NYSEG RG&E

2020 Distributed System Implementation Plan

New York State Electric & Gas and Rochester Gas and Electric

June 30, 2020

CONTENTS

ACRONYMS

ADMS	Advanced Distribution Management System
AMI	Advanced Metering Infrastructure
ANM	Active Network Management
BCA	Benefit Cost Analysis
BTM	Behind-the-Meter
CCA	Community Choice Aggregation
CDG	Community Distributed Generation
CHP	Combined Heat and Power
CLCPA	Climate Leadership and Community Protection Act
DC	Direct Current
DCFC	DC Fast Charging
DER	Distributed Energy Resource(s)
DERMS	Distributed Energy Resource Management System
DG	Distributed Generation
DPS	New York Department of Public Service
DR	Demand Response
DSA	Data Security Agreement
DSIP	Distributed System Implementation Plan
DSP	Distributed System Platform Provider
ECC	Energy Control Center
EE	Energy Efficiency
EIA	U.S. Energy Information Administration
EPRI	Electric Power Research Institute
ESC	Energy Smart Community
ESS	Energy Storage System
ETIP	Energy Efficiency Transition Implementation Plan
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FERC	Federal Energy Regulatory Commission
FICS	Flexible Interconnect Capacity Solution
FLISR	Fault Location, Isolation and Service Restoration
GBC	Green Button Connect
GHG	Greenhouse Gas
GMEP	Grid Model Enhancement Project
IDSM	Integrated Distributed System Model
LAN	Local Area Network
LMI	Low- and Moderate-Income
M&V	Measurement and Verification
MDIWG	Market Design and Integration Working Group
MM&C	Measurement, Monitoring & Control
NWA	Non-Wires Alternative(s)
NYISO	New York Independent System Operator
NYPA	New York Power Authority
NYSEG	New York State Electric & Gas Corporation
NYSERDA	New York State Energy Research and Development Authority
OMS	Outage Management System
PV	Photovoltaic
REV	Reforming the Energy Vision
RFI	Request for Information
RFP	Request for Proposal
RG&E	Rochester Gas and Electric Corporation
SCADA	Supervisory Control and Data Acquisition
SIR	Standardized Interconnection Requirements
SM/SI	Smart Meter/Smart Inverter
T&C	Terms and Conditions
T&D	Transmission and Distribution
UBP	Uniform Business Practices
UER	Utility Energy Registry
VVO	Volt/VAR Optimization
ZEV	Zero Emissions Vehicle

Defined Terms

Commission	New York Public Service Commission
Companies	NYSEG and RG&E, collectively
EE New York	NYSERDA's April 2018 white paper
Joint Utilities	New York's investor-owned electric utilities, collectively
DPS Staff	Staff of the New York Department of Public Service
Staff 2018 Guidance	Staff Whitepaper Guidance for 2018 DSIP Updates
Supplemental DSIP	Joint Utilities' Supplemental Distributed System Implementation Plan (November 1, 2016)

I. Introduction

I. Introduction

New York State Electric & Gas Corporation (NYSEG) and Rochester Gas and Electric Corporation (RG&E) (collectively, the "Companies") present our 2020 Distributed System Implementation Plan (DSIP). Our "north star" is preparing the Companies to serve as the Distributed System Platform (DSP) provider that will promote New York's policy goals, provide our customers with greater control over their energy usage and total energy bills, and provide developers and other market participants with the information they need to make informed investment decisions.

2020 DSIP objectives

- Present the Companies' vision for serving as the DSP.
- Describe our approach to building the DSP and DSP requirements.
- Provide an update on the progress we have made since our 2018 DSIP and describe our future implementation plans.
- Highlight the foundational platform technologies that will enable DSP capabilities.
- Describe actions that we are taking to promote clean energy and achieve New York's clean energy goals.
- Explain how we will build the DSP over the next five years.

Priorities for the next five years

1. Implement Advanced Metering to measure electric flows at the grid edge and enable pricing and programs that help customers make informed energy decisions.
2. Make significant progress implementing our long-term Grid Automation program, including investments in grid devices[1] that measure, monitor and control electric power flows along the network, capabilities that are necessary to accommodate large numbers of connected distributed energy resources (DER) and beneficial electrification loads while also enhancing the resiliency of the grid.
3. Enhance the accuracy and integrity of data and network models that correctly represent our distribution system assets and all connected DER and electrification loads - information that is required to plan and operate the grid.
4. Improve our integrated planning methodologies and the data and insights we share with developers.
5. Enable the deployment of clean DER and electric vehicle charging stations to make progress toward New York's clean energy goals.
6. Implement an Advanced Distribution Management System (ADMS) and design and build other control systems that will be needed to optimize our grid and DER.

Each of the six near-term priorities is foundational to achieving our long-term (2026+) vision to optimize grid, DER, and market resources, and maximize value to our customers, the grid, and New York.

[1] Grid devices include sensors, relays, switches, reclosers, capacitors, voltage regulators, and smart meters.

Exhibit I-1

The DSP is being developed in three stages.

	 Design	 Build	 Optimize
Activities	– Identify DSP capabilities – Develop Platform Technology Roadmap – Deploy Energy Smart Community and other innovation projects – Establish an Enterprise Analytics function – Install grid devices to enable Grid Automation	– Complete deployment of AMI – Continue Grid Automation – Validate Network model of System Assets and DER – Build Integrated Planning Tools that use granular AMI and system data – Deploy ADMS and Grid Operations control systems – Collaborate with the DPS Staff, the Joint Utilities, and NYISO on Market Design initiatives	– Optimize system assets and DER through Integrated Planning and Grid Operations – Enable Customer and DER value from integrated Distribution and NYISO markets – Offer Market Services that support CLCPA goals
Timeframe	2016 to 2020	2021 to 2025+	2026 and beyond

Our 2016 and 2018 DSIPs reported on the aspirations and design of the DSP. We have tested technologies, capabilities, and other design elements through the Energy Smart Community (ESC) and other innovation projects. We have also begun installing grid devices that will enable monitoring and control as part of our Grid Automation project.

We are now focused on "building" the DSP. This phase continues our multi-year investment in Grid Automation supplemented with our foundational AMI investment. These investments are required to enable monitoring and control of system assets, DER, and electric vehicle (EV) charging stations.[2] We are also building a validated network model of system assets and connected DER and EV fast chargers to support Integrated Planning and Grid Operations decisions. With these foundational investments and capabilities in place, we will be able to apply advanced control systems (the ADMS) to optimize utility and third-party DER assets.

The Companies continue to address DSP design and implementation issues through a formal collaboration with New York's investor-owned utilities (the "Joint Utilities of New York" or "Joint Utilities"[3] for short). The topics being addressed by the Joint Utilities include hosting capacity, interconnection[4] and integration of DER, enablement of a statewide EV charging network, solicitations to acquire energy

[2] This DSIP focuses on DSP platform technologies and operations. The need for and approach to the "control" of DER will evolve as DER smart inverter technology is adopted and DER can take certain actions to maintain grid conditions based on parameters established by the DSP.

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

[4] "Interconnection" is the first of many steps required to fully "integrate" DER into DSP functions.

storage, energy efficiency programs, and heat pump implementation plans. Staff of the New York Department of Public Service (DPS) along with the New York State Energy Research and Development Authority (NYSERDA), DER developers and other key stakeholders contribute to these collaborative efforts.

The Climate Leadership and Community Protection Act (CLCPA) sets the New York economy on a path to achieve “net zero” greenhouse gas (GHG) emissions. The CLCPA establishes interim target reductions relative to 1990 levels of 40% by 2030 and 85% by 2050. The CLCPA also establishes several targets for the electricity sector, including targets for solar energy, energy storage, energy efficiency, and electric vehicles. Importantly, we expect our existing DSP development strategy to enable an efficient implementation of the CLCPA. We are building a robust DSP with a foundation of technologies, capabilities, and data that will allow us to adjust to the CLCPA and future policy developments.

Exhibit I-2

We have followed a “line-of-sight” approach for developing the DSP.

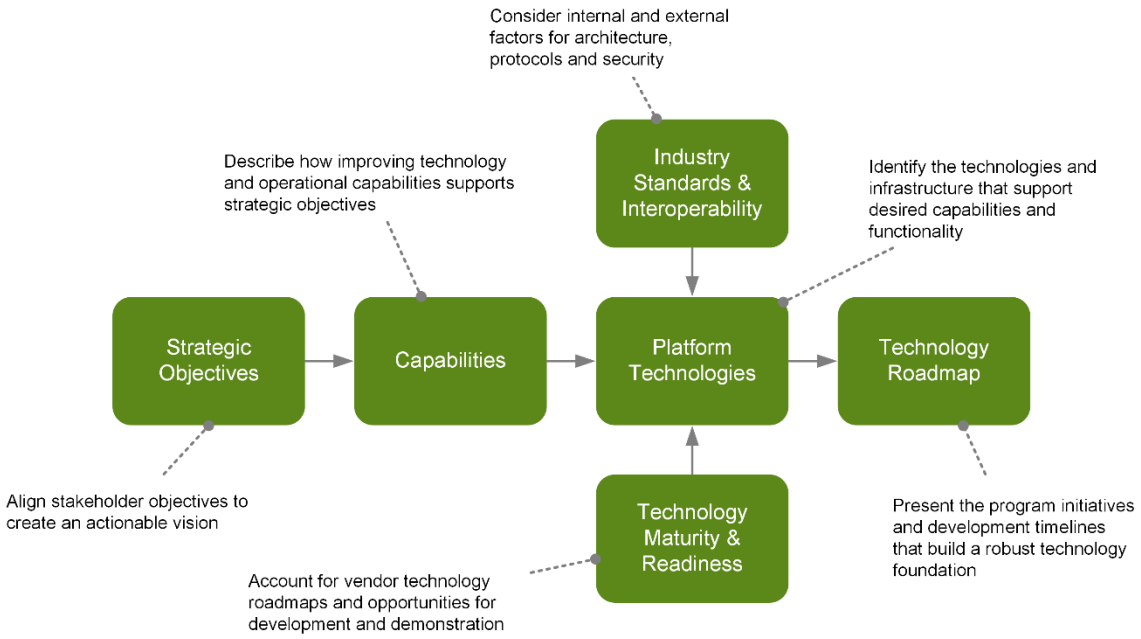


Exhibit I-3

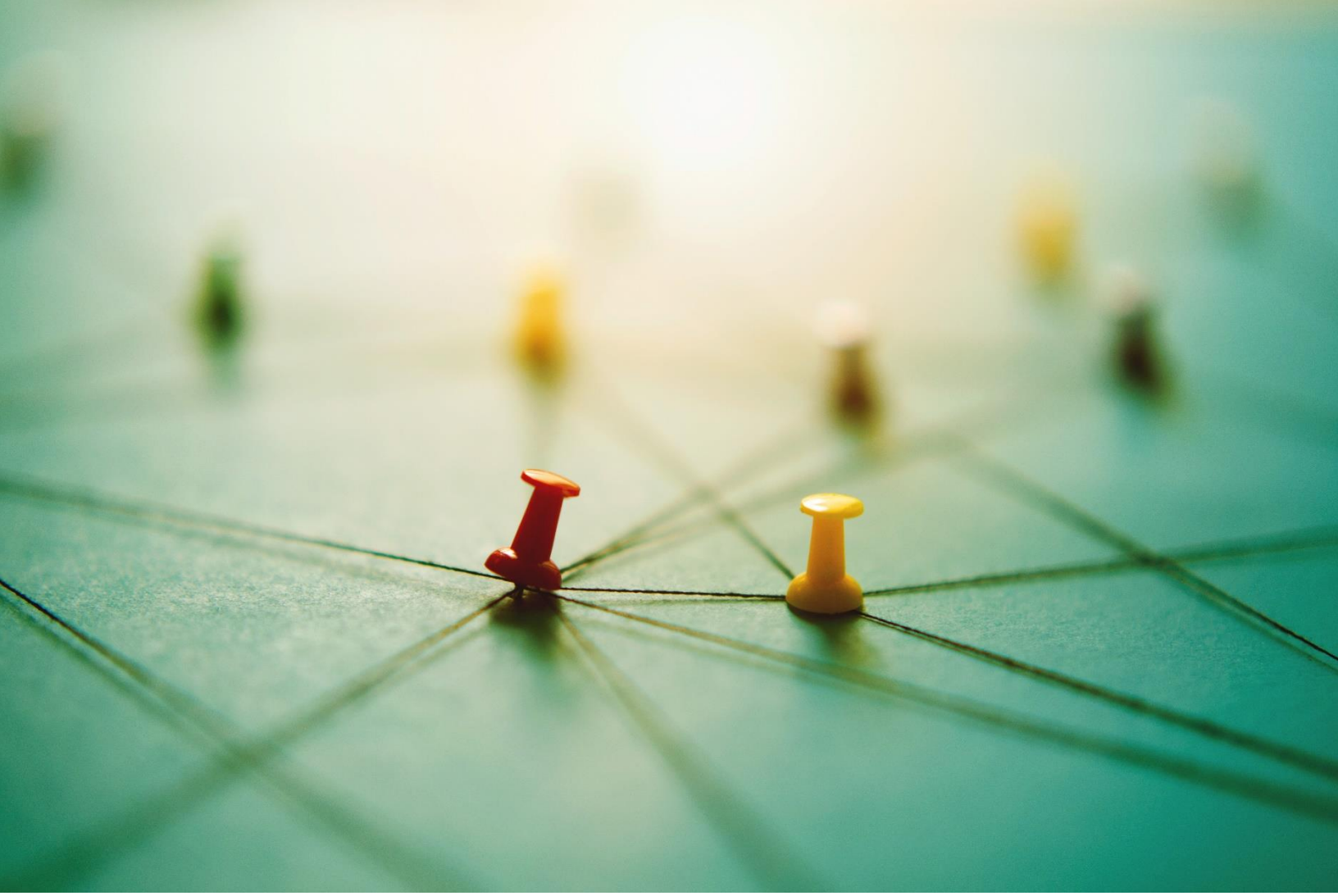
This 2020 DSIP Report is presented in six sections.

