Plan Order with the relevant benefit-cost test.[56]

Continued discussion between utilities, government agencies, and other stakeholders will help maximize the savings attained in New York and the value attributed to those savings, while minimizing the financial impact to consumers.

[56] *See, e.g.*, National Efficiency Screening Project, *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources* (Spring 2017), *available at* https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

## CLCPA Alignment

National Grid continues to support and remain aligned with the CLCPA through its EE programs which contribute to the State's EE goals and GHG emissions reduction goals.

## Integrated and Associated Stakeholder Value

National Grid's EE programs continue to benefit customers through energy savings, cost savings, increased comfort, increased control over energy bills, higher property values, and lower carbon footprints. The EE programs also support service and equipment providers, through incentives or market development support, for their goods and services. The Company's EE programs also support electric distribution systems by reducing peak demand and lessening constraints.

### Stakeholder Interface

National Grid will continue to work with interested internal and external stakeholders to increase participation and engagement in the Company's DLM Programs. National Grid currently interacts with several third-party vendors for administrative and technological enhancement of DLM Programs which includes the commercial DRMS and the residential DRMS. In addition to existing thermostat manufacturers in the **Connected**Solutions Program, the program is exploring the opportunity to add more thermostat vendors and other smart device types using the residential DRMS. With additional vendors, there will be an increased need for coordination and compatibility. Additionally, the success of DLM Programs is directly related to efforts of the distribution planning, NWA, and EE teams internally. As the DLM Programs expand, additional internal coordination will be paramount.

# 2.7 Distribution System Data

## Context and Background

Information sharing services is a primary function of the DSP. Distribution System Data (referred to as "system data"), describes the physical state, size, or operating parameters of the grid such as voltage levels, thermal capacity, or geographical location of assets. The Distribution System Data Portal transparently displays the utility system capabilities, needs, limitations, and opportunities for DERs. By sharing data with third-party DER developers to guide their installation of DER on the distribution system, the portal helps deliver efficient investment and operation of Company and third-party resources.

In order to efficiently maintain and share various system datasets, National Grid developed an on-line System Data Portal in concert with its initial DSIP. Information on the System Data Portal is refreshed on a periodic basis (monthly for some elements and annually for others) and is enhanced as new information becomes available.

There is significant on-going regulatory activity on data issues. The Commission initiated Case 20-M-0082, *Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data*, on March 19, 2020.[57] DPS Staff released two whitepapers in the proceeding on May 29, 2020.[58] National Grid looks forward to working with the Commission, DPS Staff, customers, and stakeholders to develop a Data Access Framework that supports New York State's ambitious energy policies. Commission actions in this proceeding are likely to impact the system data plans discussed in this chapter and the Customer Data chapter.

National Grid adheres to enterprise-wide data management standards that apply to both system and customer data and discussed at more length in the Customer Data chapter.

Determining what data to share on the National Grid System Data Portal is a collaborative process. As the need for data sharing grows along with technological advancements and interest from third parties, the company continues to collaborate with all stakeholders for example via the hosting capacity maps stakeholder sessions. The Company looks forward to additional collaboration and discussion with the Commission and interested third parties to continue to explore future data sharing opportunities.

[57] Case 20-M-0082, *In the Matter of Strategic Use of Energy Related Data* ("Energy Related Data Proceeding"), Order Instituting Proceeding (issued March 19, 2020).
[58] Energy Related Data Proceeding, Department of Public Service Staff Whitepaper Regarding a Data Access Framework (filed May 29, 2020); *id*., Department of Public Service Staff Whitepaper Recommendation to Implement an Integrated Energy Data Resource (filed May 29, 2020).

# Current Progress

Since filing of the initial DSIP in 2016, National Grid has made significant improvements to system data and portal functionality. Improvements have been realized in terms of the process, automation, quality control, and analysis required to develop the data, along with increased breadth of data available and improved presentation in its System Data Portal.[59] An account is required for access to National Grid's System Data Portal.

The following list shows the data sets currently available on the Company's System Data Portal:

- Introduction:
  - FAQ
  - Contacts
  - Link to (nCAP) Customer Application Portal
  - Helpful Links:
    - Joint Utilities of New York Home Page
    - NYS SIR Inventory
- National Grid Reports:
  - 5 Year T&D Capital Investment Plan
  - 15 Year Electric T&D Planning Report
  - Condition Assessment Report
  - Peak Load Forecast
  - Reliability Report
  - Summer Preparedness
  - Power Quality
  - 2018 and 2019 Hourly MLoad (aggregated system load for National Grid)
  - 2018 Distributed System Implementation Plan Update
  - 2018 DSIP Stakeholder Session Slides
  - National Grid BCA Handbook
- Distribution Assets Overview
- Hosting Capacity
- NWA Opportunities
- LSRV/VDER

A description of information currently available and its intended uses by third parties is provided in Table 2.7-1 below.

[59] *Available at* https://www.nationalgridus.com/Business-Partners/NY-System-Portal

*Table 2.7-1: Information Available on National Grid's System Data Portal*

| Portal Tab | Description / Data Provided | Stakeholder Utilization |
|---|---|---|
| **Introduction** | Provides a link to National Grid's IOAP (referred to as "nCAP"), plus FAQs, links for further help, and a contact email. This also provides a link to the DPS website hosting each of the utility's NY-SIR Inventory showing the DG interconnection queue. | Assists with access to interconnection application portal and how to use the portal. Provides helpful links to the Joint Utilities site and the NY-SIR inventory on the DPS website. |
| **Company Reports** | Provides National Grid reports including Five-Year Capital Investment Plan ("CIP"), Fifteen-Year Plan, Condition Assessment Report, Peak Load Forecast, Reliability Report, Summer Preparedness, Power Quality, 2018 and 2019 hourly load data, 2018 DSIP Update, 2018 DSIP Stakeholder Session Slides, and BCA Handbook. | Consolidated location for providing transparency to pertinent Company documents. |
| **Distribution Assets Overview** | Provides planning information for feeders including feeder number, substation name, primary voltage, thermal ratings, past and forecasted loading, and historic feeder load curves. Since the 2018 DSIP Update 8760 forecasted loading has been added. | The data provides information that helps DER developers understand potential system constraints that may impact future interconnections. |
| **Hosting Capacity 3.1 Maps** | Provides overall Hosting Capacity on a zoomed-out view. A zoomed-in localized view provides data down to nodal level as to the amount of DG capacity that each feeder could accommodate at that node without requiring significant infrastructure upgrades. | Hosting Capacity gives the developer a relative indication of where interconnection costs may be higher or lower. |
| **NWA Opportunities** | Provides a link to National Grid's NWA page which explains what an NWA is, Planning Process and Opportunities | Developers are provided an advance view as to where future DER opportunities may exist in advance of formal RFP solicitations for NWAs. |
| **LSRV/VDER** | Indicates the substations on which LSRV compensation is available as part of the VDER Value Stack compensation. | Enables DER developers to target beneficial locations and enhance the value of eligible DER interconnections. |

# Future Implementation and Planning

National Grid has plans to enhance existing data provided with the results from various studies and analysis over the next five years of this 2020 DSIP Update. Table 2.7-2 below provides a list of the items currently under consideration.

*Table 2.7-2: Planned Additions to System Data Portal*

| Data | When (CY) | Where |
|---|---|---|
| Map of NWA Opportunities | 2020-2022 | NWA Opportunities Tab |
| Load Serving Capacity Maps | 2020-21 | Hosting Capacity Maps for EV chargers, ESS when charging, and/or loads on a separate tab. |
| URL API Integration | 2020-21 | Hosting Capacity links that grant remote access to the hosting capacity results following access request and login. |
| Hosting Capacity 3.X and 4.0 | 2021+ | Hosting Capacity longer-term enhancements |

The planned revisions to the NWA Opportunities tab will aid developers in selecting the most beneficial locations, illustrate where grid limitations exist, and where the NWA solution could be located to best mitigate the issue(s). The information presented will include an interactive map of National Grid's service territory with the location of each NWA Opportunity marked. Information currently presented in the NWA website (link on System Data Portal) will be available and accessed via a pop-up box that appears when an NWA location is clicked on. Additional data may also be added as NWA opportunities mature. Significant resources were expended in setting up the NWA website. The NWA website is discussed in more detail in the Beneficial Locations for DER and NWAs chapter and Procuring NWAs chapter.

The Company will continue to advance its HCA. National Grid released the latest Hosting Capacity 3.1 map on April 1, 2020 and plans on refreshing the analysis on the entire system and releasing an update on October 1, 2020. A detailed plan for enhancing HCA is discussed in the Hosting Capacity section of this 2020 DSIP Update.

## Risk and Mitigation

Cybersecurity could pose a potential threat as the portal enhancements as increased data and capabilities will increase exposure. To help mitigate these security risks, National Grid will continue to review the sensitivity of the data. For data items that cannot be publicly provided on the Company's System Data Portal, National Grid will assess whether there are alternative means (*e.g.*, by executing a Non-Disclosure Agreement with a specific DER provider). From a security perspective, vulnerability assessments and penetration testing of the portal will be undertaken by

National Grid to ensure that security risks are identified and logged for remediation. As a first step to understanding the level of threat, and monitor access and use, National Grid and the other utilities now require that users establish a username and password to log into the System Data Portal.

The Company's current system data platform has certain performance limitations. If the quantity of hosted data or users increases substantially, the site's performance may degrade. To mitigate these risks the Company will investigate upgrades including moving the System Data Portal to another platform. Customer privacy rights are and will continue to be a priority for National Grid and the portal must comply with all customer privacy rules.

## CLCPA Alignment

The System Data Portal provides data to DG developers to aid location identification of renewable generation to meet state clean energy goals. Information provided through National Grid's NWA website provides information for third parties to use DER to solve grid constraints. The data on the LSRV tab provides information for DER developers to target beneficial locations for DER.

## Integrated and Associated Stakeholder Value

The System Data Portal provides useful data to facilitate DER interconnection. The Hosting Capacity tab provides areas for potential low-cost solar PV interconnection. The System Data Portal also provides a source of National Grid reports for visibility and transparency to third parties and customers. The system data portal provides links to the NWA website which provides NWA locations and opportunities.

### Stakeholder Interface

The Company conducted stakeholder sessions for hosting capacity and NWA information and subsequently made initial improvements to the current hosting capacity maps, identified near-term future enhancements, and developed an NWA website. Going forward the Company will continue to work with stakeholders for input.

# 2.8 Customer Data

## Context and Background

National Grid has been working on improving the customer experience with a focus on listening to and understanding our customers, developing products and services that customers want, and delivering a consistent and effortless experience for our customers. Robust, secure, and accurate customer data is foundational to a strong customer experience. The Company has made significant strides in the last two years and has plans to continue to improve security and access to meet customer expectations.

There is significant on-going regulatory activity on data issues. The Commission initiated Case 20-M-0082, *Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data*, on March 19, 2020.[60] DPS Staff released two whitepapers in the proceeding on May 29, 2020.[61] National Grid looks forward to working with the Commission, DPS Staff, customers, and stakeholders to develop a Data Access Framework that supports New York State's ambitious energy policies and the Commission's goals with respect to data sharing, data security, and customer privacy.

## Current Progress

National Grid has made progress since the 2018 DSIP Update in a number of ways relating to customer data. First, it has implemented improved internal processes, exemplified by the Customer Data Management Standard and the Customer Information Management Office. Other specific areas of progress include new improved security for cases in which third parties access utility data, ongoing improvements to the IOAP (discussed more fully in Chapter 2.10 - Interconnections), implementation of Green Button Connect My Data, and ongoing web improvements.

Broadly, improved customer data is foundational to National Grid's efforts to become a customer-centric organization. For example, many of the Company's systems and efforts have been defined by account management. However, customers can hold multiple accounts and as such, refined, accurate, and secure customer data is a key element in centering the customer, and not account numbers.

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[60] Energy Related Data Proceeding, *supra* note 57.
[61] *Id*., *supra* note 58.

The Customer Data Management Standard emphasizes best practices for the effective management of data essential to the delivery of safe, seamless and efficient services. Accurate, secure data underpins the Company's ability to deliver upon its' customer-centric vision. In addition to the Customer Data Management Standard, National Grid also has adopted a holistic Data Management Standard that applies to all types of data. The Company's standards are guided by principles, including that data:

- has purpose and a lifecycle
- has ownership and governance and protection from unauthorized access
- quality is actively managed
- standards are defined and categorized
- has a single authoritative source
- access is appropriate, which may include access controls and the ability to audit access
- when published is defined, appropriate, quality assured and verifiable

National Grid recently established the Customer Information Management Office, situated in the Customer group, to be the owners of the customer data asset within National Grid. The group's remit is to implement the Customer Data Management Standard and represent the customer data domain in the development of any forthcoming projects. Data Management practices ensure that the Company:

- properly handles data based on its level of criticality and sensitivity;
- observes the legal requirements regarding personal data ;
- Protects Personal Information from accidental or unlawful destruction, loss or alteration, and against unauthorized access or disclosure;
- follows policy, privacy and retention standards with respect to methods of sharing, transferring, storing, and disposing of data; and
- has implemented third-party agreements for data sharing where applicable.

### Improved Access and Security for Third Parties

The following identifies where National Grid has developed means to improve access and security for third parties to obtain data, and also for customers to share their data with authorized third parties.

#### Data Security Agreements (DSA) for Third-Party Data Access

A DSA is required for any Energy Service Entity (ESE) – including, but not limited to ESCOs, Direct Customers, DERs, and contractors of such entities with an electronic connection to the Company (other than by email) that provides energy data or performs an energy-related service and is seeking access to Confidential Customer Utility Information. Access to Utility IT systems alone does not necessarily trigger the need for a DSA because an entity or customer can access their account or a publicly-facing portal without entering into a DSA.

On October 17, 2019, the Commission approved a modified version of the Joint Utilities' DSA. All ESE who have electronic access to utility systems must sign and agree to adhere this DSA regarding the proper protection, storage, and use of customer data.

**IOAP Improvements**

Customer data plays an important role in the National Grid IOAP which by combining customer data with system data and process automation has lowered interconnection times. The portal offers novel visibility into an interconnection project's progress and allows the applicant to manage their entire application, from approval to construction and commissioning, online.

**Green Button Connect My Data®**

Green Button Connect My Data® is an emerging industry standard that aims to empower customers and third parties to share historical energy and billing data. This platform is designed to provide a protected, safe, and easy to use means to share energy usage and billing data to empower multiple customer use cases. Green Button Connect My Data® can support new customer energy management systems, EE or DR programs, and DER providers and possibly improve rate designs enabled by AMI. The Company is also working with the other New York utilities to improve and streamline the onboarding experience for third parties and enable ease of customer authorization to share their data. As directed by the Commission's December 13, 2018 *Order Adopting Accelerated Energy Efficiency Targets*,[62] the Joint Utilities collaborated with DPS Staff and stakeholders to support the development of common set of GBC terms and conditions. On October 16, 2019, the Joint Utilities filed the Joint Utilities Status Report on Green Button Connect My Data® with proposed GBC terms and conditions.[63] The Company is currently working to implement GBC for all of its New York State customers with plans to have it operational in early 2021.

**Customer Experience (CxP) Updates**

The Company has made improvements to the systems that support the common methods and purposes customers have for interacting with National Grid. The Company has worked to improve its web applications, phone services, and customer outage notifications which all rely to varying degrees on customer data to optimize the customer experience.

National Grid has implemented a program to improve the customer experience on its web applications. The program works to ensure stability while enhancing functionality as quickly as possible. While working towards an end-state roadmap, the program has been implemented under a Scaled Agile Framework® to allow for accelerating brisk incremental

[62] Case 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative*, Order Adopting Accelerated Energy Efficiency Targets (issued December 13, 2018), pp. 43-45.
[63] Cases 98-M-1343 *et al.*, *In the Matter of Retail Access Business Rules*, Joint Utilities Status Report on Green Button Connect My Data® (filed October 16, 2019).

improvements. These short-term improvements are vetted against the end state vision and for alignment to other major strategic projects.

**Web Self-Service Portal**

National Grid has focused on providing a better User Experience Portal ("UXP") that is accessible through desktop and mobile devices. This service is currently in production and will be expanded over the course of the coming years. The Company has added responsive web content for mobile channels to allow for a better customer experience across device categories.

**Interactive Voice Response (IVR)**

The Company replaced an aging IVR system, telephony infrastructure, and workforce management tools across all National Grid service lines.

**Speech Analytics**

National Grid has deployed voice technology to analyze customer calls which will help improve customer's interaction, gather insights on the reasons for the call, and to further enhance quality assurance.

**Two-Way Outage Communications**

This project enables two-way text capabilities for electric outage information. It enables National Grid to increase customer satisfaction and trust, while shifting calls from the contact center to a more efficient method for providing critical information to customers during major storms.

National Grid has several plans to enhance the customer experience through better deployment of customer data. The Company is also working on initiatives that will streamline the customer and third-party experiences. Implementing AMI, upon the Commission's approval, will enhance the quality and granularity of much customer usage data.

## Future Implementation and Planning

National Grid has several plans to enhance the customer experience through better deployment of customer data. The Company is also working on initiatives that will streamline the customer and third-party experiences. Implementing AMI, upon the Commission's approval, will enhance the quality and granularity of much customer usage data.

**IOAP Enhancements**

The Company is planning a series of updates to continue to improve the IOAP, especially with respect to its treatment of energy storage projects. For example, National Grid will digitize Appendix K of the NY-SIR in which the applicant specifies an energy storage project's operational characteristics. In turn, this improvement will offer interconnection applicants easier entry, better reporting, facilitate internal processes by linking to other National Grid systems. The Company is also working to integrate the data from the IOAP into other National Grid systems, notably GIS, to improve system data and modeling.

**Continuing Improvements to Web Self-service Platform**

National Grid is working to transition to a to a new responsive transactional web site with an increased ability for customers to perform transactions on the web with a higher-level of self-service than is currently available.

**Automated Customer**

The Automated Customer describes a platform for customers to communicate directly with National Grid service departments while integrating omnichannel capabilities, such as webchat and email.

**Identity Access Management (IAM)**

The Company will implement a strategic IAM solution integrated with the Business-to-Customer ("B2C") Retail Web Portal. This new IAM solution will serve as a replacement for the legacy authentication and web account management solutions across National Grid and National Grid affiliates service territories and include single-sign-on ("SSO") for services provided to third-party partners who provide information to National Grid's customers through the self-service website.

**Personalization**

National Grid is undertaking a Personalization Pilot to drive targeted offers and solutions to customers by incorporating personalization management. The personalized offers will be based on predictive propensity modeling that takes in account multiple customer aspects including past behaviors (*e.g.*, programs enrolled in, high bill, collections, etc.), locations, and other demographic information and provide a vehicle to serve personalized and targeted solutions through preferred communication channels.

**Mobile App**

National Grid is planning to redesign the mobile application to improve customer engagement and increase the level of account information that is available to customers on the app.

**Marketing Automation**

National Grid is working on a marketing automation project that drives benefits throughout the customer engagement process. For example, it will allow for message control across channels, manage touchpoints with customers and customer preferences, integrate with other customer data elements. and facilitate brisk audits of marketing campaign efficacy.

**Advanced Metering Infrastructure (AMI) and the Customer Energy Management Platform (CEMP)**

The AMI solution that National Grid is proposing will provide access to energy usage information for all customers through an envisioned Customer Energy Management Platform ("CEMP"). The Company proposes a comprehensive CEMP which will be designed to display energy usage data for customers, integrate GBC to enable data sharing with authorized third parties, provide actionable insights and energy savings recommendations, and offer direct linkages to marketplaces for energy saving products, services, and available incentives.

The CEMP development and implementation processes will be designed to be iterative and scalable over time. While the Company plans to build out the initial solution prior to meter deployment, it is the Company's plan to consider and facilitate the integration of new functionalities as they evolve in the future to meet the changing needs of customers. New features, such as integration with DERs like solar and energy storage, can be integrated into the CEMP as these technologies become more widely accepted by customers. National Grid envisions the CEMP to serve as the one-stop place to manage all customers' energy needs today and in the future.

*Figure 2.8-1: CEMP*

## Risk and Mitigation

Customer data privacy rights are a key priority and area of focus with regard to both customer-specific data and aggregated data. For example, Energy Service Companies ("ESCOs") and DER providers who receive customer data through Electronic Data Interchange ("EDI") must enter into DSAs with National Grid. The Company will continue to monitor whether the protections afforded by the DSA requirements are sufficient. In contrast, Green Button Download My Data only provides data to customers who access the link through their account page online.

National Grid will also ensure that any aggregated data sets being provided to third parties meet the aggregated data anonymity standard of 15/15[64] unless exceptions exist for specific use-cases (*e.g.*, whole building data for building owners, NYSERDA's UER). Any future exceptions to the 15/15 standard for specific use cases will be discussed first among the Joint Utilities and proposed to DPS Staff for consideration and ultimately the Commission for approval, with a goal of meeting customer and stakeholder needs and maintaining individual customer privacy.

# CLCPA Alignment

Customer Data initiatives support the clean energy and emissions reduction goals of the CLCPA by serving customers better, and empowering customers. The personalization offered by the CxP and the increased visibility offered by the CEMP will help customers both understand their energy usage, and develop conservation strategies, potentially with Company assistance. Likewise, improved data sharing will increase the opportunities for DER integration and open up the market for businesses to assist customers with tailored energy management solutions. Such energy management will help achieve the CLCPA by lowering the total energy consumed, or the total consumed on-peak. Lower total energy use will result in lower costs through less demand for total energy, and lower use on-peak will necessitate a lower level of capacity build than in a counterfactual scenario. Also, upon Commission approval to proceed with AMI, National Grid will be positioned to provide more granular data for customers and third parties to improve their energy management options, in turn delivering more value through lower cost achievement of CLCPA goals.

[64] "Under the 15/15 standard, aggregated customer usage data is considered sufficiently anonymous to share publicly if (1) the aggregated group contains at least 15 individual accounts, and (2) no one account represents more than 15% of the total load. In general, a privacy standard for aggregated energy data establishes the minimum configuration and characteristics of energy accounts that, when aggregated over a geographic area or building, are expected to provide a reasonable expectation of customer privacy by not revealing or permitting determination of individual customer-specific energy use." Cases 16-M-0411 *et al.*, *In the Matter of Distributed System Implementation Plans*, Order Adopting Whole Building Energy Data Aggregation Standard (issued April 20, 2018), p. 2, n.1.

# Integrated and Associated Stakeholder Value

The Company continues to make progress on many fronts regarding customer data to deliver and enhance the customer experience, empower customers to better control and manage their energy usage, and facilitate authorized third-party access to animate the market for energy products. The improvements to the web experience, personalization efforts, implementation of GBC, and other initiatives are designed to provide significant stakeholder value for customers, other market participants and National Grid.

On a recently initiated Strategic Use of Energy Related Data Proceeding, National Grid is looking forward to working with the DPS Staff, customers, and stakeholders to develop a Data Access Framework that supports Commission's goals with respect to data sharing, data security and customer privacy. Also, ensuring that the future data elements and improvements have a specific purpose and the benefits of the uses derived from data sharing exceeds the costs associated with it, including the risks it creates to the Company and customers.

Additionally, the IOAP allows DG and energy storage developers to fully enter their applications online and performs feasibility screenings for project siting while providing interconnection applicants the ability for full visibility to monitor their projects' status online. The portal also supports online applications for electric connections and associated project status monitoring.

## Stakeholder Interface

The Commission recently approved the Joint Utilities' DSA after an extensive stakeholder process.

Customer data issues, including security and latency, were an important part of the Company's AMI collaborative in the summer of 2018. Those stakeholder sessions helped improve the Company's AMI filings.

# 2.9 Cybersecurity

## Context and Background

A robust cybersecurity program is necessary to maintain a safe and reliable electric delivery system given the increased DER interconnections and their integration with utility operations. The importance of cybersecurity continues to increase as more intelligent devices are interconnected, the volume of data increases, and the risk of, and potential damage from, cyber-attacks grows. The need to maintain confidentiality, ensure data integrity, and improve resiliency is increasingly important as information is leveraged to drive more efficient operations and improved decision making.

In the 2018 DSIP Update, National Grid presented a Cybersecurity & Privacy framework to deliver cybersecurity capabilities and manage cybersecurity risks associated with grid modernization. The framework proposed a risk-based approach across people, process, and technology, and established a risk methodology, security design principles, information security management (policies and standards), and cybersecurity capabilities and services needed to manage threats, vulnerabilities, and risks appropriately.

National Grid will continue to ensure that third-party cybersecurity due diligence practices are formalized and in place to validate and improve alignment with relevant and existing National Grid polices, principles, standards, and leading industry best practices, such as the National Institute of Science and Technology ("NIST") Cybersecurity Framework.

## Current Progress

National Grid has improved third-party cybersecurity due diligence practices to ensure compliance with regulatory requirements and obligations, as well as cybersecurity best practices, policies, and procedures. Assurance activities are currently undertaken to attest that third parties meet applicable security requirements. This includes third-party self-assessment questionnaires to establish risk profiles and formal assessments to validate cybersecurity practices. To reduce the risk of a vendor introducing vulnerabilities into the Company's systems, where necessary, National Grid formally reviews third-party practices related to regulatory compliance, cybersecurity, and technology infrastructure.

# Future Implementation and Planning

The Company recognizes that DSP and grid modernization will introduce a myriad of benefits for the organization and its customers. This includes increasing the reliability of the system, making it more capable and more resilient to attacks, equipment failures, human errors, natural disasters, and other threats. To ensure efficient delivery of cybersecurity capabilities needed to protect, detect, prevent, and respond to risks, National Grid continues to evaluate how best to support the business to meet DSP goals and objectives. The cybersecurity capabilities will leverage National Grid services, incorporating potential improvement opportunities and expected evolutions.

The Company's cybersecurity plans over the coming five-year period include:

- Specifying security requirements as part of the selection criteria for grid modernization equipment, systems, and third-party service providers
- Monitoring and controlling access to all grid modernization equipment and systems
- Implementing appropriate cryptographic and other electronic security measures to strengthen the confidentiality and integrity of sensitive information during use, transmission, and storage
- Implementing appropriate redundancy and other features in grid modernization solution designs to protect and enhance availability
- Employing secure or "hardened" configurations of hardware and software capabilities
- Employing strict access control and authentication methods to prevent unauthorized access to user and system accounts, web services, and other system resources
- Providing appropriate malware protection for systems and relevant resources
- Maintaining ongoing processes to ensure security-related updates are identified, tested, and implemented
- Providing continuous security monitoring for system intrusions and other unauthorized access
- Monitoring and tracking security events appropriately and integrating these events into a broader incident response and reporting process
- Ensuring compliance with the Company's existing enterprise cybersecurity standards
- Deploying solutions with the flexibility to upgrade and maintain compatibility with evolving government and industry security standards
- Requiring third-party smart grid vendors to maintain a proactive security process by utilizing a Secure Development Lifecycle ("SDL"), conducting security testing on their solutions, and other appropriate activities
- Assessing the security posture of smart grid systems, both periodically and event-driven (*e.g.*, application, firmware, and hardware updates) via independent third-party cybersecurity testing
- Developing and implementing remediation plans for identified risks and emergent system vulnerabilities

### Risk and Mitigation

National Grid leverages the NIST Cybersecurity Framework, an industry framework which consists of standards, guidelines, and best practices to manage cybersecurity-related risk. The Framework provides a methodology for conducting risk and control assessments to determine control maturity, identify risks, and develop plans to improve cybersecurity posture.

To achieve its cyber priorities, the Company has developed a Cyber-Risk Framework which provides a comprehensive range of security controls and measures to identify, protect, detect, respond, and recover domains. When implemented, these measures decrease the likelihood of threats of unauthorized access, compromise, disruption, and destruction to core systems, information, and infrastructure.

## CLCPA Alignment

The CLCPA places the State of New York on a path to reach net-zero GHG emissions. While cybersecurity does not directly result in the reduction of GHG emissions, it will enable the safe and secure integration of information technology and operational technology assets. National Grid is committed to ensuring the safe and reliable operation of the energy system.

## Integrated and Associated Stakeholder Value

The increasing trend of third-party managed DERs connecting to National Grid systems exposes the Company to an increase in risk, including cybersecurity risk. The Company's cybersecurity program and third-party due diligence practices aim to enable and streamline the connection process of third parties while mitigating cybersecurity risks associated with such third parties.

### Stakeholder Interface

The Company has established a Vendor Assurance program that regularly assesses vendors and third parties and prioritizes them based on risk. This process occurs with vendors already conducting business with the Company and utilizes a risk-based approach to ensure compliance with applicable company policies, standards, and requirements. By abiding by established requirements, policies, standards, and procedures, DER providers and other third parties who seek to leverage National Grid systems will be able to operate in a manner that does not unduly increase the risk of a cybersecurity incident and that aligns with the established Cybersecurity & Privacy Framework for protecting DSP-associated systems and information.

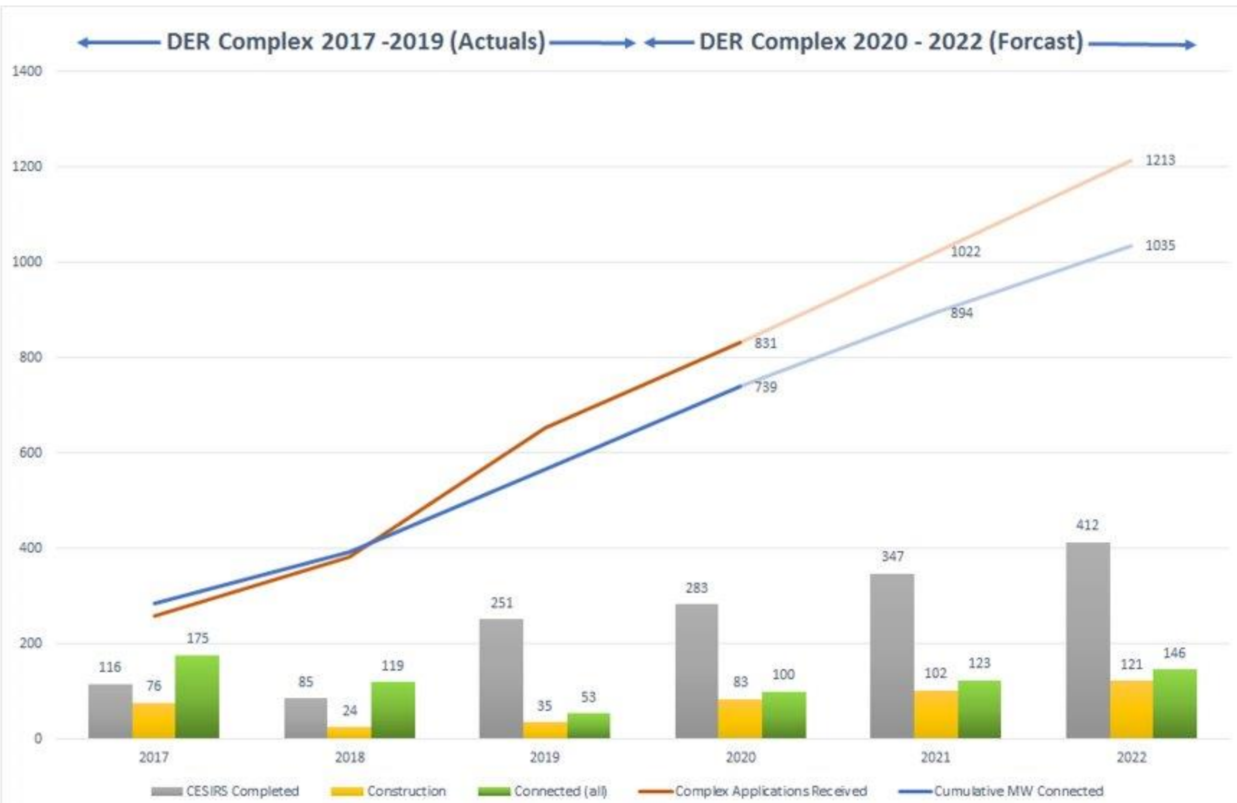
# 2.10 DER Interconnections

## Context and Background

National Grid has made significant strides in streamlining and improving the transparency of the interconnection process to adequately interconnect greater amounts of DG and energy storage projects. This includes eliminating unnecessary procedural delays and refining its end-to-end interconnection process.

The rate of DG interconnections continues to increase, as does the capacity of the DG being installed. The graphic below depicts the continuing expansion of DG interconnections within National Grid's service territory (Figure 2.10-1).

*Figure 2.10-1: DER Application-Interconnection Trends in National Grid's Service Territory*




The left vertical axis shows cumulative capacity installed and pending by year in National Grid's service territory.

- DER Forecast: Since 2017, the rate of interconnection requests has been increasing, along with the percentages advancing through the Coordinated Electric System Interconnection Review ("CESIR") process and to construction. In 2019, the Company received 653 applications and completed 251 CESIRs, with 37 projects advancing to construction and 53 projects interconnected.

