2021 Master Plan

September Draft

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Agenda

- Background
- 2021 Master Plan – Structure
- September Draft Updates
- Timeline
- Appendix I
  - 2021 Master Plan Process
- Appendix II
  - 2021 Master Plan – Proposed Project Timelines
- Appendix III
  - 2021 Master Plan- Key Themes

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Background

Background

- **The Master Plan was first developed in 2018 and is updated annually**
- **The Master Plan provides a multi-year vision for future NYISO enhancements**
  - It is intended to provide a comprehensive 5-year market plan that will enable the NYISO to prepare for anticipated changes to the bulk power system
  - The document serves multiple purposes including providing valuable information for the NYISO's project prioritization and strategic planning processes

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Background

- **The 2021 Master Plan will discuss various wholesale market initiatives that are important to respond to a transitioning grid while maintaining reliable electricity for all New Yorkers**
  - The NYISO will provide a cohesive narrative, while avoiding reiteration of unnecessary project information that is already included within project candidate descriptions
  - Describe how each individual project will help prepare for the challenges posed by a transitioning grid resulting in enhanced grid reliability and market efficiency
  - Provide a potential timeline for stakeholders
- **Today, the NYISO will discuss the final draft of the Master Plan posted with today's meeting materials**

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2021 Master Plan Structure

2021 Master Plan Structure

- The 2021 Master Plan identifies market reforms within the energy, ancillary services and capacity markets that address the challenges posed to the grid with increased intermittent resource penetration.
- The challenges within the Energy Market, capacity market and with new resource integration areas are characterized as key themes.
- Energy Market
  - Key Themes:
    - Balancing Intermittency
    - Improving Price Formation
- Capacity Market
  - Key Themes:
    - Comprehensive Mitigation Review
    - Capacity Accreditation Measures
    - Capacity Improvements to Support Reliability

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2021 Master Plan Structure Contd.

- **New Resource Integration**
  - Key Themes:
    - Enabling New Resources and Capabilities
    - Improving Market Models
- **Planning for the Future**
  - Key Theme:
    - Load Forecasting Enhancements
- **Proposed project timelines**

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September Draft Updates

September Draft Updates

- **Slides 11-14 provide a highlight of revisions to the Master Plan since the most recent draft; not all revisions are described in this presentation.**
  - The Master Plan draft is posted with today's meeting materials.

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September Draft Updates

- **Energy Markets**
  - Balancing Intermittency theme
    - The narrative of the '*Grid Services for Renewables*' project was expanded to incorporate findings of the recent study
  - Improving Price Formation theme
    - The description of the '*Enhance Operating Reserve Scheduling and Pricing*' project was expanded based on feedback from stakeholders

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September Draft Updates

- **Energy Markets**
  - Improving Price Formation
    - Minor changes were made to the following projects to clarify the intent of these projects
      - *Long Island Constraint Pricing*
      - *Constraint Specific Transmission Shortage Pricing*
      - *Eliminate Offline GT Pricing*

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September Draft Updates

- **Capacity Markets**
  - *'Transmission Security in the ICAP Market'* project was updated consistent with the NYISO's Preparing the Capacity Markets for the Grid in Transition discussions

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September Draft Updates

- **Overall Project Timelines**
  - Project timelines, shown in Appendix II, have been updated with the most recent information.

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Timeline

Master Plan Timeline

- ✓ March 2021 – Meet with each governance sector to get initial feedback
- ✓ June 3, 2021 (MIWG) – Release and discuss the initial draft of the Master Plan
- ✓ June 8, 2021 (BPWG) – Release updated draft (no discussion)
- ✓ September 14, 2021 (MIWG) – Release and discuss near final draft of the Master Plan
- ▪ December 2021 – Release final Master Plan

All updates to the Master Plan will be coordinated with the overall project prioritization process