I. Introduction	DSIP objectives, priorities, and line-of-sight
II. DSP Vision, Approach and Requirements	How our vision, approach, and State policy objectives determine DSP requirements and enabling capabilities
III. Building DSP Capabilities	The progress that we have made since our 2018 DSIP filing, and plans for the next five years, 2021-2025
IV. Platform Technologies	The investments in platform technologies that enable us to deliver DSP capabilities
V. Promoting Clean Energy	Our efforts to support clean resources that are connected to our distribution system
VI. Roadmap	An overview of how we will build the DSP over the next five years

Our 2020 DSIP submission includes four appendices along with this report:

- Appendix A describes our current progress and future implementation plans for fourteen topical areas, as well as DSIP governance implementation, and a link to the Benefit Cost Analysis Handbook filing, consistent with 2018 Guidance provided by DPS Staff;
- Appendix B presents our portfolio of innovation projects;
- Appendix C provides web links to several NYSEG and RG&E tools that provide developers with the information that they need to target their marketing efforts and connect to our network; and
- Appendix D is a glossary of industry terms.

This report presents our plans to build DSP capabilities and platform technologies as of June 30, 2020. Individual actions and their timing may be impacted by regulatory and policy decisions including a decision in our pending 2019 rate cases, Cases 19-E-0378 *et al.;* and COVID-19 developments that impact our ability to implement planned actions due to safety or financial restrictions or otherwise merit a modification to our plans.



II. DSP Vision, Approach and Capabilities

II. DSP Vision, Approach and Requirements

This section provides an overview of the Companies' DSP vision, a discussion of how we are preparing to serve as the DSP, and how we will deliver to customers, communities, and developers.[5]

Our Vision

The electric industry is in the midst of unprecedented change, enabled by innovation and advances in clean energy, power delivery, and information technologies. It is our vision to serve as a "Smart Integrator". As Smart Integrator, we will offer a platform that makes it easy for customers to manage their energy usage, sign up for service options and pricing programs, and buy products and services from third parties. We will design, adjust, and offer utility energy efficiency and other programs that are responsive to policy guidance and benefit our customers and communities.

The Smart Integrator

- Serve as a platform for customers and third-party service providers, enabling the growth, integration, and optimization of DER.
- Enable new value-added products and services that benefit customers directly and the overall efficiency of New York's energy markets.
- Improve delivery service efficiency while improving the reliability and resiliency of the network.
- Enable the participation of customers and suppliers in evolving distribution markets.

The DSP will make it easier for developers to interconnect DER and electric vehicle fast chargers to our network. We will provide information to DER developers to signal where and when DER can provide the greatest value to the grid. We will integrate DER and electric vehicle charging into our planning, operations, and market services to deliver value to customers, the grid, and New York.

Our DSIP unites these aspirations within a single implementation plan. Moreover, as part of a global energy company, we strive to be a leader in the energy sector as we transition to net-zero carbon emissions over the next two decades.[6]

DER include small and large solar generation facilities, combined heat and power (CHP) facilities, other forms of distributed generation (DG), and energy storage systems (ESS). DER also includes energy efficiency measures and demand response (DR) programs that allow customers to manage their energy usage.[7] These various DER contribute to a cleaner environment. Participation in DR programs

[5] DER developers are customers of DSP data sharing and interconnection services while also providing services to our residential and business customers.

[6] NYSEG and RG&E are utility subsidiaries of AVANGRID, Inc., a diversified United States energy company whose stated purpose is "Working together to deliver a more accessible clean energy model that promotes healthier, more sustainable communities every day." AVANGRID, Inc. is majority owned by Iberdrola Group, a global firm focused on delivering clean energy.

[7] REV Track One Policy Order, Case 14-M-0101, February 26, 2015, footnote 3, page. 3.

improves the environment as the reductions in energy demand occur when the region is producing power from power plants that operate on fossil fuels. Distributed solar power and the transition from combustion engine to electric powered vehicles and electrification of heating will also contribute to a cleaner environment.

Serving our customers

- DSP "customers" include traditional utility customers and developers.
- All our customers want safe, reliable, resilient service. They want us to operate efficiently and be easy to do business with.
- Our developer customers want us to help them identify market opportunities and connect solar power, energy storage, and electric vehicle chargers to the network as easily as possible.

The DSP will support the decarbonization of New York's economy, including the electrification of transportation, buildings, and other end-uses by developing capabilities and implementing clean energy policies. These capabilities will enable the integration of greater amounts of DER and EV charging stations that connect directly to the distribution network or change customer load profiles "behind-the-meter."

In the longer-term, our customers, developers, aggregators, and competitive suppliers will use a DSP market platform to transact efficiently with each other.[8] The potential structure of a distribution market, the products and services it may transact, and its coordination with wholesale markets operated by the New York Independent System Operator (NYISO) is currently being addressed by the Market Design and Integration Working Group (MDIWG) stakeholder process that is being led by DPS Staff.[9] [10] As described in Section III, we are not waiting for resolution of the future market design to test promising market concepts.

Approach

Building the DSP consists of (1) building capabilities and (2) investing in platform technologies to deliver (3) desired DSP outcomes. Consistent with our 2018 DSIP, we organize our capability building around three "pillars": Integrated Planning and Interconnection, Grid Operations, and Market Services.

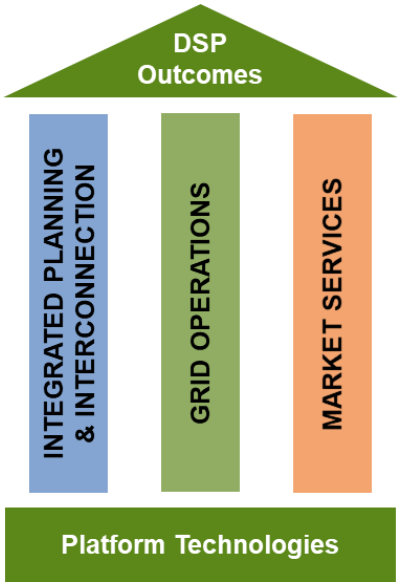
[8] This longer-term vision may include an organized distribution market that executes transactions among buyers and sellers.

[9] This topic was introduced in Chapter III of our 2018 DSIP, "Joint Utilities of New York Long-Term Vision for the DSP." The Joint Utilities presented an initial phase of market development, DSP 1.0, as well as a longer-term market vision, DSP 2.0.

[10] The coordination of the wholesale and distribution markets will be also be informed by policy actions taken by the Federal Energy Regulatory Commission (FERC). The FERC issued Order 841 in February 2018 (reaffirmed in May 2019) addressing the integration of storage. However, the FERC has not yet issued an order in Docket No. RM18-9 that addresses DER aggregation and how DER (defined to include electric storage, DG, thermal storage, electric vehicles and electric vehicle charging station) will be able to access value in wholesale markets. On January 23, 2020, the FERC issued an order accepting the NYISO's proposed Aggregation Participation Model (Docket No. ER-2276), scheduled to take effect in January 2022.

Exhibit II-1

We organize our capability building around three "pillars".



1. **Integrated Planning & Interconnection** ensures the reliable, safe, and efficient planning and design of the electric distribution network and ease of connection.
2. **Grid Operations** manages, maintains, and operates the electric power system in order to deliver system stability, power quality and reliability.
3. **Market Services** connects customers to our pricing options and programs as well as to products and services offered by competitive suppliers.

Innovation serves an important role in building the necessary capabilities and designing platform technologies. We are engaged in a comprehensive effort to test new technologies and ways of doing business by executing a portfolio of innovation projects. We continue to explore innovative concepts with the Energy Smart Community, located in Ithaca, New York where we have installed approximately 12,300 smart electric meters on a network comprised of 4 substations and 15 circuits. We continue to pilot emerging technologies, business model concepts, and marketplace functions to leverage lessons learned and inform our implementation throughout our NYSEG and RG&E service areas.

Finally, we engage directly with stakeholders to gather input and feedback on DSP development activities in three primary ways: (1) participation in meetings and webinars with the Joint Utilities that primarily focus on engaging with developers and other market-facing stakeholders[11], (2) engagement in collaborative discussions on policy and implementation topics with DPS Staff and NYSERDA, and (3) topical discussions between the Companies and a diverse set of stakeholders including elected and other public officials in our service areas.

Check out Appendix B for a catalogue of our innovation projects.

[11] The Joint Utilities' website includes meeting materials and other documentation of extensive collaboration with stakeholders: Joint Utilities of New York.

Capabilities

DSP requirements are driven by our desired outcomes. These outcomes inform the capabilities and platform technologies that we need to deliver those outcomes.

Our desired outcomes are determined by the stakeholders or "clients" that are counting on the DSP to deliver services (e.g., customers, developers, and aggregators) or produce community or societal outcomes (e.g., local and New York State governments).

Exhibit II-2

We have considered a set of guiding principles for the development of the DSIP.

Customer Driven	The DSP must provide customers with the information and services they desire to manage their energy usage and bills, including products and services offered by third parties
Safe, Reliable, and Resilient	The network must be planned and operated, including DER and EV charging station interconnections, to ensure safety, reliability, and resiliency
Secure	Information and data regarding critical infrastructure and system operations as well as the privacy and security of customer information must be protected
Efficient and Affordable	The transition to the cleaner and more sustainable grid must be done in an efficient and affordable way
Clean and Sustainable	The DSP has a critical role to serve in meeting CLCPA and other clean energy targets that are established by policy makers

Our traditional utility customers (and their communities) expect us to continue to provide safe, reliable, and affordable service. They have increasing expectations with respect to the ability of our network to withstand storms and restore power as expediently as possible (resiliency). Our utility customers want to easily engage and transact with NYSEG and RG&E to acquire a range of services that will help them manage their energy profile, including consuming less energy or generating their own energy in an effort to save money or be more sustainable.

Developers also value safe, reliable, and resilient service. We attract developers to New York and to our service areas by helping them identify locations on our network where connected DER offer the greatest value to customers and the grid. They are interested in the ease of engaging and transacting with NYSEG and RG&E, particularly as it relates to the interconnection of DER and EV charging stations.

Aggregators represent a distinct client group. Aggregators are driven by the opportunity to pool customers together to extract incremental value from market opportunities, including value that is accessible by participating in wholesale markets.[12]

[12] The precise role of aggregators in both the near-term and longer-term is being addressed by the MDIWG for distribution markets. The FERC ordered the approval of NYISO Tariff changes to include DER and aggregators in the New York wholesale market in January 2020. The

Finally, local and New York policy makers focus on advancing the public interest, which includes the interests of customers, local communities, the New York economy, and society more broadly. Policy makers communicate specific requirements through legislation (e.g., the CLCPA), community ordinances, Commission orders, and more informal means (e.g., meetings and stakeholder processes).

We anticipate that policy priorities will continue to evolve as technology and circumstances change. For example, we expect that policy goals and priorities will continue to evolve in response to advances in electrification and DER technologies, progress toward decarbonization goals, and economic conditions. The Companies are building a "robust" DSP that will support New York's current policy goals, as well as accommodate and enable this inevitable evolution of policy.[13]

Capabilities by Pillar

The DSP is responsible for providing safe, reliable, and resilient distribution service. The integration of large numbers of DER and electrification loads fundamentally change the way we need to plan and operate the network.