In an effort to drive consistency of practices across New York state, National Grid participates in the Interconnection Technical Working Group ("ITWG"), Interconnection Policy Working Group ("IPWG"), CDG Billing and Crediting Working Group, and the Smart Inverter Working Group to coordinate and collaborate with the Joint Utilities, DPS Staff, and stakeholders on interconnection issues. The ITWG promotes consistent standards across the utilities to address technical concerns and interconnection procedures affecting the DG community. Key topics the ITWG has focused on include anti-islanding protection, remote monitoring and control, technical screening processes, and ground fault overvoltage ("GFOV") protection. The IPWG explores non-technical issues related to the processes and policies relevant to the interconnection of DER in New York. The IPWG has focused on queue management, group studies, cost sharing, alignment of construction payment timelines with local permitting processes, and development of consistent project construction schedule information for all interconnection projects. The Smart Inverter Working Group has been involved in the development of a Joint Utilities Smart Inverter roadmap. This effort has required research and analysis into the benefits and challenges smart inverters could have on the planning and operation of the grid. The CDG Billing and Crediting Working Group has been involved in resolving issues related to timing/allocation of credits for CDG projects, creating additional reporting for CDG hosts and implementation of host allocation timeframes.

## Current Progress

National Grid has made significant progress in streamlining its interconnection processes. Key initiatives and achievements are noted below.

First, National Grid has performed education and outreach to streamline the process for large, complex installations. In October 2019, National Grid hosted a Solar Summit with representatives from government, regulatory, utilities, industry, NYSERDA, and other stakeholders to discuss barriers to interconnection such as permitting. National Grid also presented on Hosting Capacity maps at this summit to illustrate how developers can take advantage of the information the Company publishes and makes public in the early planning stages for projects.

Additionally, National Grid has deployed an automated preliminary screen tool as part of the IOAP Phase II. The upgraded tool automates the six mandatory preliminary screens from the NY-SIR. If a DG project passes the six mandatory screens, it may move into the construction phase without further study. Where a screen fails, explanation as to why the screen failed is provided to the applicant. The six screens from the NY-SIR that are automated are Screens A through F. An interim automated solution by the Company reduced preliminary application processing time from ten business days to five business days and the final solution reduced the average preliminary turnaround time to two business days or less.

Technical collaboration with industry groups, developers, and regulators has helped National Grid identify barriers for DG and storage project interconnections . Most of the capacity installed in the Company's service territory is from with large, complex applications. Following extensive technical review, National Grid has revised its interconnection requirements as described below:

1. Transmission GFOV Protection[65] – The substation power transformer becomes at risk for an unintentional island operation in a transmission-side ground fault event from distribution-side DG back feeding the substation.
    - National Grid is developing an asset strategy for transmission GFOV. The Company aims to reduce the cost and timelines for installing transmission GFOV protection.
    - For electric transmission, in 2018 National Grid established the requirement to install GFOV (*i.e.*, $3V_0$) on transmission-supplied power transformers in new substations as well as in existing substations that require extensive modification or replacement of the transformer and/or its transmission supply connection.

2. In mid-2018, National Grid and the Joint Utilities, in collaboration with the ITWG, designed a new CESIR template that has additional and clarified information for end users, including triggers, system impact results, and more information and scope associated with those impacts driving the system upgrade costs. The new CESIR format is a universal template used across the New York utilities and is refined based on developer feedback.

3. National Grid has purchased three (3) $3V_0$ mobile units There is one mobile unit in each of the Company's operating divisions that can be utilized for $3V_0$ protection at a substation so the DG is able to connect and operate while the permanent $3V_0$ construction is completed at the substation, thereby allowing National Grid to further support efforts to connect DG to the electrical infrastructure in a timely fashion.

National Grid's interconnection specifications, as published in the Company's Electric System Bulletin ("ESB") No. 756, *General Requirements for Parallel Generation Connected to a National Grid Owned EPS*, were revised in 2019 and are updated on an annual basis to ensure ongoing regulatory compliance and the implementation of best practices.

## Future Implementation and Planning

National Grid shares the state's objectives to increase DER penetration for the benefit of

[65] Transmission ground fault overvoltage ("GFOV") protection (also known as "$3V_0$") is often implemented as relaying on the delta side of a transformer bank (confirmed as a utility best practice in the IEEE Power & Energy Society ("PES") Technical Support ("ITS") Task Force report on IEEE 1547-2018).

customers. The Company continues to be actively engaged with DPS Staff and industry representatives through both the ITWG and IPWG. The Company will also build on the success of the IOAP Phase II implementation and continue to enhance the IOAP to further automate the interconnection process.

A major focus of future interconnection activities will be on energy storage in support of New York State's goal of interconnecting 1.5 GW of energy storage by 2025 and 3 GW by 2030. Energy storage at this scale will be a significant undertaking to enable integrated services and higher penetration of DG into the distribution electric power system ("EPS"). Energy storage paired with DG (*i.e.*, hybrid facilities) are an example of technology combinations that could soon provide value for the Company's grid operations. National Grid is working collaboratively with the ITWG and IPWG on the development of an Energy Storage roadmap that will facilitate the successful interconnection of future projects. The following will be an essential part of this roadmap and will help set rules on energy storage interconnections:

- Relay and control scheme requirements
- Metering requirements and alignment with utility tariffs
- Development of a standardized interconnection agreement template for ESS operating characteristics
- Fast tracking eligibility
- Hybrid solar + storage requirements

By creating guidelines for the above, both National Grid and developers will benefit in easier interconnection processes, faster document reviews, and quicker interconnection timelines.

In 2019, as part of an ongoing Distributed Generation Interconnection REV Demonstration project,[66] National Grid proposed expanding a cost-sharing solution for increasing the pace and scale of interconnecting DG systems through upfront investment by the Company, coupled with a cost-allocation methodology aimed at removing barriers for DG interconnection applicants. The proposal was to install $3V_0$ at four additional National Grid substations - Cedar, Butler, Indian River, and Berry Rd - expanding on the successful first phase installations at the Company's Peterboro and East Golah substations. The work includes the installation of $3V_0$ protection and load tap changer ("LTC") controller upgrades at each substation and is expected to be completed by late summer 2020. During the design and construction phases, the Company marketed the increased capacity and the project's cost-allocation methodology to DG developers. Because of these efforts, the Company will be able to secure a sufficient level of DG interconnection applications for each substation to fully subscribe the available capacity. As this demonstration has proved to be scalable and suitable for larger-scale deployment, National Grid will be proposing an expansion to additional substations as part of its upcoming CIP.

National Grid is also working collaboratively with DPS Staff and industry representatives on supporting the IPWG efforts for new cost-sharing proposals. If this effort results in a new approach

[66] REV Proceeding, Niagara Mohawk Power Corporation d/b/a National Grid Distributed Generation Interconnection REV Demonstration Project – Revised Implementation Plan (filed October 19, 2018) ("Revised Implementation Plan").

being adopted, this could help stimulate future projects and accelerate NY towards achievement of its clean energy goals.

In addition, the Company continues to explore new pathways to make the interconnection process more efficient and reliable. Examples of this include:

- National Grid is actively participating in discussions on Smart Inverter functionality through the Joint Utilities working group. The Company will be a key contributor in the standards to be implemented in NY state.
- National Grid has been collaborating with the IPWG and ITWG on cross-queue coordination. This will allow for more visibility between the different market participants and a better understanding of when a project becomes firm in the interconnection queue.
- National Grid has been working with the ITWG on CESIR fee and interconnection cost transparency. This will provide developers with a better understanding of the costs associated with a project before they submit an interconnection application.
- National Grid continues to provide ESB updates for the implementation of generation projects. ESB No. 756 for interconnections is currently under a revision cycle with updates to be released later in 2020. These documents serve as a starting point for developers to gain an understanding of what will be required for interconnection with the Company's EPS.
- National Grid is piloting a PMI Eclipse meter that is secure and compatible with our existing EMS infrastructure to reduce the M&C costs for small DG projects.

Below are some planned ways National Grid will be aligning with the CLCPA and helping progress NY towards its clean energy goals.

National Grid is working on progressive cost sharing proposals through the IPWG. The proposals being discussed could lead to a more comprehensive plan to develop mechanisms for both utility-initiated and market-driven DG upgrades. For a utility-driven upgrade, a proposal considers the amount of DG in the interconnection queue or otherwise forecasted at substations where potential generator backfeeding could thermally overload transformers. Installed transformers are sized to supply load and the traditional planning process uses load forecasts to identify where to replace transformer banks before they become an issue. With the rapid deployment of large DG, however, the potential to violate transformer thermal ratings from DG generation backfeed is quickly becoming an issue. Market-driven proposals discussed among IPWG members have considered the principles of the National Grid's proactive

Distributed Generation Interconnection REV Demonstration Project (*i.e.*, $3V_0$ Demonstration Project ) and seek to expand those principles, with appropriate guardrails to protect utility customers and the utilities from cost exposure.

- **Adopting the Distributed Generation Interconnection REV Demonstration Project's cost-sharing mechanism for 26 additional substations:** Proactive $3V_0$ installation would be selected by reviewing sites with large DG queues and developer interest. Proactively installing the upgrade will reduce customer upfront costs and reduce the interconnection timeline. The burden of cost recovery would be on National Grid, contrasted with the current NY-SIR cost recovery method of cost sharing where developers have greater risk and longer timelines before realizing the benefits of the cost sharing. The Company will recover the investment through a pro-rated fee charged to all applicants (not just the first applicant) with DG aggregate systems above 50 kW who connect to the upgraded substation transformer banks. The fee will be based on the Company's estimated common system upgrade costs (subject to true-up once actual costs are known) for each of the substations divided by a factor that represents the total substation transformer bank capacity at each location. The DG interconnection applicant would still be responsible for respective site-specific upgrades and distribution line upgrades.

- **Cost Sharing for DG Upgrades:** National Grid, in collaboration with IPWG members, is working on proposing a new cost-sharing mechanism for substation transformer bank replacements, other substation upgrades, and distribution line upgrades. This new mechanism is intended to stimulate more DG growth and resolve the issue with the high interconnection cost for the first mover.

National Grid will pursue Multi -Value Projects ("MVP") as a new transmission spending rationale to improve areas where the Company has constraints related to interconnecting new renewables. These projects are considered multi-value because they would also address asset replacement or reliability issues. This will provide the benefit of enabling more renewables to interconnect to the Company's ESP and furthering the achievement of the state's clean energy goals, while also providing benefits of increased reliability and system resiliency. The Company is also exploring an MVP approach for distribution projects to help mitigate costly interconnection upgrades for DG projects.

National Grid plans to progress a number of pilot projects. These are a category of projects that will test new technology and practices around improving DG interconnections.

- **Active Resource Integration**: This project is building on National Grid's DSP REV Demonstration Project and would test the ability to increase the amount of solar PV integrated into the system in constrained areas via development of curtailment capabilities. A second phase would test the cost-effectiveness of using load to mitigate curtailment volumes. The benefit would be to enable greater DG penetration with reduced upfront costs.

- **PMI Eclipse**: Low-cost monitoring solution for DG customers. This monitor is being used for proposed DG projects that do not require a PCC recloser under the NY-SIR but still need monitoring. This is a customer-side solution for generating facilities sized under 500 kW with a cost of approximately $10K. This project is currently being piloted. See the Progressing the Distributed System Platform chapter for additional details.

- **GridEdge**: Pilot for an alternative approach to anti-islanding protection. This uses a Power Line Carrier ("PLC") to provide anti-islanding protection. GridEdge enables the ability to provide anti-island protection to multiple DG sites on a single line.

- **Distributed Generation Interconnection REV Demonstration Project**: Adopting and scaling the cost-sharing mechanism as proposed under this REV demonstration project for 26 additional substations.

- **$3V_0$ Mobiles**: These $3V_0$ mobile units can be deployed to allow DG applicants to connect in advance of the completion of the permanent $3V_0$ installation completion. The mobile units also allow National Grid to supply power while major substation work is being completed, such as for $3V_0$ and upgraded LTC installations.

## Risk and Mitigation

Managing new technologies, such as smart inverter controls, can present new challenges. Meeting NYISO requirements and implementing IEEE 1547-2018 ride-through requirements will require manufacturers' inverter models to be available for National Grid's power flow and short circuit analytical software tools to properly evaluate DER impacts on the EPS.

There are challenges to automating the NY-SIR supplemental screens as originally envisioned for an IOAP Phase III. It will be valuable to learn from completed research projects under NYSERDA's Program Opportunity Notice ("PON") 3404.[67]

# CLCPA Alignment

DER integration directly supports both REV and CLCPA goals to reduce the carbon footprint by displacing fossil fuel generator production and excess capacity with renewable generation sources while flattening peak loads. Reductions to SO2, NOx, and CO2 emissions are quantifiable via the Social Cost of Carbon ("SCC") and other metrics. DER interconnection growth has created additional benefits to stakeholders such as providing load relief in areas of high load and creating user-friendly online tools through the IOAP.

# Integrated and Associated Stakeholder Value

National Grid has implemented meaningful improvements to its DG interconnection process and will continue to proactively improve this process to enable renewables on the system.

Improvements include changes in resources, processes and software capabilities as well as advances in automation to achieve or exceed the mandatory NY-SIR timelines. In November

[67] *See* NYSERDA Electric Power Transmission and Distribution ("EPTD") Distributed Energy Resource Integration Program Opportunity Notice ("PON") 3404, *available at* https://www.nyserda.ny.gov/-/media/Files/FO/Closed-Opportunities/2016/3404summary.pdf

2019, the Company completed the IOAP Phase II project and automated preliminary screens for complex distributed generation projects. The upgrade helped reduce the average preliminary screen turnaround time from 10 business days to under two or less business days per application.

The Company continues to conduct weekly/bi-weekly calls with all key interconnection applicants to discuss their specific projects and help resolve any interconnection issues. National Grid has also performed numerous educational outreach efforts to assist and promote the development of DER projects in NY.

Building from the Distributed Generation Interconnection REV Demonstration Project as described above, the Company is investigating a cost-sharing mechanism for other pro-active hosting capacity upgrades. Transmission constraints to DER are also being investigated and projects that are being proposed, including Multi-Value Projects interconnected at transmission or distribution, aim to maximize hosting capacity for renewable generation projects in parallel with traditional utility upgrades for reliability, asset condition, and/or load relief.

As DER integration continues to grow and evolve, more benefits will emerge. In pursuit of such benefits, the Joint Utilities are investing further smart inverter functionality and integration to unlock even more ancillary benefits of inverter-based generation.

## Stakeholder Interface

Stakeholder outreach is performed when new DER programs are introduced. Additionally, revisions within National Grid's ESB No. 756 as part of the Annual Revision Cycle are communicated through stakeholder outreach sessions.

# 2.11 Advanced Metering Infrastructure

## Context and Background

AMI, commonly referred to as smart meters, will provide monitoring and granular data, delivering customer benefits, enhancing grid operations, and providing additional control capabilities that are the foundation of a modern distribution system. Granular, time-series data from smart meters and other intelligent devices at customers' premises enable advanced analytics, innovative rate designs, and customer engagement strategies that benefit both the customers and the grid. Voltage sensing and measurement functions support increased system efficiency and enable improved outage detection, and restoration processes. AMI capabilities also support DER measurement, monitoring, and control, which is essential for DER integration. National Grid believes the granular information produced by AMI is necessary to achieve the clean energy objectives set forth in the CLCPA.

National Grid has continued to refine its AMI proposal from the initial DSIP. Following the Three-Year Rate Plan Order, the Company convened a stakeholder collaborative in 2018. As part of the collaborative, the Company held eight formal large and small group meetings with seventeen stakeholders, and deep-dive discussions on specific topics with interested groups. That effort culminated in the filing of the AMI Report[68] and the Supplemental AMI Report[69] in which National Grid is seeking approval for territory-wide deployment of AMI. The Company believes this proposal presents a once-in-a-generation opportunity to align key clean energy policy goals like those set forth in the CLCPA with operational requirements, while delivering customer benefits through a modernized grid. At the time of this 2020 DSIP Update, the Company's AMI proposal remains pending before the Commission.

Currently, the majority of the Company's 1.7 million electric and more than 640,000 gas metering points use Automated Meter Reading ("AMR") technology. AMR monthly reads are acquired through radio frequency collection utilizing a fleet of Company-owned service vehicles that drive along defined routes within communication range with each meter. A small number of larger wholesale customers and retail customers have interval meters. The interval meters currently communicate through cellular connections or through wireless internet protocols.

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[68] Cases 17-E-0238, *et al*., *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service*, Report of Niagara Mohawk Power Corporation d/b/a National Grid on the Proposed Implementation of Advanced Metering Infrastructure (filed November 15, 2018).
[69] *Id*., Niagara Mohawk Power Corporation d/b/a National Grid Supplemental Report on the Proposed Implementation of Advanced Metering Infrastructure (filed September 4, 2019).

The AMR system, including electric meters and gas encoder receiver transmitters ("ERTs"), were originally deployed in a major program between 2002 and 2004, and they are nearing the end of the manufacturers' estimated useful life of twenty years. As part of the initial DSIP filed in June 2016, National Grid considered multiple options for replacing this equipment. Based on that analysis, the Company determined a system-wide smart meter deployment offers the best benefit-cost outcome compared to the other metering solutions, and it also best supports the achievement of the REV-related clean energy objectives, as well as the CLCPA.

## Current Progress

Following the Three-Year Rate Plan Order, National Grid convened a collaborative with DPS Staff and sixteen stakeholder groups to further refine and update the Company's AMI proposal. The collaborative process included eight large and small group meetings, as well as deep-dive discussions on areas of interest to particular groups. The exchange of ideas through the collaborative process confirmed the Company's commitment to deploying AMI as a key investment for enabling the transition to the clean energy future. Moreover, the collaborative led to important refinements to the Company's AMI business plan, including: the development of robust Customer Engagement Plan, drafting of a customer-facing Smart Meter Privacy Statement, modification of the time-varying pricing ("TVP") proposal, bill guarantees for customers participating in the TVP program, a cost allocation proposal, and a mobile sustainability hub to educate customers about AMI benefits.

The Company incorporated the input in the revised AMI business plan, which it filed on November 15, 2018 as part of the AMI Report. While the plan was under Commission review, the Company continued to monitor the AMI proposals of peer utilities and negotiate with AMI vendors. Through the process of continuous review and negotiation, the Company identified additional benefits and reduced costs. On September 4, 2019, National Grid filed its Supplemental AMI Report, incorporating additional refinements into the AMI business case. The refinements improved the BCA ratio and highlighted anticipated qualitative benefits from the AMI functionality.

In a related effort, the Company also filed proposals to align its Clifton Park Demand Reduction REV Demonstration Project with the AMI proposal. The Clifton Park project began as a way for the Company to gain AMI insights and experience in advance of full-scale AMI deployment. As part of the demonstration project, National Grid deployed approximately 13,300 electric AMI meters and 11,500 gas ERTs operating on a cellular network. The AMI functionality was operational by July 2017 with a customer acceptance rate of 93%. Alongside the AMI deployment, the Company launched an enhanced customer portal which presents interval electric and gas usage data, while facilitating the Peak Times Reward ("PTR") program, rewarding customers for saving energy on specific conservation days. National Grid has extended the PTR program through the summer of 2020.

As part of the AMI collaborative, stakeholders recommended the Company consider testing the time-varying rate design included in the AMI proposal with customers in Clifton Park. On

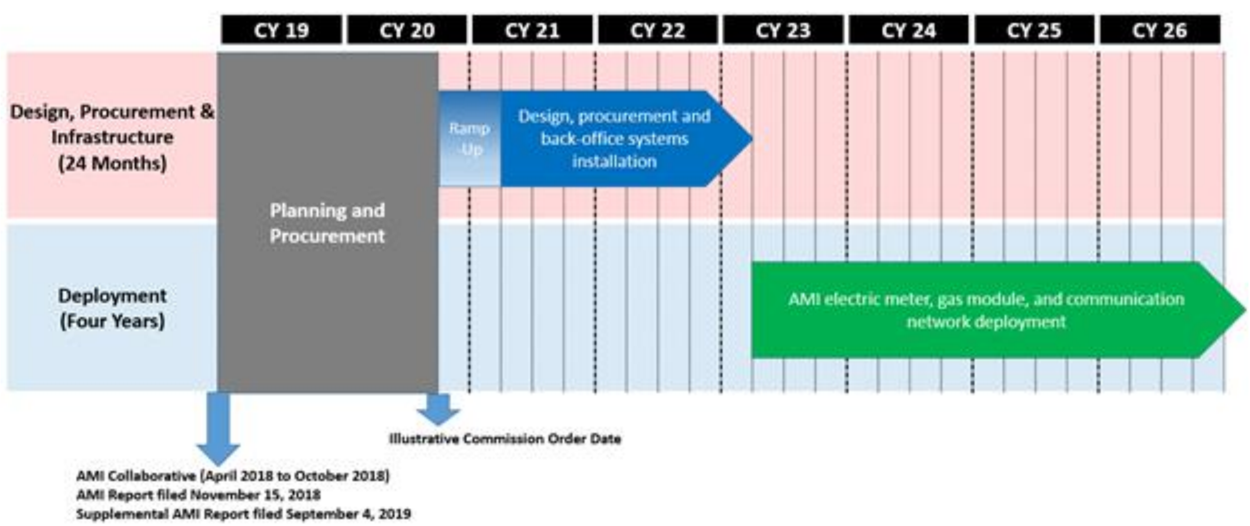
February 14, 2019, National Grid filed a proposal to align the Clifton Park project with the opt-out rates included in the Company's AMI proposal; testing them over a three-year period. On October 22, 2019, the Company filed a petition, revising the opt-out rate structure it proposed in the February filing. At the time of this filing, the innovative pricing proposal remains pending with the Commission.

As part of the AMI Report efforts, the Company advanced a Request for Solution ("RFS") solicitation to evaluate the costs and capabilities of the core components of the AMI solution, including the head-end collection system ("HES"), meter data management system ("MDMS"), field area network ("FAN"), and electric meter and gas modules. National Grid included the results of the RFS in the AMI Report and Supplemental AMI Report. In addition to the cost refinements from RFS process, the Company also identified important cross-jurisdictional synergies (*e.g.*, shared back-office systems) that could be achieved if National Grid's Rhode Island and Massachusetts affiliates also receive regulatory approval to deploy AMI in their service territories.

## Future Implementation and Planning

The Company is proposing a six-year AMI deployment with two years of design, procurement, and back-office system installation, and four years of meter and gas module installations. Upon receiving Commission approval, the Company would commence a six-month ramp up period in which it would finalize the sanctioning process, execute contracts, and onboard resources. Figure 2.11-1, which is provided for illustrative purposes only, provides a visual representation of the AMI deployment period assuming Commission approval in early FY21.

*Figure 2.11-1: Illustrative Timeline for National Grid's AMI Implementation*



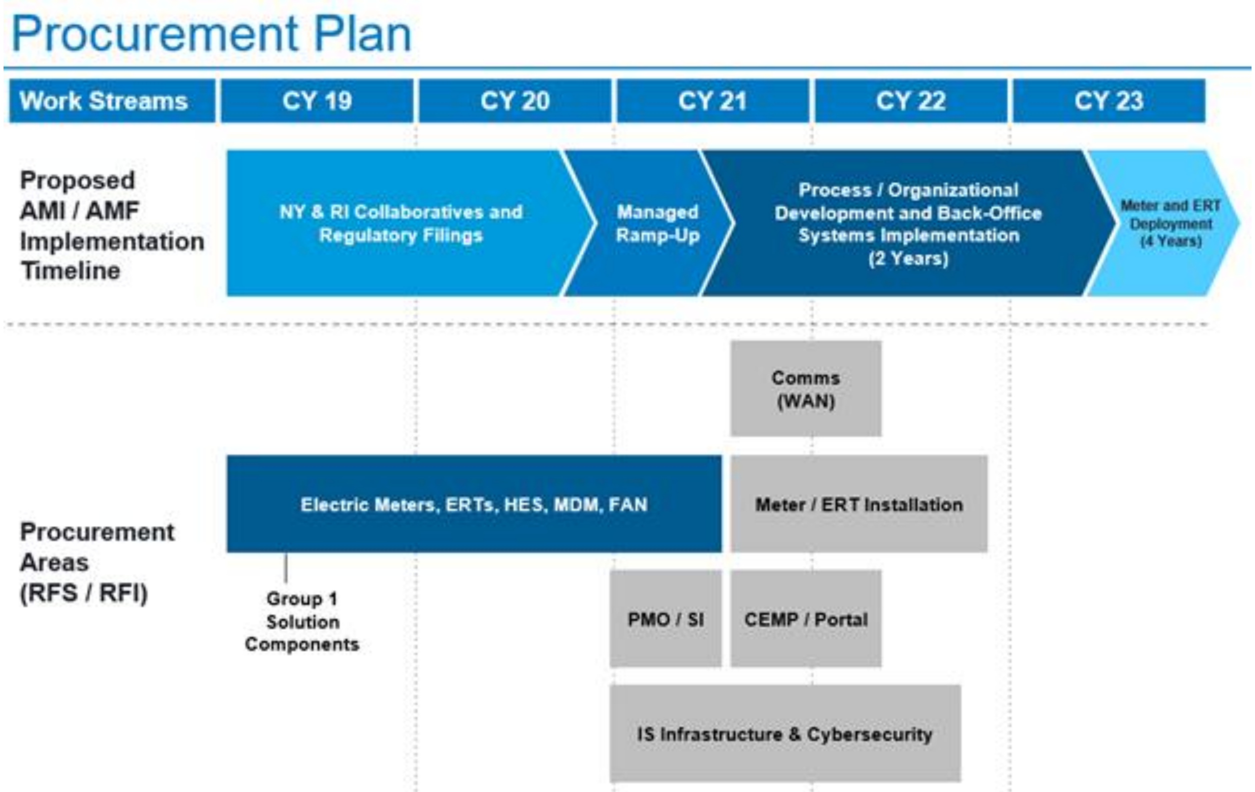
By investing in AMI, National Grid will be taking a key step toward achieving REV and CLCPA objectives. AMI supports implementation of the Energy Storage Roadmap and provides a cost-effective solution for NEM successor tariffs' metering requirements. AMI will also improve the Company's DSP provider capabilities. In this role, the Company will construct, operate, and maintain highly-integrated technology platforms, enhancing the incorporation of third-party owned DERs, which can include DR, EE, energy storage, and DG. These technologies will be tightly integrated into the Company's distribution infrastructure.

When AMI meters have been deployed and the associated back-office infrastructure is in place, customers will have access to more granular usage data in near real-time. The frequency of the readings combined with the granularity of the data will enable customers to take control of their energy usage through EE, conservation, DR, and new pricing programs.

The enhanced functionality includes: facilitating adoption of innovative rate designs (*e.g.*¸ TVP) without having to manually reprogram 1.7 million electric meters; access to real-time energy usage data via a home area network ("HAN")-enabled device such as a smart-phone app; load disaggregation; more timely notice to National Grid of outages, improving situational awareness on the system and outage response; as well as remote meter reconnects and disconnects (subject to Home Energy Fair Practices Act compliance). The Company further expects the functionalities provided by AMI to evolve further benefiting customers and the grid.

In addition to the collaborative efforts and timelines described above, the Company's procurement effort has addressed solution design and delivery options, such as software-as-a-service ("SaaS") versus utility ownership, and multi-jurisdictional cost synergies. Figure 2.11-2 includes a depiction of the AMI procurement approach. The initial focus in FY19 was on "Group 1" solution components. Additional procurements will follow to obtain bids for services throughout deployment.

*Figure 2.11-2: AMI Procurement Approach*[70]




## Risk and Mitigation

### Procurement

Technology is changing rapidly, and the Company will be faced with difficult decisions related to certain components of the end-to-end solution (*e.g.*, HES and MDMS) as well as how best to provide value for the customer while ensuring the solution is flexible and adaptable to meet existing and future needs. These concerns are being mitigated by National Grid through deliberate inclusion of questions and requirements in the procurement process related to solution options and road mapping considerations.

### Process Design

Process design is an important component upon which program development and organizational change depends. Many utility functions will be impacted by the deployment of AMI including those performed by meter field technicians, meter shop technicians, customer service reps, control center operators, billing analysts, and others. To facilitate a smooth transition for both customers and employees, the Company is incorporating a six-month managed project ramp-up to allow for sanctioning, contract execution, and resource onboarding, followed by two years to implement and test the back office systems. This will ensure adequate resourcing, process design, and change management prior to meter deployment.

[70] National Grid's affiliates in New England jurisdictions use Advanced Metering Functionality ("AMF") to describe the same technology which in New York is described as AMI.

**Customer Engagement**

The benefit of TVP is directly related to: 1) the number of enrolled customers; 2) the level of customer response to the new price signals; and 3) the resulting peak and energy savings. National Grid recognizes that customers will require a substantial amount of education, training, and access to tools that will enable them to become active participants in such programs. For example, customers will need to fully understand the cost implications of consuming electricity during hot summer days, as compared to a cool springtime morning, as well as how specific technology and program offerings can help them manage their energy costs. National Grid will address these needs through a customer-centric approach, culminating in the development of a comprehensive Customer Engagement Plan. The Company will also work to expand customer engagement in programs and services like EE, DR, and DER adoption using its proposed CEMP discussed in the Customer Data chapter. The CEMP will offer customers access to energy usage information, personalized insights, and opportunities for further energy savings (*e.g.*, DR enrollment, solar PV adoption).

**Meter Access**

Many electric meters and gas modules within National Grid's territory are located in basements, service closets, or other locations that require access via lock and key. While National Grid has considered this in its estimates, risks exist where poor accessibility could slow down deployment. In turn, the pace of benefit realization could also be impacted. Evidence of access-related deployment slowdown could be mitigated with enhanced, targeted communication to known meter locations or augmented via appointments.

## CLCPA Alignment

The pathway to achieving the goals set forth in the CLCPA requires a multi-faceted strategy that accelerates decarbonization of the electricity sector, electrification of the transportation sector, and the transformation of the heating sector through energy efficiency and electrification. AMI plays a critical role in all three of these areas.

First, by enabling energy insights, targeted EE and DR, as well as time-varying rate structures, AMI is key to reducing peak load in furtherance of the CLCPA's GHG emission reduction targets (*i.e.*, 40x30 and 85x50). Likewise, the system information produced by AMI (*e.g.*, identifying areas of high demand and lower voltage) can facilitate increased integration of DERs, such as solar, which will help reach the CLCPA's goal of installing 6,000 MW of solar generation by 2025. Second, by facilitating the development of more cost-reflective rates for supply and delivery, AMI can play an important role in the adoption of EVs. Finally, the proposed implementation of AMI-compatible gas modules provides helpful insights into natural gas usage that can lead to reduced consumption and further aid in the adoption of electric heat pump technology. Overall, the customer and system insights provided by a foundational investment in AMI will put National Grid, its customers, and the State on a trajectory to meet the CLCPA's ambitious clean energy targets.

# Integrated and Associated Stakeholder Value

The Commission has long recognized advanced metering as a key component to modernizing the grid and achieving the REV objectives.[71] The Company shares this view: AMI plays a foundational role in delivering DSP benefits to customers, such as enhanced "demand response and energy efficiency programs, as well as innovative rate structures, allowing [customers] to better manage electricity consumption and bills and drive overall system efficiencies."[72] Moreover, "AMI will facilitate customer access to value-added products and services provided by third-parties including DER providers and [energy services companies]."[73]

The case for AMI has only grown stronger since the Commission articulated its initial views. For example, in the *Guidance for 2018 DSIP Updates*, DPS Staff noted that AMI "provides grid-edge measurement, data acquisition, and control capabilities which are ***either essential or beneficial*** to a number of important functions in modern distribution system[s]."[74] (Emphasis added). Likewise, the *Staff Whitepaper on Rate Design for Mass Market Net Metering Successor Tariff* recognized the value of AMI in facilitating the development and implementation of sophisticated rates with demand-based price signals, as well as the flexibility to design time-of-use rates with critical peak periods.[75]

Altogether, National Grid continues to believe its proposed investment in AMI presents a once-in-a-generation opportunity to address an operational need (*i.e.*, the existing fleet of metering assets and gas modules nearing the end of their useful life) with technology capable of delivering on the promise of the clean energy future. The path for achieving the goals, whether through customer benefits, system efficiencies, or enhanced operational capabilities, is predicated on insights and capabilities from a modern AMI-enabled grid. Use cases, such as providing actionable energy insights; load and data disaggregation; behavior-based energy efficiencies; remote connects, disconnects, and meter reads; enhanced outage restoration; voltage reductions; the continued integration of DERs; implementation of time-varying rate structures; and facilitating the electrification of the transportation sector, are either enabled or enhanced by the deployment of AMI.

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[71] *See* REV Proceeding, REV Track One Order, p. 98, where the Commission notes that "[i]t is clear that some form of advanced metering will be needed to implement REV."
[72] REV Proceeding, Order Adopting Distributed System Implementation Plan Guidance (issued April 20, 2016) ("DSIP Guidance Order"), p. 58.
[73] *Id.*
[74] *See* DSIP Proceeding, 2018 DSIP Update Guidance, p. 26. "Granular time-series data from smart meters and other intelligent devices at customers' premises enable advanced analyses, innovative rate designs, and customer engagement strategies which benefit both the customers and the grid. Voltage sensing and measurement functions support increased system efficiency and enable improved outage detection and restoration processes. Capabilities supporting DER measurement, monitoring, and control are essential for DER integration."
[75] Cases 15-E-0751 *et al.*, *In the Matter of the Value of Distributed Energy Resources* ("VDER Proceeding"), Staff Whitepaper on Rate Design for Mass Market Net Metering Successor Tariff (filed December 9, 2019), pp. 22, 34.

## Stakeholder Interface

As DER continue to grow, National Grid will need greater visibility into DER performance to better utilize resources in efficient distribution grid operations. The data generated by AMI meters provide basic and foundational information for seamlessly integrating distributed resources and modeling their behavior. AMI information will be able to support multiple DER use cases identified within this filing to include: interconnection, forecasting, ESS integration, EV integration, hosting capacity, and NWAs.

In addition, the robust Customer Engagement Plan included with the Company's AMI Report addressed the three phases of AMI deployment: 1) marketing, education, and outreach; 2) deployment with a 90-60-30-day plan to engage customers when meters are being deployed; and 3) empowerment and enablement to assist customers with realizing the benefits AMI offers.

# 2.12 Hosting Capacity

## Context and Background

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 and/or secondary network system.[76]

To encourage efficient DER integration, National Grid provides estimates of its system's hosting capacity[77] for each radial distribution circuit within the Company's service territory. The results of HCA provide valuable system data that has been requested by DER providers. The hosting capacity information supports a "DER Planning" use case and benefits stakeholders as it helps prospective interconnection customers to make more informed business decisions with respect to marketing activities and relative interconnection costs, prior to committing resources to an interconnection application.

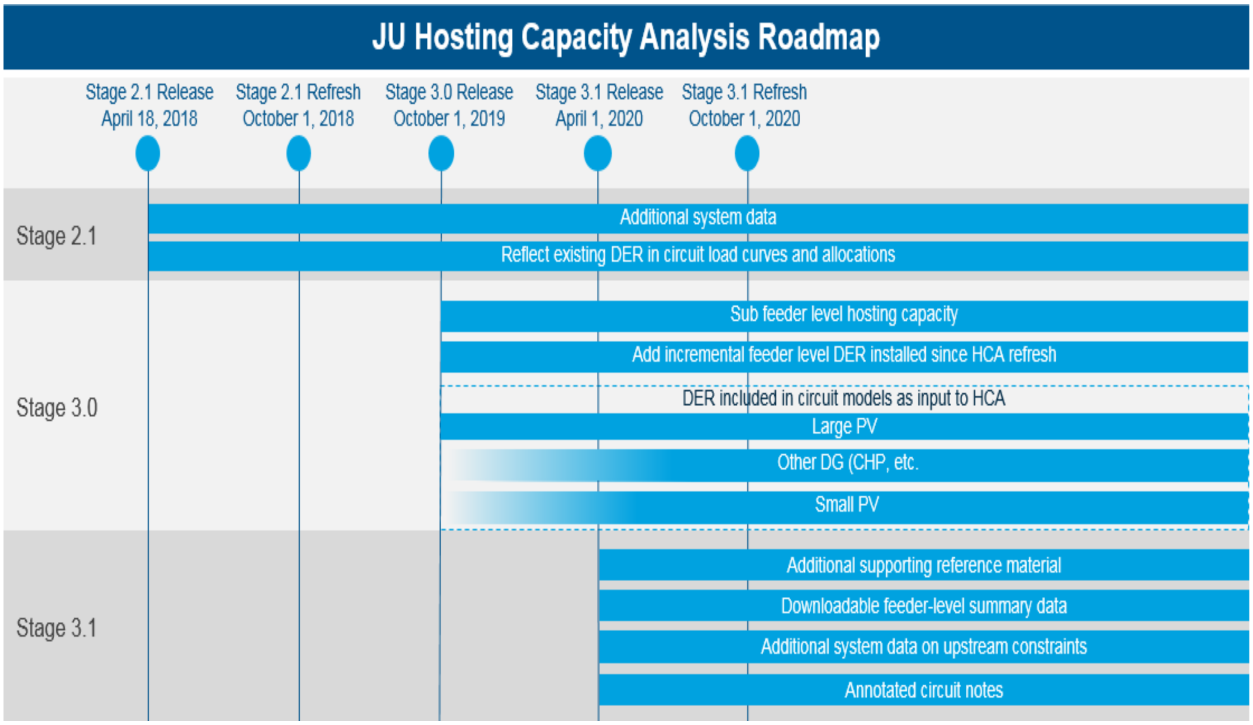
Stakeholders can access the most up-to-date HCA map through National Grid's System Data Portal at https://ngrid.apps.esri.com/NGSysDataPortal/NY/index.html

## Current Progress

National Grid, in coordination with the Joint Utilities, continues to progress hosting capacity efforts in stages as presented in Figure 2.12-1. The Company completed these stages by developing feeder models in CYMDIST distribution power flow software and using the Distribution Resource Integration and Value Estimation ("DRIVE") software tool developed by EPRI. The DRIVE tool is a capacity evaluation application used to determine the ability of a radial distribution feeder to host distributed energy resources without causing adverse impacts to the distribution system.

[76] Electric Power Research Institute ("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, *available at* http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002008848
[77] *Available at* https://ngrid.portal.esri.com/SystemDataPortal/NY/index.html

*Figure 2.12-1: Joint Utilities Hosting Capacity Analysis Roadmap Development to Date*




The Company has completed Stages 1, 2, 2.1, 3, and 3.1 and posted these results to the hosting capacity tab on its System Data Portal. In Stage 1, several parameters, such as voltage class, feeder load level, station transformer fusing, level of interconnected DG, and substation $3V_{0}$, were assessed and results were presented in a red zone map. Stage 2 evaluations met the Commission's targets,[78] including a system data update (Stage 2.1). Stage 2 and 2.1 analyses were carried out on a feeder level only, in which a maximum and a minimum hosting capacity value were provided for each feeder analyzed. Detailed Stage 3 evaluations provided sub-feeder level hosting capacity which incorporated existing installed DG into the modeling and analysis,[79] as well as the inclusion of additional system data during the Stage 3.1 release in April 2020. The types of DER considered in HCA as well as the granularity in which information is assessed and presented will continue to evolve.

The increased granularity of data in the Stage 3.0 release provided more locational-specific information to better inform DG developers via the presentation of HCA on a sub-feeder level.

National Grid conducted HCA using the EPRI DRIVE tool on a nodal-level basis and then, for reporting purposes, nodes with similar hosting capacity values, based on the breakpoint ranges specified in Stage 2, were grouped together and displayed with an associated color code. For example, if the first several nodes outside the substation had hosting capacity values greater than

[78] DSIP Proceeding, DSIP Filings Order, pp. 14-15.
[79] This enhancement incorporates the interconnected DG to date into the circuit models used for the HCA with a priority on large solar PV, which remains the DER technology with the most significant impacts on hosting capacity.

5 MW, they would be grouped together and colored dark blue; if that same feeder had several nodes towards the tail with hosting capacities between 300 and 499 kW, they would be grouped together and colored light red. This detailed HCA enables users to more specifically identify locations along a feeder with higher levels of hosting capacity for DER development.

Using an Esri-based mapping platform, National Grid displays the feeder location as well as pertinent tabular information about each feeder via data pop-ups on its System Data Portal. The System Data Portal is publicly accessible and provides users with information to gain insight into the current state of National Grid's electrical system and obtain a more precise idea of locations that are most accommodating for the interconnection of DG. The hosting capacity map displays the geographical layout of National Grid's distribution system and includes both distribution feeders at the 5kV and 15kV voltage class as well as distribution substations.

*Figure 2.12-2: Hosting Capacity Tab for Stage 3.1 on National Grid's System Data Portal*

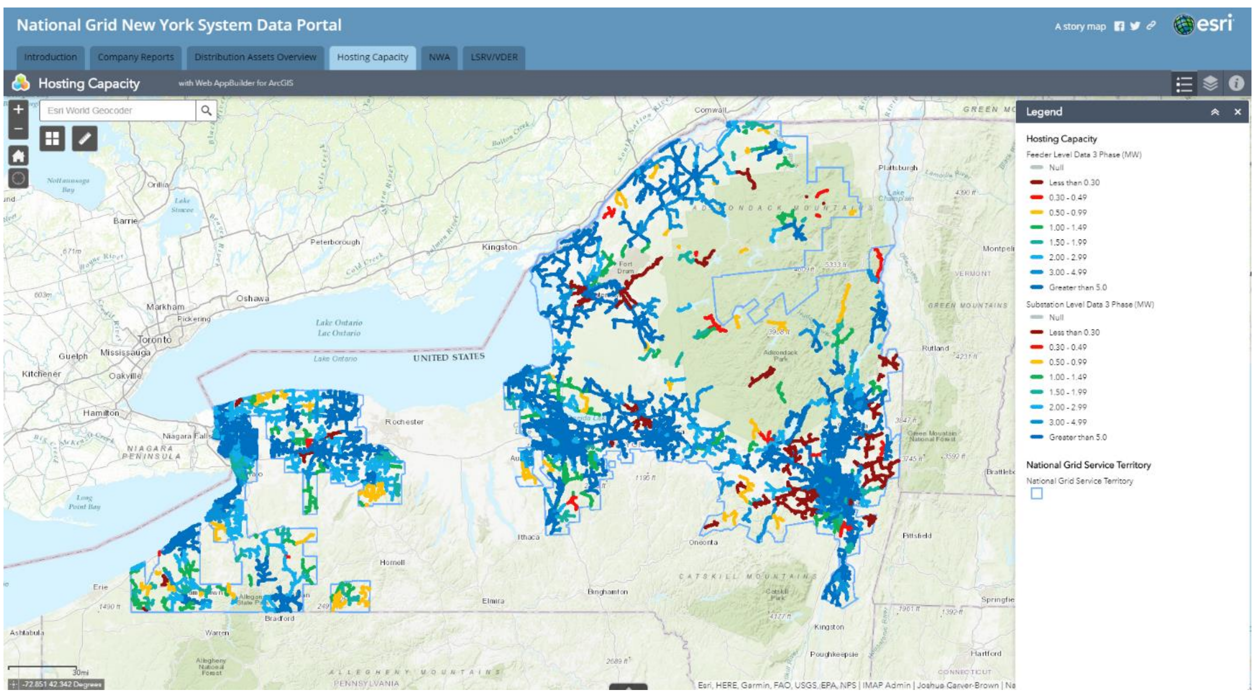
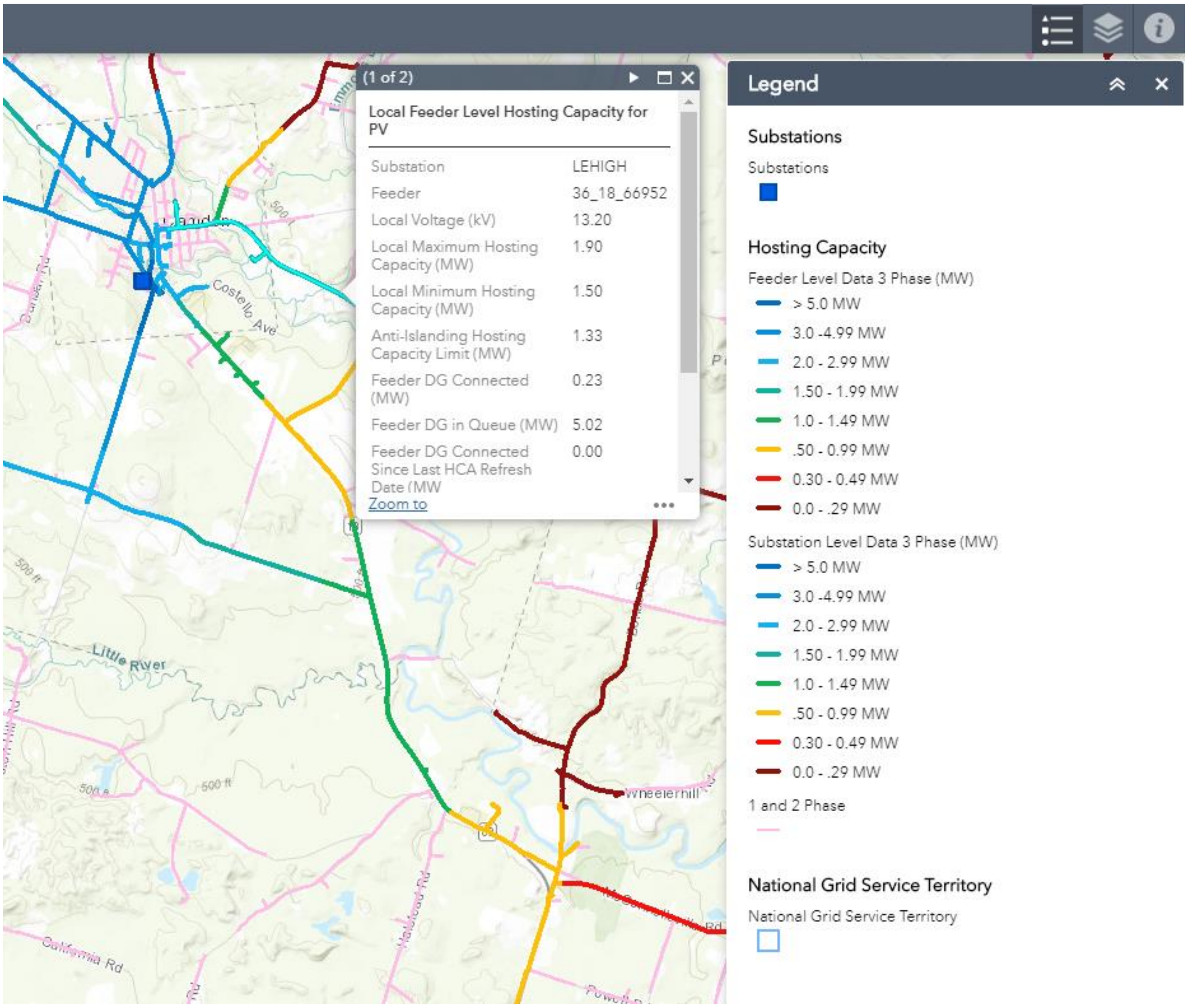


*Figure 2.12-3: National Grid's Sub-Feeder Level Hosting Capacity for Solar PV*




The Joint Utilities have coordinated to ensure common information is available for each feeder in the data "pop-ups." For Stage 3, these data pop-up boxes are used to provide valuable system data including local minimum and local maximum sub-feeder hosting capacities, local voltage, and installed and queued DG values. The DG-connected and in-queue values are updated on a monthly basis to provide timely updates of DG development activities on a particular feeder. Additionally, line items have been added to the pop-ups for Stage 3 to reflect the amount of DG that has been installed since the most recent refresh of the hosting capacity analyses posted on the portal. Since DG will continue to be installed after the analyses have been run, this information provides a sense of the magnitude to which the real-time hosting capacity values may differ from what is represented on the portal. Figure 2.12-4 below shows an example of the feeder level line items are available on the Stage 3.1 pop-up:

*Figure 2.12-4: National Grid Sub-Feeder Level System Data*

**Local Feeder Level Hosting Capacity for PV**

| | |
|---|---|
| Substation | LORDS HILL |
| Feeder | 36_11_15066 |
| Local Voltage (kV) | 4.80 |
| Local Maximum Hosting Capacity (MW) | 1.00 |
| Local Minimum Hosting Capacity (MW) | 1.00 |
| Anti-Islanding Hosting Capacity Limit (MW) | 0.24 |
| Feeder DG Connected (MW) | 0.06 |
| Feeder DG in Queue (MW) | 0.00 |
| Feeder DG Connected Since Last HCA Refresh Date (MW) | 0.00 |
| Load Zone | C-2 |
| DG Connected/In Queue Refresh Date | March 24, 2020 |
| HCA Refresh Date | September 30, 2019 |
| Notes: | 3Vo is not an a viable option.Alternative GFOV options would be required. |

*Please see Hosting Capacity Pop-Up Definitions PDF on the welcome screen for definitions and more details

Substation level data is available in a second tab included on the data pop-up which contains information at the substation bank to which the selected feeder is connected. As part of the Stage 3.1 release, additional system data was added to the substation level pop-up in the form of the substation bank thermal capacity as well as the estimated $3V_0$ protection threshold. This data will assist developers in identifying the potential need for substation upgrades at prospective interconnection locations. Figure 2.12-5 below shows the Stage 3.1 substation level pop-up information:

*Figure 2.12-5: National Grid Substation Level System Data*

**Substation Level Data**

| | |
|---|---|
| Substation/Bank Name | Lords Hill |
| Substation/Bank Installed DG (MW) | 0.24 |
| Substation/Bank Queued DG (MW) | 0.00 |
| Substation/Bank Total DG (MW) | 0.24 |
| Substation/Bank DG Connected Since Last HCA refresh (MW) | 0.01 |
| 2018 Substation/Bank Peak (MVA) | 4.20 |
| Substation/Bank Thermal Capacity (MVA) | 4.2 |
| Substation Backfeed Protection | No |
| Estimated 3V0 Protection Threshold (MW) | 0 |
| DG Connected/In Queue Refresh Date | March 24, 2020 |
| HCA Refresh Date | September 30, 2019 |

*Please see Hosting Capacity Pop-Up Definitions PDF on the welcome screen for definitions and more details

Successful completion of Stages 3 and 3.1 have provided customers and project developers with more granular hosting capacity maps which helps to identify locations for more efficient interconnection of DER. The rollout of Stage 3.1 successfully addressed stakeholder requests to gain further insight into the data that characterizes both the feeders as well as the HCA results. National Grid continues to appreciate stakeholder feedback on how the HCA and displays can be improved moving forward. The Joint Utilities have developed a Stage 3.0 reference materials guide[80] which includes FAQs, webinars, and instructions.

## Future Implementation and Planning

National Grid will continue to enhance the hosting capacity maps. As the hosting capacity maps evolve, both the analysis and data requirements increase in complexity. In the 2018 DSIP Update Guidance and during the 2019/2020 Stakeholder engagement sessions, DPS Staff and stakeholders, respectively, raised multiple improvement and enhancement requests to be made to the hosting capacity maps such as the following:

- **EPRI DRIVE Utility Inputs, Analyses Used, and Study Parameters Transparency:** More reference material on how the Joint Utilities conduct the HCA. For example, this includes detailed breakdowns of the DRIVE inputs, analysis criteria, and threshold settings.

- **Better Communication of Available Reference Materials and Supporting Documentation:** Additional resources to provide adequate training and troubleshooting support to developers new to the tool. This includes basic guidance summaries with links to other reference materials, release notes, user guides, and FAQs.

- **Upstream Substation/Bank-Level Constraints:** More information on the hosting capacity limitations at upstream locations such as the substation or substation transformer bank (provided either in the data pop-ups or as calculated hosting capacity values). Examples include: Substation Bank/Transformer Nameplate/Thermal-Limit, Substation Regulator/LTC Back-feeding Protection Limit, Substation Bus Voltage Fluctuation Limit, Substation $3V_0$ Protection Threshold.

- **HCA Criteria Violation Transparency:** Additional data pop-up elements that note the violation criteria driving the reported hosting capacity limits (*e.g.*, voltage, thermal, protection).

- **HCA – Data Validation Efforts:** More externally facing reference information on how the hosting capacity results are validated initially, and on an ongoing basis, to ensure accuracy and completeness. This includes both identifying false positives and negatives (*i.e.*, where zero is provided) as well as testing the actual values and the consistency of the model results.

80 *Available at* https://jointutilitiesofny.org/wp-content/uploads/2020/03/JU-DRAFT-Stage-3.0-Reference-Materials-2020-02-26.pdf

- **Circuit Equipment Ratings:** Greater focus in the HCA and communications back to stakeholders as to how the analysis reflects the equipment ratings through the granularity of its results.

- **Additional Map Functionality:** Greater functionality in the hosting capacity portals that include download-ability, filterability, searchability. Downloadable data formats include, .csv, .xlsx, .gdb, .kmz, open API access.

- **Increased Analysis Refresh Rate:** Conduct HCA more frequently for circuits experiencing significant changes (*e.g.*, new interconnections > 500 kW on a specific circuit). Ideally, analysis results are refreshed frequently enough to ensure the reported hosting capacity values are reflective of current system conditions.

- **HCA for Energy Storage:** Estimate of the amount of energy storage (load and generation) that may be accommodated without adversely impacting the distribution system under current configurations and without requiring infrastructure upgrades.

- **HCA for Combined Heat & Power:** Estimate of the amount of combined heat & power-based DG that may be accommodated without adversely impacting the distribution system under current configurations and without requiring infrastructure upgrades.

- **HCA for Electric Vehicles:** Estimate of the amount of EV-based load that may be accommodated without adversely impacting the distribution system under current configurations and without requiring infrastructure upgrades.

- **HCA for Hybrid Solar + Storage:** Estimate of the amount of hybrid solar + storage (collocated load and generation) that may be accommodated without adversely impacting the distribution system under current configurations and without requiring infrastructure upgrades.

- **Time-Varying Hosting Capacity**: HCA that includes greater temporal granularity that considers seasonal load trends and other varying hourly load profiles, outside of minimum daytime load and peak load scenarios.

- **Forecasted Hosting Capacity:** Expected hosting capacity at each feeder, in the next five years to capture expected gross load growth, connected DG, DR, and energy storage as well as traditionally planned substation and distribution system upgrades (*i.e.*, asset condition, load relief, reliability, etc.).

- **Dynamic Hosting Capacity**: Dynamic Hosting Capacity would reflect any "dynamic" changes to the circuit configuration either permanent or temporary and the associated change in hosting capacity limits.

Several of the proposed enhancements have already been incorporated into National Grid's 3.1 latest release such as: elements of the Upstream Substation/Bank-Level Constraints, EPRI DRIVE Utility Inputs, Analyses Used, and Study Parameters Transparency, and Better Communication of Available Reference Materials and Supporting Documentation.

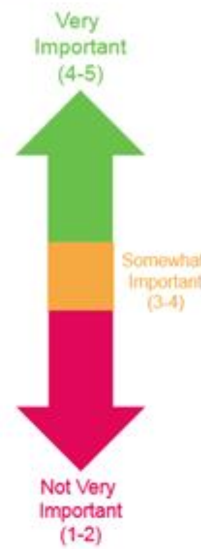
To the help prioritize and understand the value and needs of the remaining proposed enhancements described above, the Joint Utilities cast a wide net and reached out to stakeholders who use the hosting capacity maps via a survey. Figure 2.12-6 below represents the ranking of developers' desired improvements to the hosting capacity maps.

*Figure 2.12-6: Survey Results – Developers' Priorities for Hosting Capacity Enhancements[81]*

**Developers' Priorities for Enhancements**

**Q7.** Please think now about the importance of possible enhancements of future updates to your organization overall. Please rate the level of importance of each of the following proposed enhancements to your business, using a five-point scale where 1 is "not at all important," and 5 is "very important."

| Enhancement | Mean Score |
|---|---|
| Forecasted Hosting Capacity | 4.50 |
| Additional Map functionality (downloadability/filterability) | 4.43 |
| Hosting Capacity for Hybrid Solar + Storage | 4.32 |
| Hosting Capacity Analysis for Energy Storage | 4.31 |
| Upstream Substation/Bank-Level Constraints | 4.28 |
| Increased Analysis Refresh Rate | 4.24 |
| Dynamic Hosting Capacity | 4.11 |
| Circuit Equipment Ratings | 4.07 |
| Hosting Capacity - Data Validation Efforts | 4.03 |
| Better Communication of Available Reference Materials and Supporting Documentation | 3.88 |
| Time-Varying Hosting Capacity (increased temporal granularity) | 3.85 |
| Hosting Capacity Analysis Criteria Violation Transparency | 3.81 |
| EPRI DRIVE Utility Inputs, Analyses Used, and Study Parameters Transparency | 3.01 |
| Hosting Capacity for Electric Vehicles | 2.40 |
| Hosting Capacity for Combined Heat & Power | 1.89 |




The developers also provided information regarding the rationales behind their ranking of each of these requested enhancements. These results show that most of the enhancements are for reduced risk with project development and business planning purposes.

[81] The primary group of responders to the survey were solar developers. For this reason, hosting capacity for EVs ranked as a low priority from the survey results. However, based on the DPS Staff Whitepaper and the EV industry, the need for hosting capacity maps for EV/Load Serving is likely of higher importance than reflected in the survey results. *See* EVSE Proceeding. EVSE&I Whitepaper, p. 5.

*Figure 2.12-7: Survey Results – Developers' Ranking Rationales*

**Reduced Risk with Project Development**

- EPRI DRIVE Utility Inputs, Analyses Used, and Study Parameters Transparency
- Upstream Substation/Bank-Level Constraints
- Hosting Capacity Analysis Criteria Violation Transparency
- Hosting Capacity - Data Validation Efforts
- Circuit Equipment Rating
- Increased Analysis Refresh Rate
- Time-Varying Hosting Capacity (increased temporal granularity)
- Forecasted Hosting Capacity
- Dynamic Hosting Capacity

**Business Planning**

- Better Communication of Available Reference Materials and Supporting Documentation
- Additional Map functionality (downloadability/filterability)
- Hosting Capacity Analysis for Energy Storage
- Hosting Capacity for Combined Heat & Power
- Hosting Capacity for Electric Vehicles
- Hosting Capacity for Hybrid Solar + Storage

**Faster Interconnections**

- Not listed a primary rationale for any of the enhancements

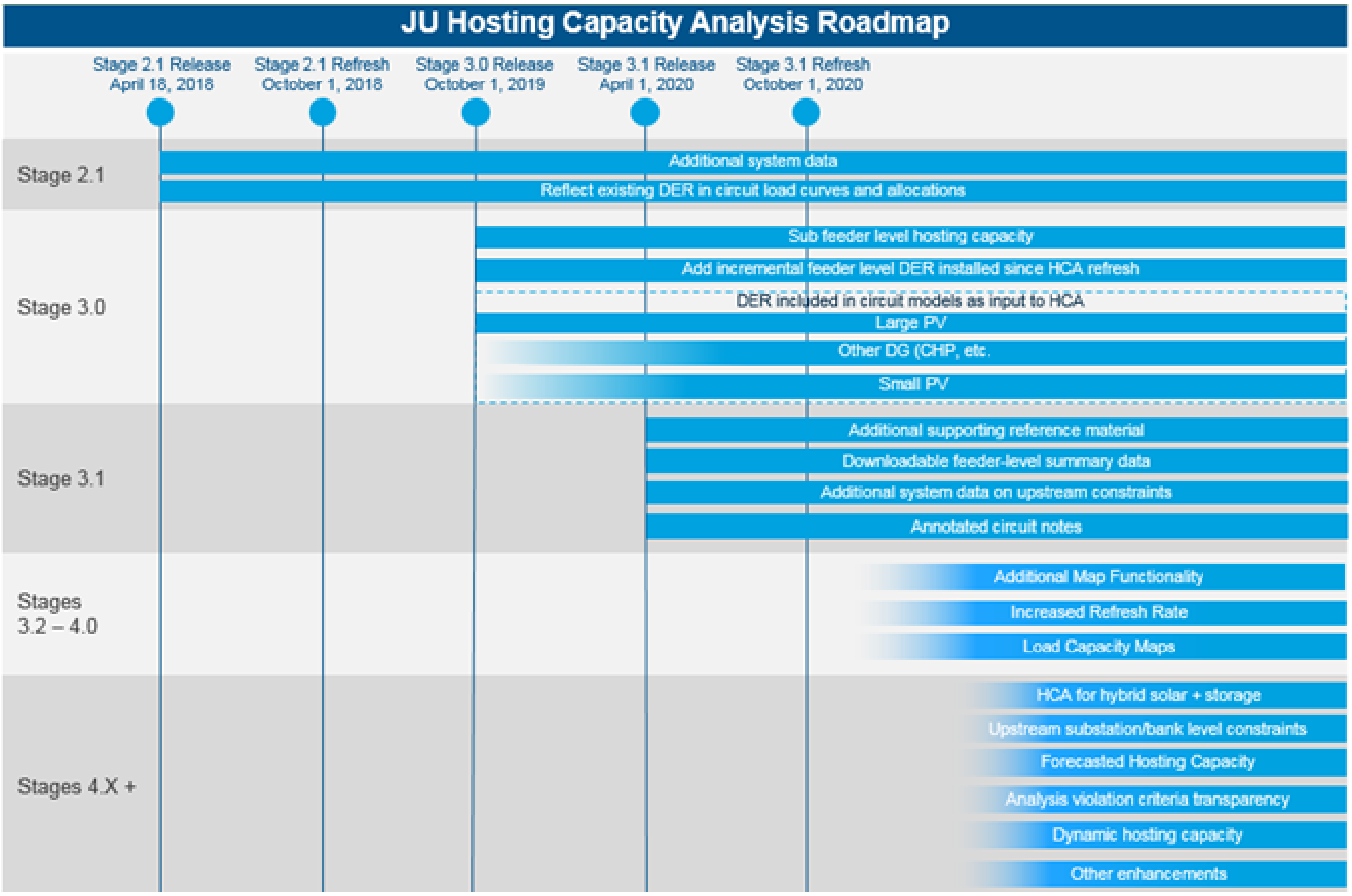
Based on the survey results and stakeholder input provided to the Joint Utilities, National Grid plans to prioritize three (3) near-term enhancements that will likely be completed over the next 1-2 years. These proposed enhancements are as follows:

- **Load Hosting Capacity Map** based on remaining load capacity on radial distribution feeders. This map will help developers of energy storage, EV chargers, and other load interconnections and will provide a foundation for future energy storage and EV hosting capacity specific map developments.
- **REST URL** access to the Hosting Capacity map results to allow the streaming of the hosting capacity results data to third-party websites for the overlay of additional and more localized information (*e.g.*, available land parcels).
- **Increased Refresh Rate** via frequent analysis updates for circuits experiencing significant growth in DG and energy storage.

In addition to identification of these three near-term proposed enhancements, the Company, in collaboration with the Joint Utilities and stakeholders, plan to apply the survey results to develop and update the longer-term road map (see Stages 4.X+ in Figure 2.12.6 below). As such, the Joint Utilities plan to hold at least two more stakeholder sessions in 2020. In consideration of the longer-term roadmap it is important to note that several of the proposed enhancements require discussion in the interconnection forums before being considered for implementation in future hosting capacity maps. For example, more advanced energy storage and EV maps require a more formalized queue interconnection process akin to the current DG interconnection queue process.

Also, all proposed enhancements need to take into consideration the data, software, costs, and resources required to enable them.

*Figure 2.12-8: Joint Utilities Roadmap for HCA Stages 2.1, 3.0, 3.1, and 3.X*




## Risk and Mitigation

The primary use case for hosting capacity data in New York is to help guide DER and EVSE investments and marketing activities to areas of the grid where the costs of interconnection are likely to be the lowest. The HCA, representing the overall sub-feeder level hosting capacity, does not account for all factors that could impact interconnection costs such as protection considerations, substation constraints, and transmission constraints. National Grid recently has added both projected $3V_0$ thresholds and substation bank thermal ratings to its hosting capacity maps, however, there are other substation constraints to consider. The Joint Utilities are working to add these items as the hosting capacity roadmap evolves. As a cautionary note, data provided in the hosting capacity maps is for informational purposes only and is not a substitute for the established interconnection application process.

DER, EVSE, and system data used for HCA must be accurate and current to provide accurate results. To help mitigate these issues, National Grid has created automated processes and implemented quality assurance/ quality control ("QA/QC") measures. Progressing through the various stages of HCA also relies on the evolution of the HCA software. The Company continues to work with EPRI on the development of its DRIVE tool and the integration with the CYMDIST distribution power flow software.

## CLCPA Alignment

Hosting capacity maps help developers find locations that are likely lower cost and easier for interconnection and will help to support the 6 GW of solar by 2025 CLCPA goal. Future planned developments will further facilitate CLCPA goals. A few examples of key future developments that can help meet CLCPA goals are as follows: :

- Hosting capacity maps for load will: facilitate increased EVSE and thereby support economy-wide GHG emissions reduction targets.
- Hosting capacity maps for energy storage will help support the 3 GW of energy storage by 2030 target.

## Integrated and Associated Stakeholder Value

The development of the hosting capacity maps requires the integration of a significant amount of data from multiple sources to conduct the analysis. For example, historical loading and solar PV values are obtain from OSIsoft® PI Historian while updated power flow models are updated via GIS. Going forward, in order to enable the enhancements described above, additional data and analysis integration will need to occur for such things as EV charging data and energy storage dispatch profiles. The proposed near-term API integration will significantly increase the value of the hosting capacity map results via integration into third-party websites that provide other sources of data as overlays (*e.g.*, land availability, permitting restrictions, etc.).

### Stakeholder Interface

Stakeholder engagement will be a critical input into the design of these longer-term aspects of the analysis. The Company, along with the Joint Utilities, will engage stakeholders to solicit their input on these approaches and the value proposition for developers to further inform the continued expansion of the roadmap for hosting capacity.

National Grid will continue industry engagement in the EPRI DRIVE users' group to have the opportunity to propose enhancements and improvements.