The final stage of DER integration is optimization of grid resources and DER to maximize value for customers, the grid, and New York. This may require the capability for the Companies to "control" selected DER in circumstances where exercising control is necessary to maintain network stability and reliability or where it is mutually beneficial to the Companies and the DER owner or operator.[14]

Each aspect of DER and electrification integration requires that attention be directed to preserving physical and cyber security. Physical security relates to grid assets; cyber security relates to flows of data and information among utility systems and the sharing of information among the Companies, customers, and third-party service providers. Optimization depends critically on cybersecurity.

Companies believe that it is prudent to develop the DSP to accommodate the likely requirements of aggregators for both wholesale and distribution markets.

[13] We expect that policy developments will not require a redesign of the three pillars. However, new energy technologies and advances in existing technologies or new DER enablement services will impact business processes and may require adjustments to our platform technologies and data requirements.

[14] As discussed in Section III, the Companies will design, build, and test capabilities that enable optimization of grid resources during the 2021-2025 DSIP period. It is conceivable that a distribution market will be established within or beyond the DSIP period and that market transactions will contribute to optimization.

Exhibit II-3

The DSP will deliver key capabilities within each pillar and area of responsibility.

DSP Pillar	Responsibilities	Activities
Integrated Planning and Interconnection	Integrated planning determines what type of infrastructure or non-infrastructure solution is needed (including where and when) to deliver safe, reliable, and resilient distribution service. Integrated planning shares insights with DER developers that inform where DER or EV charging stations might be connected at low cost and provide value to the grid.[15]	– Perform planning studies that incorporate DER (forecasting loads and DER, estimating hosting capacity, evaluating infrastructure and non-infrastructure solutions that resolve network needs, etc.). – Share system planning data and insights with DER developers. – Manage large numbers of interconnection requests, including large DER projects that require special distribution planning studies. – Manage connection of DER and EV charging stations to the distribution network.
Grid Operations	Grid Operations is the DSP function that manages, maintains, and operates the electric power system to deliver system stability, power quality, and reliability. Large numbers of connected DER can present challenges to maintaining the stability of the grid. DER alter power flows and dynamics on the grid and along circuits; some DER operate intermittently and unpredictably.[16]	– Provide near real-time awareness of overall grid performance including the impact of large DER and electrification loads. – Take actions to maintain the stability of the distribution network and the quality of power delivered to customers. – Monitor DER operations and exercise control over DER as necessary to maintain grid performance and optimize grid assets and DER.
Market Services	Market Services connects customers to our pricing options and programs as well as to products and services offered by competitive suppliers. Many of our pricing options and programs will be targeted to a specific DER integration objective (e.g., an EV time-of-use rate).	– Help customers make better energy management decisions. – Securely share customer information with DER developers and other suppliers with customer authorization and other privacy restrictions. – Operate a secure on-line marketplace for customers to sign up for utility programs and tariffs and purchase products and services from third parties. – Enable third-party aggregation.

[15] An electric utility can share insights and provide price signals as to where and when DER provides value to the grid but there are many factors that contribute to customer investment and operating decisions.

[16] The specific location of DER on a circuit (e.g., next to a substation in an urban area or at the end of a line in a sparsely populated region) impacts both planning and grid operations.

We want to ensure that DERs, EVs and beneficial electrification are part of each DSP pillar. This means:

- Reflecting connected and future DER and electrification load in integrated planning;
- Connecting DER and EV charging stations to our network in a safe, reliable, resilient, and efficient manner;
- Integrating DER and electrification load in grid operations; and
- Offering programs, pricing options, and services that support desired outcomes.

Platform Technologies

The distribution network must become significantly more "intelligent" to accommodate a more dynamic grid. The DSP requires data and information and the ability to act on that information to perform Integrated Planning, Grid Operations, and Market Services functions. The design of platform technologies is an integrated solution that supports the five DSP desired outcomes. For planning purposes, we organize the design effort into five "technology initiatives." Implementation consists of specific investments or "projects" that advance an initiative.[17]

Exhibit II-4

DSP Platform Technologies are organized into five initiatives.

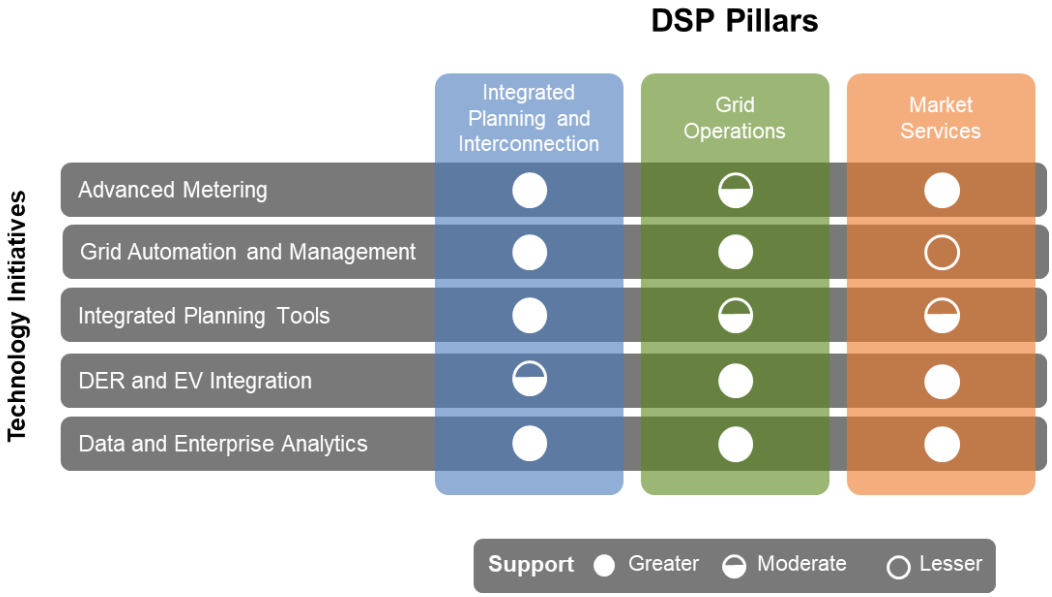
Advanced Metering Infrastructure	Advanced meters plus communications infrastructure that provide granular customer consumption data that (a) can be used to develop granular load profiles and forecasts, (b) help customers manage their energy usage, and (c) provide grid operators with grid-edge visibility and advanced operational capabilities.
Grid Automation and Management	Automated grid devices and management technologies that provide the Energy Control Center (ECC) with visibility and decision support to make adjustments to the distribution system to support resiliency, reliability, power quality, DER integration, and other outcomes and, with the implementation of an ADMS, optimize grid assets and DER.
Integrated Planning Tools	Advanced analytical tools that leverage load, system, and DER data to plan the network and provide insights to DER developers.
DER and EV Integration	Systems that improve interconnection management and integration of connected DER and EV charging stations to achieve planning and operational benefits.
Data and Enterprise Analytics	(a) building an integrated network system model of grid assets and connected DER to support Integrated Planning and Grid Operations, and (b) applying analytics to AMI, grid operations, DER and other data to provide insights and derive value

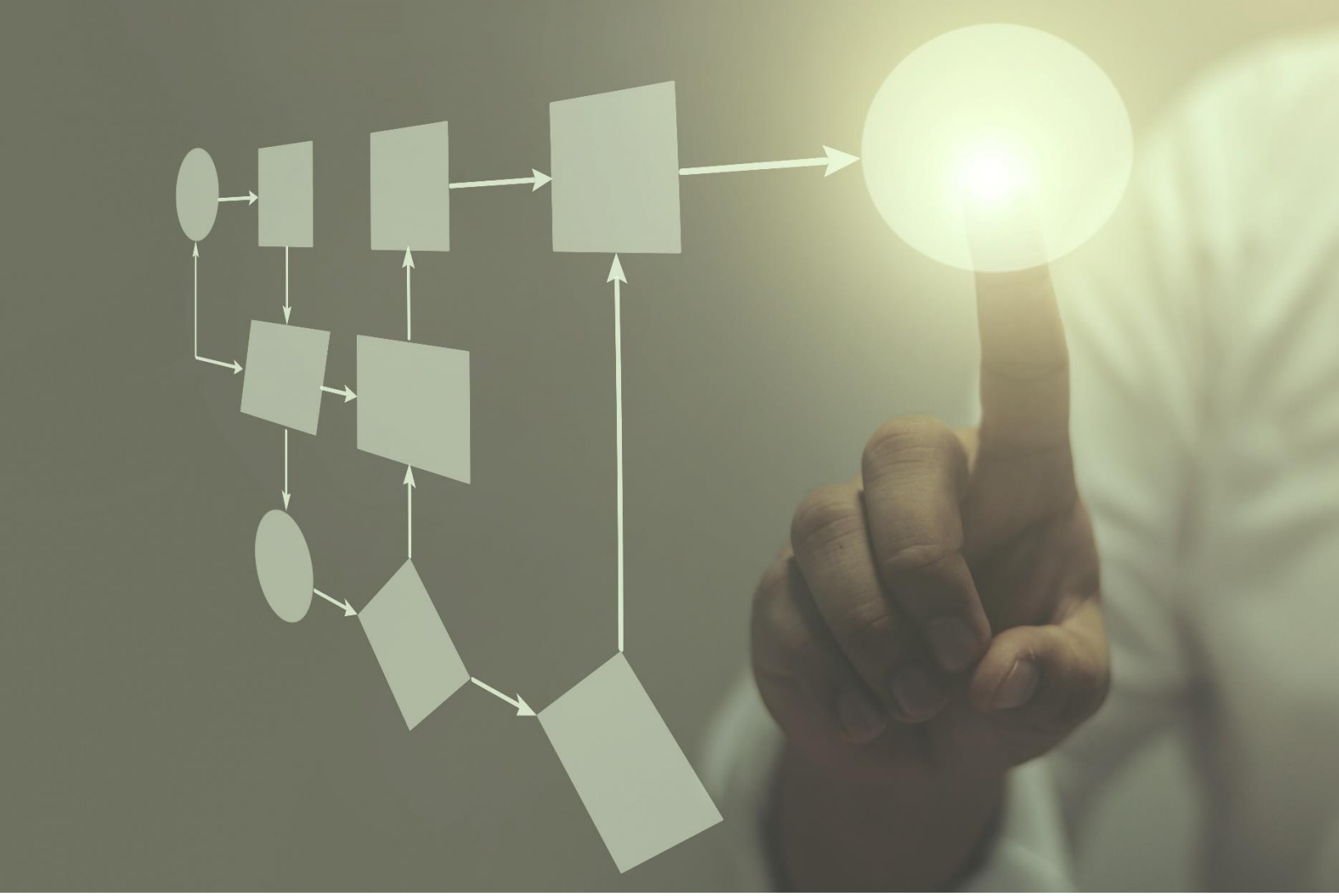
[17] Specific projects are reported in our annual Five-Year Capital Expenditure Forecast filings, with funding approvals provided in rate cases.

Our platform technologies are planned in a coordinated manner to support all three DSP pillars. For example, Grid Automation provides data that improves the quality of many Integrated Planning activities and enables Grid Operations. However, it is not expected to make a significant contribution to our ability to offer Market Services. Most of the platform technology initiatives contribute significantly to two or all three of the pillars and are “foundational.”

Exhibit II-5

Platform Technologies enable multiple DSP capabilities.





III. Building DSP Capabilities

III. Building DSP Capabilities

This section reviews our progress to date and future implementation plans as we build DSP capabilities in each of the three pillars.

Integrated Planning & Interconnection

Integrated Planning is the DSP function that ensures the reliable, resilient, safe, and efficient planning and design of our electric distribution network. Interconnection is a related but distinct function that manages requests for interconnection and connects DER and EV charging stations to our grid.

Integrated Planning

We are integrating DER into our long-term planning processes, optimizing the contribution of DER together with our more traditional investments that we make to improve the reliability and resiliency of the grid. We are building our Integrated Planning function to achieve the following outcomes:

- Maintain a safe, reliable, resilient network by making investments in distribution facilities and/or connecting new DER;
- Deliver value to customers over the long term by sharing data that enables efficient investment decisions by the Companies and DER developers; and
- Provide system information and insights to other functions to support their respective DSP responsibilities.

Exhibit III-1

Integrated Planning incorporates seven sub-functions.