National Grid has held webinars for developers explaining and demonstrating the hosting capacity capabilities on the Company's System Data Portal. The webinars have proved to be a useful tool for providing a live demonstration on how the portal is intended to be used and how to get the most useful information out of it. Additionally, the webinars have provided a useful discussion forum for fielding developers' ideas on how to improve the functionality and the information on the portal. The Joint Utilities have also put together supporting documents for developers to help with using the hosting capacity maps.

# 2.13 Beneficial Locations for DERs and Non-Wires Alternatives

## Context and Background

The impacts of DER vary greatly depending on where they are placed on the distribution system. National Grid endeavors to identify where DER may provide benefits to the electric delivery system through its integrated planning process and shares that information on the System Data Portal.[82] The Company strives to provide that information with sufficient granularity to facilitate investment decisions by the DER providers. The objectives in defining beneficial locations are to accelerate the proliferation of DER and increase the effectiveness and efficiency of the electric delivery system.

National Grid defines a beneficial location as a location where DER integration can reduce, delay, or eliminate the need for electric system upgrades or enhance reliability and/or efficiency of the electric system. There are multiple procurement and compensation mechanisms that rely on accurate assessment of beneficial locations. To date, National Grid has identified potential beneficial locations in support of NWAs, LSRV, and the programs initiated by the 2018 Energy Storage Order (*i.e.*, competitive procurement for energy storage dispatch rights and novel, targeted DLM programs). For more information regarding these 2018 Energy Storage Order programs, please refer to the Energy Storage and Energy Efficiency Integration and Innovation topical section in this 2020 DSIP Update. The beneficial locations associated with NWAs, LSRV, and bulk power energy storage procurement represent areas in which appropriate DER will be compensated for the value they provide in support of the grid. Beneficial locations identified through HCA include areas with lower interconnection costs for DER, which will ultimately result in lower costs for customers.

## Current Progress

The Company continues to identify beneficial locations for its evolving portfolio of programs, procurements, and DER tariffs, as each is expected to continue to evolve as market mechanisms and analytic capabilities mature. National Grid performs long-term, feeder-level forecasts that feed into an integrated planning process that subsequently informs the Company's identification of beneficial locations. The Forecasting chapter discusses National Grid's current capabilities and multi-year roadmap. The Company uses these forecasts as inputs into a forward-looking, system-wide analysis of locational marginal costs through its Marginal Avoided Distribution Costs

[82] *Available at* https://ngrid.portal.esri.com/SystemDataPortal/NY/index.html

("MADC") study filed as the Enhanced MCOS study in Cases 15-E-0751 and 16-M-0411.[83] This study identifies where DER may be able to provide locational support to the electric distribution system through targeted relief in areas where load growth has the potential to create electrical stress on the system. The MADC study also estimates the marginal system relief value by comparing the amount of system relief needed to the traditional investment that the Company would pursue to alleviate the forecasted stress.

In the DSP Demonstration Project, the Company translated the MADC's $/kw-year to a $/kWh rate by estimating the number of hours at each constraint. demonstration project is how sensitive the hourly distribution value is to both the frequency and severity of system constraints.

Beneficial locations are increasingly driving DER deployment. National Grid has completed twelve evaluations for NWA opportunities. Additionally, as of May 21, 2020, the Company has received applications for 60 MW of DG across 21 LSRV target areas, resulting in approximately 42% of LSRV capacity remaining in the Company's service territory. National Grid has provided hosting capacity information on 1,916 feeders via interactive maps on the Company's System Data Portal. More details on NWA and hosting capacity data are discussed in their respective topical sections of this 2020 DSIP Update.

## Future Implementation and Planning

Identifying beneficial locations for DER and properly valuing those benefits will continue to be a focus for National Grid over the next five years. The intent of providing beneficial location information is to guide DER developers, as well as EV charging station developers, to locations on the grid that may offer enhanced compensation opportunities and/or lower interconnection costs.

The Company plans to update its MADC study in the second half of 2020. In this refresh, the Company will be using updated feeder-level peak load forecasts for its entire service territory to identify future constrained locations. Study outputs will also inform National Grid's procurements for the Term- and Auto-DLM programs mandated by the 2018 Energy Storage Order. As applicable, it will inform other applications, including the distribution components of the Value Stack tariff or other programs. More detail on this effort is discussed in the Enhanced MCOS Study section of the Other DSIP Information chapter of this 2020 DSIP Update.

Over the time horizon covered by this 2020 DSIP Update, the scope of beneficial locations may evolve as more types of flexibility in load, enabled by software, hardware, and DSP programs enter operation.

[83] VDER Proceeding, Niagara Mohawk Power Corporation d/b/a National Grid Enhanced Marginal Cost of Service ("MCOS") Study (filed July 31, 2018). The same MCOS study was subsequently filed in a new proceeding at the request of DPS Staff. *See* Case 19-E-0283, *Proceeding on Motion of the Commission to Examine Utilities' Marginal Cost of Service Studies* ("MCOS Studies Proceeding"), National Grid's Enhanced Marginal Cost of Service Study (filed June 7, 2019).

## Risk and Mitigation

Since beneficial locations inform DER deployment with the goal to optimize capacity upgrades, reliability, and efficiency of the electric system, poor evaluation of these locations can have the opposite effect and drive up costs to customers. To mitigate this risk, it is crucial that the inputs used to assess beneficial locations are carefully selected, which is why National Grid continues to improve its forecasting capabilities to best derive its anticipated system needs both in location and magnitude. Even if the system needs are accurately forecasted, there is risk that the procurement or compensation mechanisms for DER at beneficial locations do not result in the desired system outcome. This risk can be addressed by learning and adapting procurement mechanisms.

# CLCPA Alignment

Identifying beneficial locations can inform economic deployment of DER, such as energy storage and solar, thereby supporting the clean energy goals of the CLCPA at least cost. Targeting beneficial locations in utility procurements, such as in DLM and NWAs, will provide new opportunities for DER. Making the information of these beneficial locations publicly available to developers, such as through the Company's System Data Portal, further facilitates optimal siting where DER can provide the most value to both customers and the distribution system as well as facilitate the most cost-effective placement of EV charging stations.

# Integrated and Associated Stakeholder Value

Beneficial locations are both an input and an output to other processes described in this 2020 DSIP Update. Notably, the combination of forecasts and integrated planning informs National Grid's HCA. In turn, the Company incentivizes DER to site in beneficial locations through a number of mechanisms, including DLM programs, NWA solutions, and the LSRV portion of the VDER Value Stack tariff.

## Stakeholder Interface

National Grid is engaged with DER stakeholders in multiple forums, including Joint Utilities working groups and as a party to the many REV-related proceedings, including the Commission's examination of utilities' MCOS studies in the MCOS Studies Proceeding. The Company continues to enhance its System Data Portal to better present beneficial locations to inform developers and other stakeholders.

# 2.14 Procuring Non-Wires Alternatives

## Context and Background

Non-Wires Alternatives ("NWA") are an important mechanism for bringing DER onto National Grid's electric system. NWA assessments are a natural outgrowth of National Grid's planning processes. The Company performs planning studies over both short- and longer-term horizons, summarized in the annual CIPs. In concert with other Joint Utilities members, National Grid has developed NWA suitability criteria to identify projects which are reasonable candidates for NWA consideration. In 2019, the Company began applying the suitability criteria earlier in the planning process. National Grid's planning groups document the amount and location of load relief needed to mitigate system capacity or reliability needs, while working to scope a traditional solution. Once the Company has defined the system needs that could be addressed by an NWA solution, it will communicate the need to the market via an RFP.

RFPs include a project overview with a description of the specific need and relevant high-level customer information, which may include average and peak demands, and other system characteristics in the detail necessary for respondents to develop solutions and submit a proposal. RFPs also include links to other National Grid resources including the NWA Website and System Data Portal, which contains information regarding NWA areas, and the Company's BCA Handbook for an explanation of the Company's BCA process. RFPs also contain an order-of-magnitude cost estimate for the National Grid to implement a traditional solution. The Company's NWA solicitation process aims to balance the timing of the system need against a reasonable timeline for DER providers to develop responses to the RFP. The RFP is filed with the Commission and posted on the public PSC website, in addition to being available on National Grid's Ariba procurement system. DPS Staff and other stakeholders are regularly apprised of the status of potential NWA projects.

National Grid evaluates RFP responses to proposed NWA opportunities considering both economic and technical dimensions. The Commission's BCA Framework Order,[84] explained in more depth in National Grid's BCA Handbook, guides the economic assessment of a project. The technical assessment of a proposed NWA solution evaluates whether the proposed solution will provide a safe, reliable, and operationally sound solution. NWA projects that satisfy the technical requirements and have a positive BCA may progress.

**Suitability Criteria**

The Company's NWA suitability criteria matrix is presented in Table 2.14-1:

[84] REV Proceeding, Order Establishing the Benefit-Cost Analysis Framework (issued January 21, 2016) ("BCA Framework Order").

*Table 2.14-1: National Grid's NWA Suitability Criteria Matrix*

| Criteria | Potential Elements Addressed |
|---|---|
| Project Type Suitability | Project types include Load Relief and Reliability. Other types have minimal suitability and will be reviewed as suitability changes due to State or Federal policy or technological changes. |
| Timeline Suitability | 18 months minimum prior to the date of the system need |
| Cost Suitability | Greater than or equal to $500K |

By applying the suitability criteria earlier in the planning process, the Company creates more time to refine the NWA solution(s), providing bidders more time to develop proposals and meet the need date.

## Current Progress

The Company has taken many steps to implement and refine its NWA RFP process. These efforts include monthly phone calls to provide DER providers with project/process status updates, broader bidder and stakeholder outreach, and improved vendor interactions. To date, National Grid has issued twelve RFPs, three of which are currently under evaluation. The following table summarizes the RFPs released through the end of May 2020.

*Table 2.14-2: Status of National Grid's 2017-2020 NWA RFPs through Competitive Solicitation*

| 2017-20 NWA Projects | Load Relief Needed (MW) | Need Date | Date Solicitation Issued | Project Status |
|---|---|---|---|---|
| **Baldwinsville** | 4-6 MW | 2023 | Jan 2017 | Closed |
| **Old Forge** | 13 MW | 2023 | April 2017 | Closed |
| **Gilbert Mills** | 1.7MW | 2023 | Aug 2017 | Closed |
| **Fayetteville** | 140kW | 2020 | Aug 2017 | Closed |
| **Van Dyke** | 8MW | 2020 | Dec 2017 | Closed |
| **Golah Avon** | 6 MW | 2021 | Dec 2017 | Closed |
| **Buffalo-53** | 1 MW | 2020 | Dec 2017 | Closed |
| **Fairdale** | 1 MW | 2020 | Aug 2018 | Closed |
| **Pine Grove** | 10 MW | 2021 | Nov 2018 | Evaluation |

| 2017-20 NWA Projects | Load Relief Needed (MW) | Need Date | Date Solicitation Issued | Project Status |
|---|---|---|---|---|
| **Sawyer** | 1.7 MW | 2020 | Dec 2018 | Planner Review |
| **Watertown** | 5.7 MW | 2022 | Nov 2019 | Evaluation |
| **Rensselaer** | 1 MW | 2020 | Jan 2019 | Evaluation |

For the projects currently under evaluation by the Company, preliminary screenings have been completed and those project proposals determined most viable (as determined by the screening criteria) are currently being evaluated through an in-depth engineering analysis and preparation of a BCA, according to the procedures outlined in National Grid's BCA Handbook. For the projects undergoing planner review, the load forecast will be revised to determine the area needs.

**RFP Process Improvement**

Throughout 2018 and 2019, RFPs were further improved by:

- Clarifying technical needs
- Incorporating checklists of the items needed for the Company to thoroughly review the proposed solutions
- Extending time for proposal development
- Better aligning the proposal content requested with more comprehensive needs of the internal reviewers.
- Providing an approximate value of a potential NWA solution so that bidders can determine if their NWA solution is cost-competitive when compared to the traditional wires solution.
- Providing sample terms and conditions in RFPs to help NWA providers secure/investigate financing options prior to proposal submittal.

During the proposal review process, National Grid provides individual vendor and group updates through our procurement platform for both updates to individual bid status and questions and answers applicable to all bidders.

**Vendor Stakeholder Engagement**

The Company has been engaging the NWA vendor stakeholder community by holding monthly conference calls to share an overview of the competitive solicitation process, update potential bidders on upcoming opportunities, and provide a forum for questions and clarifications. To increase the value of the calls, the Company has introduced a webinar series that includes a tutorial on National Grid's System Data Portal, proposal review criteria, the integrated planning function, and new NWA website.

The Company has also established a new NWA email address, Non-WiresAlternativeSolutions@NationalGrid.com, that stakeholders can utilize as an alternative to contacting specific National Grid employees with specific inquiries. National Grid monitors this NWA mailbox daily under normal conditions.

**NWA Website**

In 2019, the Company relaunched the NWA website so that potential bidders have more direct access to RFPs, opportunities, and general NWA information. The landing screen shot is captured in Figure 2.14-1 and the website link is https://www.nationalgridus.com/Business-Partners/Non-Wires-Alternatives/

*Figure 2.14-1: National Grid's NWA Website Landing Screen*


The NWA website contains:

- Introductory information about NWAs and the Company's planning process
- NWA opportunities, both current and upcoming
- Project-specific RFPs
- Links to National Grid's procurement platform and enrollment instructions
- Links to the National Grid System Data Portal

The website content will be refreshed periodically with specific project information and other information beneficial to potential bidders.

**Market Research**

In 2019, National Grid conducted a significant study to inform its NWA process. The study included a benchmarking exercise to test the Company's approach against national and international peers, and market research with potential bidders and related firms to improve the NWA RFP process. The results of the benchmarking process revealed that the Joint Utilities, inclusive of National Grid, are leading the country in best practices for the NWA procurement process. The feedback from the potential bidder survey resulted in the following changes for the Company:

- RFP updates as discussed above in the RFP Process Improvement section
- Enhanced content provided in stakeholder engagement calls

**Land Inventory**

In accordance with the 2018 Energy Storage Order, the Company began to include information regarding suitable, unused and undedicated land in its NWA RFPs. This information includes location and satellite view, footprint available (sq. ft. or acres), and an estimated fair market value or the assessed value used for property tax purposes. The RFP could provide a market value based on a formal appraisal. If a formal appraisal is not the basis of the estimated market value provided in the RFP and there is interest expressed by bidders in the property during the course of responding to an RFP, the utility will proceed with a more formal review. This would include an environmental review and any other reviews needed, followed by securing a formal real estate appraisal of the property to determine the fair market value.[85] This formal appraised value will be used in National Grid's BCA should the bidder elect to proceed with lease or sale of the property.

**Interconnection Costs**

In accordance with the 2018 Energy Storage Order, the Company provides either the estimated utility-sided interconnection costs in the NWA RFP for non-binding planning purposes for DERs (whereas customer-sided interconnection costs cannot be reasonably estimated at the time of the RFP release), or an indication that interconnection costs for utility- owned equipment will be borne by the utility and will be included as a cost in the BCA. The Company provides guidance on local situations that may have a substantial impact on interconnection costs and can reasonably be anticipated. Any interconnection is highly dependent on the technology proposed and the configuration at the proposed site.

**EE/DR Integration**

Load reduction from EE and DR programs that National Grid already administers may be a viable mechanism for increasing the cost-effectiveness of an NWA solution. The Company's NWA solution development process evaluates the potential use of existing EE and DR to help reduce system needs.

## Future Implementation and Planning

Below is a list of National Grid's upcoming NWA solicitations. More information can be found on the Company's NWA website: https://www.nationalgridus.com/Business-Partners/Non-Wires-Alternatives/

[85] The lease or sale of real property by the utility will require Commission approval under PSL Section 70.

*Table 2.14-3: National Grid's Planned NWA Projects*

| 2020-2025 NWA Projects | Need Date | Estimated Solicitation Timing |
|---|---|---|
| **Byron** | 2025 | 2023 |
| **Mallory** | 2022 | 2020 |

In addition to pursuing solicitations for specific projects, the Company, in concert with stakeholders and the Joint Utilities, will investigate solutions to certain NWA challenges with the aim of further enabling NWA opportunities. These efforts are summarized in the following paragraphs.

**Improved RFPs**

As described previously, National Grid will continue to improve the NWA RFPs and the associated information provided. Future RFPs will be revised thorough a continuous improvement effort including feedback from external stakeholders (*e.g.*, vendors), internal stakeholders, and lessons learned.

**NYISO Market Development**

The Company and NWA bidders are interested in the ability for projects which provide distribution services to the DSP through NWA to receive compensation from the NYISO for wholesale products, known as dual participation. National Grid has derived early insights into this process from its both its Company-owned energy storage units at the East Pulaski and North Troy substations and the process associated with procuring the dispatch rights to bulk energy storage projects as directed by the 2018 Energy Storage Order.

**Term-DLM Transition**

For upcoming NWA procurements, National Grid will consider and evaluate any proposed solutions that are Term-DLM resources in the same manner as other solutions are considered in our EE/DR or competitive procurement process. If the bid proposal is accepted, the new NWA contract will supersede any previous Term-DLM contracts. If the bid proposal is not accepted, the resource will be permitted to finish out any existing contract under the Term-DLM program.

**Contracting**

The Company learned that contracting for NWA is time-consuming and complex. To simplify the process, National Grid now includes sample contractual terms and conditions in NWA RFPs to alert bidders of their responsibilities. In the future, the Company expects to develop a standard contract.

## Risk and Mitigation

National Grid has identified two areas of risk with NWAs. The first risk relates to the uncertainty of using DER technologies to support system performance. The Company can mitigate this risk by accurately describing its procurement needs in the RFP and working closely with bidders to understand the capabilities of their technologies and proposed solutions. Secondly, after selecting a preferred solution, there is the risk that the Company and the bidder cannot come to terms on a contract. This risk can be mitigated by including sample terms and conditions in the NWA RFP and through close collaboration and negotiation to create mutually beneficial compensation and contract terms.

# CLCPA Alignment

The Climate Act has established bold clean energy targets that include specific quantities of storage, offshore wind, and solar. To the extent NWAs provide solutions that include energy storage, solar, and/or other renewable generation that help achieve Climate Act targets.

# Integrated and Associated Stakeholder Value

NWA solutions provide more pathways to integrate DER into grid operations and rely on strong forecasting, integrated planning, and identification of beneficial locations sufficiently in advance of the need. Integrating NWAs into the T&D planning processes enables the identification of NWA investments by National Grid that could provide net benefits for customers above and beyond the traditional wires solution.

# 3 Other DSIP Information

# 3.1 DSIP Governance

**DSIP Scope, Objectives and Participants**

This 2020 DSIP Update serves as a core planning document, outlining National Grid's plans with respect to DER and EV 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 horizon of this plan is five years, it is refreshed on a two-year cycle.

The DSIP is an informational document that offers insight into the Company's on-going efforts and future plans in support of its role as the DSP provider but does not seek funding approval for these efforts. National Grid rate cases and other cost recovery filings with the Commission are the venue for the approval of investments discussed in this 2020 DSIP Update. The DSIP update cycle does not match the Company's rate case cycle and therefore includes work the Company has been approved to proceed with as well as future plans that will be presented in forthcoming rate case proposals. As of the publication of this 2020 DSIP Update, National Grid anticipates filing a rate case around or about July 31, 2020 which will account for the effects of COVID-19 on customers for whom affordability is paramount.

**DSIP Work Processes**

There are several work processes associated with the development of the DSIP and its implementation. These processes, both internal and external, progress in parallel, sometimes in advance of formal policies and procedures as the DSP evolves.

Externally, National Grid works closely with the Joint Utilities to foster efficient stakeholder engagement and consistency with respect to the evolution of the DSP. The Joint Utilities have developed a governance structure that includes a REV Leadership Team that coordinates the activities of two subordinate Joint Utilities committees, the DSP Steering Committee and the Regulatory Policy Committee. These committees then coordinate multiple work teams that focus on the individual topics discussed in this 2020 DSIP Update.

Internally, National Grid develops the DSIP through the contributions of dozens of subject matter experts ("SMEs") representing the breadth of departments and functions within the Company that have a role in DSP activities. An executive level DSIP Steering Committee guides and oversees the development of the DSIP

**Joint Utilities Website**

The Joint Utilities collectively maintain and regularly update their website (www.jointutilitiesofny.org) with valuable resources for interested parties. For example, a summary of current Joint Utilities DSP enablement activities is updated each quarter and posted to the website homepage to keep third parties informed of utility efforts to advance DSP implementation. The Joint Utilities welcome suggestions to enrich this website through their email address at info@jointutilitiesofny.org.

**Stakeholder Engagement**

Building on the structures established in 2016 and 2018, the Joint Utilities have collaborated effectively with stakeholders to enhance communication channels and inform this 2020 DSIP Update.

Notably, in the fall of 2019, the Joint Utilities reached out to hundreds of stakeholders regarding the form and content of the 2020 DSIP Update. Stakeholders generally found the filings useful but suggested that the documents be trimmed to be more practical. The Joint Utilities shared the results of the survey with DPS Staff and used those responses to guide the creation of the 2020 DSIP Update. The Joint Utilities presented the results of the survey to stakeholders on December 11, 2019.

**Updates Between DSIPs**

The Joint Utilities will offer two products to keep stakeholders informed of important developments in DSP capabilities: (1) a quarterly newsletter, and (2) a bi-annual webinar. Both items will be produced as a collaborative effort among the Joint Utilities. Content from the newsletters will also be posted to www.jointutilitiesofny.org

To be added to the digital mailing list and receive the invite to the bi-annual webinar, please email info@jointutilitiesofny.org

National Grid expects the capabilities of the DSP will continuously evolve and as such the Company's DSIP needs to be flexible enough to accommodate adaptive goals and paths forward. Progress with respect to this plan and adjustments to the plan will be documented in future DSIP updates that are anticipated to occur biennially.

# 3.2 Marginal Cost of Service Study

National Grid has not made any changes to either its traditional Marginal Cost of Service ("MCOS") study or its Enhanced MCOS study since the 2018 DSIP Update. Both of those studies are examined and documented in other proceedings. In 2018, National Grid released its Enhanced MCOS, which it renamed the Marginal Avoided Distribution Capacity ("MADC") study, to examine, on a substation basis, the quantity of traditional assets that DER could defer on a location-specific basis. The MADC study outputs include the location, quantity, value and need date for DER to defer a traditional infrastructure solution.

In the April 18, 2019 Value Stack Order, the Commission instituted a new proceeding to examine the enhanced MCOS studies the Joint Utilities filed in 2018, including National Grid's MADC.[86] DPS Staff held a Stakeholder Forum on June 28, 2019, which was followed by a series of filings throughout 2019 that including a refiling by each utility of its most recent enhanced MCOS study, individual utility responses to multiple rounds of information requests, Joint Utilities Comments filed on November 25, 2019, and Joint Utilities Reply Comments filed on December 13, 2019. That proceeding is still pending with the next likely step to be the filing of a DPS Staff Whitepaper in 2020.

As of the time of publication of this 2020 DSIP Update, National Grid is planning to file a rate case around or about July 31, 2020 which will include a new traditional MCOS study which will inform a limited set of ratemaking activities, notably the development of "marginal cost" rates including the Excelsior Jobs Program and the Empire Zone Rider.

[86] MCOS Studies Proceeding, *supra* note 83.

# 3.3 Benefit-Cost Analysis

The primary purpose of the BCA Handbook is to provide DER developers with a guide as to how the Commission's BCA Framework will be implemented in evaluating proposed DER projects and proposals to meet the system needs set out in this 2020 DSIP Update. The BCA Framework Order states:

> *The [BCA] Handbooks would be developed in coordination with each utility's DSIP, where system needs, proposed projects, potential capital budgets, and plans for soliciting DER alternatives will be provided. Because market engagement should be consistent across New York, the Handbooks would establish methodologies based on common analytics and standardized assumptions, and would identify various sensitivities and synergies.*[87]

The BCA Framework Order required each utility to file its proposed BCA Handbook with its initial DSIP on June 30, 2016.[88] As required by the BCA Framework Order,[89] the Company's BCA Handbook was developed in cooperation with the Joint Utilities and provides a set of common methodologies that apply uniformly across the state. Many of the common methodologies, assumptions, and source included in the BCA Handbooks are provided in Appendix C of the BCA Framework Order. The utilities' BCA Handbooks deviate from each other only where necessary to accommodate distinctions among the various service territories.

Version 2.0 of the Company's BCA Handbook, filed contemporaneously with the 2018 DSIP Update, provided updated utility-specific and state-wide input assumptions and sources as well as clarifying edits to Version 1.0 methodological descriptions and additional example applications. As with Version 1.0, the Company's Version 2.0 BCA Handbook was developed in cooperation with the Joint Utilities and differs from the other utilities' BCA Handbooks only where necessary to accommodate distinctions between the service territories.

Similarly, Version 3.0, filed contemporaneously with this 2020 DSIP Update, provides utility-specific and statewide input assumptions and clarifying edits to Version 2.0.

Pursuant to the BCA Framework Order, National Grid has made the calculation methodologies and universal input parameters used for its BCA transparent and publicly available in its 2020 Version 3.0 BCA Handbook.

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[87] REV Proceeding, BCA Framework Order, p. 29.
[88] *Id*., p. 31.
[89] *Id*.

Version 3.0 of the Company's BCA Handbook will be available on the National Grid System Data Portal at https://ngrid.apps.esri.com/NGSysDataPortal/NY/index.html

*Table 3.3-1: New York Assumptions for Version 3.0 of BCA Handbook*

| New York Assumptions | Source |
|---|---|
| Energy and Demand Forecast | NYISO: Load & Capacity Data[1] |
| Avoided Generation Capacity Cost (AGCC) | DPS Staff: ICAP Spreadsheet Model[2] |
| Locational Based Marginal Prices (LBMP) | NYISO: Congestion Assessment and Resource Integration Study Phase 2 (CARIS Phase 2)[3] |
| Historical Ancillary Service Costs | NYISO: Markets & Operations Reports[4] |
| Wholesale Energy Market Price Impacts | DPS Staff: To be provided[5] |
| Allowance Prices ($SO_2$, and $NO_X$) | NYISO: CARIS Phase 2[6] |
| Renewable Energy Certificate (REC) Price | NYSERDA: Results of most recently completed RECs solicitation[7] |
| Net Marginal Damage Cost of Carbon | DPS Staff: To be provided[8] |

[1] The 2020 Load & Capacity Data Report is *available at* https://www.nyiso.com/documents/20142/2226333/2020-Gold-Book-Final-Public.pdf/

[2] The ICAP Spreadsheet Model is found under Case 14-M-0101 at the Commission's website, *available at* http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-M-0101&submit=Search.

[3] The NYISO published finalized annual and hourly zonal LBMPs from the 2018 CARIS Phase 2 on January 22, 2019, on the Comprehensive System Planning Process (CSPP) page, *available at* https://www.nyiso.com/cspp. The direct link to the CARIS Phase 2 results are *available at* https://www.nyiso.com/documents/20142/1407490/2018-CARIS-2-Hourly-LBMP.zip/80fac5d5-c95f-5d92-4beb-9b3f23cd2c1f .

[4] Historical ancillary service costs are available on the NYISO website at: http://mis.nyiso.com/public/P-6Blist.htm. The values to apply are described in Section 4.1.5.

[5] DPS Staff will perform the modeling and file the results with the Secretary to the Commission on or before July 1 of each year.

[6]The NYISO publishes price assumptions for NOx and SOx. The most recent of which is the 2019 study, *available at* https://www.nyiso.com/documents/20142/7239276/03c+2019_CARIS_EmissionsForecastInformatio.pdf/a9ccb4fd-317f-b3fd-b475-112c54602430?version=1.0&t=1561031785776&download=true

[7] The results of NYSERDA RECs contract solicitations are *available at* https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/Renewable-Generators-and-Developers/RES-Tier-One-Eligibility/Solicitations-for-Long-term-Contracts. The weighted average contract price from the most recently completed solicitation is generally used.

[8] DPS Staff will perform the modeling, file the results with the Secretary to the Commission on or before July 1 of each year, and post the results on DMM under Case 14-M-0101.

# 4 Appendix A: Tools and Information Sources

## National Grid References with Links

- National Grid Internet Homepage:
  https://www.nationalgridus.com/Upstate-NY-Home/Default
- National Grid Customer Usage Tracking:
  https://www1.nationalgridus.com/SignIn
- National Grid's Interconnection Online Application Portal (IOAP) (new Customer Application Portal or "nCAP"):
  https://ngus.force.com/s/
- National Grid System Data Portal:
  https://ngrid.apps.esri.com/NGSysDataPortal/NY/index.html
  The above link includes tabs to the categories listed below:
  - Load Forecast Report;
  - HCA;
  - Non-Wires Alternatives opportunities;
  - Locational System Relief Value ("LSRV") areas, and
  - Reports tab (Note: The BCA Handbook will be added following its filing on 6/30.)
- National Grid Customer Market Place:
  https://marketplace.nationalgridus.com/
- National Grid New York Solar Market Place:
  https://www.nationalgridus.com/upstate-NY-Home/Ways-to-Save/Solar
- National Grid Energy Savings Program:
  https://www.nationalgridus.com/Upstate-NY-Home/Energy-Saving-Programs/
- National Grid **Connected**Solutions:
  https://www.nationalgridus.com/Upstate-NY-Home/Energy-Saving-Programs/ConnectedSolutions
- National Grid Electric System Bulletin No. 756:
  https://www.nationalgridus.com/media/pronet/shared_constr_esb756.pdf

## Joint Utilities of New York and New York Reforming the Energy Vision (REV) References with Links

- Joint Utilities of New York:
  http://jointutilitiesofny.org/
- Joint Utilities of New York EV Readiness Framework:
  http://jointutilitiesofny.org/wp-content/uploads/2018/03/Joint-Utilities-of-New-York-EV-Readiness-Framework-Final-Draft-March-2018.pdf
- Joint Utilities Resources:
  http://jointutilitiesofny.org/resources/
- Utility Specific Non-Wires Alternatives Opportunities:
  http://jointutilitiesofny.org/utility-specific-pages/nwa-opportunities/
- NY REV Homepage:
  https://rev.ny.gov/
- REV Connect:
  https://nyrevconnect.com/
- REV Connect Non-Wires Alternatives:
  https://nyrevconnect.com/non-wires-alternatives/

## Other References with Links

- New York State Department of Public Service (DPS) search page:
  http://www3.dps.ny.gov/W/PSCWeb.nsf/All/FCFC9542CC5BE76085257FE300543D5E?OpenDocument
- DER Integration Case 16-M-0412, Benefit Cost Analysis Handbook:
  http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-M-0412
- Distribution System Implementation Plan (DSIP) Proceeding Case 16-M-0411:
  http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-m-0411&submit=Search
- DPS: Interconnection Technical working Group:
  http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DEF2BF0A236B946F85257F71006AC98E
- 2015 New York State Energy Plan:
  https://energyplan.ny.gov/Plans/2015
- New York's Clean Energy Jobs and Climate Agenda:
  https://www.governor.ny.gov/news/governor-cuomo-unveils-20th-proposal-2018-state-state-new-yorks-clean-energy-jobs-and-climate
- New York Independent System Operator (NYISO) Homepage:
  http://www.nyiso.com/public/index.jsp

- New York State Energy Research and Development Authority (NYSERDA) Homepage:
  https://www.nyserda.ny.gov/
- NYSERDA: Electric Vehicle Programs:
  https://www.nyserda.ny.gov/Researchers-and-Policymakers/Electric-Vehicles/Electric-Vehicle-Programs
- Electric Power Research Institute (EPRI): Impact Factors, Methods, and Considerations for Calculating and applying Hosting Capacity:
  https://www.epri.com/#/pages/product/000000003002011009/?lang=en
- EPRI: Defining a Roadmap for Successful Implementation of a Hosting Capacity Method for New York State:
  https://www.epri.com/#/pages/product/3002008848/?lang=en
- United States Department of Energy (DOE) Modern Distribution Grid Report:
  https://gridarchitecture.pnnl.gov/modern-grid-distribution-project.aspx
- DOE: Alternative Fuels Data Center:
  https://www.afdc.energy.gov/stations
- DOE: Modern Distribution Grid:
  https://gridarchitecture.pnnl.gov/media/Modern-Distribution-Grid_Volume-I_v1_1.pdf
- ENERGY STAR Portfolio Manager®:
  https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager
- Institute of Electrical and Electronics Engineers (IEEE): Experimental Evaluation of Load Rejection Overvoltage from Grid-Tied Solar Inverters:
  https://ieeexplore.ieee.org/xpls/icp.jsp?arnumber=7356399.
- Energy.Gov: Green Button Open Energy Data:
  https://www.energy.gov/data/green-button
- Multistate ZEV Task Force:
  https://www.zevstates.us/.
- National Standard Practice Manual:
  https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

## DSIP Related Proceedings and Efforts

- 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 (VDER Proceeding) (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)
- In the Matter of the Utility Energy Registry (Case 17-M-0315)
- Whole Building Energy Data Aggregation Standard (Cases 16-M-0411 and 14-M-0101)
- 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 (SIR) for Small Distributed Generators (Case 18-E-0018)
- Joint Petition for Certain Amendments to the New York State Standardized Interconnection Requirements (SIR) for New Distributed Generators and Energy Storage Systems 5 MW or Less Connected in Parallel with Utility Distribution Systems (Case 19-E-0566)
- Dynamic Load Management (DLM) Programs (Cases 14-E-0423 and 15-E-0189)
- In the Matter of a Comprehensive Energy Efficiency Initiative (Case 18-M-0084)
- Proceeding on Motion of the Commission Regarding Cyber Security Protocols and Protections in the Energy Market Place (Case 18-M-0376)
- Proceeding on Motion of the Commission to Examine Utilities' Marginal Cost of Service Studies (Case 19-E-0283)
- In the Matter of Consolidated Billing for Distributed Energy Resources (Case 19-M-0463)
- Proceeding on Motion of the Commission to Consider Resource Adequacy Matters (Case 19-E-0530)
- Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data (Case 20-M-0082)

# 5 Appendix B: Additional Topic Details

## 5.1 Integrated Planning

The following responds to DPS Staff's request to provide additional details to address National Grid's resources and capabilities which support integrated electric system planning.[90]

**1. Means and methods used for integrated system planning**

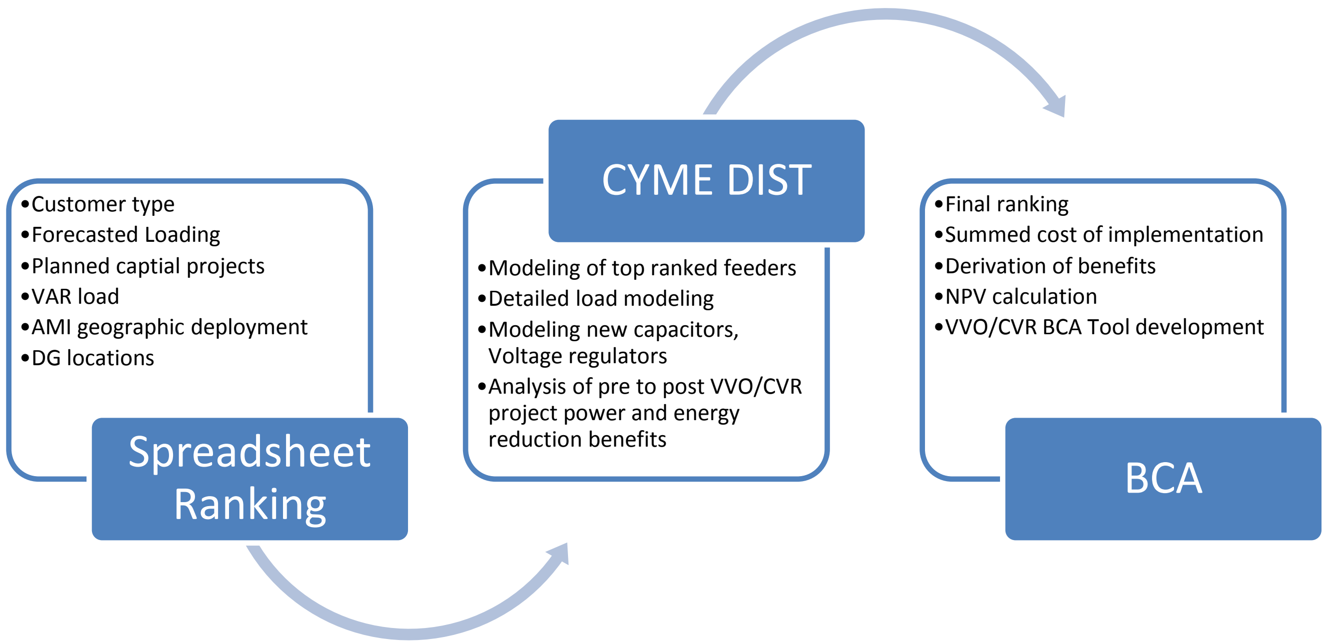
Today's integrated distribution planning process involves many different components and sub-processes, from forecast development through project delivery, and is a highly complex process with many steps, resources, data sources, decisions points, etc. Two specific examples of an integrated planning process for VVO/CVR and FLISR follow.