Advanced Forecasting[18]	Long-term granular forecasting of load and DER by location and time
Utility Transmission & Distribution (T&D) Solutions	Identifying areas of the grid that require an investment or are candidates for a Non-Wires Alternative (NWA), and defining the traditional T&D solution
Non-Wires Alternatives[19]	Procuring NWAs through a competitive solicitation process
Hosting Capacity[20]	Estimating the amount of DER (in kW) that can be accommodated by a circuit or section of a circuit without requiring an upgrade
Beneficial Locations[21]	Identifying locations on the grid where DER could help address constraints and potentially defer grid investments or where EV charging stations and other electrification load can be accommodated
System Data Sharing[22]	Sharing Forecast, Non-Wires Alternatives, Hosting Capacity, and Beneficial Location information with DER developers to inform their business decisions
Interconnection[23]	Managing requests to interconnect DER and EV charging stations in a safe, efficient, and reliable manner. This includes processing applications, technical screening, and managing NWA contracts, and engineering flexible solutions.

To perform our Integrated Planning studies, we need an up-to-date representation of the physical and electrical attributes of distribution infrastructure that comprise the network and the location and operational attributes of connected and forecasted DER. As discussed in Section IV, we are developing a data model that organizes, consolidates, and integrates data and information from several sources. We refer to this data model as the “integrated distributed system model” (IDSM).

[18] Refer to Appendix A – Topic 2 for a detailed discussion of Advanced Forecasting.

[19] Refer to Appendix A – Topic 14 for detailed discussion of Non-Wires Alternatives.

[20] Refer to Appendix A – Topic 12 for a detailed discussion of Hosting Capacity.

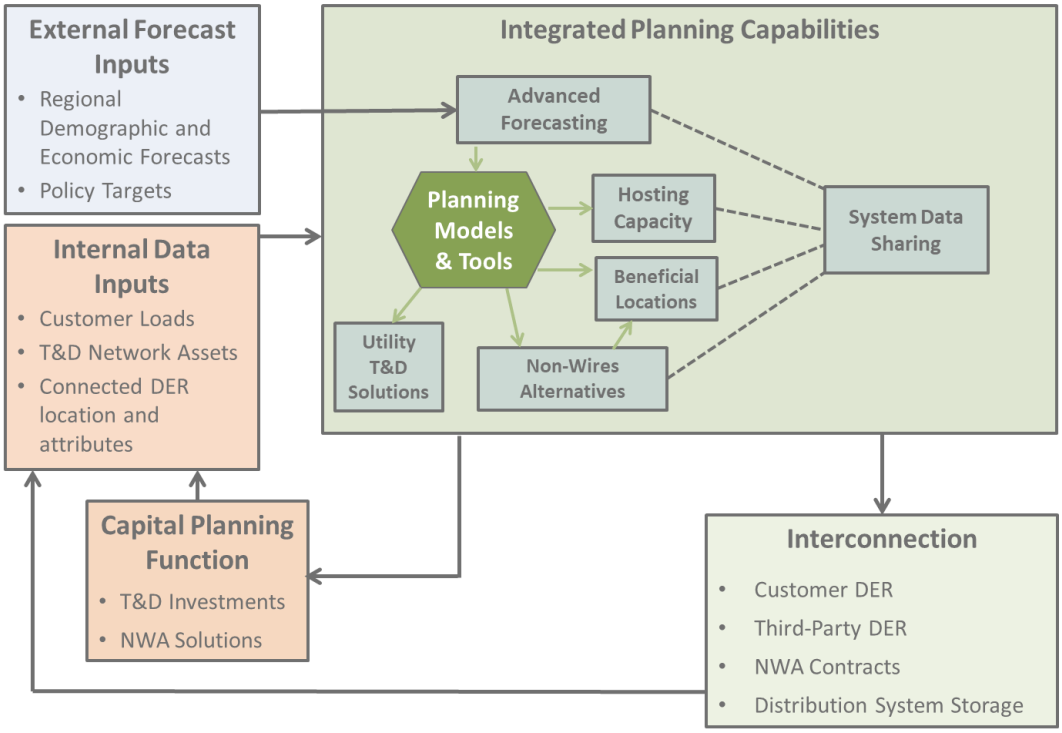
[21] Refer to Appendix A – Topic 13 for a detailed discussion of Beneficial Locations.

[22] Refer to Appendix A – Topic 7 for a detailed discussion of System Data Sharing.

[23] Refer to Appendix A – Topic 10 for a detailed discussion of DER Interconnection.

Exhibit III-2

Integrated Planning relies on external inputs and system data.



Our current focus is to build a strong foundation to integrate large quantities of DER into our Integrated Planning and Grid Operations functions. Both our Integrated Planning and Grid Operations functions require the ability to collect, update, maintain, manage, and access granular data.[24] This capability depends, in turn, on infrastructure investments that collect data on customer loads at advanced metering points and power flows and attributes (e.g., voltage) throughout the network (sensors and other grid devices). With respect to Integrated Planning, we are also focused on building capabilities in several areas that will leverage more granular data while sharing the results of these enhanced analyses with DER developers to support their marketing, project development, and interconnection efforts.

The Joint Utilities address Integrated Planning in a collaborative manner. A primary focus of the Joint Utilities since the 2018 DSIP filings has been to enhance hosting capacity maps to reflect stakeholder requests and feedback. The Joint Utilities' Hosting Capacity working group, informed by extensive consultations with DER developers and other stakeholders, have been enhancing the Hosting Capacity process and on-line presentation of circuit maps in stages over the past four years. Several enhancements have been made since the 2018 DSIP filing to hosting capacity analyses, maps, and supplemental circuit-specific information provided through pop-up windows.

Check out Appendix A, Topic 12 for more details on Hosting Capacity.

[24] Integrated Planning requires large amounts of granular historical data to inform long-term planning; Grid Operations requires current or recent data regarding the status of the grid to inform near-term operations decisions.

We have also adjusted our NWA process to engage integrated planning in the identification of NWAs earlier in the capital planning process. We have tested two forecasting tools in the ESC that are designed to forecast DER and rooftop solar energy, respectfully.

The Companies are pursuing “Flexible Interconnection” agreements that enable DER to avoid certain system reinforcements through the use of an operational approach called “active network management” (ANM). The Companies are actively managing a Flexible Interconnection Capacity Solution (FICS) innovation project to develop this capability.

Future enhancements to Integrated Planning will leverage benefit from the availability of granular load data as the Companies deploy AMI throughout our service territories and develop an accurate model of the network (circuits, grid devices, connected DER and EV charging stations, and meters). We expect to start reflecting AMI and grid automation data into load forecasting models and performing 8760 load and DER forecasting use case by the end of 2025.

Exhibit III-3

Integrated Planning & Interconnection Progress and Future Implementation

	Progress	Future Implementation	
Capabilities			
Advanced Forecasting	– Test LoadSEER and WattPlan in the ESC	– Identify tools to perform DER and EV forecasts – Design Enterprise Analytics 8760 forecasting use case	– Perform 8760 forecasting use case
Utility T&D Solutions	– Integrate NWAs into Project Planning Process	– GMEP, Detailed Network Model – Automate data transfers among systems and tools	
Non-Wires Alternatives	– Integrate NWAs into Integrated Planning	– Develop standard contract – Implement M&V Protocols and improve Contract Administration	– Refine M&V and monitoring and control back-end processes
Hosting Capacity	– Stage 3.0 nodal hosting capacity analyses – Additional circuit pop-up table information	– Stage 4.0 hosting capacity – Incorporate PV> 500 kW and infrastructure projects > $500k	– Hosting capacity forecast – Reflect all existing DER in power flow analyses – Automate data flows and calculations to enable frequent updates
Beneficial Locations	– Identified Beneficial Locations (2018 DSIP)	– Apply approved MCOS/VDER methodologies	– Incorporate granular AMI and system data into NWA analyses
System Data Sharing	– Share system data with developers	– Implement Data Proceeding requirements	
Interconnection	– Phase 2 screening tests – PV + ESS guidelines – 2 FICS projects operational by end of 2020	– ESS interconnection, control, and metering requirements – Continue implementing and operating FICS, including identifying applicable ANM project alternatives	– Phase 2 automation – Refine M&V and monitoring and control back-end processes
Timeframe	2018 to 2020	2021 to 2022	2023 to 2025

For more information, check out Appendix A, Topic 1 (Integrated Planning)

Grid Operations

Grid Operations is the DSP function that manages, maintains, and operates the electric power system to deliver system stability, power quality, and reliability. Our objective is to improve the reliability and quality of service to our customers and developers. We are developing the ability to integrate large numbers of DER into all Grid Operations functions. The ADMS and other enabling platform technologies are discussed in Section IV. We are also coordinating our operations with the NYISO to ensure the reliability of our own distribution and lower-voltage transmission systems and the New York high-voltage transmission grid, while providing access of distribution-connected DER to NYISO markets.

We are building our Grid Operations function to achieve the following outcomes:

- Maintain full situational awareness of the distribution system and all connected loads and DER;
- Utilize accurate short-term forecasts for electricity consumption and production by our customers;
- Maintain grid connections to loads and DER while keeping voltage and equipment loading within limits;
- Locate and isolate power interruptions when they occur, and restore power safely and quickly;
- Coordinate grid operations with DER operations;
- Optimize the reliability, efficiency, and cost of the distribution network with NWAs, loads, and DER;
- Support whole-system optimization at the T&D interface.

Exhibit III-4

Grid Operations consists of three core functions.

Measurement, Monitoring and Control (MM&C)	Reliable real-time operations maintaining situational awareness of the distribution network, connected loads and DER, and keeping voltage and equipment loading within specified limits
Grid Optimization	Making use of all available assets, including network infrastructure and DER, to optimize reliability, efficiency, and cost of the distribution network, and the connected power system more broadly
DER Management	Coordination and control of discrete and grouped DER to ensure network reliability and full participation of owners, operators, and aggregators[25]

[25] Each of the three core Grid Operations' functions depends on cybersecurity provisions that protect data as it is communicated from grid devices to Company systems and among Company systems and tools. As discussed in Appendix A – Topic 9 (Cybersecurity), we comply with the North American Electric Reliability Corporation critical infrastructure protection (CIP) standards and guidelines and current cyber security industry best practices.

Grid Operations will rely on (1) an up-to-date inventory of all DER, EV charging stations, and distribution assets and their capabilities; (2) near real-time data regarding customer usage and power flows throughout the distribution grid; and (3) systems and technology that respond automatically to mitigate potential issues and support grid operators in resolving operational issues.

Progress and Future Implementation

Exhibit III-5 below presents our progress and future implementation plan for Grid Operations. Grid Operations depends on several foundational platform technology projects, as discussed in Section IV. We are currently in the "build" phase of the DSP, as indicated by the progress made since the 2018 DSIP and initiatives planned for the 2021-2022 period.

We have also made progress over the past two years working with the Joint Utilities to enhance operational coordination with the NYISO. While most of these activities relate to market and planning activities, we have made progress to enhance our operational coordination, communication, and control. By 2022, we expect to establish formal operating procedures to monitor and control DER for both real-time and day-ahead dispatching.

Our innovation projects have contributed to development via lessons learned and testing of Grid Operations' capabilities. These include several projects leveraging our Energy Smart Community. Several of our innovation projects are designed to test our MM&C capabilities. We have tested ADMS concepts in the ESC and are currently performing a Fault Location, Isolation and Service Restoration (FLISR) pilot project in Lancaster; FLISR will also be tested in Brewster. We are exploring active network management, applying this to two FICS installations expected to be in service in 2020. Our OptimizEV project tests our ability to control home EV chargers. We are also conducting energy storage innovation projects that test our ability to aggregate and dispatch energy storage DER.

Several of these projects will continue into the 2021-2022 period, with any successful outcomes resulting in an assessment of use cases and decision on broader deployment during the 2023-2025 period.

Exhibit III-5

Grid Operations Progress and Future Implementation

	Progress	Future Implementation	
Capabilities			
Measure, Monitor and Control	– Installed approximately 1,360 grid devices – Upgraded 20 substations – Subscribed new ANM customers – Completed Phase I DER M&C, interconnecting smart inverters to DER in a laboratory environment,	– Deploy AMI – Grid Automation deployment (ongoing) – Begin multi-year Grid Model Enhancement Project (GMEP) survey of circuits – Design Phase II M&C field demonstration (potential)	– Deploy AMI – Grid Automation deployment (ongoing) – Continue GMEP survey – Begin deployment of DER gateways in 2025, enabling two-way communication between the ECC and DER – Conduct Phase II M&C field demonstration (potential)
Grid Optimization	– Completed ADMS proof of concept in the ESC – Volt/VAR Optimization (VVO) testing in the ESC – Launch FLISR pilots in Lancaster and Brewster	– Grid Automation deployment (ongoing) – Complete FLISR pilots – Upgrade Outage Management System (OMS)	– Grid Automation deployment (ongoing) – Deploy ADMS, including VVO and other advanced applications – Install a Distributed Energy Resource Management System (DERMS) (2025+)
DER Management	– Designed OptimizEV pilot testing customer responsiveness to charging price signals – Deployed four ESS innovation projects – Completed Phase I DER M&C (described above)	– OptimizEV pilot will continue through the first quarter of 2021 – Establish ECC communications link with aggregators – Operate FICS projects	– Leverage ANM to improve integration of DER – Implement successful OptimizEV scenarios – Aggregate energy storage for grid services – Establish process to maintain resource data synchronization with the NYISO and aggregators
Timeframe	2018 to 2020	2021 to 2022	2023 to 2025

For more information, check out Appendix A, Topic 3 (Grid Operations)

Market Services

Market Services is the function that connects customers to our pricing options and programs, as well as to products and services offered by competitive suppliers. This function empowers our customers to make better energy management decisions by providing them and their potential suppliers with access to energy usage and other relevant information, consistent with data privacy requirements. Potential suppliers can use customer-specific information (shared securely and only with customer authorization) to tailor their offerings to different customers. The Companies can anonymize aggregated customer data for a DER developer to design a market campaign for a community distributed generation (CDG) project.

Our customers will be able to use our online products and services platform to choose among NYSEG and RG&E time-of-use and other pricing options, enroll in energy efficiency or demand response programs, and purchase products and services from competitive suppliers. Our customers will be able to participate in NYSEG and RG&E tariff options that reduce energy usage during periods of high demand, thus reducing their energy costs.

Market Services also includes efforts by the Companies to engage customers in clean energy options, including energy efficiency, solar energy, energy storage and electric vehicles. These efforts are discussed in Section V.

We are building our Market Services function to achieve the following outcomes:

- Empower customers that have easy and secure access to their own detailed energy usage data and the ability to securely share their usage data with third parties, with authorization;
- Provide insights and tools that help customers manage their energy usage;
- Develop an expanded products and services platform that is easy for customers to navigate with the ability to self-select program, service, and pricing options from NYSEG, RG&E, or products and services from a third-party supplier; and
- Ensure security and privacy of customer data that resides within the Companies or is provided to a third party, with authorization.

Exhibit III-6

We are building capabilities to support and animate market development.

Empower Customers	Help customers make more informed energy management decisions
Securely Share Information	Securely share customer information with DER developers and other suppliers with customer authorization and other privacy restrictions;
On-line Marketplace	Operate a secure on-line marketplace for customers to sign up for utility programs and tariffs and purchase products and services from third parties
Enable Aggregation	Enable third-party aggregation

Sharing of customer and system data is a critical contributor to the animation of markets.[26] The Joint Utilities' Customer Data Working Group[27] works together to specify common data definitions, availability, granularity, privacy standards, and usage agreements. Specifically, the working group has been focusing on developing uniform standards for:

- Green Button Connect (GBC) terms and conditions (T&C) that are consistent across all Joint Utilities and in compliance with the DPS Order Adopting Accelerated Energy Efficiency Targets[28] and Energy Storage Order.[29]
- Whole building aggregated energy data T&C, required by the DPS[30], which develop privacy standards and data requirements needed for Community Choice Aggregation (CCA)[31] in anticipation of statewide energy benchmarking. These whole building standards will allow utilities to provide customers with aggregated and anonymized whole building meter data.
- Uniform Business Practices (UBPs) for DER developers to govern their business and marketing practices.
- Data security agreements (DSAs) that energy service entities are required to execute to obtain access to customer data through the utility's system.[32]
- Utility Energy Registry (UER), a NYSERDA initiative, to share aggregated community-level load data with DER developers.[33]
- A data exchange to securely exchange customer and system data between the utility and third parties.

Customer data sharing is addressed in detail in Appendix A, Topic 8 (Customer Data).

Progress and Future Implementation

Exhibit III-7 on the following page presents our progress and future implementation plan for Market Services. We anticipate that the recent data sharing proceeding will result in additional actions.

The Companies continue to make substantial progress in each of the Market Services capabilities. We collaborate with the Joint Utilities and stakeholders on sharing information and enabling aggregation to develop protocols that protect the security and privacy of customer information while designing solutions that can be implemented consistently throughout New York

[26] On March 19, 2020, the Commission initiated a proceeding (Case No. 20-M-0082) to address access to customer energy usage and system data as part of the REV strategy to promote innovation and customer choice.

[27] The Customer Data and System Data working groups merged in December 2018 to form one data-sharing working group.

[28] December 13, 2018. Order Adopting Accelerated Energy Efficiency Targets. Case 18-M-0084.

[29] December 13, 2018. Order Establishing Energy Storage Goal and Deployment Policy. Case 18-E-0130.

[30] April 20, 2018. Order Adopting Whole Building Energy Data Aggregation Standards. Cases 16-M-0411 and 14-M-0101.

[31] April 20, 2018. Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs. Case 14-M-0224.

[32] October 17, 2019. Order Establishing Minimum Cybersecurity and Privacy Protections and Making Other Findings. Case 18-M-0376.

[33] April 20, 2018. Order Adopting Utility Energy Registry. Case 17-M-03515.

We are developing the platform tools that we will need to develop insights and target solutions to segments of customers and to individual customers, leveraging advanced metering data when it becomes available.

Exhibit III-7

Market Services Progress and Future Implementation

	Progress	Future Implementation	
Capabilities			
Empower Customers	– Deployed customer mobile application that provides easy access to several account functions	– Employ data analytics to develop and share customer-specific insights	– Offer targeted EE insights that reflect availability of granular AMI and system data
Securely Share Customer Information	– Provided more secure data exchange platform – Increased data shared via data interchange or secure websites – Implemented GBC and propose GBC T&Cs – Established statewide data security agreement (DSA) – Participated in NYSERDA EE data pilot and expanded data exchange in Monroe County	– Implement Data Proceeding requirements, including data to be shared, procedures for sharing data, and any standards or protocols – Address privacy and cyber security provisions of the Data Proceeding while continuing the Companies' efforts to strengthen privacy and cyber security protections – Expand EE-related data exchanges with NYSERDA and other agencies – Enable customer data sharing via Energy Manager (using GBC)	
Build On-line Marketplace	– Completed RG&E marketplace demonstration project and implemented in NYSEG – Targeted marketing of energy efficiency program offerings	– Apply data analytics to share insights with aggregators	– Enable self-service data sharing options
Enable Aggregation	– Developed data aggregation standards – Provided customer data to third parties to support CCA and CDG development – Evaluated four Joint Utility aggregated data use cases	– Test Joint Utility aggregated data use cases – Apply data analytics to share insights with aggregators	– Map available AMI data – Enable aggregation based on factors other than location – Support value-added market analyses and engagement
Timeframe	2018 to 2020	2021 to 2022	2023 to 2025

IV. Platform Technologies

IV. Platform Technologies

This section presents our investments in platform technologies that enable us to deliver DSP capabilities.

Technology Initiatives and Projects

The DSP requires data and information and the ability to act on that information to perform Integrated Planning, Grid Operations, and Market Services functions. Platform Technology initiatives are integrated to achieve DSP outcomes efficiently as we integrate DER and electrification load. These outcomes include enablement of DSP capabilities that allow us to integrate DER and EV charging stations and thereby contribute to realization of the CLCPA clean energy goals.

Exhibit IV-1

Platform Technologies are organized within five initiatives for the DSIP period and beyond.

Initiatives	Purpose
Advanced Metering	– Deploy AMI to provide visibility of load and voltage at the grid edge – Include infrastructure that securely communicates real-time data to control systems, enabling the ECC to manage and optimize power flows – Enable time-varying rates, outage notifications, automated disconnects and reconnects
Grid Automation and Management	– Deploy substation and line automation – Monitoring, control, and management of the distribution network to achieve reliability, efficiency, and cost-effective integration of DERs – Develop a decision support system to assist control room and field operating personnel – Enable remote/automatic control of switching and voltage control equipment
Integrated Planning Tools	– Forecast electricity consumption, DER production, and electrification load by circuit and time of day – Continue to improve Hosting Capacity maps and refresh rates
DER and EV Integration	– Integrate DER into all aspects of Integrated Planning and Grid Operations – Support integration, coordination, and optimization of energy storage, small-scale solar, and EV charging stations – Improve interconnection processes and enable Flexible Interconnection – Improve management and visibility of DERs on the system to enable optimization of DER and grid resources
Data and Enterprise Analytics	– Develop integrated distribution system model to support Integrated Planning and Grid Operations – Enable automated data flows among systems – Turn “big data” into actionable insights for customers, DER developers, and the Companies

The Companies organize the technology investments into specific projects that are reported in our annual Five-Year Capital Expenditure Forecast filings, with approvals requested in rate cases.

Exhibit IV-2

The DSIP includes eleven key technology projects over the next five years.

Initiatives	Projects	Major Projects
Advanced Metering	**Advanced Metering Infrastructure**, an integrated system of smart meters, communications networks, and data management systems	☆
Grid Automation and Management	**Line Automation**, including electronic controls for voltage regulators, capacitors, switches and reclosers	☆
	Substation Automation for all NYSEG/RG&E substations	☆
	Advanced Distribution Management System with D-SCADA, VVO, FLISR and DERMS	☆
Integrated Planning Tools	**Hosting Capacity** investments to enable Stages 3.x and 4.0 maps	
	Benefit Cost Analysis (BCA) Tool updates for improved evaluation of Non-Wires Alternatives	
DER and EV Integration	**Storage Integration** to coordinate ESS resources with DSP capabilities	
	EV Integration with Investments in charger make-ready infrastructure	
	Smart Solutions including an online marketplace	
Data and Enterprise Analytics	**Data and Network Model, including GMEP** to support data validation and management systems	☆
	Prioritized Analytics Projects based on high value use cases	

Major Projects

Five of the eleven technology projects designated with a "☆" in Exhibit IV-2 involve major deployments of foundational platform technologies needed for building the DSP in the next five years.

Advanced Metering Infrastructure

AMI provides monitoring and visibility at the grid edge. In addition to measuring electricity consumption at 15-minute intervals, the advanced meters will provide operational information including power outages, voltage, and detection of tampering. AMI will help customers manage their energy usage, and support time-varying pricing and innovative rate structures. The granular data collected by millions of advanced meters will help the Companies build dynamic load models and improve forecasts, thereby contributing to more precise distribution planning. Our AMI deployment involves an upgrade to our customer billing system to support time-varying rates. This system upgrade is a major undertaking and is scheduled to begin this fall, contingent upon receiving regulatory approval for AMI deployment.

Status

Advanced meters, a communications network and head-end systems have been demonstrated as part of the Energy Smart Community.[34] A three-year meter deployment is planned to start in the Spring of 2022. Our AMI project management team and governance plan are in place. The management team is proceeding with internal resource planning, scheduling, and overall deployment planning. We have also developed a schedule and are drafting RFPs to procure products and services necessary to deploy AMI. Most of the RFP preparation is complete, with several procurement efforts underway. The Companies are drafting procurement contracts to minimize any delay once we have approval to proceed.

Grid Automation

Grid automation and management supports enhanced operational capabilities for the DSP. The automation of equipment on distribution lines and in substations will improve the responsiveness, reliability, and efficiency of the distribution system. When combined with sophisticated control systems such as ADMS and DERMS, automation devices can be coordinated to enable ANM, enabling higher penetrations of DER and beneficial electrification.

Status

Over 100 grid devices have been automated within the ESC footprint. These include reclosers, switches, voltage regulators and capacitors. ADMS was also demonstrated as a proof of concept. Outside the ESC, the Companies have automated over 1,000 additional grid devices, and SCADA has been installed at twenty distribution substations. Deployment of substation and line automation will continue across our service territory. FLISR is being demonstrated for future use, with a successful project in Lancaster, and another demonstration is set to begin in Brewster later this year.

[34] The head-end system consists of hardware and software that receives meter data, stores interval load data to support customer billing, and communicates meter data to other corporate systems.

Distribution Data and a Network Model

We are developing a system model[35] that organizes, consolidates, and integrates data and information from several different sources. The "integrated distributed system model" (IDSM) can serve as a starting point or "source of truth" for other models and systems used for Integrated Planning, including power system analysis, engineering design, and capital budgeting. It will also serve as the source of truth for Grid Operations. Given the pace of change and increasing complexity of distributed systems, the Companies believe that the IDSM will help improve the accuracy, efficiency and transparency of Integrated Planning and its sub-functions. The model will incorporate electrical infrastructure information; load information; DER information; and certain customer information. This information will be enhanced with geospatial data, demographic data and other information that can be used to support analytics and machine learning. The IDSM will enable the DSP capabilities that are described in Section III and is foundational to the application of integrated planning tools, performance of grid automation and management, and integration of DER and EV charging stations. Successful execution of integrated planning requires accurate internal data inputs, reliable forecasts of external data inputs, robust planning models and tools, sound planning analyses, and effective communications with internal and external stakeholders.