**VVO/CVR**

Starting in early 2019 the Company undertook an integrated study that considered several variables such as forecasts, customer types, planned capital projects, AMI deployment plans, and DG locations to conduct a BCA and prioritize locations for VVO/CVR to maintain voltage compliance across the distribution system and help adopt high levels of DER penetration via improved voltage control.

[90] DSIP Proceeding, 2018 DSIP Update Guidance, p. 8.

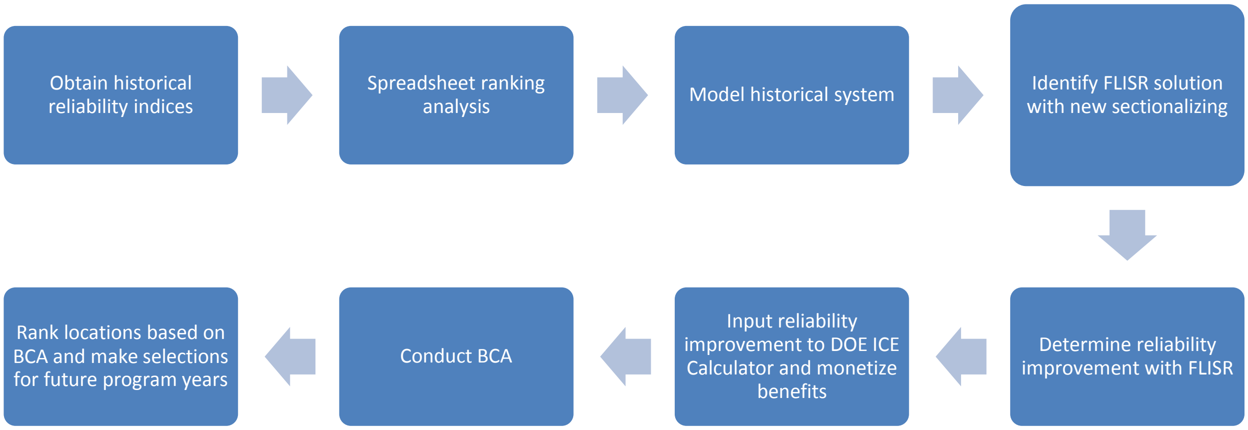
*Figure 5.1-1: VVO BCA*




**FLISR**

Similar to VVO/CVR, National Grid performed an in-depth analysis to determine the costs and benefits of FLISR to yield optimal initial deployment locations. This analysis integrated reliability performance metrics with DER quantities, customer demographics, and forecasts to serve as inputs to other modeling tools. The Company used the CYME Reliability Assessment Module ("RAM") and the U.S. Department of Energy ("DOE") Interruption Cost Estimate ("ICE") Calculator first to determine the improvement in reliability from FLISR and the associated value to customers.

*Figure 5.1-2: Process for Determining FLISR Locations*




**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.**

National Grid's load and DER forecasting currently includes some probabilistic elements, most notably the impact of weather on load and DER penetration levels. Through the development of forecasting scenarios (see more details in Advanced Forecasting chapter), National Grid is taking further steps towards probabilistic planning. Over the next five years, those distinct forecasting scenarios will transition to a probabilistic spectrum of scenarios. New planning methods will be developed to consider the new forecasting input, improving how planners make decisions and meet customer needs.

**3. How the utility ensures that the information needed for integrated system planning is timely acquired and properly evaluated.**

National Grid's GIS is the primary repository in which key attribute data is maintained for distribution assets. This data set is used to develop interconnected models of the distribution system. The GIS is tied to the Company's work management system such that, as projects (*e.g.*, system upgrades, system reconfigurations, DG interconnections, and new spot loads) are completed, the resulting as-built information is posted to GIS. The Salesforce system is the primary repository of DER information, from application through interconnection. DER data from Salesforce is shared with GIS to accurately model DER on National Grid's system. Similarly, GIS is integrated with CYMDIST load flow tools so that up-to-date models can be created for Distribution Planning and HCA. Load forecasts are updated on an annual basis in time for summer preparations for system peak. DER forecasts are also generated on an annual basis to inform the Company's distribution planners of areas with projected high DER interconnection. Distribution planners are assigned regional areas of responsibility, so they have awareness of other variables impacting the local area (*e.g.*, economic development, municipal planning activities, etc.). Lastly, loads can be updated in the CYMDIST model via a link to National Grid's EMS and the OSIsoft® PI Historian database that maintains historic loading information for substations that have real-time monitoring.

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

On a case-by-case basis National Grid's planning engineers often run multiple scenarios to assess the impact of various assumptions or alternatives. Examples of the types of sensitivities are:

- Spot load sensitives
- DG capacity sensitivities
- Alternate load transfers for load balancing and reliability
- Comparison of traditional utility solutions and NWA solutions

Over the next five years, with the given increase in system complexity and a drive towards a probabilistic approach to forecasting, it is expected that a greater number of sensitivities will be able to be evaluated by the Company.

**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.**

For long-term horizons, the Company refreshes its fifteen-year load and DER forecast on an annual basis that are then applied in planning studies and reflected in an annual revision of the five-year CIP. As part of the CIP review process, DER solutions, such as DLM and NWAs, are considered. For the short-term, National Grid conducts a summer preparedness plan for the upcoming summer period every year.

A good example of changing trends is the recent COVID-19 mitigation measures that have impacted load. The Company is assessing this trend change for both short-term and long-term impacts.

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

National Grid's peak load forecast now includes EVs at three different penetration levels: base, low and high. Currently, planners apply the base forecast in distribution planning analysis. The Company is currently working on forecasts related to beneficial electrification and these will be factored into the Company forecasts in the near future. In addition to capacity planning, the Company is pressing through several Asset Management Maturity initiatives such as risk management to improve its overall asset management so as to enhance and maximize the whole-life performance of the grid.

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

The current and future impacts of EE programs are embedded within the load and DER forecasts used by the T&D network planners. However, EE solutions over and above forecasted EE that solve a targeted problem can be proposed as an NWA solution either on its own or as part of a portfolio of DER. Additionally, active EE measures (control flexibility) can participate in any of the Company's DLM programs where in particular the upcoming Term DLM program will identify specific locations where active EE measures can participate. The Company reviews the NWA proposals where any proposed active EE measure is evaluated for its ability to solve the local grid need. In addition, it is expected a review process of proposed active EE measures for the Term DLM program will be conducted once it is launched.

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

National Grid affiliates operate electric distribution companies in Massachusetts and Rhode Island. The distribution planning functions in all three jurisdictions (*i.e.*, New York, Massachusetts, and Rhode Island) report to a common vice president and lessons learned are routinely shared between planning departments. The Company also participates in various forums in which planning issues are discussed including Joint Utilities meetings and ad hoc meetings with utilities in other jurisdictions to compare process and progress. One of the key Joint Utilities working groups is Integrated Planning where topics such as forecasting, hosting capacity, planning criteria, and more recently COVID-19 impacts, are discussed. COVID-19 impacts are discussed among the Joint Utilities on a weekly basis. The Company is also a full program subscriber to the EPRI Distribution Systems Operations and Planning (Program 200) which provides access to research on topics including HCA, DER integration, and distribution system automation. In addition, the Company is an active member of CEATI and their associated programs. Both programs provide the Company with access to best practices and lessons learned from other jurisdictions.

# 5.2 Advanced Forecasting

The following responds to DSP Staff's request to provide additional details to address National Grid's resources and capabilities to enable advanced electric system forecasting and provide the most current forecast results.[91]

**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.**

National Grid's System Data Portal provides access to the Company's forecast information for DER developers and other stakeholders.

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

Stakeholders requested 8760 hourly forecast information at the feeder level. As such, National Grid's 8760 forecasts are currently available via the Company's System Data Portal. The Company continues to work with the Joint Utilities on all forecasting topics and expects assessment of stakeholder requirements will continue going forward.

**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.**

National Grid shares both its system-level and feeder-level forecasts via the System Data Portal. The System Data Portal currently provides a detailed report of the Company's top-down peak load forecasts by NYISO load zone. Long-term forecasts are generally issued during the last quarter of each calendar year so that they are reflective of the most recent summer peak loads. Additionally, the Company continues to assess stakeholder data needs through the Joint Utilities, following the new guidelines set by the proceeding for energy data set by the Commission and Staff Whitepapers

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

Spatially, National Grid's forecast process will result in forecasts at the Company, NYISO zones, distribution substations, and radial feeder levels. Temporally, the forecasts range from hourly forecasts to multi-year annual projections.

[91] *Id.*, pp. 9-10.

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

The forecasts are provided separately by load and DER type, including but not limited to solar PVs, ESS, and EE at the system level over a fifteen-year period and at the feeder level over a five-year period.

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

The current system-level forecasts include multiple weather scenarios to develop normal 50/50, as well as extreme weather scenarios, at 90/10 and 95/5. DER scenarios have been added at the system- and feeder-level forecasts with base, low and high probabilistic levels Going forward the Company plans to provide more granular probability levels.

The annual 8760- and 24-hour load projections for peak and average days, weekday and weekend, and summer, winter and shoulder months provide more granular temporal information for planning when compared to annual peak forecasts. Providing multiple DER scenarios (minimum, maximum and base) gives the planners additional information to assess potential grid needs. In the future, assigning relative probabilities to each scenario will allow planners to consider multiple alternatives in a more quantitative fashion.

**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.**

In general, each of these elements are projected independently and combined in the forecast. However, as described in the Forecasting Chapter, the interdependencies of solar plus storage are integrated with each other and subsequently incorporated into the combined forecast.

**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.**

The forecasts prepared for National Grid's use are the same forecasts the Company shares with stakeholders. The Forecasting and Integrated Planning chapters describe in detail how the forecasts are evolving to fulfill the Company's requirements.

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

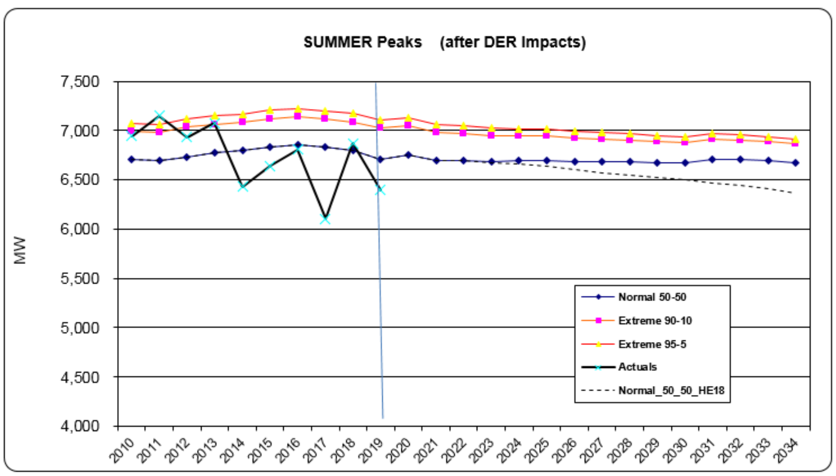
National Grid's objectives are to gather as much information as necessary about customer energy usage, DER markets, and future new sources of load such as EV charging and electrification of heat. The configuration and capabilities of the Company's distribution system is also important to support the granular spatial and temporal nature of the forecasts being produced. The Company acquires the data used in its forecasts through internal and external sources, much of it is publicly available, while some is purchased or used under license agreements.

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

The production of substation-level load and supply forecasts are derived by aggregating the connected feeder-level forecasts. Feeder-level forecasts are calibrated against actual feeder peak data followed by calibration with system level forecasts to ensure consistency of results.

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

*Figure 5.2-1: National Grid's Historical Summer Peaks and Forecast Comparison*




For the system peak load forecast as shown in Figure 5.2-1 above, historical peak loads are compared to the 50/50, 90/10, and 95/5 forecasts. System-level forecasts have generally been accurate in the one-three percent range. Since National Grid just recently developed its initial 8760-hour forecasts at the feeder level, the accuracy of these forecasts has yet to be determined. Once sufficient actual data is available, the Company plans to compare actual loading results to the recently developed feeder-level forecasts to assess the variance of metered load to the forecasted load. Attention will be on the peak load periods and minimum day-time load periods.

**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.**

Individual 8760-hour forecasts have been produced by the Company for each distribution substation. This information provides increased visibility into substation loads for all hours of the year. Providing an annual load cycle will aid DER developers in evaluating impacts such as capacity constraints at peak, the potential that injections may result in reverse power flows, and the frequency in which DR may be called upon, as well as how loading may impact desired charge and discharge cycles for ESS.

**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.**

While current forecasts consider the relative impacts of various DERs and load including that consumed by EVs, National Grid has not performed a sensitivity analysis considering multiple DER scenarios. The 8760 feeder-level forecasts that account for all DER along with associated probability levels are aggregated to produce substation level forecasts.

**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.**

National Grid uses an extensive amount of external data informing its DER forecasts. Information received from DER providers as part of interconnection requests and in support of EE and DR programs operated by the Company are embedded in the forecast. In addition, to the extent that market participant information is embedded in the longer-term NYSIO DER forecasts, it is considered in the Company's forecasts. However, the Company does not currently use forecasts from individual DER developers as National Grid has not been able to ascertain the value of such forecasts. The Company does, however, use external data for existing EVs from IHSM-Polk, a leading provider of vehicle data, for use in informing historical EV sales.

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

In keeping with National Grid's stated goal of establishing forecasts based on simulations, the Company seeks the best-of-breed, open source simulation models from the DOE and academia for modeling load and specific DER-type growth. The Company and its affiliates have established strong relationships with the DOE National Laboratories, key universities (*i.e.*, Massachusetts Institute of Technology ("MIT"), Stanford University, and University of California ("UC") Berkeley) and other utilities that are looking to approach the forecasting challenge in the same manner as National Grid and its affiliates. The Company, and its affiliates, are also an actively engaged with the NYISO and ISO New England ("ISO-NE"), respectively, and take into consideration the best practices of each other's jurisdiction.

**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.**

Moving to a simulation mode of forecast production allows the forecast model to evolve with additional detail and information as it becomes available to continuously enhance the forecast. By using the combination of a system-level perspective (*i.e.*, the traditional area for out-of-model adjustments) and a simulation-based feeder-level model where DERs are modeled directly, the potential for inaccuracies are reduced.

# 5.3 Grid Operations

The following responds to DSP Staff's request to provide additional details to address resources and capabilities needed to transform grid operations in both the distribution system and the bulk electric system.[92]

**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.**

National Grid will continue to ensure the safe and reliable delivery services to its customers by continuing to plan and operate the distribution system using good utility practices. Paramount to operations is the visibility of system parameters to understand loading and voltage under real- time and predicted conditions. This includes matching an understanding of system configuration with short-term forecasting of load and generation. The need for increased situational awareness, control, operational tools, and processes and procedures will increase in order to satisfy a secure and economic dispatch, as the numbers of DER increase. The need for data and tools to secure the network will increase with the development of new tariffs, markets, and participants.

The NYISO is responsible to dispatch wholesale resources in a secure and economic manner. DER and aggregations of DER interconnected to the distribution system will be allowed to sell into the wholesale market as a result of anticipated NYISO tariff amendments. The NYISO does not have the ability or the responsibility to monitor or control the individual distribution-connected resources which reside with the distribution utility. Therefore, significant coordination will need to exist between the NYISO and the utilities. The Grid Operations Chapter provides more details on this topic.

The Joint Utilities Monitoring and Control Working Group, ITWG, NYISO-Joint Utilities Working Group, Market Design and Integration Working Group, and NYISO MIWG continue to discuss the level of monitoring and control for interconnected DER to facilitate markets and operations.

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

The utilities are responsible for providing safe, reliable, and quality services to customers by operating the distribution system in accordance with good utility practices. The assets required to operate the distribution system (*i.e.*, systems for monitoring and controlling) are owned by the utility and borne out of utility good practices and lessons learned. As part of the REV Track One Order,[93] the utilities were assigned the role of the DSP provider within their respective service territories. The Joint Utilities undertook a process to define functions, roles, and responsibilities

[92] *Id*., pp. 11-12.
[93] REV Proceeding, REV Track One Order, pp. 40-45, 48-53.

of a DSP and DSP provider and out of that extensive effort the current proposed model was developed. Alternative models were not investigated.

Additional details of the DSP and both market and grid operations will be detailed in the supplemental Market Design and Integration Report, subject to guidance from DPS Staff.

**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.**

National Grid, in conjunction with the Joint Utilities, is formulating roles and responsibilities as DSIP-related grid and market operations evolve. There are currently numerous efforts, as defined in the 2020 DSIP Update, which need to be factored into the roles and responsibilities of planning and grid operations. Several stakeholders are involved in these efforts including the NYISO, DPS Staff, and DER providers.

The Joint Utilities have been coordinating with the NYISO through the NYISO-Joint Utilities Working Groups and the MDIWG.

Undoubtedly, as DER penetration increases, and grid operations evolve to a more active network management mode, roles and responsibilities will have to evolve accordingly. As the various efforts outlined above progress to finalization, roles and responsibilities will be further defined.

**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 for each of the following areas.**

It is through on-going collaboration between the utilities and other parties that processes, resources, and standards are developed to extensively employ DER for example though the multiple working groups referenced in this report.

**a. Organizations**

The Joint Utilities undertook an effort to understand what the DSP will look like as the markets and technologies evolve. This effort included an investigation into the required DSP functions for markets, grid operations, and planning. National Grid's organizational design to implement the DSP functionality will adjust as part of the DSP evolution. Consideration is given to current and future functions and how the organization can perform the needed functions in an efficient and effective manner.

**b. Operating Policies and Processes**

Operating policies and processes continue with NYISO and other parties via the associated working groups along with the various publications that come out of those efforts as described in detail in the Grid Operations chapter.

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

The Grid Operations chapter provides significant detail on the information systems and software requirements.

**d. Data communications infrastructure**

The Grid Operations chapter provides more details regarding the communications infrastructure.

**e. Grid sensors and control devices**

In accordance with the Three-Year Rate Plan Order, the Company is progressing with plans to install additional feeder monitoring sensors and substation RTUs to enhance situational awareness. Over the next five years National Grid expects to install RTUs at 40 distribution substations and feeder monitoring sensors at the head end of 220 feeders. This data will inform operating personnel about thermal loading and voltage issues, and other important elements necessary to cost-effectively maintain service quality. This data will also provide interval performance information which can be key to accurately identifying areas where DER may provide value.

The majority of substations with 15kV class distribution circuits have been selected to have RTUs installed, while the majority of substations with 5kV class distribution circuits will have distribution line sensors installed. Substations with multiple distribution circuits rank high on the priority list, as well as those surrounded by 15kV class distribution.

As part of the Smart Inverter roadmap, the continued investigation into low-cost M&C solutions will be made for DERs lower than 500 kW.

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

As part of its VVO/CVR and FLISR programs, National Grid is installing more intelligent switching devices that can be programmed for autonomous control or operated remotely from the Company's control centers.

The Company had investigated a secondary voltage regulator device and a power electronic tie controller. However, a number of hurdles were identified that resulted in terminating further pursuit.

The Company plans to continue to review the integration of the novel grid infrastructure technologies for potential application in New York.

**g. Cybersecurity measures for protecting grid operations from cybersecurity threats**

The Company has implemented measures to ensure safe and reliable grid operations including capabilities that enable the prevention, detection, and response to cybersecurity threats. From the perspective of the end user, enforcement of least-privilege access and monitoring of activity is a means to prevent data loss and to identify malicious activity. The Company closely monitors access to its IT networks and is analyzed to ensure that malicious user activity is detected and flagged so that necessary actions can be taken. Network traffic is monitored in real time to detect any abnormal network traffic, devices, or endpoints and to establish a baseline for traffic during grid operations so that any abnormal activity can be detected and appropriately addressed. The Companies Cybersecurity department plays a critical role in the central monitoring of activity and brings together detection, analysis, and response in the event of a cybersecurity incident.

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

The Companies Energy and resource management systems have a robust architectural design to recover from cyber disruptions. At a high level, the architectures include equipment located at primary and backup data centers. The management systems are capable of switching between the primary and backup site and operating independently in case of a site failure. Within each site, servers are be redundant with both hot and standby servers with capability to switchover.

In addition, recovery procedures are created and maintained, including a periodic backup schedule and recovery exercise. This architecture will enable recovery from a cyber-disruption at the individual server, site. or system level.

**5. Describe the utility resources and capabilities which enable automated VVO.**

**a. Identify where automated VVO is currently deployed in the utility's system**

The vast majority of National Grid's distribution feeders have voltage regulations schemes that are controlled through local autonomous controls on substation transformer load tap changers, feeder voltage regulators, and/or switched capacitor banks. The Company's grid modernization plans for VVO will incorporate control schemes that coordinate the automated control of voltage regulating devices considering remote monitoring, telecommunications, and advanced control algorithms. The Company deployed its first advanced VVO scheme as part of the Clifton Park Demand

Reduction REV Demonstration Project. The REV demonstration implemented VVO schemes on eleven distribution feeders and was activated in April 2019. Following the Clifton Park installation, the Company began an annual program to install VVO in targeted locations across its service territory. Currently, deployment of VVO is in progress on twelve feeders. This includes four feeders in the Town of Niagara, four feeders in the City of Syracuse, and four feeders in the City of Albany. The Company expects to continue VVO scheme deployments statewide through to 2025 and beyond based on locations with net positive value.

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

Implementation of VVO/CVR technology on select circuits is forecasted to provide a 3% reduction in energy consumed and peak demand, resulting in an associated reduction in GHG emissions. These benefits are achieved without direct customer engagement. The beneficiaries of these benefits are:

- Individual customers on managed circuits will have reduced kWh usage.
- All National Grid customers will benefit from reduced ICAP purchase requirements to the extent that the circuit's peak demand is coincident with the larger electrical system's peak demand, which will be passed on as savings to all customers.
- Society will benefit from the reduction in GHG emissions related to energy production and
- The expected reduction in feeder peak demand may defer the need for future distribution capacity investments.

The economic terms are described below in the Company's response to Question 5d.

The Company and its consultant are currently recording data and will begin M&V in the near future of the two VVO/CVR schemes currently in operation in Clifton Park. This M&V will provide valuable feedback to the Company's planned continued VVO/CVR program and also inform any needed adjustments to its BCAs.

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

There are a number of anticipated benefits of a VVO/CVR deployment which includes the following:

- The implementation of a VVO/CVR system is expected to result in improved feeder power factor, flatter voltage profiles, reduced feeder losses, reduced peak demand, and reduced energy consumption by customers. The estimated reduction in peak demand and energy consumption is expected to be approximately 3% on average but will vary from feeder to feeder based on the individual feeder characteristics.

- The additional operational data collected by automated capacitors and regulators, which is available to control center operators, will support the improved management of the distribution system which will assist in the integration of DER. Actively maintaining proper voltage via intelligent centralized control will also improve feeder voltage performance, keeping the voltage flat and low, and thereby allowing for higher DER penetration.
- The deployment of VVO/CVR schemes will provide historical data to improve distribution system planning.
- VVO/CVR will have a direct impact on the peak load experienced by the feeders on which it is deployed. Therefore, the Company expects this technology to support the System Efficiency EAM metrics by reducing peak load.

The costs of VVO/CVR deployment can be summarized in a few categories:

- Engineering/Design Labor
- Radios and telecom equipment for distribution devices
- Upgrades to existing distribution devices (*i.e.*, regulators and capacitors) to accommodate remote operation
- New distribution devices (*i.e.*, regulators and capacitors) to react to system dynamics
- Upgrades to substation regulation equipment (*i.e.*, regulators or LTCs) to accommodate remote operation
- New distribution primary-based line voltage monitors ("LVMs")
- Software licensing for VVO/CVR centralized control application
- Back office support infrastructure (e.g. firewalls, network connectivity support equipment)

A BCA utilizing the National Grid BCA Handbook was completed. The results are provided in the Company's response to Question 5.d below.

**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**

A preliminary BCA was completed for all stations and feeders, where the next increment to its VVO/CVR program targets 21 substations and 94 feeders that have the highest BCA results. The benefit-cost ratio for the 21 stations was calculated to be 1.6 with a net present value of $20M. In addition, this preliminary BCA indicates there is net positive value to continue the program beyond the 21 stations identified, therefore the Company plans to continue deployment of VVO/CVR to all stations and feeders with a positive net value to customers.

In addition to the proposed 21 stations, the Company has two stations that have VVO/CVR installed today with an additional 7 stations currently in design/construction phases.

**e. Provide the utility's plan and schedule for expanding its automated VVO capabilities**

Over the next five years, National Grid plans to build on lessons learned and successes from the VVO/CVR schemes deployed at the Clifton Park Demand Reduction REV Demonstration Project and expand the VVO program across New York where it is deemed beneficial to customers.

The energy and demand savings will vary from feeder to feeder. The Company will monitor and verify the performance of the program as the implementation progresses and will continue to identify future feeders in which the Company anticipates a positive BCA.

The Company plans to conduct a pilot project supported by NYSERDA to assess the ability and benefits of integrating smart inverters with the existing VVO/CVR scheme currently in operation in the Clifton Park. In addition, an offline analysis will be used to determine the incremental benefits of tying AMI data with optimal VVO/CVR operation.

**f. Describe the utility's planned approach for securely utilizing DERs for VVO functions**

With changes from the revised IEEE 1547:2018 Standard it is expected DER smart inverters may be able to provide voltage/reactive power support, enabling greater opportunities to integrate DER assets into the grid. The pilot project supported by NYSERDA will assess the ability and benefits of integrating smart inverters with the existing VVO/CVR scheme currently in operation at Clifton Park.

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

See the Company's response to Question 5.d above.

**6. Describe the utility's approach and ability to implement advanced capabilities.**

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

Despite the Company having some form of monitoring at 89% of its feeders, at a device level there is still much work do to:

- % of feeders with distribution line sensors installed at the feeder head = 8%
- % of feeders that have reclosers with communications = 29%
- % of reclosers with communications = 90%
- % of cap banks with communications = less than 1%
- % of regulators with communications = less than 1%

The Control Center Technology Roadmap lays out the investments in Control Center Operations. National Grid has completed upgrading its EMS that is currently being used to support distribution operations until ADMS is available.

Starting in 2007, National Grid implemented FLISR capabilities on eight sub-transmission lines that have successfully mitigated customer interruptions and the Company plans to add an additional six projects over the next five years. Lessons from these projects will help inform the deployment of DA technologies on distribution feeders. As described in the Grid Operations chapter, the Company plans to start a distribution FLISR program within the next five years.

The Company has deployed VVO/CVR at two stations in Clifton Park and is currently constructing VVO/CVR at an additional three substations in 2020.

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

To help address the challenges described in Item a above, the Company has the following plans to add additional monitoring and DA:

- VVO/CVR program
- FLISR (Sub-T and D) program
- Feeder monitoring program
- RTU program
- AMI
- PCC reclosers for DG

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

Around two years ago the Company created two new departments: Grid Modernization Solutions ("GMS") and Grid Modernization Execution ("GME"). These two groups work closely together whereby the GMS conducts analysis and develops the high-level plans for monitoring and DA and once approved for implementation, these plans are handed over to the GME group for execution. The GME team manages the implementation and monitors its progress and provides a feedback loop to GMS for consideration in future plan developments.

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

The list below provides a sample of some of the benefits provided through additional monitoring and DA:

- Increased reliability, resiliency, and system efficiencies through situational awareness
- Operational efficiency associated with line crew call-outs
- Improved accuracy in grid planning
- Greater visibility for grid operations

- Improved data for third parties and customers
- Improved forecasts
- Provide foundations for a more transactive grid market
- Help integrate DER assets

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

Currently, the Company does not have ADMS application functionality available in the control room production environments. National Grid's deployment plans for ADMS are discussed extensively below.

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

Phase 1 ADMS will deliver system infrastructure and baseline monitoring and inform functionality. By leveraging select applications on a predetermined number of feeders, these applications will provide operational benefits by utilizing load flow and suggested switching applications on the as-switched network model. This platform, along with improved visibility to devices and data, will inform and enable control room staff to manage circuit performance and make optimal operational decisions informed by the system and applications (*i.e.*, DER monitoring, fault location analysis, restoration switching analysis, and load flow analysis).

Phase 2 will expand ADMS functionality for control and automation on a common platform for OMS/Advanced Applications and DSCADA. OMS hardware and software will be refreshed, and functionality will be incorporated into a common model with the DMS applications. DSCADA will be built, implemented, and integrated with the ADMS platform. As the Company progresses system adoption and maturity, ADMS functionality will be extended in line with National Grid's operational roadmap with full automation, DERMS, and mobile interface features.

The capability improvements expected to accrue during the ADMS/DSCADA project include:

- Enable system operations to maintain or improve reliability under the growing system complexities associated with the integration of DER
- Create a platform to enable utilization of exponential growth of remote monitoring, control, and distribution automation
- Assist in creating efficient system operations and the potential to defer capital investments where possible
- Refresh end-of-life hardware and software for the OMS
- Integrate DSCADA system with OMS to receive real-time data, thereby improving outage response
- Interface with DA devices and grid edge sensing/AMI
- Allow integration of current stand-alone systems used on the distribution system for advanced functionality related to DA schemes (*i.e.*, FLISR and VVO).