Data governance is necessary to maintain the accuracy and integrity of the IDSM. Appropriate governance will streamline the time and effort required to refresh forecasts and system information that is shared with stakeholders.

Status

The IDSM relies on a solid data foundation, and the Companies are implementing a five-part plan to build it. This includes: (1) data concept and design to manage data from multiple sources and automate processing and integration; (2) granular metered load from advanced metering to validate network models and build forecasts; (3) verification of distribution network infrastructure data with the GMEP; (4) connected customer and DER data, including location, phasing, technology type, and capability; and (5) operational data from the network including current, voltage and power flow. Collecting and managing the data is a multi-year effort and will continue to evolve as sensors and devices are deployed throughout the distribution network over the next several years.

Appendix A, Topic 1 (Integrated Planning) provides more details on the integrated distributed system model.

ADMS

The distribution network must become significantly more "intelligent" to accommodate a substantial increase in DER of varying type, size, and operating attributes that are dispersed throughout our service areas. Our ECCs will continue to be responsible for grid operations under constantly changing

[35] A system model identifies the important elements of a complex system, the relationships among elements, and data that defines each element. It serves as a single source of truth for multiple business area that use the system definition as the starting point to perform targeted analyses.

network conditions, utilizing grid-side, supply-side, and demand-side resources. The Companies are developing a platform technology architecture that utilizes centralized control based on an ADMS. The ADMS consolidates distribution SCADA, outage management, and advanced distribution applications onto a “single pane of glass” for distribution operators and engineers. The ADMS will be the primary system for monitoring, control, and management of the distribution network to achieve reliability, efficiency, and cost-effective integration of DER. We envision the ADMS will provide decision support to assist operators in the ECCs and help them coordinate the safe and efficient work of field operating personnel. The ADMS will also manage operation of switching (FLISR) and voltage control equipment[36] (VVO) on the distribution network. Over time the ADMS will leverage an expanding network of grid devices and advanced software applications to support feeder optimization. In the future, ADMS will be a core technology for active network management which, among other capabilities, will enable higher hosting capacity and better integration of DER in the distribution system.

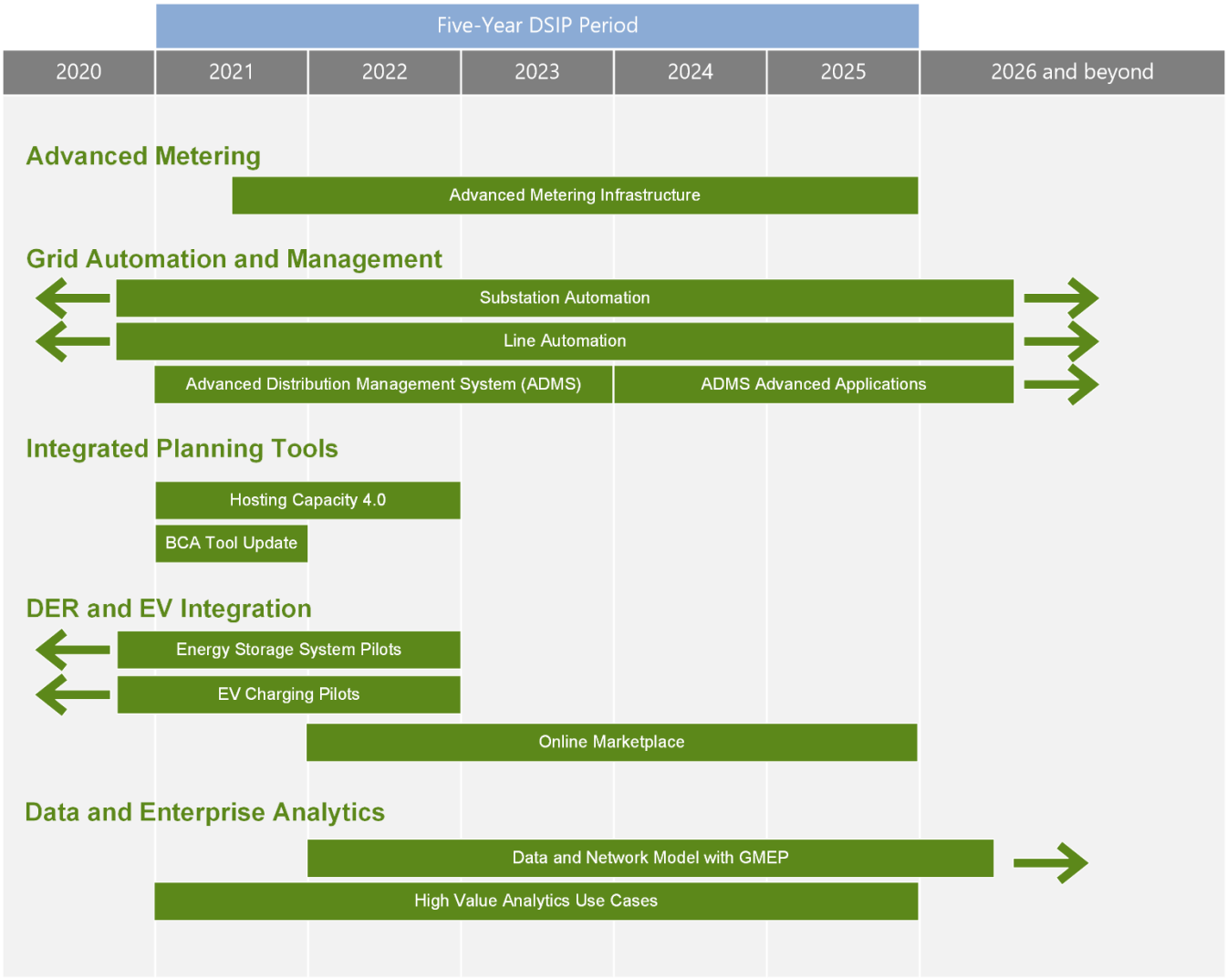
Status

The Companies anticipate completing the ADMS in 2023. However, integration of additional advanced applications for the integration and DERs (DERMS) and beneficial electrification is likely to be required beyond 2023. The DERMS will likely interface with third party DER systems including smart inverters, energy storage management systems, demand response platforms, EV charging platforms, and microgrid controllers. The development of these systems will be informed by DSP/NYISO market design.

[36] Automated grid devices needed for VVO primarily include voltage regulators, capacitor banks, and load tap changers. There is also a potential for smart inverters to participate in VVO.

Exhibit IV-3

We will be deploying foundational platform technologies within five initiatives over the next five years and beyond.



V. Promoting Clean Energy

V. Promoting Clean Energy

This section highlights our efforts to support clean resources that are connected to our distribution system.

The Companies have been working with the Joint Utilities to implement policy guidance and make progress toward targets established in several Commission orders. The CLCPA codifies many of these targets and establishes an overall target to reduce GHG emissions relative to 1990 levels of 40% by 2030 and 85% by 2050. The act includes several electricity sector targets, including a target of 70% reliance on renewable energy by 2030 and 100% clean energy by 2040. The specific targets include:

- Energy Efficiency: 185 trillion BTU reduction from New York's 2025 forecast;
- Solar Energy: 6,000 MW by 2025;
- Energy Storage: 3,000 MW by 2030; and
- Electric Vehicles: 850,000 zero emission vehicles (ZEVs) by 2025.

The CLCPA establishes a Climate Action Council (CAC) to establish a suite of strategies within two years (i.e., by July 2021) to achieve the CLCPA targets. We anticipate that these strategies will address electrification of buildings and other end-uses, policies with significant impacts on the planning and operation of utility distribution systems and therefore on the responsibilities of the DSP and future DSIP filings.[37]

Specific CAC strategies are necessary to guide the development of actions that will achieve the CLCPA goals. Most notably, we expect that our actions to build DSP capabilities will complement and support the strategies to be identified by the CAC to achieve New York's clean energy goals.

Exhibit V-1

The Companies are developing each DSP pillar to enable developers to invest in New York's clean energy future.

Integrated Planning and Interconnection	Secure sharing of system information (hosting capacity, load and DER forecasts, NWAs, and beneficial locations) and efforts to improve our interconnection processes and reduce the costs of interconnecting to our grid
Grid Operations	Platform technologies and capabilities that enable us to safely connect and manage large numbers of DER and EV charging stations throughout our service area while maintaining reliable and resilient distribution service
Market Services	Secure sharing of customer information and market platforms that allow DER developers and other third-party service providers to transact with customers, provide time-varying rates and other programs that help customers reduce energy usage and costs, and communications to customers to educate them about how they can manage their energy usage and contribute to decarbonization

[37] On May 14, 2020, the Commission opened a proceeding (Case 20-E-0197) that focuses on the need to plan for future investments in the transmission and distribution systems to ensure that the electric grid will support New York's clean energy goals.

Our ability to connect large numbers of DER and integrate electrification loads contributes substantially to realizing New York's clean energy targets. This section focuses on our efforts in energy efficiency, solar energy, energy storage (including energy storage integrated with solar generation), and electric vehicles. As discussed below, our efforts to build DSP capabilities and invest in platform technologies puts the Companies in a position to support New York's clean energy goals.

Although it is not utility-owned equipment, smart inverters have the potential to enable more efficient integration of clean DER (especially solar energy and storage) and enable DER to provide local grid support services including voltage regulation and frequency control. We will close this section with a discussion of our efforts to leverage the potential benefits of smart inverters as we integrate DER.

Energy Efficiency

The CLCPA energy efficiency goal represents nearly one-third of the total GHG emission reductions needed to achieve the statewide 40 x 30 target.[38]

NYSEG and RG&E each offer a portfolio of eleven electric EE programs that are targeted to all commercial & industrial, residential, and multi-family customer segments, including two programs that target Low- and Moderate- Income (LMI) customers.[39] Since 2018, a total of 44,861 NYSEG customers and 24,953 RG&E customers have participated in electric EE programs. The 2019-2020 EE portfolios are forecasted to achieve nearly 275,000 megawatt-hours (MWh) savings for electric programs and roughly 552,600 million British thermal units (MMBtu) savings for gas programs in 2019 and 2020.[40] [41]

[38] The 2015 New York State Energy Plan established a goal of 40% emissions reductions from all sources by 2030.

[39] Our 2019 Energy Efficiency Transition Implementation Plan (ETIP) Annual Report was filed on May 29, 2020.

[40] 2019-2020 NYSEG and RG&E System Energy Efficiency Plan and ETIP, Table 3-A and Table 3-B. May 29, 2020.

[41] The Commission has initiated a proceeding to consider the impacts of the COVID-19 crisis on consumers and utilities. One of these impacts has been interruption in the ability to provide energy efficiency services that require safe access to homes and businesses by contractors. This is likely to impact the ability of New York's utilities to meet their 2019-2020 energy efficiency targets.

Exhibit V-2

We are pursuing a multipart strategy for Energy Efficiency[42]

Energy Efficiency Customer Offerings	The Companies continue to offer an increasing number of EE programs to provide customers multiple channels to access EE services, proactively support state climate goals, and respond to changing markets
Customer Access to Energy Usage Data	The Companies are working to make energy usage data available to customers. As AMI becomes available throughout the service territories, customers will gain increased access to usage data, allowing them to make better informed decisions on energy usage and use this insight to inform marketplace transactions
Customer Segmentation for Targeted Offerings	With more granular data through AMI, the Companies will continue development of targeted offerings for specific customer segments to address issues faced by selected customer groups
Integrated Platform	The Companies are continuing efforts to streamline customer access to the Companies' programs and products by providing offerings through an integrated platform

The Companies also offer demand response programs that contribute to clean energy goals when the reductions in energy demand occur during hours when the region is producing power on the margin from power plants that operate on fossil fuels.

Our energy efficiency programs are supported by investments in platform technologies. Advanced meter data provides more granularity around the impacts of energy efficiency on usage and provides additional rigor to measurement and verification of energy efficiency actions. Over time, this will allow us to design and implement better and more cost-effective programs.

Online marketplaces can be highly effective for educating consumers and cultivating engagement. The Companies have developed and tested multiple marketplaces throughout our service territories. We intend to expand and enhance the marketplace concept leveraging data and information from Advanced Metering to deliver targeted offerings for our customers. Energy efficiency programs will be an important part of the portfolio.