- Support operational and market-facing functions of a DSP and enable the future investment in DERMS.

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

National Grid believes that the effective dispatch of DER enables an optimized solution based on system security and economics. This functionality begins with ADMS and progresses through DERMS functionality. Both ADMS and DERMS enable markets and provide situational awareness to the grid operator and facilitate the management of NWAs, Term-DLM, energy storage, and other DER.

# 5.4 Energy Storage Integration

The following responds to DPS Staff's request to provide additional details specific to ESS resources.[94]

**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.**

Please see the link to the latest NY-SIR interconnection queue for National Grid for projects below 5 MW:

http://www3.dps.ny.gov/W/PSCWeb.nsf/All/286D2C179E9A5A8385257FBF003F1F7E

Please also see the link below to access NYISO's interconnection queue spreadsheet where National Grid is identified as "NM-NG" in column L of the spreadsheet:

https://www.nyiso.com/interconnections

**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 into the utility's long-range energy storage 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; and,**
- **f. next steps with clear timelines and deliverables.**

Information below is based on projects either with a signed letter of intent to proceed, under construction or operation:

Please refer to Table 5.4-1 below.

[94] DSIP Proceeding, 2018 DSIP Update Guidance, pp. 13-15.

*Table 5.4-1: National Grid's Plans to Implement and Operate Beneficial Energy Storage*

| **Project** | **North Troy** |
|---|---|
| Description | 3 MW 2 MWh LI-ION Battery |
| Use Case | Distributed Peak Reduction, Wholesale Market Participation (anticipated), Power Quality (anticipated) |
| Original Schedule | Anticipated in service by 12/31/18 |
| Current Status | Energized in December 2019 and anticipated full commercial operation by June 2020 |
| Lessons Learned to date | Challenges with permitting battery storage facilities |
| Adjustments & Improvement opportunities Identified to Date | N/A |
| Next Steps with Timelines & Deliverables | Complete full integration testing and commissioning and optimize unit operations; integrate with company operations and maintenance (O&M) |
| | |
| **Project** | **East Pulaski** |
| Description | 3 MW 2 MWh LI-ION Battery |
| Use Case | Distributed Peak Reduction, Reliability, Wholesale Market Participation (anticipated), Power Quality (anticipated) |
| Original Schedule | In service by 12/31/2018 |
| Current Status | Full commercial operations for local grid needs; currently registering in NYISO wholesale markets |
| Lessons Learned to date | Requirements to participate in wholesale markets still evolving and additional effort to understand and verify compliance to NYISO market rules. Learned from tests performed to understand reactive capability of battery storage systems. |
| Adjustments & Improvement opportunities Identified to Date | Have continued to refine short-term planning and operations of facility with Company's Planning, Operations and O&M departments and adjust operational parameters of unit controls to automate unit dispatch to meet local grid needs. |
| Next Steps with Timelines & Deliverables | Complete NYISO registration and begin participation in NYISO wholesale markets and gain experience with dual participation by also simultaneously addressing local grid needs. |

| Project | Pine Grove |
|---|---|
| Description | NWA Solution using PV + battery ESS |
| Use Case | 10 MW of load relief to maintain loading on Pine Grove Substation below TB1 Summer Emergency rating, such that in the event of an outage on TB2, TB1 is not overloaded |
| Schedule | Need date: June 1, 2020 |
| Current Status | Contract negotiations underway |
| Lessons Learned to date | Evaluation of proposals with multiple internal stakeholders provides a robust review of potential solutions. Improvements to the RFP help National Grid understand the proposed solution more thoroughly and the response format requested allows a more efficient review of the proposals. |
| Adjustments & Improvement opportunities Identified to Date | Continue to improve RFP and include more commercial aspects as determined by contract negotiations. Develop standard contract language. |
| Next Steps with Timelines & Deliverables | Complete contract negotiations and move to project implementation and interconnection. |
| **Project** | **Old Forge*** |
| Description | 20 MW and 40 MWh battery |
| Use Case | Form a Microgrid for reliability and participate in the NYISO markets |
| Original Schedule | Installed and operational by end of 2022 |
| Current Status | Selected winning bidder and started contract negotiations |
| Lessons Learned to date | TBD |
| Adjustments & Improvement opportunities Identified to Date | TBD |
| Next Steps with Timelines & Deliverables | TBD |
| **Project** | **North Lakeville*** |
| Description | 10 MW and 20 MWh battery |

| | |
|---|---|
| Use Case | Voltage support following N-1 contingency and participate in the NYISO markets |
| Original Schedule | Installed and operational by end of 2022 |
| Current Status | Selected winning bidder and started contract negotiations |
| Lessons Learned to date | TBD |
| Adjustments & Improvement opportunities Identified to Date | TBD |
| Next Steps with Timelines & Deliverables | TBD |
| **Project** | **Gilman Town** |
| Description | 5 MW and 20 MWh battery |
| Use Case | Form a Microgrid for reliability and participate in the NYISO markets |
| Original Schedule | 2025 |
| Current Status | Planning and BCA |
| Lessons Learned to date | TBD |
| Adjustments & Improvement opportunities Identified to Date | TBD |
| Next Steps with Timelines & Deliverables | TBD |
| Next Steps with Timelines & Deliverables | TBD |

* Old Forge and North Lakeville Projects are responsive to the Commission's directive in the 2018 Energy Storage Order that utilities secure dispatch rights for bulk energy storage projects strategically sited to address system needs.

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

In addition to the Company projects in the table above, National Grid includes a projection of third-party ESS additions in the 15-year feeder-level load forecasts used for system planning. ESS is forecasted in a similar fashion as solar, considering both policy targets and individual project economics. Currently, National Grid only forecasts solar PV coupled with ESS on the distribution system, based on the assumption that the paired systems will enroll in the Value Stack tariff. Total forecasted amounts generally align with the state's goals for energy storage, and National Grid plans to incorporate energy storage with more varied use cases over time as viable storage markets are developed.

**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[4];**

**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.**

National Grid has begun to leverage ESS within its operations and continues to look for opportunities to cost-effectively deploy ESS with a focus the following use cases:

- **Distributed (localized) Peak Reduction** – ESS can provide relief for a localized peak load issue (*e.g.*, station bank or feeder limitation). This would likely occur in a relatively small number of hours annually.
- **Demand Charge Reduction** – ESS can be installed BTM to reduce the peak demand of a given customer by dispatching during peak usage. The ESS would perform this function at targeted intervals in each billing period.
- **Wholesale Market Participation -** Energy, capacity, voltage regulation, operating reserves, and DR could be provided by ESS year-round.
- **Increased Hosting Capacity/Decreased Interconnection Costs** – ESS can increase the hosting capacity on any given feeder (depending on the limiting asset constraint) by charging with mid-day energy from a feeder with a high concentration of solar PV and then discharging during times of higher load. Such an ESS would likely be operated on daily cycles with seasonal variation.
- **Reduced Generation Intermittency**– Intermittent (often renewable) sources of generation can have a more limited number of use cases because they cannot be considered 'dispatchable.' By pairing ESS with these generation sources, the generation source's intermittency can be reduced, increasing the number of applicable use cases for these

existing systems and therefore their value. The ESS would likely perform some daily smoothing to maximize the operator's revenue.

- **Power Quality** – Flicker, harmonic filtering, voltage, and VAR support are functions that ESS could provide year-round.
- **Reliability** – Support for load transfers, preventing/responding to N-1 thermal/voltage impacts, grid stability, and black start capability are functions that ESS could provide year-round, with a specific focus on high-load periods.
- **Optimal Dispatch of Conventional Generation -** Many types of conventional generation have an optimal power output for fuel efficiency but may need to operate above or below that point at times to follow the load. Adding dynamically dispatched ESS can reduce the need for the generator to ramp up or down, allowing it to remain at optimal efficiency or even replace peaking units. The ESS could provide these functions year-round.

**4. 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.**

Many tools are currently and will continue to be utilized to integrate ESS into the planning and operations processes. For example, CYME's software application, CYMDIST EPRI Storage Value Estimation Tool (StorageVET®), and Quanta Technology's Energy Storage Planning Tool, are being used by National Grid in the analysis of demonstration projects

The Company also intends to utilize the short-term forecasting capability associated with its ADMS deployment to optimize scheduling and dispatch of ESS. As part of its bulk energy storage procurement of dispatch rights, the Company plans to procure consultancy, training, and market operations services from a third-party power marketer for the ESS.

**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.**

For the two energy storage projects currently in operation, EMS is used to monitor the projects' input/output power and control the interconnecting circuit breakers. In addition, the Company has access to the energy storage vendor's web portals and can make settings changes through it. It is expected that National Grid's functionalities will expand over the next five years via ADMS and Power Marketer integration.

**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 part of its future plans to develop short-term load and generation forecasting capabilities, the Company will consider how to incorporate operating information submitted during the utility interconnection process into its short-term forecasts. Energy storage resources, such as those that are co-located with solar PV generation assets, may have a reasonably predictable operating profile incentivized under the DRV and LSRV time windows specified by the VDER tariff. However, for energy storage resources that are more actively managed (*i.e.*, through the NYISO or utility programs) using detailed operating schedules established between the energy storage resource and the NYISO or National Grid can act as an input to the Company's future short-term load and generation forecast methods. Static and dynamic operating information of energy storage resources could potentially be coordinated between the Company's ADMS, DERMS, and the Company's short-term forecast application, as well as being considering during the Company's annual feeder-level forecast analysis.

**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.**

National Grid's System Data Portal currently provides much of the information needed to beneficially locate ESS, including hosting capacity, LSRV locations, NWA information, and system capacity data. As more data is made available to the Company (through increased system monitoring), every effort will be made to incorporate it into the portal, consistent with the Company's cybersecurity and customer data protection practices.

**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.**

National Grid is prepared to enter into seven-year dispatch contracts for 30 MW/60 MWh of storage to provide a combination of local grid support and wholesale market participation, well exceeding the 10 MW requirement of the 2018 Energy Storage Order. The Company looks for opportunities in its capital planning process to use storage cost-effectively across multiple system voltage levels. In addition to its efforts to develop the two Company owned and operated storage projects, the process improvements related to interconnection should facilitate customer owned and operated systems at a rate consistent with the State's goal of 3 GW by 2030.

**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, along with DPS Staff, have held weekly calls since January 2019 regarding the implementation of the 2018 Energy Storage Order directives, notably the directive for utilities to competitively procure dispatch rights to bulk energy storage systems. These calls have helped gain alignment, share lessons learned, and receive feedback from DPS Staff. Topics of discussion have included storage technology, bid ceiling variables, strategy, process, tariffs, and anonymized proposal reviews. In addition, NYSERDA has participated in several key meetings on similar topics.

The Joint Utilities Integrated Planning working group have future plans to discuss identification, software tools, and planning of energy storage for mid- to long-term grid needs.

# 5.5 Electric Vehicle Integration

The following responds to DSP Staff's request to provide additional details regarding EV integration.[95]

**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.);**

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

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

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

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

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

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

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

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

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

**k. the type and size of utility service needed to support the EV charging use case; region, area, substation, circuit, tap, and transformer**

National Grid has developed multiple scenarios in addition to a base case EV forecast, including forecasts representing the Annual Energy Outlook from the DOE, as well as meeting the state's ZEV MOU goals. These scenarios are useful for assessing the impacts of EV loads under different levels of adoption and incorporate different mixes and locations of EV charging infrastructure. The scenarios consider a mix of charging from both L1 and L2 infrastructure for National Grid customers. As stated in National Grid's 2018 DSIP Update, these EV charging loads are aggregated into the Company's aggregated load forecast.

As discussed in the forecasting section, National Grid is planning to introduce probabilities to each of these scenarios, to build a more holistic perspective on the projected demand at a feeder level from distributed loads such as EV charging. The current scenarios will be given a probability of occurrence, and the estimated probability of each scenario will provide a range of probable outcomes for EV charging at the feeder level. This probabilistic forecast will incorporate policy,

[95] *Id.*, pp. 16-18.

market, technology, and financial drivers to determine the likely outcomes for both hourly and multi-year forecasts.

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

National Grid has planned for EV charging use cases of all types throughout the territory, in order to provide a comprehensive suite of charging solutions for all customers. As outlined in the EV Integration section above, customers require many flexible options for EV charging, and accelerating the state's EV adoption goals require deploying a holistic set of charging solutions. To support this flexible network of charging solutions, National Grid addresses customer needs in these three areas:

- Commercial / Multi-User "Make-Ready"
    - Residential Charging Program
    - Fleet Charging Program

National Grid will also build upon its experience from Phase 1 of the EVCS program, its robust trade ally network, and other industry stakeholders to support new technologies and business models as they evolve throughout the planning period.

**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.**

The Company's Phase 1 EVCS program has worked closely with trade allies and site hosts to determine the least cost sites for deploying EV charging infrastructure. The EV forecasts are aggregated into the total forecasted load at the feeder level, and this data is used to determine the availability and costs for installing EV charging infrastructure at a potential site. The probabilistic forecasts going forward will provide "kW band" of projected hourly load at the feeder and system level, further enhancing the value in the discussions between National Grid, site hosts, and developers.

Additionally, the Company has begun building simulated transportation models to inform the EV charging needs for vehicles throughout the territory. This practice will give greater insight into both National Grid planning teams and our industry partners about where to install EV charging infrastructure. By placing EV charging infrastructure in highly traveled areas, these models help accelerate EV adoption, and help the state to achieve the ZEV goals.

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

As outlined in the EV integration section, the trade ally network has been a key factor in hitting the goals of Phase 1 of the EVCS program. The trade ally network of entities such as EV charging installers, electricians and equipment manufacturers have provided essential insight into the needs of the Company's customers. The Company's forecasting and planning efforts help accelerate the engagement process with trade allies and site hosts and simplify the process of finding low-cost areas for EV charging infrastructure.

The Company provides trade allies with EVCS program training materials, includes them in marketing and recruiting activities, and collaborates with them to build a combined experience in deploying EV charging infrastructure. The Company plans to continue to support these engagements with stakeholders with additional capacity forecasting details, to provide the lowest-cost EV charging infrastructure for all customers in the Company's service territory.

**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.**

Planning, implementing, and managing EV charging requires several types of data, including customer data, site host data, and system data. The Company's experience in Phase 1 of the EVCS program since 2018 provides a foundation to continue to build upon during the planning period. In particular, the main types of data for planning purposes are:

- *Expected EV charging demand and utilization.* The Company has operational data from Phase 1 of the EVCS program that informs both internal planning teams and interested third-parties. Phase 1 charging data gives greater insight into the charging loads, charging behaviors, and number of drivers by segment. The Company will also use this information to determine the level of charging at each customer type (Level 1, Level 2, or DCFC). This insight will continue to become more valuable as EV adoption grows.
- *Customer load profile.* The Company will need to have insight into the existing customer load profile in order to understand the impact of a proposed EV charging infrastructure installation. This load profile informs the customer about what type of charging to install, as well as system-level impacts. This type of load profile requires AMI.
- *Driving behavior.* As highlighted in question 3, traffic flow and driving behavior is important to understand when planning for EV charging infrastructure deployment. The Company is developing transportation modeling capabilities as part of the load forecasting process, which will inform system planners and third-parties about where EV adoption is likely to occur.
- *Siting of EV charging infrastructure.* Phase 1 of the EVCS program has provided insights into the cost components in installing EV infrastructure, and the costs can vary for those costs depending on where the charging ports are installed (*e.g.*,

trenching and cutting costs). The Company can help inform customers of these costs once the location is known, ideally early in the development process, in order to provide the lowest-cost solution.

- *Distribution asset load profile.* The Company 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, feeder, etc.

**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.**

This information can be found in Table 5.5.4 below provided in response to Question 6.

**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;**

*Table 5.5-1: National Grid's Charging Development Programs*

| National Grid's Phase 1 EVSC Program | |
|---|---|
| **Detailed Description of Initiative with Explanation of Alignment to National Grid's Long-Range EV Integration Plan** | In 2017, the Company received approval for an EV Charging Host Program to make capital upgrades to enable the installation of EV charging stations at commercial customers' properties, and to provide incentives to property owners to encourage the installation of these charging stations. This "make-ready" infrastructure program enables proactive investment in electrical infrastructure on both the utility and the customer side of the meter.<br>This program helps meet the state's ZEV goals by 2025 and helps to reduce GHG emissions throughout the Company's territory, accelerating achievement of CLCPA goals. It has enabled commercial customers such as retailers, workplaces, fleet operators, and apartment owners overcome the costs of installing EV infrastructure. |
| **Original Project Schedule** | Approved in the Three-Year Rate Plan Order for implementation over the rate years (FY 2019-2021). |

| | |
|---|---|
| **Current Project Status** | The program set a target of deploying up to 490 L2 ports in 3 years based on the approved budget. The program exceeded that goal approximately a year early and, as of Q1 2020, the program had enabled more than 900 L2 ports across approximately 130 customer sites.<br>The program currently has a waiting list equal to more than 200 ports and the Company receives approximately 30 applications quarterly, as well as ongoing feedback from the vendor community indicating strong interest in continuing this program. |
| **Lessons Learned to Date** | Program participants (both site hosts and trade allies) have been satisfied with the process in Phase 1 of the program.<br>Program incentives have been important for customers to make the commitment to installing EVSE.<br>Third-party trade allies have been crucial in engaging with customers and site hosts; their training, marketing and experience have helped accelerate the deployment of EVSE.<br>Flexibility is important, to react to technology changes, local policy changes, or permitting challenges. The Company has helped stakeholders navigate this process and will continue to do so to provide a seamless transition to electric transportation. |
| **Project Adjustments and Improvement Opportunities Identified to Date** | Identify charging locations early in the development process in order to reduce the site installation costs such as trenching and cutting. |
| **Next Steps with Clear Timelines and Deliverables** | The Company will continue to manage the program to its completion, in order to deploy as many EVSE ports as possible throughout the territory. These more than 900 EV charging ports have helped the state meet it ZEV goals, as well as have a significant impact on its GHG reduction goals. |
| | National Grid's Proposed Phase 2 EV Program |
| **Detailed Description of Project with Explanation of Alignment to National Grid's Long- Range EV Integration Plan** | The Company is proposing a robust EV portfolio in its service territory comprised of three components to address commercial/multi-user, residential, and fleet charging needs with a goal to accelerate EV adoption and support the State's ZEV and broader climate goals.<br>The proposed EV program will address three key areas:<br>- A Commercial/Multi-User EVSE "make-ready" program to significantly increase the number of charging ports at multi-user sites, such as workplaces, retail locations, and public parking areas, within the Company's service territory<br>- A Residential program to provide simple, low-cost monthly pricing for EV charging and to increase the availability and ease of networked L2 charger installation to customers at their residences. This program allows the Company to prepare for significant EV adoption by influencing customers to charge their cars off-peak, thereby minimizing infrastructure upgrades that may become necessary |

| | |
|---|---|
| | - A Fleet program to assist fleet operators in electrifying their light duty and medium-heavy duty vehicles through advisory services, fleet "make ready" infrastructure support, a dedicated SPOC at the Company to establish a smooth customer experience, and an electric school bus rebate program to assist underserved LMI and EJ Communities |
| **Original Project Schedule** | The Company is proposing a four-year program. |
| **Current Project Status** | Developing a proposal for submittal before the Public Service Commission. |
| **Lessons Learned to Date** | N/A |
| **Project Adjustments and Improvement Opportunities Identified to Date** | N/A |
| **Next Steps with Clear Timelines and Deliverables** | The Company anticipates developing new EV charging solutions for the solutions outlined above, with the following goals:<br>- Commercial / Multi-User "Make-ready": Enable the deployment of at least 20,000 Level 2 ports as well as up to 600 DCFC ports at 100 sites<br>- Residential Charging Program: a smart-charging plan to reduce electricity costs through fixed monthly pricing and load management for up to 20,000 customers<br>- Fleet Vehicle Program: Fleet assessment services to help ~100 customers navigate the complex electrification transition, fleet-ready infrastructure support for ~50 customer sites, LMI and EJ Communities Electric School Bus Support for ~25 school buses, as well as a dedicated SPOC for Fleet customers |

**7. Explain how the JU 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 collaborate closely on market trends, new EVSE technologies, best practices, and stakeholder engagement. The Electric Vehicle Working Group is the primary forum for coordination between the utilities on EV specific topics. The release of the DPS Staff *Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment* in January 2020 provided an opportunity for the Joint Utilities to discuss best practices for deploying EVSE infrastructure, costs related to electrical system upgrades for "make-ready" infrastructure, and how to accelerate EV adoption in the state.

The Joint Utilities also presented at the first EV Make-Ready Technical Conference in April 2020, hosted by DPS Staff. The conference provided a venue for the Joint Utilities to give perspective on the core principles in EV make-ready design, key success factors in implementation, load serving capacity maps, and program application processes.

As more programs are put in place across the state, and as EV adoption grows, the EV Working Group will continue to coordinate on key success factors, program administration, cost containment, industry engagement and EV charging technology evolution.

**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.**

The Company has been engaged with NYSERDA, NYPA, NYSDEC, and DPS Staff through the implementation of Phase 1 of the EVCS program and will continue to do so throughout the rest of the program. National Grid has worked closely with those agencies as customers go through the process of installing EVSE on their premises, and the Company has kept the process as streamlined as possible through phase 1 of the program.

The Joint Utilities Electric Vehicle Working Group has also collaborated closely with these organizations in the first half of 2020, including many discussions following the release of the DPS Staff *Whitepaper Regarding Electric Vehicle Supply Equipment and Infrastructure Deployment*. The Joint Utilities were also active participants in the series of EV Technical Conferences hosted by DPS Staff in April 2020.

# 5.6 Energy Efficiency Integration and Innovation

The following responds to DSP Staff's request to provide additional details regarding EE integration and innovation.[96]

**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.**

Existing DLM and EE programs can provide cost-effective load relief in constrained areas and National Grid is integrating programs such as EE and DLM into NWA assessments. DR/EE sales representatives work with the NWA procurement team to contact customers and use enhanced incentives and/or targeted marketing strategies to reduce the load in identified areas. This initial contact is especially important for the expansion of the CSRP in constrained areas, where participation in DR/EE can be achieved through initial marketing that provides rebates for participants and effectively lowers costs for all customers. The CSRP is activated for peak-shaving purposes and can be used to value constrained areas. National Grid is working internally and with DPS Staff to determine the next steps in this valuation.

The Company's EE team works closely with the Forecasting and Distribution Planning teams to share data and consider opportunities to further integrate EE, DR, and NWA. The realized load reduction from DR/EE has the potential to reduce the magnitude of an NWA solution requirements, thereby having the potential to drive down the cost of the NWA procurement. For additional information about the coordination between DR/EE and NWA areas, please refer to Section 2.14, Procuring Non-Wire Alternatives, of this 2020 DSIP Update.

National Grid maintains a workflow system that stores energy and demand savings by customer location. Monthly data is currently aggregated and reported in a SEEP scorecard report on a quarterly basis under Case 15-M-0252 – In the Matter of Utility Energy Efficiency Programs National Grid – Quarterly Clean Energy Dashboard Scorecard Reports.

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

Aggregated monthly energy savings data is shared publicly via the DPS Scorecard Reporting Process. Table 2.6-1 provides the energy savings achieved annually by National Grid for 2018 and 2019.

[96] *Id*., pp. 18-19.

*Table 5.6-1: National Grid Energy Savings Achieved Annually for 2018 and 2019*

| | **2018** | **2019** |
|---|---|---|
| | | |
| Energy Efficiency Gross Savings (MWh) | 343,692 | 398,761 |
| Energy Efficiency Net Savings (MWh) | 309,323 | 358,885 |

**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.**

In the short term (one to five years), the Company uses the approved program targets as the anticipated impact of EE on the forecast. Over the longer term it reviews state policy and other market information including regional NYISO EE projections in developing outer year forecasts. The amount of future energy and peak load reductions are based on the approved program savings and an extensive evaluation of historical program impacts. Forecasts are provided at both the Company level and at the level of the regional NYISO zones. The Company continues to assess ways to utilize data in more granular level forecasts. Its proprietary EE workflow system can provide project level EE measure installation data for each participant.

National Grid uses short-term forecasts to initiate DR events. As per the DLM tariff, "Planned Events may be called when the Company's day-ahead forecasted load level is at least 92 percent of the Company's forecasted summer system-wide 95/5 peak."

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

The Company's current EE programs are managed to achieve system wide benefits. Currently, National Grid is assessing enhancements and new measures to offer through the portfolio to impact more targeted needs in the electric system and reduce costs for customers. These include things such as new measures that impact system peak loading and additional incentives for locations in constrained areas.

**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.**

Customers are able to use the Green Button Download My Data tool for downloading energy consumption data. The customer may then share their data with an emerging array of online applications and benchmarking tools to make more informed energy decisions which could include EE measures.

National Grid is working towards using residential customer energy consumption data, with appropriate data security standards and anonymization, for conducting propensity modelling and identifying locational and site energy savings potential across target areas. Insight from propensity modeling facilitates the design of targeted and customizable EE offerings that can provide customers and the Company with deep energy savings while improving the efficiency of program delivery methods. National Grid is evaluating third parties capable of delivering these services. There is growing promise in the potential of Real Time Energy Management ("RTEM") services and offerings across the small commercial, large commercial and retail customer segments. National Grid is exploring opportunities for strategic analysis of constraints, consumption, and load data to identify commercial customers and areas of high energy efficiency potential and grid benefits, and partner with RTEM providers who could deliver services tailored to customer needs.

**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.**

National Grid participates in ongoing proceedings implementing New York State energy policies and seeks to be recognized as a leader devoted to transforming the way our customers heat and cool their homes, offices, and buildings to reduce emissions and combat climate change. In compliance with the ambitious EE and electrification goals authorized by the NENY Order, National Grid will continue to invest to achieve on these goals and provide long-term benefits for customers.

As part of the process to support NENY, National Grid will continue to participate in the heat pump and LMI management committees that guide implementation through a collaborative State-wide approach. Additionally, through participation in the upcoming Performance Management and Improvement Process, the Company will look to gain and share best practices regarding program management. Through these and other collaborative opportunities, the Company looks forward to creating actionable program frameworks to meet the objectives of State energy policies. National Grid's approach to planning its EE offerings will be aligned with the principles of REV and the NENY Order.

The Three-Year Rate Plan Order created a set of metrics that EE programs will influence. The Company is working to position its portfolio for success through innovation, partnerships, and expanded offerings. Specific examples of these initiatives are described in the Company's SEEP filing and progress will be reported through the existing reporting channels. To accelerate growth, National Grid is working to evolve its current offerings to be more responsive to the market and customer needs, while also introducing new technologies and delivery approaches that increase energy savings while also reducing costs. Existing programs that do not sufficiently meet customer needs and that can be substituted with more cost-effective or more sustainable business models will be discontinued at the Company's discretion. National Grid will continually evaluate its EE portfolio to ensure it is positioned for success.

**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 REV demonstration projects and the anticipated schedule for assessment.**

The Joint Utilities have pursued a variety of REV demonstration projects focused on developing a better understanding of how to effectively deploy innovative programs that include elements of EE. While the utilities are developing and implementing these REV 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 smart home rates with accompanying home energy reporting capabilities, building efficiency initiatives, and incentive programs for demand reduction. The Joint Utilities have identified two key mechanisms that can be used to boost customer participation and engagement in EE initiatives and enable new utility business models. The first is to provide customers with greater visibility into both their own energy use patterns and the wide variety of available products and services tailored to their energy needs. The utilities' smart metering, demand reduction, and behavioral program providing customer home energy reports are examples of offerings that advance engagement, motivating customers to take control of their energy use and management, and enabling utilities to successfully meet their EE commitments. The second mechanism is building specific awareness of EE opportunities through carefully crafted marketing strategies. These may include project-specific incentives for large C&I customers; distribution channel partnerships with ESCOs, retailers, and contractors; new homeowner and school-based education and awareness initiatives; and targeted marketing to customers through the online marketplace platform, based on customers' usage patterns and specific energy needs. Building on these valuable findings, several successful business models tested in the Joint Utilities' the following demonstration projects that are described in more detail in the "Progressing the Distributed System Platform" chapter highlight the energy efficiency components and the associated expansions.

The P4P EE pilot is a new program that will spur deep EE retrofits in residences by incentivizing "Portfolio Managers" (*i.e.*, EE aggregators) to focus on this underserved market. National Grid's P4P pilot will focus on single-family homes in a three-county area surrounding the City of Syracuse. Lessons from the P4P EE pilot, which will be implemented in 2021, will help evaluate the energy efficiency model's potential for scalability across other residential segments, beneficial outcomes of third-party partnership, alleviation of financial market challenges, and shared value between utility actors, customers, market and third-parties. The P4P pilot will also encourage EE service providers to drive existing rebate offerings such as heat pumps towards a higher adoption of both deep EE measures and electrification of heat.

**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 actively coordinated their EE program design and implementation since the Commission's May 2007 *Order Instituting an Energy Efficiency Portfolio Standard* ("EEPS Proceeding")[97] and this coordination continues today with formal and informal teams addressing all aspects of the REV and Clean Energy Fund ("CEF") Proceedings. As part of their continuing coordination efforts, the Joint Utilities participate in a working group in which they 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 smart home rates. 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. These efforts include focus on the development of and outcomes from demonstration projects, to minimize duplicative efforts and ensure the sharing of lessons learned from each utility demonstration project with all of the Joint Utilities. The Joint Utilities remain committed to continuing this coordination to further support the diversity of EE programs across the state, and to achieve the new EE targets through 2025 as part of the NENY initiative.

**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 continues to collaborate and initiate projects to supplement Commission orders and to develop new or improve existing offerings. For example, NYSERDA and National Grid successfully piloted a community-based event in 2019 that provided EE, DER, and bill assistance services to LMI customers, as well as additional external community resources. The Company and NYSERDA are currently evaluating the pilot to scope possibilities for future years. As mentioned above, NYSERDA and National Grid continue to work together on a P4P demonstration to increase EE offerings and test an Advanced M&V Platform to increase the accuracy, persistence, and reliability of EE savings. Through this effort, the Company has established replicable ways of working, such as new protocols for joint procurement processes with NYSERDA, which will facilitate future collaboration of this sort.

National Grid also continues to coordinate and collaborate with NYSERDA on residential high efficiency heating equipment and multifamily offerings to drive efficiency, eliminate duplicative

[97] Case 07-M-0548, *Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard* ("EEPS Proceeding"), Order Instituting Proceeding (issued May 16, 2007).

efforts, address market gaps, and better meet customer needs. For example, National Grid's sales team is sharing information regarding the NYSERDA RTEM program with eligible customers.

# 5.7 Distribution System Data

The following responds to DPS Staff's request to provide additional details which are specific to distribution system data.[98]

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

National Grid has conducted stakeholder meetings on the improvement and evolution of the Hosting Capacity maps. These stakeholder meetings are being used to develop the roadmap for Hosting Capacity Stage 3.X and 4.0. It is discussed in greater detail in the Hosting Capacity section of this 2020 DSIP Update.

Stakeholder meetings were held to develop the NWA website and make sure the proper data is being supplied to NWA developers. Stakeholder input will be solicited to improve and refine the data available on the NWA website and the NWA tab of distribution system portal. More discussion on NWA website and NWA mapping is in the Beneficial Locations for DER and NWA and Procuring NWA chapters of this 2020 DSIP Update.

**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.**

As described throughout this section, a wealth of system data is provided via National Grid's public System Data Portal. National Grid provided password protection to its System Data Portal. This allows us to control access and track who is using our data. However, not all data can be publicly shared due to legal, regulatory, system security, and/or privacy considerations. For data not on the System Data Portal, DER developers may request information from the Company via a Request for Information ("RFI"), and the Company will evaluate and respond to the request on a case-by-case basis. RFIs should be submitted via the appropriate project manager or customer representative assigned to the project. If the project does not yet exist, inquiries should be submitted via the National Grid customer service line (1-800-642-4272), where it will be directed to the appropriate party.

In addition to data on the System Data Portal, National Grid updates interconnection queue data monthly via filings with the Commission in compliance with the requirements set out in the NY-SIR.

**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.**

[98] DSIP Proceeding, 2018 DSIP Update Guidance, pp. 20-21.

A wide range of information is available to DER developers in a self-serve fashion from National Grid's System Data Portal. The Company continually looks to improve the portal and over the coming years further enhancements will be made such that each tab on the portal will provide the ability for the user to navigate, view, sort, filter, and download the data in a standard format such as .csv.

**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.**

In general, National Grid will continue to provide data on the portal as it becomes available. Please see Table 4.7.2 for the Planned Additions to System Data Portal Table.

**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.**

The method for distribution is via an RFI response and may require the execution of a Non-Disclosure Agreement. Data Security Agreements ("DSAs") may also be required in certain circumstances.

**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.**

System data is presented publicly via the System Data Portal, or in response to individual RFI requests. National Grid has not yet identified any fee-based data sets. However, the Company reserves the right to charge a fee for the provision of data that is outside of or above and beyond that which the Company uses for its business (*i.e.*, value-added services). The Joint Utilities are currently discussing under what scenarios advanced datasets would be provided.