As a supplement to these programs, NYSERDA and the Joint Utilities developed a Statewide Heat Pump Program Implementation Plan[43] as one element of the State's clean energy pathway that will help customers make the transition to energy-efficient electrified space and water heating technologies. The plan provides contractors and other heat pump solution providers with a consistent experience and business environment throughout New York. The Companies have proposed a $8.5 million budget for the 2021-2025 period with a goal of achieving savings of approximately 112,000 MMBtu.[44] The Companies are currently engaged in a procurement process to select a program administrator. After securing a program administrator, the Companies will turn their attention to developing and managing a

[42] Our energy efficiency efforts are described in detail in Appendix A – Topic 6 (Energy Efficiency).

[43] Filed on April 30, 2020 in Case 18-M-0084.

[44] April 30, 2020 Statewide Heat Pump Program Implementation Plan, p. 47.

contractor network. A statewide study of evaluation, measurement, and verification of heat pump activities is scheduled to be completed by June 2022.[45]

In addition, the New York Utilities[46] are currently working with NYSERDA and DPS Staff to improve the way that energy efficiency is delivered to low- and moderate-income customers.[47] The CLCPA includes requirements for investment of resources to benefit disadvantaged communities, as well as requirements for the PSC to create programs to benefit LMI and disadvantaged communities and mechanisms to track the adoption of clean energy solutions in the LMI market segment.

Finally, the Commission has recently initiated a proceeding[48] as a follow-on to its 2018 EE Order[49] to address the strategic use of energy-related data, including data that will help the Companies and third-party service providers identify opportunities for energy efficiency and thereby support achievement of New York's energy efficiency goals.

Solar Energy

The environmental contribution of solar energy is well understood. Solar energy encompasses CDG and other large solar facilities connected either to our distribution facilities or to transmission facilities operated by the NYISO. Solar Energy also includes smaller rooftop solar facilities on homes, commercial buildings, or municipal facilities. Finally, it includes "solar+storage" facilities of varying sizes.

We support the integration of solar facilities in several ways. We securely share hosting capacity information with DER developers that helps them identify areas of our system where they may be able to interconnect solar facilities without incurring significant costs. Our interconnection process is designed to efficiently manage interconnections in compliance with the New York State Standardized Interconnection Requirements (SIR). In the future, we expect that smart inverter technology will further support the integration of solar energy on our network.

Energy Storage

Energy storage, whether connected to the grid or located on customer premises, smooths out demand profiles, lowers energy costs, and contributes to clean energy goals.[50] Energy storage also provides a multitude of grid operational services, such as supporting load and maintaining optimal voltage. A battery's ability to store and shift the use of renewable generation means that energy storage can also help meet New York's clean energy goals more economically and efficiently, particularly if intentionally paired (i.e., planned and operated) along with a renewable energy source. The degree to which an

[45] As with other EE programs, implementation of the heat pump program is being affected by the COVID-19 pandemic.

[46] The New York Utilities are comprised of the Joint Utilities plus National Fuel Gas Distribution Corporation.

[47] On July 14, 2020, NYSERDA and the New York Utilities jointly are scheduled to file a proposed implementation plan to deliver a portfolio of energy efficiency programs to LMI customers.

[48] Case 20-M-0082, Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data, Order Instituting Proceeding (issued March 19, 2020). DPS Staff filed two whitepapers on May 29, 2020 as the first step in this proceeding.

[49] Case 18-M-0084, In the Matter of a Comprehensive Energy Efficiency Initiative, Order Adopting Accelerated Energy Efficiency Targets (Issued December 13, 2018)

[50] As specified by New York law, a qualified energy storage system is a "commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy using mechanical, chemical, or thermal processes to store energy that was generated at one time for use at a later time". PSL 74.

energy storage system can be considered a clean resource depends on the net impact of its operations on fossil fuel generation in New York.

The Companies are incorporating energy storage into our integrated planning functions, NWA procurements, interconnection processes, and grid operations. Our objective is to proactively support the identification and development of energy storage projects that benefit our customers and the. We, along with the Joint Utilities and the rest of the industry, are still in the early stages of determining business models that are most likely to maximize the benefits of energy storage and take advantage of downward trending technology costs.

NYSEG and RG&E are procuring a minimum of 10 MW each as directed by the Commission (December 2018 Energy Storage Order). NYSEG is currently in the contract negotiation phase and expects to exceed its 10 MW minimum requirement. RG&E anticipates conducting an additional RFP in the first quarter of 2021 to reach its 10 MW procurement requirement, as RG&E did not procure any energy storage projects as part of the initial RFP. Many NWA RFP respondents have incorporated battery storage as part of their proposed NWA solution.

We are conducting four innovation projects that will help us integrate storage. Each project is designed to focus on a series of use cases that will help the Companies understand the impact of energy storage projects on customers and the grid. The four projects represent a total installed capacity of 3.6 MW and up to 14.4 MWh of battery storage. Installation of the batteries were completed for three of the four projects at the end of 2018. For the Aggregated Behind the Meter project, two customer sites were completed at the end of 2018 with the remaining installations to be completed by August of this year. We are currently executing multiple use cases on all four projects.

 Details on our energy storage efforts can be found in Appendix A – Topic 4.

Exhibit V-4

The Companies are conducting four innovation projects to help integrate energy storage

Aggregated Behind-the-Meter (BTM) Energy Storage[51]	We are partnering with a third-party market partner to install six storage facilities of varying sizes on commercial and industrial customer sites in the ESC footprint. NYSEG will install a total of 765 kW / 3,080 kWh energy storage.[52] We are testing three use cases: customer energy demand management, aggregated demand response market participation, and circuit and system peak reduction. Two battery systems were installed by the end of 2018, and we installed another three by the end of the first quarter in 2020. The sixth and final site is expected to be completed by the beginning of the third quarter in 2020. Data collection to be completed in May 2021, followed by a report.
Distribution Circuit Deployed BSS	NYSEG installed a 477 kW / 1,890 kWh energy storage system on an ESC circuit in 2018. We are testing three use cases: daily circuit peak reduction and load shaping, our ability to maintain circuit loading within the hypothetical rating, and voltage regulation.
Integrated EV Charging & Battery Storage System	RG&E installed the 150 kW / 600 kWh energy storage system in December of 2018 at our Scottsville Road Operations Center in Rochester. The purpose of this project is to demonstrate how battery storage can be integrated with EV charging to improve project economics, minimize the impact of EV charging on the grid, and derive value from market services by pairing an ESS with an EV DC fast charger. We are testing three use cases: building /circuit demand reduction, building load factor improvement, and demand response. By addressing the building load and DC fast charger load through battery optimization, we are relieving the circuit demand.
Peak Shaving Pilot Project	RG&E installed a 2.2MW / 8.8 MWh battery storage system at Substation 127 in Farmington in December of 2018. We are testing three use cases: substation peak demand reduction, ability to reduce customer power quality issues, and O&M cost reduction.

We have learned several initial lessons from our energy storage projects since the 2018 DSIP:

- Data collection, including communications, and data analytics are critical to effectively demonstrate battery capabilities and stakeholder benefits.
- The performance and capabilities of large-scale battery systems are still being refined. Technology and safety standards are also still in development, which can lead to design challenges at customer sites.

[51] October 31, 2019. “Aggregated Behind-the-Meter Battery Storage.” NYSEG 3Q 2019 Quarterly Report. Case 14-M-0101.

[52] NYSEG intended to sign up eight customers for a total of 1.060 MW (4.2 MWh), but secured only six customer sites for a total of 0.765 MW (3.08 MWh).

- Specific characteristics of a customer's site can have a large impact on the design and viability of a battery system.

Although cost effectiveness continues to be a challenge, these lessons and the results of ongoing innovation projects will inform our future implementation of this promising resource.

Electric Vehicles

NYSEG and RG&E support electrification of the transportation sector as a major contributor to GHG reductions and a clean economy. Through a multi-state memorandum of understanding, New York has first committed to a target of 850,000 ZEVs by 2025 in 2013.[53] Electrification of transportation will also be a major focus for achieving the CLCPA targets.

The Commission is likely to define the precise role(s) to be served by the State's electric distribution utilities in Case 18-E-0138. On January 13, 2020, DPS Staff filed an EV Whitepaper that described a statewide "make-ready" program. As of this date (June 30, 2020), the Commission has received comments from the Joint Utilities and other stakeholders, but has not yet issued its order.

In addition to our proposed EV efforts, we have made progress on our four EV-related capabilities since our 2018 DSIP[54]:

- Forecast EV growth and assess grid needs;
- Integrate EV load while managing peak demand;
- Support EV market growth with sufficient charging infrastructure; and
- Positively influence customer perceptions of EVs.

Forecast EV growth and assess grid needs

We are working with a leading Electric Vehicle Supply Equipment (EVSE) company to develop EV load profiles for various EV charging use cases including Level 2 (multifamily, workplace, urban parking lot / garage, retail, and hotel) and Level 3 (corridor and destination).[55] These load profiles along with load profiles for residential and fleet charging will be used to model overall EV load shapes and conduct more sophisticated forecasting.

[53] October 24, 2013. "State Zero-Emission Vehicle Programs: Memorandum of Understanding." Parties include Governors of California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont. Memorandum of understanding includes agreement to coordinate and collaborate to promote effective and efficient implementation of ZEV regulations.

[54] Our electric vehicle efforts are described in detail in Appendix A – Topic 5 (EV Integration).

[55] Level 1 equipment provides charging through a standard 120-volt AC outlet. Level 2 equipment offers faster charging at 208 – 240 volts AC, and typically requires a dedicated circuit for the charger. Level 3, also known as DC fast chargers (DCFC) support the fastest charging but are usually found only at public charging stations due to more complex infrastructure requirements.

Integrate EV load while managing peak demand, and support EV market growth with sufficient charging infrastructure

Exhibit V-5

Six EV integration pilots are underway.

EV Rate	NYSEG and RG&E implemented an EV rates on April 1, 2019 that encourages customers to charge EVs during off-peak hours, helping to minimize the impact of EV charging on peak demand.
OptimizEV Pilot	This pilot assesses how to optimize vehicle charging based on price signaling. Participants use a web-based interface to set their desired charge, time flexibility, and choose a discount. We use a cloud service to monitor EV charging and an aggregator collects the data. We began installing chargers for customers in the ESC in Q3 2019 and achieved our goal of recruiting 35 participants by Q4 2019. The modified controllable EVSE has been installed at all 35 participant locations and we began full operation of the pilot in Q1 2020. Optimized charging sessions were available beginning in March 2020 and will continue through February 2021.
Integrated EV Charging and Battery Storage System	This project focuses on demonstrating how battery storage can help manage the load impact of EV charging along with building load. The project involves five Level 2 chargers and two Level 3 chargers installed at RG&E's Scottsville Road facility along with a 150 kW / 600 kWh stationary. We completed installation and commissioning in 2018 and will complete the project by the end of 2020.[56]
Request for Information (RFI) on Data Collection and Load Management	In 2019, NYSEG and RG&E issued a Request for Information (RFI) to potential data collection and load management vendors to help us understand the technologies that are available to collect charging data from EVs, integrate load, and perform networking tasks. The 2019 RFI process informed the Companies on the technology and platforms available to enable these capabilities and will continue to inform planning for future customer offerings and EV programs.
DC Fast Charger Pilot	We are collaborating with the New York Power Authority (NYPA) and Greenlots to assess a make-ready model for supporting DCFC.
Statewide DC Fast Charging Incentive	As directed by the Commission's February 2019 DCFC Order, NYSEG and RG&E are offering a per-plug incentive program to encourage the installation of DCFCs. NYSEG has received and approved two applications for a total of five plugs. RG&E has not received any applications. NYSEG and RG&E filed a DCFC Incentive Program Annual Report on March 1, 2020.[57]

[56] This project is also discussed in Exhibit V-4.

[57] NYSEG/RGE's 2019 Annual Report on the DCFC program is available in Case No. 18-E-0138 here.

Positively influence customer perceptions of EVs

The Companies collaborated with Nissan and the Rochester-based ROC-EV initiative to promote EVs and a customer EV rebate offering. Additionally, the Companies held several employee EV ride and drive events in 2018 and 2019 to promote electric transportation and sustainability.

Smart Inverters

The Companies believe that it is appropriate to reflect the potential role served by DER smart inverters in our plan to build the DSP. The vast majority of grid-connected DERs produce electricity using inverters that convert direct current (DC) to alternating current (AC). Modern inverters include power electronics, control systems and software that can modify the electrical output of the inverter according to changes on the generator side (e.g., PV panel shading or battery charge level) or in response to changes on the grid side (e.g., voltage fluctuations). Combined with two-way communications, these "smart inverters" can enable coordinated DER operation and provision of grid services for utilities and their customers, such as regulating voltage.