**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 System Data Working Groups will continue focusing on updates to and consistency of individual utility system data portals, as well as refinement and/or expansion of system data use cases to better meet stakeholder needs. The Joint Utilities System Data Working Groups have and continue to collaborate to align on data provided and formats to the extent possible.

**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.**

Wherever possible the Joint Utilities coordinate to maintain commonalities amongst the data available on each utility's System Data Portal. However, due to differences in the utility systems and data availability, total consistency is not always possible. Where there are inconsistencies, the Joint Utilities strive to mitigate to the extent possible to do so.

# 5.8 Customer Data

The following responds to DPS Staff's request for additional details specific to customer energy consumption and production data.[99]

**1. Data Types, Description and Management Processes**

**a. Describe the type(s) of customer load and supply data acquired by the utility.**

National Grid collects and maintains electric consumption and demand data along with gas consumption data for its customers. The type of customer load and supply data acquired by National Grid varies by customer rate class. Basic data for non-interval-metered customers includes cumulative kWh, net or accumulated kWh, and maximum recorded kW (if a demand meter is present).

In an effort to promote EE opportunities for customers, National Grid is working with the US Environmental Protection Agency ("EPA") to make it easier for customers to use the EPA's ENERGY STAR Portfolio Manager® benchmarking tool. Portfolio Manager® is an interactive web-based energy management tool that allows building owners or property managers to track and assess energy and water consumption across an entire portfolio of buildings.

National Grid has implemented the ENERGY STAR Portfolio Manager® which will support the 4/50 whole-building aggregated data privacy standard. The only exception to this 4/50 rule is in the event of a local ordinance or mandate that requires otherwise.

National Grid collects the following electric supply/generation data from revenue grade metering.

- Read Date & Days
- Read Type
- Total kWh
- Hourly kWh values
- Delivery Charges
- Supply Charges
- Late Payment Charges
- Total Charges
- Metered Peak kW
- Metered On-Peak kW

[99] *Id*., pp. 21-23.

**b. Describe the accuracy, granularity, latency, content, and format for each type of data acquired.**

All customers currently have access to their monthly energy usage and cost information through the National Grid Web Portal at https://www.nationalgridus.com

Additionally, Green Button Download My Data is available to all customers and provides the following monthly data dependent on customer rate class:

- Read Date & Days
- Read Type
- Total kWh
- Delivery Charges
- Supply Charges
- Late Payment Charges
- Total Charges
- Metered Peak kW
- Metered On-Peak kW
- Billed Peak kW
- Billed On-Peak kW
- TOU On-Peak kWh
- TOU Off-Peak kWh
- KVAR
- Load Factor

Green Button Download My Data can be accessed through the Track Usage link within the Your Account tab on the National Grid website. Monthly data is provided in XML format. National Grid also internally manages acquired data in its databases and provides internal reports in Excel format.

*Figure 5.8-1: Usage Tracking File Download*

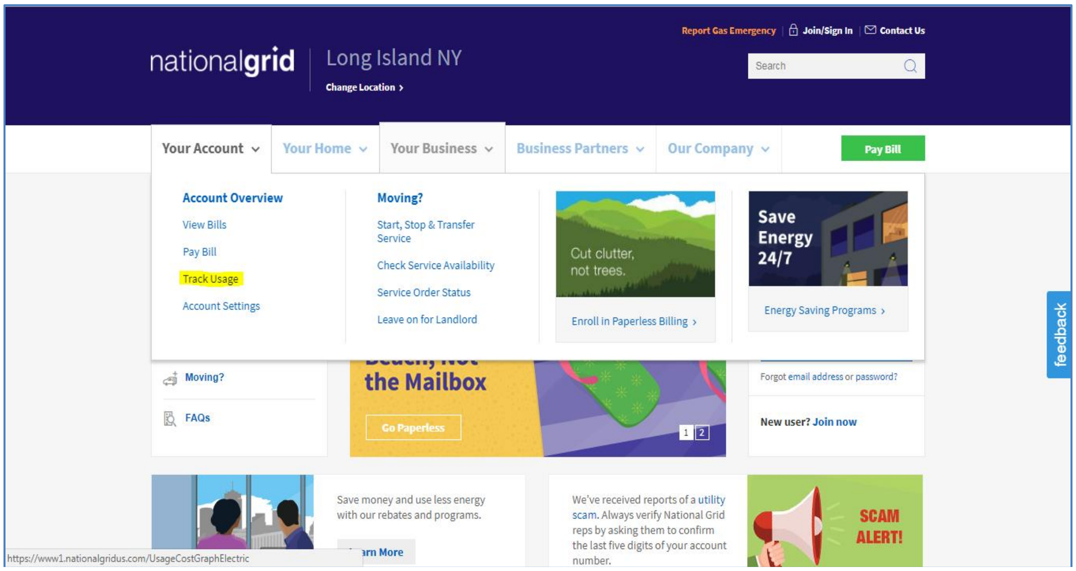


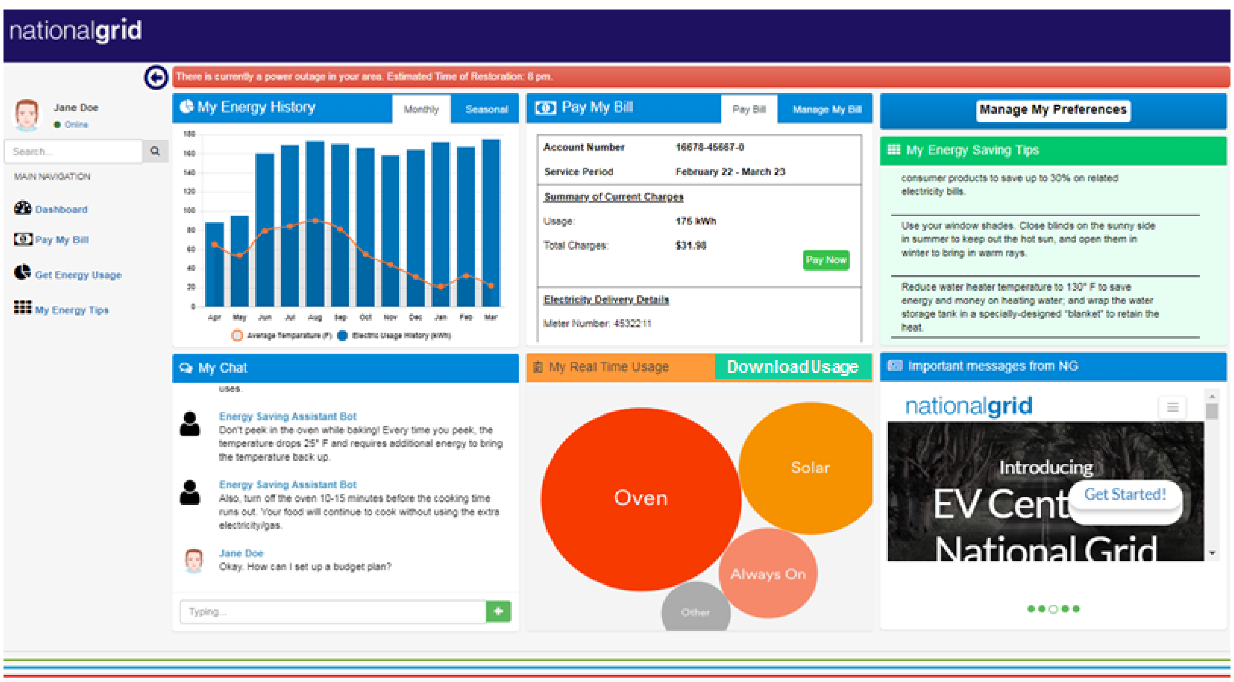

*Figure 5.8-2: Usage Tracking File Download*


National Grid customers have the ability to download their usage information directly through Green Button Download My Data and will be able to authorize third parties to access their data through Green Button Connect My Data which the company is currently implementing and plans to have operational by 3/31/2021. The Company expects to enhance the download capabilities using the Green Button Connect My Data as part of the CEMP once AMI is approved.

Within National Grid's Customer Experience Transformation portfolio of projects, an effort is underway to significantly improve the customers' digital experience. Included in this effort is the development of a customer portal in which the CEMP will be integrated. Additionally, with preference management and personalization capabilities, customers will be presented with a robust platform where they can access information about their account, manage their energy use, and view solutions that are relevant to them.

Figure 5.8-3 below is an example of what the customers may see within their portal. While this is illustrative only it generally shows what customers will experience in the future, and the natural fit with CEMP and Green Button Connect My Data.

*Figure 5.8-3: Customer Green Button Connect Data Portal*




*Illustrative only and not reflective of actual customer portal.

National Grid has proposed the following data latency solutions as part of the Company's AMI Business Case:

- Electric
  - Fifteen-minute intervals
  - Transmitted every 4 hours (6 times a day)

- Gas
    - One- hour intervals
    - Transmitted every 8 hours (3 times a day)

Building owners have additional options to access their whole building aggregated usage data for individual properties using the EPA ENERGY STAR portfolio Manager® aggregated data upload system.

- Bill month and year
- Billing Days
- Total therms or kWh
- Total charges
- Number of bills

**c. Describe in detail the utility's means and methods for creating, collecting, managing, and securing each type of data.**

National Grid acquires customer load (usage) data by capturing information into its billing systems and databases that is measured and recorded by the utility's billing meter for each customer account location. These can be interval, AMI, once approved, and/or register-read meters. There are differences in the type and granularity of the customer load and supply data acquired based on customer type, meter type, and the extent to which AMI has been deployed. In some cases – generally for C&I customers – additional data such as demand (kW) and reactive power data will also be acquired. As National Grid implements new technologies such as AMI, more granular (interval) data will be available and evolve the data-sharing mechanisms and standards, as appropriate.

The security of customer information is increasingly critical as more granular data is collected and analyzed to make data-driven decisions. Managing customer information requires implementing, enforcing and ensuring that security policies are followed and that security controls are in place. Security policies include least privileged access rights, secure code practices, and regular security reviews to ensure information is protected. Also, security control capabilities, such as encryption, vulnerability and virus scanning, configuration of technology to minimize available services, endpoint protection, and tracking and recording of assets that process personal data, will ensure the confidentiality, availability, and integrity of information. Security controls to monitor network and user activity reduce the risk of data loss and manipulation, and can produce alerts if anomalous activity is detected.

**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.**

EDI supports ESCO transactions today and National Grid is moving to use of EDI as permanent process for DER providers. The Company has included, as a requirement in RFPs for all AMI metering devices, the ability to support home area network ("HAN") integration. Vendors need to at least provide a roadmap to support HAN integration. This will allow the customer to securely obtain raw load and supply data directly from their AMI meter, once AMI is approved, through a variety of third-party devices located in the home. HAN data can be managed by the customer or provided to designated third-party agents at the customer's discretion.

The Company is currently working to implement Green Button Connect My Data. Green Button Connect My Data is an emerging industry standard that aims to empower customers and third parties to share historical energy and billing data. This platform is designed to provide a protected, safe, and easy to use means to share energy usage and billing data for a myriad of possible use cases. Green Button Connect My Data can support new customer energy management systems, energy saving DR programs, third-party DER development, and possible new pricing programs. The Company is also working with the other utilities in New York State to improve and streamline the onboarding experience for third parties and enable ease of customer authorization to share their data. The Company is currently working to implement GBC for all of its New York State customers and plans to have it operational in early 2021.

**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, only customers and their properly designated agents are deemed to be legitimate users who will be provided access to each type of data.

**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.**

The data the Company is working to make available to customers are intended to help them better manage their energy needs. Enhanced customer data can support enrollment in EE and DR opportunities, customer impact analysis for investments in renewable generation and energy storage, the assessment of alternate rate designs enabled by AMI and customer owned technologies such as home/building energy management systems. To ensure the available data fully meets customer needs, the Company actively engages with customers and stakeholders to discuss use cases and remain customer centric. For additional information, please refer to the Customer chapter in this 2020 DSIP Update.

**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.**

Sharing customer data with third parties plays a key role in the success of third-party partnerships. This includes ensuring that data can be shared safely, securely, and in a timely fashion. Effective security practices and policies must be in place on both sides, at National Grid and at third parties that are leveraging customer data. To ensure this, security architects will evaluate the security controls in place as it relates to third-party systems and practices prior to sharing customer data. Third parties must ensure that customer data is only used for the purposes that are defined, that it is stored in a safe and secure manner and is deleted upon the end of its usefulness. Controls must be in place to ensure that data is not intercepted or manipulated in transit between National Grid and third parties and that data integrity is maintained. A contractual agreement must be established between National Grid and third parties to ensure that both parties understand the nature of the data being shared and responsibilities are established, access control policies are in place, and reporting and notifications are provided in the event of a cyber breach or incident.

Additionally, National Grid has developed policies, standards and guidelines that govern data access and the protection of sensitive information which requires information to be classified appropriately and protected in accordance with the classification. National Grid's Data Privacy Policy states that personal information will not be disclosed unless:

- The disclosure is fair and lawful and consistent where appropriate, with the notified purpose(s); or
- The individual has given appropriate 'consent'; or
- The disclosure is necessary e.g. in the individual's vital interest; or
- The disclosure is covered by 'exemption' from any relevant legislation.

Transfer of any customer information to selected external third parties will only take place if (in addition to the other relevant policy / implementation framework requirements) the third party agrees as a minimum to:

- Process personal information strictly in accordance with the business' instructions.
- Comply with relevant privacy laws and the business' policies and procedures.
- Implement appropriate security measures to deliver the required levels of protection.
- Seek permission from the relevant National Grid business for further onward transfers (*e.g.*, to sub-processors).
- Promptly report any breaches, risk, or issues to personal information to National Grid.
- The businesses right to audit for compliance and
- On termination of the agreement either return the personal information or dispose of it securely.

**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 developers. Since the filing of the initial DSIPs, the Joint Utilities have collaborated in the Customer Data Working Group to advance several customer data efforts, including:

- Submitting two joint filings on customer privacy standards and approaches.
- Defining data sets and costs in support of CCA efforts through development and filing of CCA tariffs.
- Working with DPS Staff and NYSERDA on UER and appropriate privacy standards.
- Providing comments in response to the Commission's notice regarding Uniform Business Practices for DER Suppliers (UBP-DERS).
- Evaluating potential opportunities for aggregated data automation and developing whole-building owner aggregated data access and privacy standards and
- Engaging with stakeholders to solicit feedback and inform future customer data needs and means of accessing that information.

Currently, there are a number of channels through which customer data is shared with customers and their authorized third parties. These include utility bills, Green Button Download My Data, Green Button Connect My Data, EDI, UER, Secure File Transfer Protocol ("SFTP"), File Transfer Protocol with Pretty Good Privacy ("PGP") Encryption, online third-party data platforms, and the data identified in UBP-DERS.

Also, in compliance with the December 13, 2018 *Order Adopting Accelerated Energy Efficiency Targets*, the Joint Utilities collaborated with DPS Staff and stakeholders to support the development of joint Green Button Connect My Data (please see the section below regarding Green Button Connect My data below) GBC terms and conditions ("T&C"). On October 16, 2019, the Joint Utilities submitted a "Joint Utilities State Report on Green Button Connect My Data" with a proposed joint GBC Terms and Conditions (T&C.) On October 17, 2019, the Commission approved a modified version of the Joint Utilities' data security agreement ("DSA"). The Company, along with the other Joint Utilities, have agreed to ensure that all third parties sign and agree to this DSA which will ensure the proper protection, storage, and use of customer data.

On March 19, 2020 the Commission initiated Case 20-M-0082, *Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data*.[100] DPS Staff released two whitepapers in the proceeding on May 29, 2020.[101] National Grid is looking forward to working with the Commission, DPS Staff, customers, and stakeholders to develop a Data Access Framework that supports New York State's ambitious energy policies.

**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.**

Customer data will be shared with third-party participants to enable informed decision-making but doing so also increases the risk of data loss, theft, or corruption of the associated data. National

[100] Energy Related Data Proceeding, *supra* note 57.
[101] *Id.*, *supra* note 58.

Grid will have in place capabilities and processes that reduce this associated risk and enable the safe and reliable use of customer data for its many applications. These capabilities include advanced log management, alerting, and real-time analytic functionality that interrogate network infrastructure, detect suspicious devices and remediate at-risk endpoints. Monitoring capabilities identify endpoints and monitor network traffic and user activity to reduce the risk of malicious activity and associated potential for data loss. Standardized policies for identity and access management, enforcement of least-privilege access (ensuring that users only have access to the information and functions necessary to carry out their job function), ensuring appropriate authentication and authorization of users that can access customer data, and monitoring of privileged access place limitations to what users have access to and thereby limit the risk of insider threats. Additional controls, such as encryption of customer data at rest or transit, tracking and recording of assets that process personal data, virus and vulnerability scanning, penetration testing of assets, and staff training and awareness, will be in place to minimize the risks associated with loss, theft, and corruption of customer data.

It is critical to ensure that third parties who have access to information have adequate security policies and capabilities in place to safeguard customer data. Risk assessments are completed by security architects to provide a view of security controls that are in place and those that need to be implemented to address any residual risks. Third parties must be able to ensure that access to National Grid's information and related customer data is restricted to those granted such access, that the data is not further shared outside of those so authorized, and that it is deleted when the data is no longer required. A contractual agreement is established between National Grid and third parties to ensure that both parties understand the nature of the data being shared, responsibilities are established, access control policies are in place, and reporting and notifications are provided in the event of a cyber breach or incident. National Grid is a strong advocate of requiring third parties such as ESCOs and DER Suppliers to have DSAs and contractual agreements in place to protect customer data.

**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.**

Aggregated community-level energy data will be provided for NYSERDA's UER at no charge, consistent with the Commission's *Order Adopting Utility Energy Registry*.

**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 general, National Grid proposes that any Value-Added Data (including aggregated data) provided to third parties should be provided only for a fee. Value Added Data has one or more of the following characteristics:

- It is not routinely developed or shared.

- It has been transformed or analyzed in a customized way (*i.e.*, aggregated data).
- It is delivered more frequently than Basic data.
- It is requested and provided on a more ad hoc basis and/or
- It is more granular than Basic data.

The Company has not proposed fee structures for Value Added Data except for fee structures for CCA data as required in the CCA tariffs.

Current exceptions are the provision of whole building data uploads to EPA's ENERGY STAR Portfolio Manager® for purposes of assisting building owners in complying with Local Law 84 for National Grid's downstate NY gas affiliated and community-level aggregated datasets provided by National Grid for NYSERDA's UER.

**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.**

Currently, there are a number of channels that share customer data with customers and their authorized third parties. These include utility bills, Green Button Download My Data, EDI, UER, SFTP, online third-party data platforms, and the data identified in UBP for DERs. The Company believes these channels are consistent with the means and methods at the other utilities. All the utilities are consistently applying aggregated data privacy standards approved by the Commission for general aggregated data, whole building aggregated data and community-level aggregated data. The Joint Utilities are also aligned on methods to share aggregated customer data to NYSERDA's UER.

**j. Describe in detail the ways in which the utility's means and methods for sharing customer data with third parties are <u>not</u> highly consistent with the means and methods at the other utilities. Explain the utility's rationale for each such case.**

The Joint Utilities are working together to develop a statewide standard in phases, with the understanding that utilities will have different starting points. Utilities implementing full AMI solutions plan to provide basic customer usage data to customers via online platforms and to customer-authorized third parties using the Green Button Connect My Data standard or a comparable specification. Utilities not implementing full AMI solutions expect to provide basic customer usage data to end-users via Green Button Download My Data or an alternative specification. The Joint Utilities will continue to leverage existing platforms, including EDI, SFTP, and online customer engagement platforms.

National Grid's downstate NY gas affiliates are utilizing EPA ENERGY STAR Portfolio Manager® uploads of whole building aggregated data to assist building owners in complying with Local Law 84. Utilities that do not have building owners who need to comply with a local ordinance may choose not to share whole building data using this method.

**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.**

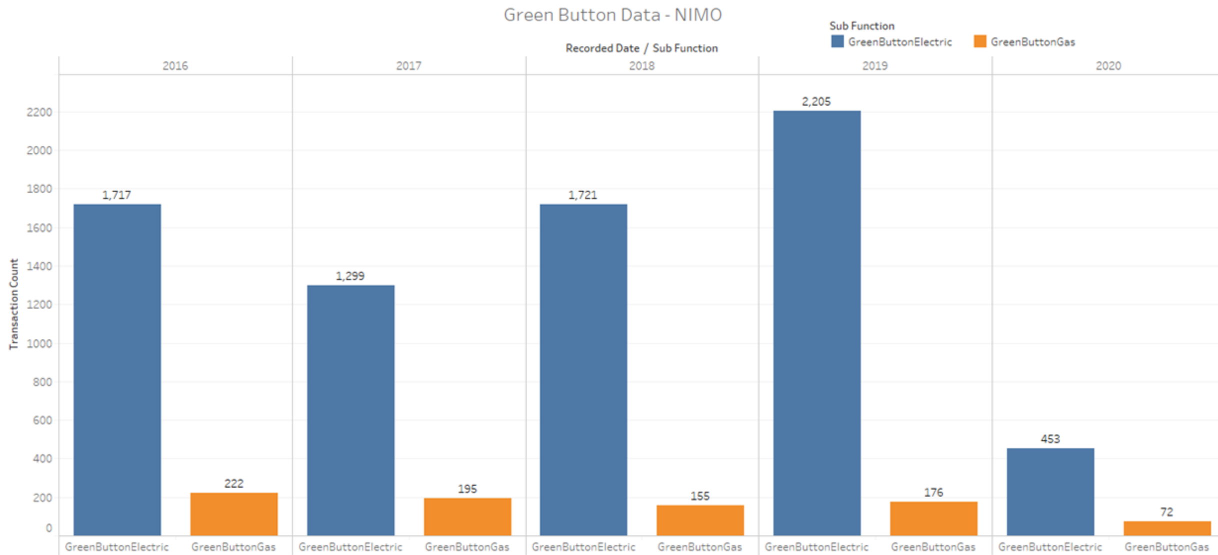
National Grid is currently implementing Green Button Connect My Data and plans to have this platform and service up and ready by 03/31/2021 as per the Company's Three-Year Rate Plan Order. The Company is working with the Joint Utilities to improve the customer authorization process and streamline the third-party onboarding experience for GBC to ensure a better user experience for sharing customer data. Third parties will be able to access customer data once a customer has authorized a selected third party. Also, once a third party signs off on the appropriate third-party terms and conditions and DSA, third parties will then be granted access to historical customer energy data. This data however is only available on monthly reads via the Company's AMR meters. If AMI is approved the Company plans to share more granular data on a more frequent basis. The Company is still planning on implementing Green Button Connect regardless of AMI approval, however it has been noted by many third parties that more frequent and granular energy and billing data would be more helpful to serve customers. The Company is incorporating AMI planning into its GBC implementation in hopes that AMI is approved in 2020.

**b. Describe how the utility is making customers and third parties aware of its GBC resources and capabilities.**

National Grid has developed a detailed AMI Customer Engagement Plan that will address all customer-related components of the proposed AMI deployment, including Green Button Connect My Data functionality. While AMI has not yet been approved, National Grid is still developing plans to make both customers and third parties alike aware of Green Button Connect My Data in order to make for a success launch. As previously stated, National Grid is planning to have GBC implemented by 03/31/2021 and as such there will be an updated website for both customers and third parties to provide authorization and gain data access accordingly.

When Green Button Connect My Data functionality is available, National Grid also proposes to track customer utilization and third-party authorizations provided. Similar to Green Button Download My Data, National Grid will track participation as seen in the graph below.

*Figure 5.8-4: Customer Green Button Connect Participation Tracking*




| | Sub Function | | |
|---|---|---|---|
| Year of Rec.. | GreenButtonElectric | GreenButtonGas | Grand Total |
| 2016 | 1,717 | 222 | 1,939 |
| 2017 | 1,299 | 195 | 1,494 |
| 2018 | 1,721 | 155 | 1,876 |
| 2019 | 2,205 | 176 | 2,381 |
| 2020 | 453 | 72 | 525 |

# 5.9 Cybersecurity

The following responds to DPS Staff's request to provide additional details which are specific to cybersecurity concerns.[102]

**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;**

National Grid has in place Information Security Standards that provide a linkage to industry standard Regulatory, Framework and Standards References. These technology standards have been created and apply to all National Grid systems to develop an overarching Information Security Standard to be followed by all parties that impact National Grid Systems.

This Standard defines the information security controls required to manage risks from third party access to the Company's information assets. It covers parties such as suppliers, developers, contractors, and business partners who have access to Company sites or information. It also includes controls such as background checks and terms to be included in Company contracts as conditions that need to be met by third parties before they are granted access. A risk assessment is undertaken before third-party access is granted, with the results of the assessment used to determine the security controls to be applied to manage those risks.

**c. the means and methods for verifying, documenting, and reporting third-party compliance with utility policies and procedures;**

The process involves a detailed assessment with third-party counterparts to verify that appropriate controls and standards are in place, documented and satisfy the requirements of the National Grid. The evaluation also consists of a risk assessment and findings are documented and fed into vendor profiles that rank vendors for further evaluation based on risk. Further evaluations involve the completion of assurance reporting or certifications and in some cases, include on-site assessments of vendor facilities to evaluate security and privacy controls. As risks are identified, they are fed into the risk process for monitoring and management, with appropriate mitigation plans developed to remediate the risk as appropriate.

[102] DSIP Proceeding, 2018 DSIP Update Guidance, pp. 23-24.

**d. the means and methods for identifying, characterizing, monitoring, reporting, and mitigating applicable risks;**

The Company has an established Risk and Asset Management policy to ensure any risk in information assets are assessed and treated in an appropriate and consistent manner. This enables the Company to achieve and maintain appropriate protection of all information assets. Risk assessments are completed and measured against information assets to identify, quantify and prioritize risks against criteria for risk acceptance and objectives.

**e. the means and methods for testing, documenting, and reporting the effectiveness of implemented security measures;**

Information Security Standard for Technical Compliance Checking has been created to define the standard requirements for ensuring that information security controls are being implemented properly. This standard details the baseline security requirements for all information assets, including all systems within the National Grid production, development, and test environments and includes third parties and vendors who impact National Grid systems. The Company's Vendor Assurance program also regularly evaluates existing vendors and third parties to ensure sufficient security and privacy protections are in place, in line with the Company's security requirements.

The Company completes simulated cybersecurity incidents and drills to test the resiliency and response in the event of a real cybersecurity attack. These drills are created to strengthen response, identify areas of improvement and are completed to exercise incident response plans, improve communication, and gather lessons learned.

**f. the means and methods for detecting, isolating, eliminating, documenting, and reporting security incidents; and,**

The Company's incident management policy ensures that a consistent and effective approach is applied to the management of information security incidents and to ensure information security events and weaknesses associated with information systems are communicated in a manner allowing timely corrective actions to be taken.

The Cybersecurity Operations Center ("CSOC") provides the organization with the ability to detect suspicious activity across the organization, in real-time, through continuous monitoring of IT and CNI systems, networks, and assets on a 24x7 basis, enabling detection and targeted response to potential threats to systems and information.

Additionally, the Cybersecurity Operations group works with a variety of private and public intelligence sources to continually stay abreast of emerging threats. External intelligence is coupled with internal analysis for detection of indicators of compromise across information assets which allows for further targeted detection and response to potential incidents.

As part of companywide cybersecurity training and awareness campaigns, employees receive annual training on how to identify and report suspicious behavior. This ensures that the Company's first line of defense has the proper awareness to potentially prevent a security incident and report them appropriately, so response can be initiated to isolate and remediate the incident.

**g. the means and methods for managing utility and third-party changes affecting security measures for third-party interactions.**

Recognizing that some of our risk comes from external partners, National Grid has an enhanced Strategic Sourcing Process that enables us to establish strong supplier partnerships. Non-Disclosure Agreements are used to manage the risk associated with sharing data with third parties. Following a risk-based approach, the Vendor Assurance Program reviews and monitors third parties for compliance against National Grid policies and control frameworks, including cybersecurity and data privacy controls. The National Grid Cybersecurity roadmap and delivery plans includes strengthening automated enforcement of data privacy and third-party controls.

The Company has established a Change Control & Configuration Management Standard and Information Systems Acquisition, Development and Maintenance policy to address operating systems, infrastructure, business applications, off-the-shelf products, services, and applications. Controls have been established to manage the introduction of new information assets and major changes, replacement and/or removal of existing assets, and will follow formal processes of change control and configuration management. This process includes the documentation, specification, testing, quality control, and managed implementation of changes.

**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 National Grid Cybersecurity program provides the organization with the underpinning capabilities to limit exposures to security events and establish a foundation to further develop National Grid's cybersecurity capabilities. The Cybersecurity program is prioritized based on risk and promotes a comprehensive approach to protect the organization and provide for the ability to identify, detect, prevent, respond, and recover from cyber-attacks. The overall vision is to have the necessary combination of proactive and reactive measures to provide the required situational awareness to deal with multi-pronged, targeted attacks that evolve and change over time and be prepared to respond appropriately. The program includes investments to develop further segregated networks to limit the potential impact of cybersecurity breaches and incident response capabilities to remediate breaches.

National Grid has established incident response and recovery plans, which contain playbooks for addressing various types of incidents. The plans focus on identification, containment, and remediation to ensure an incident is handled appropriately and business operations are restored as quickly and efficiently as possible. The plans and procedures are continually tested and updated based on post-incident reviews and lessons learned to ensure a constant state of readiness.

The Security function additionally works with a variety of private and public intelligence sources to continually stay abreast of emerging threats and leverages defense in depth to provide multiple levels of security control and redundancy to mitigate cybersecurity threats. For all systems, including those that hold customer and utility system data and support safe reliable grid operations, secure code development and back-up and recovery services are built in to reduce the likelihood and impact a cybersecurity event.

**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;**

The Group Resilience and Continuity Policy has been established to enable the Company to be appropriately resilient and ensure business continuity in the event of a cyberattack, disruption, technology failure, or any event that disrupts normal operations of business processes.

National Grid proactively scans the horizon to identify arising resilience threats and hazards, while improving the Company's processes to understand resilience risk exposure and risk appetite. This will allow the Company to anticipate the risk to the business, providing opportunities for early intervention and mitigation of risks. This ensures that a proper balance between risks and benefits, weighed against cost and value, is clearly understood and consistent with commercial and regulatory obligations.

In addition to the Company's ability to anticipate, National Grid can also prevent risks from materializing, both in respect of their impact and likelihood. The Company proactively builds redundancy making business processes and operations more reliable and able to withstand adverse impacts, thus reducing vulnerability.

National Grid strives to continuously improve our resilience where there are short-term gains that come into view. Over the longer term, the Company ensures that it systematically learns from previous experience and embeds this learning through an active program of training and development.

**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;**

National Grid has defined formal Service Level Agreements with third parties and vendors who provide services and depend on the operational nature and business criticality of a service or application.

Each application and service will feature a service level agreement for incident response and timely restoration. These agreements will define service criticality leveraging business impact assessments, quantified potential for tangible loss, and a measure for intangible loss, such as reputation.

**c. Provide and explain the plan for timely recovery of the process following a disruption; and,**

Business Continuity Plans ("BCP") are developed to protect the assets of National Grid which includes People, Premise, Providers and Processes. The intent is to minimize the effects of interruptions, including cybersecurity events, by providing a framework that ensures that disrupted business processes are recovered quickly. Each BCP defines operationally critical business processes and restoration time objectives. In the case of a cyber event that impacts business processes, the Incident Response Plan will be invoked, and the restoration of operationally critical business processes will take precedent.

**d. Describe each process, resource, and standard used to develop, implement, test, document, and maintain the plan for timely process data recovery.**

BCPs are maintained to ensure currency, accuracy and effectiveness and are reviewed at least on an annual basis to ensure it reflects current business processes and recovery requirements. The document details business staffing plans and requirements in the case staff absence or long-term outages.

In the event of a cybersecurity incident where data becomes unavailable, the incident response plan will be invoked to manage the event to resolution. The plan clearly defines the classification of an incident and determines the incident criticality and severity. Depending on the nature and severity of the incident, an applicable level of triage and response takes place with identified roles and responsibilities as well as notifications distributed based on established communication plans. Identified manual workaround processes may be enacted if required to carry out the minimum requirement to continue business operations.

**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.**

Cybersecurity plays a critical role in protecting and securing the utility's advanced metering resources and capabilities. This includes ensuring that security services are in place to address the needs of the utility to support advanced metering resources and that any gaps are identified and remediated to ensure safe and reliable operations.

Advanced metering offers many benefits to customers, but it also increased the utility attack-surface through an increased number of endpoints and connected devices that produce data used to make informed decisions at home and on the grid. Network monitoring services will be in place to proactively scan for anomalies and abnormal behavior at the device level and at the network level. Communications will be through secure channels to reduce the risk of data being intercepted, interpreted, or manipulated during transit. User activity, from a customer and utility perspective, must be monitored to prevent data loss or manipulation to protect sensitive information, such as personally identifiable information and usage data. To do this, single sign-on, authentication, and privileged access management capabilities will enforce and monitor behavior and establish a baseline for user activity.

**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.**

Through the procurement process, vendors are assessed and scored based on responses to an evaluation questionnaire that requires a response to questions regarding cyber disruptions and restoration. The questions focus on confirming that capabilities are in place in the event of a cybersecurity event. The questions regarding the operational aspects of AMI capabilities seek to determine the procedures in place for incident management, defined roles and responsibilities, communication plans, points of contact, detection and alert capabilities, incident management practices, reporting, lessons learned and security policies in place.

# 5.10 DER Interconnections

The following responds to DPS Staff's request to provide additional detail specific to DER interconnections.[103]

**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.**

National Grid's publicly available customer application portal (https://ngus.force.com/s/ny-home), nCAP is an online application portal to facilitate electronic submission of applications and associated payments. The portal provides the applicant with a more streamlined experience. Customers are able to check project status, meter set dates, and estimated completion dates, sign documents electronically, and request changes to existing interconnection applications online. The Company has further enhanced nCAP to automate certain technical screens to further expedite the interconnection process.

**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;**

National Grid's customer application portal, nCAP, tracks the DER type, size, and location for each application. The interconnection queue with this information is available on the DPS public website.[104] The queue can also be found on the nCAP website where the size of the generation and interconnection feeder is identified, as well as case number, application status, opening date/time, queue date, and connected date (where applicable). Recent upgrades were made to the nCAP to gather additional information regarding ESS. Access to specific project information can be access via he nCAP portal only with appropriate login and password verification.

**b. DER developer;**

The interconnection queue publicly provided on the DPS website provides the company name of each DER developer in the queue. This data is available as an Excel file.

[103] *Id.*, pp. 25-26.
[104] *See* http://www3.dps.ny.gov/W/PSCWeb.nsf/All/286D2C179E9A5A8385257FBF003F1F7E?OpenDocument

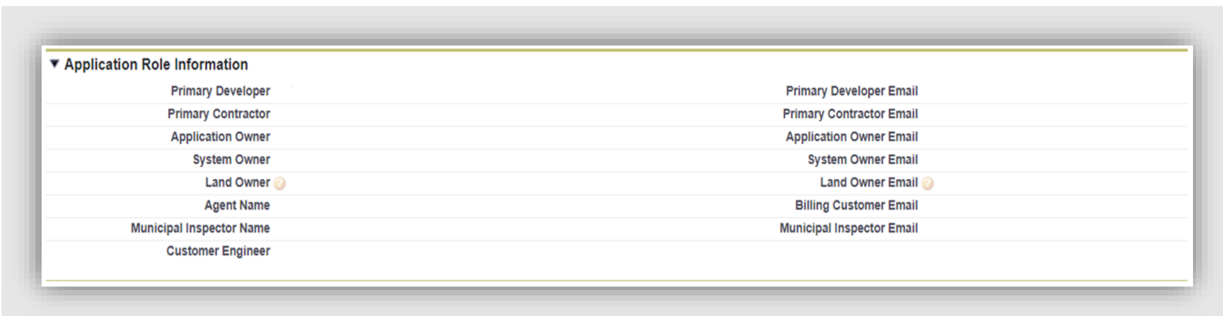
**c. DER owner operator;**

National Grid's customer application portal, nCAP, tracks the DER owner for operation of the connected DER facility; however, this data is not publicly available and is only accessed via login for the user's specific project.

**d. DER operator;**

National Grid's customer application portal, nCAP, tracks contact information for various customer stakeholders as shown below but does not currently track DER operator information. In case of emergencies or outages, National Grid would contact the system owner and/or applicant. For large, complex DER interconnections, contact information and switching procedures are established with National Grid's control centers.

*Figure 5.10-1: Customer Stakeholder Tracking in National Grid's nCAP*




**e. the connected substation, circuit, phase, and tap;**

National Grid's customer application portal, nCAP, tracks DER by circuit, substation transformer, and substation. It identifies if an application is single phase or three phase, but it does not track which phase or tap it is connected to. The substation and feeder circuit are publicly available on the DPS website interconnection queue.

**f. the DER's remote monitoring, measurement, and control capabilities;**

National Grid's ESB 756 Appendix B specifies the DER customer's requirements for M&C in accordance with the NY-SIR , which may be amended periodically. Those DER facilities with M&C are integrated into National Grid's EMS to enable the Company's distribution system operators to remotely trip the generation, or DER facility, from the Company's EPS if necessary to maintain reliability.

**g. the DER's primary and secondary (where applicable) purpose(s); and,**

National Grid's customer application portal, nCAP, does not track the applicant's intended purpose for their DER operation or whether the application has a primary or secondary purpose.

**h. the DER's current interconnection status (operational, construction in-progress, construction scheduled, or interconnection requested) and its actual/planned in-service date.**

National Grid's customer application portal, nCAP, tracks the DER facility's interconnection status for interconnection requested, planned, and actual in-service date, construction scheduled, construction in-progress, and operational dates on each application. The date of DER application, final letter of acceptance, and project completed status are all publicly available on the DPS website interconnection queue.

**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.**

National Grid provides dedicated staff to manage the DER application process. The Customer Solutions team is the job owner for simple DER projects (less than 50kW) while the Customer Energy Integration team is the job owner for complex DER projects (greater than 50kW). These job owners utilize National Grid's customer application portal, nCAP, as a means to track and manage the DER applications throughout the interconnection process. National Grid uses a software application, Tableau, to help manage the data and provide visibility of application status via reports and key performance indicators ("KPIs") in an effort to assist job owners with workload management. KPIs are regularly monitored (*i.e.*, daily or weekly in most cases) to ensure success in meeting implementation schedules. The duration between application and final acceptance can be monitored publicly via the DPS website interconnection queue.

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**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.**

National Grid already dedicates resources to assist the DER community in managing their projects throughout the interconnection process. These employees are dispersed throughout the Company's field offices (*i.e*., Buffalo, Syracuse, Utica, and Albany). National Grid utilizes nCAP to provide status on an application's process workflow. Stakeholders that are properly identified in the "application roles" for an application may (depending on the complexity and scale of the project) receive email notifications at key milestones in the process. Once a stakeholder or developer submits an application, a member of National Grid's Customer Energy Integration ("CEI") team is assigned to review the application for completeness, and once the application is moved through the process and a study is commenced, a job owner is assigned to manage the project through the study phase. If the project progresses to a construction phase, a CEI team member manages the project to completion.

Customers can access the nCAP application in a self-serve fashion to monitor the progress of their projects. To the extent Customers are in need of additional information or support, they may contact the Company through, email at Distributed.Generation-NY@nationalgrid.com. In addition, National Grid's Customer Energy Integration (CEI group) conducts weekly/bi-weekly calls with many of the major developers regarding project portfolios to facilitate manage application processing. In the construction phase, the Company tracks the progress of the utility's distribution construction for complex DG applications via the STORMS work management system.

**1. The utility's processes, resources, and standards for constructing approved DER interconnections.**

National Grid has various external and internal processes, resources, and standards for constructing approved DER interconnections.

- National Grid's electric system bulletins (ESB) are publicly available[105] and ESB 756 Appendix B[106] is specific to DER interconnections in NY.
- IEEE 1547 and UL 1741, industry-related standards are industry standards referenced in National Grid's ESB 756 Appendix B
- NYS adoption of the National Electrical Code (NEC®).
- The National Electrical Safety Code (NESC®), an external code that National Grid complies with for distribution and substation construction, as well as
- OSHA requirements and the use of various applicable IEEE and ANSI standards.

In reviewing applications National Grid utilizes multiple technical screens to determine if a DG project can interconnect and if it requires a CESIR. The most recent CESIR template can be found on the ITWG website.[107] Once all application requirements are met, work orders are released to progress with any make-ready work and metering requirements. Throughout the process, the Company coordinates with the developer for any required site testing and commissioning. The work orders are then completed, and the DER information is incorporated into the Company's GIS system.

**6. The utility's means and methods for tracking and managing construction of approved DER interconnections to ensure achievement of required performance levels.**

For simple DER projects, National Grid's STORMS work management system tracks and manages construction of approved DER interconnections and integrates progress status into the customer application portal, nCAP. For complex DER projects requiring system upgrades, National Grid's Program/Project Manager manages the engineering, procurement, and construction of the system upgrades and collaborates with the CEI team job owner(s) for routine progress meetings with DER customer(s). A Primavera P6 tool is used to track the construction schedule as well as PowerPlant for tracking and reconciling the construction costs associated with system upgrade construction of a complex process DER interconnection. National Grid uses a construction timeline template from the NY-SIR to create schedule transparency for DG projects. National Grid has an internal bi-weekly meeting set up to keep track of all the construction projects and to monitor DG project performance with engineering, customer group, and construction.

[105] *See* https://www.nationalgridus.com/ProNet/Technical-Resources/Electric-Specifications
[106] *See* https://www.nationalgridus.com/media/pronet/shared_constr_esb756.pdf
[107] *See* http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DEF2BF0A236B946F85257F71006AC98E

In addition, National Grid's STORMS work management system is also utilized to track and manage the line construction for the complex DER Projects. In line with the NY-SIR, the Company classifies complex DG projects as those from 50 kW to 5 MW, and simple projects are typically under 50 kW and do not require system upgrades.

**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.**

As previously referenced, National Grid already employs dedicated resources to assist the DER community in managing their projects throughout the interconnection process. These employees are located throughout National Grid's upstate NY divisional offices (*i.e.*, Buffalo, Syracuse, Utica, and Albany). In addition to utilizing nCAP to manage application processing, the Customer Solutions (CS) and CEI teams also utilize National Grid's work management system (STORMS) to track and progress applications that have moved into construction status. Most applicants should be able to track the progress of their interconnection application in a self-service manner through the nCAP portal. To the extent applicants are in need of additional information or support, they are able to contact CS and CEI team members through the help feature of nCAP and email at Distributed.Generation-NY@nationalgrid.com . For any interconnection dispute, the developers can reach out to the Company's Ombudsperson for resolution.

# 5.11 Advanced Metering Infrastructure

The following responds to DPS Staff's request to provide additional details specific to AMI.[108]

**1. Provide a summary of the most up-to-date AMI implementation plans, including where AMI has been deployed to date.**

The Company deployed AMI technology in 2017 to over 13,3000 residential electric service customers as part of the Clifton Park Demand Reduction REV Demonstration Project. The technology includes AMI electric meters and gas ERTs where gas service is present. The AMI technology operates on a cellular network.

In accordance with the Three-Year Rate Plan Order and timeline described above, the Company filed its AMI Report and Supplemental AMI Report seeking approval for full-scale deployment of AMI in the service territory. As of the filing of this Updated DSIP, the Company's proposal remains pending before the Commission.

**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;**

AMI increases the number of monitoring parameters and the granularity of data available to planning and operations. AMI may also afford an opportunity to increase M&C on smaller DER to foster situational awareness of the system which helps to maintain system reliability and safety. As set forth in the Supplemental AMI Report, AMI will enable more detailed forecasting and distribution system planning, which will lead to more efficient system utilization and enhanced situational awareness for grid operators, all in furtherance of the Company's role as the DSP provider.

**b. help DER developers plan and implement DERs;**

AMI provides more granular data (hourly or more frequently) to analyze the true usage of a feeder's capacity and to understand system operating profiles more readily. This, in turn, helps developers understand the DER operating profiles that most benefit the customer, the system, and the developer. For instance, this may include integrating a more granular feeder loading profile into distribution planning models to more accurately ascertain the number of hours a DER may be constrained, or when to best operate a DER to offload a constrained element, thereby optimizing performance and adding value for all stakeholders. Using the CEMP and HAN-enabled

[108] DSIP Proceeding, 2018 DSIP Update Guidance, pp. 26-27.

technology, the Company will provide customer energy usage data to customers, who may share that data with third parties (*e.g.*, DER developers).

**c. help DER operators plan and manage operation of their DERs;**

With AMI-enabled customer and system data, smaller DER operators will be able to assess historical performance and forecast future conditions. This will help DER developers understand how to plan their DER operations in a manner that maximizes customer benefits. AMI will also help to provide additional near real-time monitoring to the Company to better understand how DER contributes to the grid.

**d. enable or enhance the utility's ability to implement and manage automated Volt-VAR Optimization ("VVO");**

The Company expects that the more granular data from AMI meters may enhance the effectiveness of the VVO program. AMI meters can provide granular voltage information along the distribution secondary system to centralized control systems to more precisely adjust voltage regulation. More granular metering information can also enhance load allocation within distribution load flow models and improve their accuracy for planning and operations. Specific to the AMI business case, the Company quantified incremental VVO benefits associated with AMI in addition to those achieved by grid modernization.

**e. improve the utility's ability to prevent, detect, and resolve electric service interruptions;**

A benefit of smart meter technology is the ability to identify an outage in near real-time. Although individual smart meters are electrically powered, they maintain sufficient energy to transmit a message indicating the loss of power. This ability has several advantages over the current process, which relies on customer calls and algorithms to estimate the boundaries and customers impacted by an outage event. AMI meters will also transmit a return-to-service signal and can be "pinged" to assess the level of service restoration achieved. This increased visibility during major and minor storms will enhance situational awareness, potentially creating efficiencies for crew management and reducing responses to false outages.

**f. improve the utility's ability to implement rate programs that facilitate and promote customer engagement, DER development, and EV adoption;**

AMI deployment is an important enabling technology for innovative rate designs aimed at promoting customer engagement, reducing or shifting energy use, supporting DER development, and increasing EV adoption. Without AMI, the options for customer savings and incentives are limited. With AMI and time-varying rates, customers can get price signals that align with the value they are delivering to the grid. Additionally, this approach may foster a technology platform on which competitive third parties can innovate to offer valuable services to customers (*e.g.*, home/building energy management, aggregated DR, smart EV charging). The increase in options for managing energy consumption and expense is at the heart of next-generation customer engagement.

**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.**

National Grid will have experienced cybersecurity architects involved in all phases of AMI design and deployment to ensure that all communications between the meter and the Company are secure, authenticated, and authorized so that customers are secure in the knowledge that their private data is protected from theft, snooping, tampering, or other threats. In addition, the Company's cybersecurity approach will use the CEMP to authenticate HAN-enabled devices. More detail on which specific industry standard protocols will be used for device authentication, authorization of access to meter data, and encryption of communications between the meter and the Company, as well as HAN devices will be developed throughout the design process.

**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.**

DER developers, customers, and other stakeholders can access the Company's AMI Report and Supplemental AMI Report on the Commission's dockets under Case Nos. 17-E-0238 and 17-G-0239. Upon Commission approval, the Company will implement the robust Customer Engagement Plan developed as part of the AMI collaborative process. This effort will include a customer communications plan on the smart meter rollout and schedule throughout the deployment period. The Company will proactively communicate this information to customers and stakeholders using a variety of channels, including direct mail, email, and community meetings as well as creating a central place for information, such as schedule deployment areas and meter functionalities. The Company envisions that its website and direct mailing would be the primary method of updating and relaying relevant information on AMI to any interested parties.

# 5.12 Hosting Capacity

The following responds to the request of DPS Staff to provide additional details specific to hosting capacity.[109]

**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;**

In Stage 1 several parameters such as voltage class, feeder load level, station transformer fusing, level of existing connected DG, and station $3V_0$ were assessed and results were presented in a red zone map. This was a simple approach to conducting HCA but provided solid foundations for the future Stages described below.

In Stage 2 analyses were carried out on a full feeder-level for all voltage classes, and a maximum and a minimum hosting capacity value were provided for each feeder analyzed. Each circuit's hosting capacity was determined by evaluating what level of solar PV interconnection would lead to planning criteria violations. The analysis was performed by adding PV systems with an AC nameplate rating starting at 300kW and gradually increasing installations on the three-phase distribution lines until the hosting capacity limit was determined.

Stage 2.1 provided an additional substation level data element that includes information on the substation bank which the selected feeder is tied to.

Stage 3 evaluations provided sub-feeder level hosting capacity (nodal analysis) incorporating existing installed DER (all technologies and sizes) into the modeling and upstream station constraints such as $3V_0$ and transformer bank loading into the analysis.

The Stage 3.1 release displayed additional data in the pop-ups. These pop-ups items included substation thermal ratings, $3V_0$ thresholds, and feeder notes.

Future Stage 3.X releases are expected to include enhancements such as increased analysis refresh frequency, forecasted hosting capacity, consideration of other DERs such as ESS and EVs, and abnormal circuit reconfigurations.

The capabilities in Stage 4 extend beyond the formal definition of HCA and build on its foundation to perform fully integrated value assessments. The definition of Stage 4 is yet to be fully

[109] *Id.*, pp. 27-29.

determined but it will be defined while incorporating stakeholder inputs and the status of DER at that time.

Figure 2.12.1 above shows how the stages build up from one another, improving HCA along the way, potentially leading to long-range HCA in the future.

**b. the original project schedule;**

Stage 3 from the original schedule was replaced with Stage 2.1. The original scope of Stage 3 was altered, and the completion date was changed and completed on October 1, 2019 (as discussed above). The Stage 3.1 release with additional data was released on April 1, 2020. The Joint Utilities are working on a roadmap to define 3.X and Stage 4 timelines and roadmaps.

**c. the current project status;**

As described previously, the Company is currently working on developing a roadmap for Stage 3.X and 4 releases and is proposing three near term developments to include enhancements such as increased analysis refresh frequency, forecasted hosting capacity, consideration of other DERs such as ESS and EVs, and abnormal circuit reconfigurations as described in the Hosting Capacity Chapter. The Company will also be performing its yearly update to the base 3.1 HCA data on October 1, 2020.

**d. lessons learned to-date;**

The Joint Utilities established a common method for performing HCA using the EPRI DRIVE tool. EPRI assisted the Joint Utilities in developing several assumptions and criteria that provided the framework for the HCA. In order to deliver accurate information on the System Data Portal, the distribution feeder level data was first verified and corrected before using the EPRI DRIVE tool. Much of the work and projects associated with hosting capacity to date have focused on data, modeling, and analysis required to perform the actual HCA. Due to the large scale of the hosting capacity initiative and the need for accurate data, this was recognized as a valuable opportunity to identify specific areas where overall data clean-up was most needed. During the feeder level verification, National Grid kept records of all data errors that were encountered and has begun to implement solutions for correcting this data moving forward. The quality of the data used for individual feeder models proved to be the biggest challenge in completing the Stage 3 HCA. The volume of data quality issues and the time required to correct them required a better solution for an efficient refresh process and for future stages. To address this, National Grid was able to successfully automate several functions that were used to identify, record, and correct data errors which largely eliminated the most time-consuming portion of the hosting capacity procedure.

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

Please see the Company's response in item d above.

**f. next steps with clear timelines and deliverables**

Please refer to the future implementation and planning section.

**2. Where and how DER developers/operators and other third parties can readily access the utility's hosting capacity information.**

All hosting capacity information that is available to third parties is available on the National Grid System Data Portal.

**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.**

All hosting capacity information that is available to third parties is available on the National Grid System Data Portal. This will be where all hosting capacity related information will be housed in the future. The timeline of future work will continue to follow the roadmap.

HCA data will be fully updated on a yearly basis with DG in queue and connected information updated on a monthly basis. The next update is planned for Oct 1, 2020.

**4. The means and methods used for determining the hosting capacity currently available at each location in the distribution system.**

National grid uses CYMDIST distribution power flow software to develop feeder models and the Distribution Resource Integration and Value Estimation ("DRIVE") software tool by EPRI to evaluate radial distribution feeder ability to host distributed energy resources without causing adverse impacts to the distribution system. More details on the means and methods used for determining the hosting capacity are provided in the Hosting Capacity section under Current Progress in this DSIP Update.

**5. The means and methods used for forecasting the future hosting capacity available at each location in the distribution system.**

Although forecasted hosting capacity was identified as a very important future enhancement. The Joint Utilities are in preliminary discussions on methods and approaches to provide forecasted hosting capacity as it is a complex topic and requires the development of new process and likely software changes/additions. As it was identified as an important enhancement it will be part of the longer-term roadmap due for release in 2020.

**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.**

As described in the prior answer, the Joint Utilities will be determining the timeline for this item as part of a longer-term roadmap in 2020.

**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,**

Hosting capacity levels can be identified for each National Grid feeder on the System Data Portal. In addition, data showing DG connected and DG in queue is provided to help DER developers identify the remaining hosting capacity on each feeder. Figure 2.12.2 (Hosting Capacity Tab on System Data Portal) provides a geographic overview of the relative hosting capacity across the Company's service territory. The areas shown in blue have higher hosting capacity and non-blue colors show lower values of hosting capacity. Typically, the major limitations to hosting capacity are:

- Voltage class (*i.e*., 5 kV that represents approximately 50% of National Grid's feeders)
- The amount of DER already connected
- Distribution system equipment limitations such as thermal constraints, recloser settings, voltage regulation capabilities, fixed shunt capacitor banks, and protection challenges

**b. timely increase hosting capacity to enable productive DER development at those locations.**

National Grid have progressed pilots and programs to increase hosting capacity in regions with insufficient hosting capacity to support projected DG (*e.g*., proactive $3V_0$ protection installation at Peterboro, E. Golah, Cedar, Indian River, Butler and Berry Rd substations with an associated cost sharing methodology to reduce barrier to entry for DER developers) as described in more detail in the DER Interconnections chapter of this 2020 DSIP Update. The section also includes the Company's future proactive $3V_0$ program expansion plans.

In addition, National Grid has modified distribution and substation design standards for new equipment installation that will indirectly increase hosting capacity. Similarly, where the Company has plans to either replace assets such as transformer banks or conductors, make voltage class upgrades, or undertake other asset replacements for normal system improvement reasons, hosting capacity will likely, yet indirectly, be increased.

# 5.13 Beneficial Locations for DERs and Non-Wires Alternatives

The following responds to DPS Staff's request for additional details specific to National Grid's resources and capabilities in supporting the identification and presentment of beneficial locations for DERs and NWAs.[110]

**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; and,**

**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.**

The primary resource National Grid uses to share up-to-date information about beneficial locations is the Company's System Data Portal which maintains "tabs" specific to NWA opportunities, LSRV areas, and HCA. The information is presented on interactive geographic maps when suitable and tabular information is provided in pop-up windows. The ability to query, filter, and sort is available for some information, and the Company is working to expand that capability for additional datasets.

In addition to the National Grid System Data Portal, information is also provided on the Joint Utilities website[111] and the REV Connect portal.

**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,**

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[110] *Id.*, 29-30.

**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 Company will determine future constraints and needs of the transmission, sub-transmission and distribution systems to maintain safe and reliable service to customers. With growing levels of DER deployment, the method in which DER impacts are analyzed and incorporated by National Grid's Planning groups into the Company's integrated planning process and studies continue to evolve such as through its MADC studies and integrated T&D assessment mentioned previously. Planning assessments developing traditional infrastructure enhancement solutions, and appropriately applying the suitability criteria, all contribute to accurately and comprehensively identifying those traditional utility projects that may be deferred through utility DER programs and procurements such as NWA opportunities. The Energy Efficiency and NWA sections further detail how the Company actively seeks to procure DER in beneficial locations that have been identified. The Company is also considering how DER can be utilized to provide a partial solution to complement a traditional utility project (i.e. hybrid) to address an overall system need. Additionally, National Grid's Planning groups document the amount and location of load relief needed to mitigate system capacity or reliability needs where appropriate.

**3. Locations where energy exported to the system, or load reduction, would be eligible for:**

**a. compensation under the utility VDER Value Stack tariff;**

Energy exported to the distribution system from eligible projects is eligible for VDER Value Stack compensation on a territory-wide basis. Only projects in specified locations are eligible for the LSRV component. LSRV compensation for projects interconnecting at 52 substations originally. Open areas are presented on LSRV/VDER Tab of the National Grid System Data Portal. The Company proposed using its MADC to update the rates and locations of LSRV zones.

**b. utility dynamic load management programs, including the Commercial System Relief Program, Distribution Load Relief Program, and Direct Load Control Program;**

National Grid currently operates DLM programs, in accordance with directives provided by the Commission in Case 14-E-0423. The Distribution Load Relief Program ("DLRP"); the Commercial System Relief Program ("CSRP"); and the Direct Load Control Program ("DLC Program"), which includes the **Connected**Solutions and coolControl Programs, were launched in 2015. DLRP and CSRP focus on C&I customers, while the DLC Program targets residential and small-commercial customers. The location-specific DR programs in Kenmore, coolControl and DLRP, have been closed out at the end of 2018 and further details are provided in the Company's 2018 Annual DLM report.

National Grid is also currently developing details for its Term-DLM procurement, which was created in accordance with directives provided by the Commission in Case 18-E-0130. The Term-DLM procurement focuses on C&I customers to provide localized load reduction at specific areas within the Company's service territory that may be constrained under normal and/or contingency operating conditions.

The Company has updated its standard NWA RFP language to allow for partial solutions including DR that can serve as part of the NWA solution portfolio that wholly meet the requirements for a specific NWA. The Company is also considering how to integrate DR programs into NWA portfolios. It is likely in many cases that DR may not be able to meet most system needs alone but relatively low-cost DR can be a useful component as part of a portfolio solution with other DER.

Other DR programs such as CSRP, are not geographically targeted, rather they are applied for system peak shaving. More details on DLM programs are discussed in the Energy Efficiency chapter of this 2020 DSIP update.

**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.**

EE programs generally provide system-wide benefits and are not usually geographically targeted. However, targeted EE initiatives are being explored in NWA locations in an effort to develop least cost NWA solutions.

# 5.14 Procuring Non-Wires Alternatives

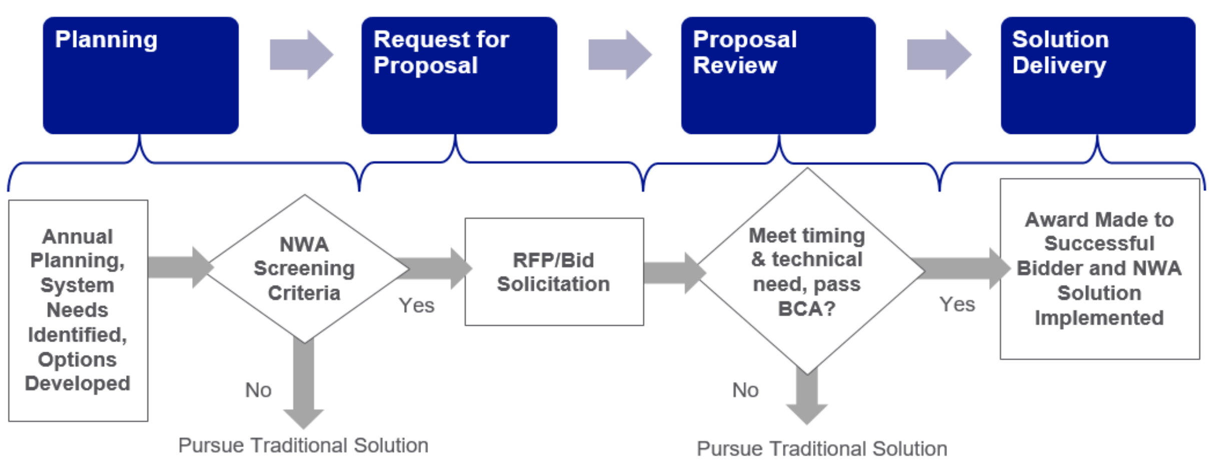
The following responds to DPS Staff's request for additional details specific to National Grid's resources and capabilities supporting utility procurement of DERs as alternatives to traditional distribution system upgrades.[112]

**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.**

Emerging system needs are identified as early as possible. This allows for comprehensive consideration of the NWA and wires solutions as part of the electric distribution system planning process.

1. System Needs Identified: The need is identified as a result of studies, operational issues, process safety issues, occupational safety issues, regulatory requirements, and/or customer requests. Planning teams develop a Needs Case, fully justifying the system need(s) and concerns of the study area.
2. NWA Screening Criteria: Where a system need has been identified, Planning performs an initial screening for NWA, considering the criteria listed in previously. Projects not meeting the criteria continue with wires or traditional solutions.
3. Request for Proposals: RFPs are developed and issued through our procurement platform as previously mentioned.
4. Solution Delivery: Evaluation of submitted proposals are competed and if successfully pass technical viability and the BCA, an award made to the successful bidder. Projects that do not pass technical viability and the BCA continue with the wires or traditional solution.

*Figure 5.14-1: NWA Procurement Process*




[112] *Id.*, pp. 31-32.

**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;**

The Company has developed a detailed NWA implementation process to maximize the efficiency of the procurement and implementation through operation of the NWA solution. This process clearly defines responsible, accountable, consulting, and informed parties for each step, allowing for quick turnaround and minimized costs.

National Grid has taken a number of steps to minimize DER providers' time and expenses as described in more detail in the prior Current Progress section.

**b. The use of standardized contracts and procurement methods across the utilities.**

The Company has worked with the Joint Utilities to create a more streamlined approach to procurement with DER providers with respect to contract terms and conditions of work. The Company includes sample terms and conditions in RFPs to help NWA providers secure/investigate financing options prior to proposal submittal. The Company plans to continue developing a standardized contract and will continue to share with the JU best practices for issuing contracts and implementing procurement methods.

**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.**

**Location of NWA Opportunities**

National Grid's NWA information can be found on the following websites:

- National Grid:https://www.nationalgridus.com/Business-Partners/Non-Wires-Alternatives/
- Joint Utilities: http://jointutilitiesofny.org/utility-specific-pages/nwa-opportunities
- REV Connect: https://nyrevconnect.com/non-wires-alternatives/

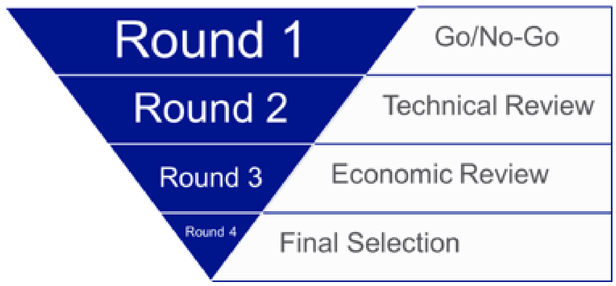
Pre-qualified vendors are sent NWA opportunity notifications via Ariba, National Grid's procurement system. Interested vendors may contact:

- Non-wiresAlternativesSolutions@nationalgrid.com

**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.**

National Grid evaluates the NWA solution bids proposed by vendors using a systematic approach which considers technical and economic factors. A BCA will be performed to determine the cost-effectiveness of NWA solutions. NWA projects must provide a safe, reliable, and cost-effective solution when compared to the wires solution.

*Figure 5.14-2: Overview of Proposal Evaluation*




Proposals are ranked based on their criteria scores. The number of projects which National Grid will procure is a function of the proposal price, scoring of proposals based on evaluation criteria, capability of each proposal to fully or partially address the NWA solution requirements, and National Grid's final discretion. See below for a summary of the criteria and the process by which the review team will evaluate and prioritize bids.

*Table 5.14-1: Summary of Proposal Evaluation Categories*

| | |
|---|---|
| Proposal Content & Presentation | Safety |
| Developer Experience | Customer and Socio-Economic Impacts |
| Environmental | Scheduling |
| Project Viability | Offer Price |
| Functionality | Adherence to Terms |
| Technical Reliability | Credit |

The figure below provides an excerpt from the NWA screening tool used to narrow down to the best proposals:

*Table 5.14-2: Excerpt from the NWA screening tool used to narrow down to the best proposals*

| | Control, Comms & Operations | Weight, % | Rating | Weighted Score | Comments |
|---|---|---|---|---|---|
| 4 | Local & substation level controls and communication clearly defined and feasible | 30% | | 0.00 | |
| | Control center operators ability to control & monitor the NWA as necessary | 20% | | 0.00 | |
| | Line crew, safety, maintenance & support (ability to respond to NWA technical issues) | 40% | | 0.00 | |
| | Coordination potential with DSP systems and concepts | 10% | | 0.00 | |
| | TOTAL Control, Comms & Operations | 100% | | 0.00 | |

**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;**

**b. describe the location, type, size, and provider of the selected alternative solution;**

**c. provide the amount of traditional solution cost which was/will be avoided;**

**d. explain how the selected alternative solution enables the savings; and,**

**e. describe the structure and functional characteristics of the procurement transaction between the utility and the solution provider(s).**

National Grid's NWA opportunities are presented on the National Grid website and System Data Portal, Joint Utilities website, REV Connect Site. Pre-qualified vendors are sent NWA opportunity notifications via Ariba, National Grid's procurement system. Interested vendors may contact: Non-wiresAlternativesSolutions@nationalgrid.com

Identified projects that meet applicable NWA suitability criteria and are deemed technically feasible will be sourced through National Grid's procurement process. RFP development includes compiling a procurement solicitation and information that informs stakeholders/potential partners about the area and its electrical system needs. The area needs assessment will include information such as:

- size of the load relief required (in kw or MW)
- daily peak load profiles, duration of need
- mapping illustrating the area of need
- characterization of customers (how many residential and C&I customers).

In addition, performance attributes, utility costs, technology suitability, and hosting capacity may be included in the solicitation. The Commission's orders addressing anonymized aggregated data and customer data protections will guide any public solicitation which relies on the provision of customer data.

As NWA RFPs are released, closed or awarded, the Company files a publicly available report with the Commission which is posted to the DPS website and the Company website.