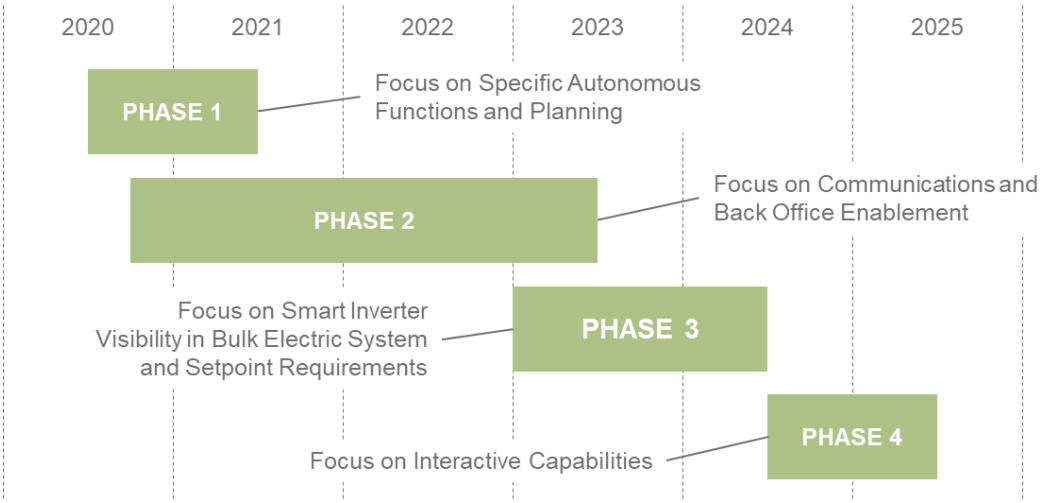
In July 2019 the Joint Utilities initiated a smart inverter working group (SIWG) to develop a proposal for the potential adoption of interactive, communicative and grid support ("smart") inverters in New York. The SIWG has worked with New York stakeholders and leading industry and technical groups outside of New York to develop recommendations for smart inverters in New York. These include:

- Establish requirements for high priority Smart Inverter Autonomous Functions that specify how smart inverters will operate to ensure grid reliability and safety.
- Establish requirements for communications links and back-office systems and software that monitor and utilize key DER data.
- Establish requirements for Smart Inverter Advanced/Interactive Functions that will enable tighter DER integration and provision of grid services in the future.

The Joint Utilities' recommendations will be implemented four phases, beginning in the second half of 2020, and continuing into 2025. Key next steps in the process are the detailed review of the draft white paper with the Electric Power Research Institute (EPRI) in July 2020, and the subsequent review of the white paper with the Interconnection Technical Working Group.

Exhibit V-6

The Joint Utilities smart inverter recommendations is proposed to be implemented in four phases over five years.

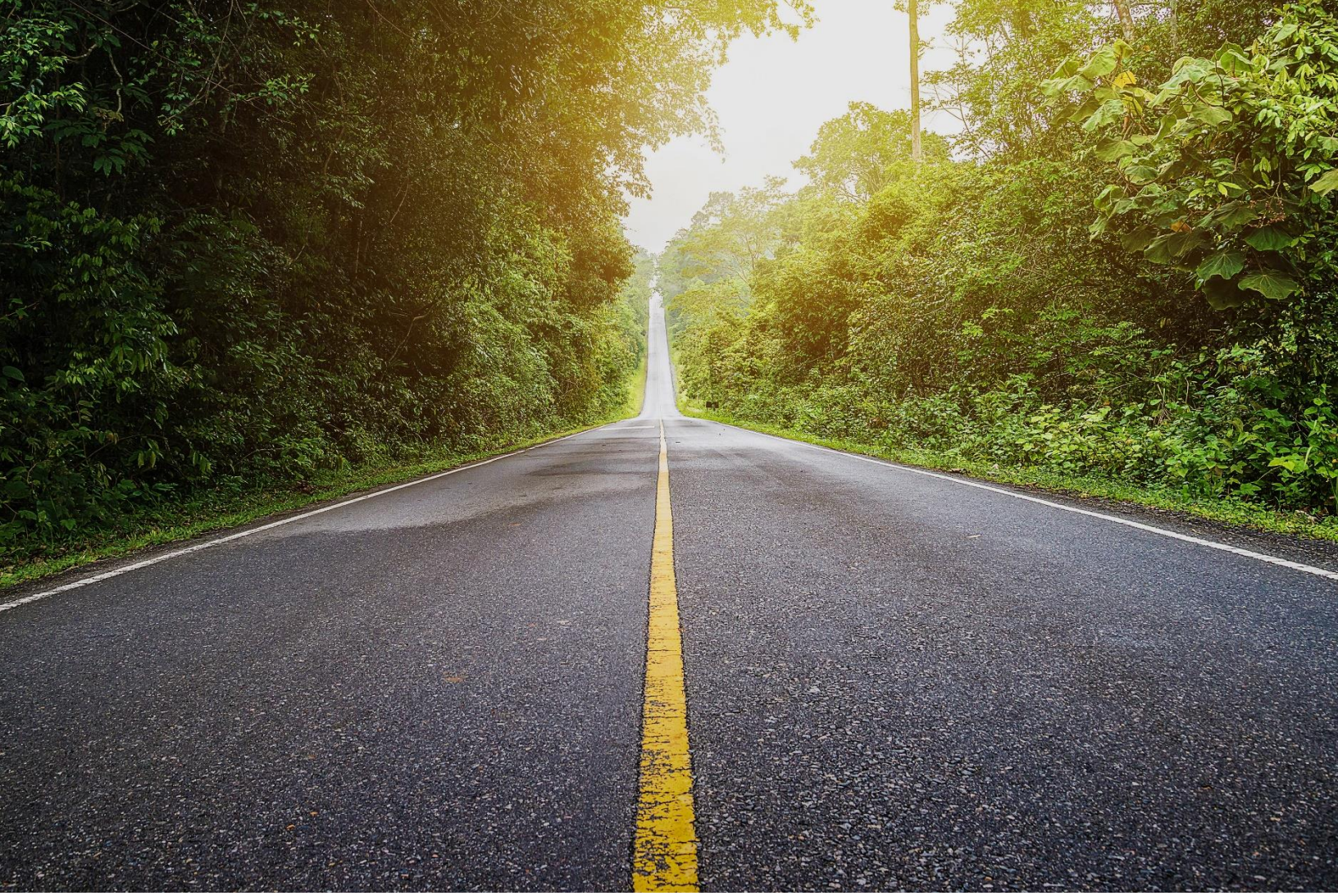


The Companies are working on a Smart Meter/Smart Inverter project that would assist with the integration and control of energy storage and small (10-50 kW) DER.[58] [59] We are testing our ability to interface smart meters with smart inverters in a lab environment, enabling us to control storage resources. Smart inverters allow the Companies to have visibility and exercise control over storage and other DER when appropriate, which could in turn help to reduce system impacts and defer system upgrades and investments.

Finally, we completed Phase I of an "Enhanced M&C" project with Smarter Grid Solutions that tested monitoring and control of smaller DER in a laboratory environment, including community-sized installations (smaller than 500 kW). This demonstration interconnects the DER using a smart inverter in place of traditional, and more costly, infrastructure to connect distributed generation. Phase II will be a field demonstration.

[58] This project is described in more detail in Appendix A – Topic 3 (Grid Operations).

[59] The SM/SI project is a NYSERDA project with Rochester Institute of Technology (RIT) in a lead role, in partnership with two technology firms: ConnectDER and Itron.



VI. Roadmap

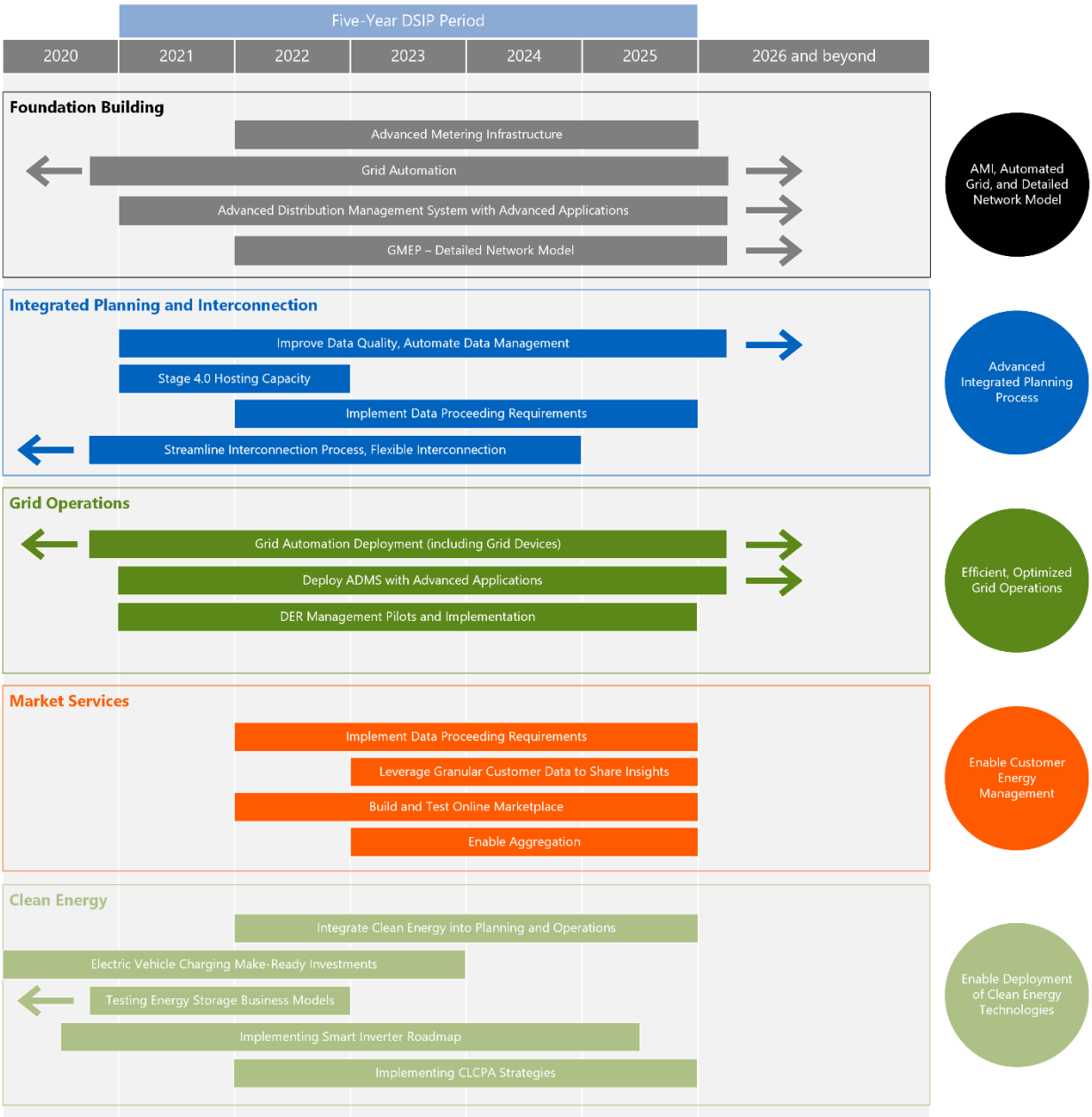
VI. ROADMAP

We conclude with a summary roadmap of DSIP progress to date and our planned implementation over the next five years.

Exhibit VI-1 presents a high-level DSIP roadmap of platform technologies and capabilities that we are building in each of the three pillars, and within five technology initiatives. We will continue to update the DSIP roadmap as policies and circumstances evolve, and will update our report in 2022.

Exhibit VI-1

Our roadmap integrates activities across the three DSP pillars.



This integrated set of investments and actions will allow us to build a DSP that will be customer-centric, clean, integrated, and smart.

Customer-Centric

The Smart Integrator places customers in the center. Customers make the decisions to engage with DER that not only helps them meet their energy needs, but helps other customers and the environment. Our role is to empower customers, provide them with a products and services marketplace to securely transact, and to provide them with the information they need to make sound decisions.

Clean

We are actively engaged in delivering value to our customers and enabling New York State's policy objectives. We serve a proactive role in the proliferation of energy efficiency, clean distributed generation, energy storage, and electric vehicles where and when they provide appropriate value.

Integrated

Although we present the DSP by focusing on its individual components, the DSP is being planned, and will be built and operated, as an integrated whole. Our Platform Technologies are designed to support the Integrated Planning, Grid Operations, Market Services, and Information Sharing functions.

Smart

We are compiling and managing a common set of granular data that supports each of the Smart Integrator functions. We have historically been able to plan and operate the grid by geographic area. Now, we must plan and operate the grid and share information that is differentiated by geographic location and by time. Our ongoing investments in AMI, DER database, grid automation, and MM&C will provide us with the granular data we need.