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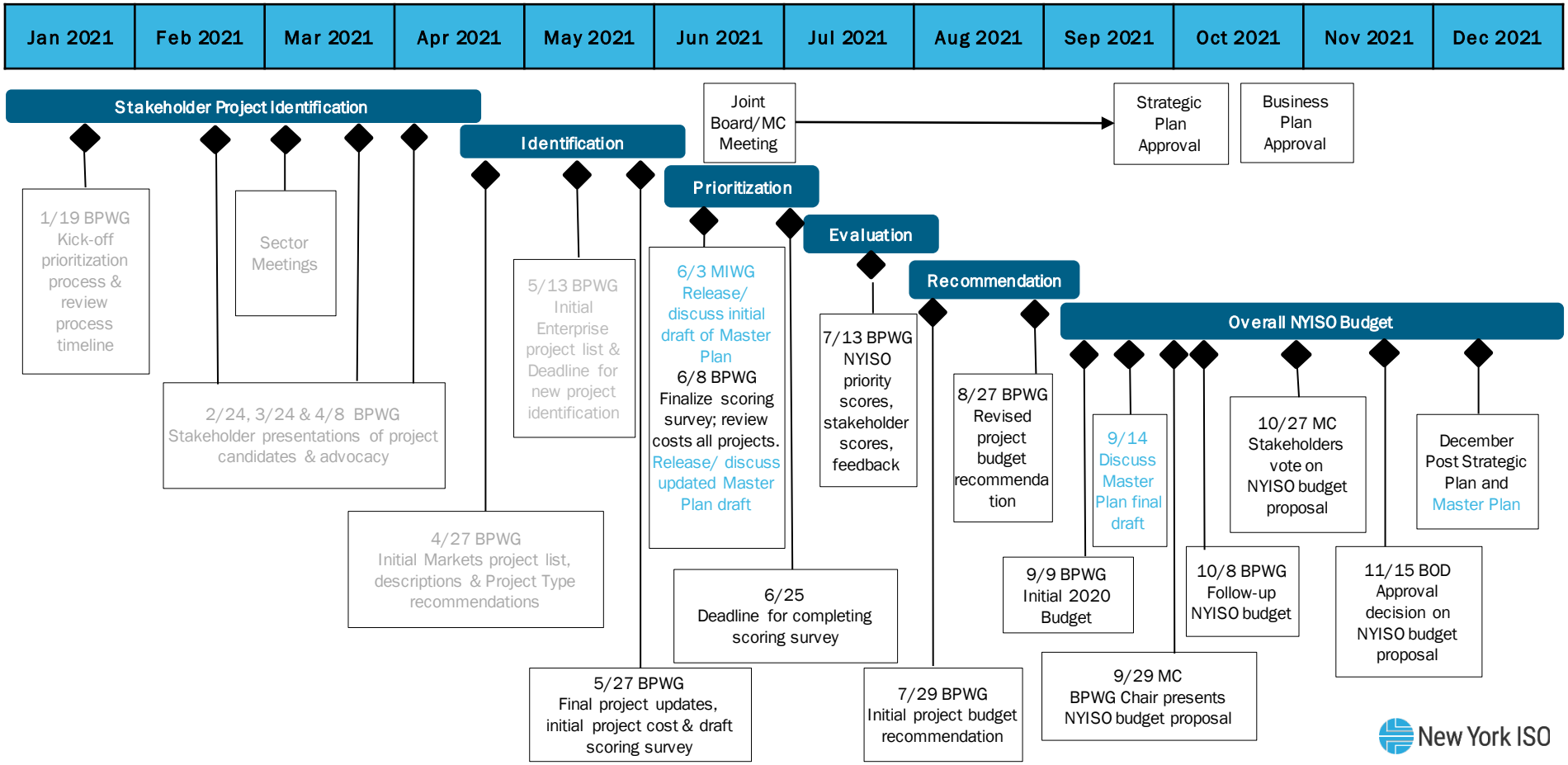
2022 Proposed Project Prioritization Timeline



DRAFT – FOR DISCUSSION PURPOSES ONLY

Appendix I: 2021 Master Plan Process

Master Plan Process

- **The Master Plan starts with receiving feedback at each of the Sector Meetings**
- **An initial draft of the Master Plan will be produced in June**
  - This draft is intended to share NYISO's initial thoughts based on Sector Meeting feedback
- **An updated draft of the Master Plan will be produced near the end of June**
  - This draft will incorporate additional feedback
- **A near final draft of the Master Plan will be produced near the end of August**
  - This draft will incorporate any changes as a result of the project prioritization and the budget process
- **A final Master Plan will be produced near the end of the year**
  - This final version will incorporate any changes from the final approved budget

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Appendix II: 2021 Master Plan Proposed Project Timelines

Energy Market Projects: Timeline

2021 Master Plan							
Energy Markets		**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
	Balancing Intermittency						
1	Dynamic Reserves	SC	CP	MDC	FR	DEP	
2	More Granular Operating Reserves				MDC	FR	DEP
3	Reserves for Energy Security				SC	MDC	FR
4	Grid in Transition	ID	SC				
5	Balancing Intermittency			MDC	FR	DEP	
6	Review of Real-Time Market Structure					ID	SD
7	Grid Services for Renewables	SC		MDC	FR	DEP	
	Improving Price Formation						
8	Constraint Specific Transmission Shortage Pricing	MDC	FR	DEP			
9	Lines in Series Constraint Pricing			DEP			
10	Eliminate Offline GT Pricing				DEP		
11	Long Island Reserve Pricing				MDC	FR	DEP
12	Adjustment of Energy Offer/Bid Floor			MDC	DEP		
13	Enhance Operating Reserves Scheduling and Pricing						SC
14	Carbon Pricing	SD	AWAITING NEW YORK STATE GUIDANCE				

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Capacity Market Projects: Timeline

	Capacity Markets	2021	2022	2023	2024	2025	2026
	Comprehensive Mitigation Review						
15	Comprehensive Mitigation Review	MDC	DEP				
	Capacity Accreditation Measures						
16	Improving Capacity Accreditation		MDC				
17	Capacity Value Study	DEP	SD	SC		DEP	SD
	Capacity Improvements to Support Reliability						
18	Demand Curve Reset	DEP		SD	SC	DEP	
19	Demand Curve Translation Enhancement			DEP			
20	CRIS Expiration Evaluation	CP	MDC				

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New Resource Integration Projects: Timeline

	New Resource Integration	2021	2022	2023	2024	2025	2026
	Enabling New Resources and Capabilities						
21	DER Participation Model	DEP	DEP				
22	Hybrid Co-Located Model	DEP					
23	Hybrid Aggregation Model	MDC	FR	DC	DEP		
24	Engaging the Demand Side				ID	SC	CP
25	Internal Controllable Lines		CP	MDC	DC	DEP	
	Improving Market Models						
26	Enhance Run Limited Resource Modeling					CP	MDC
27	5-minute Transaction Scheduling			CP	MDC	FR	DEP
28	Improve Duct Firing Modeling		CP	MDC	DEP		

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Planning Projects: Timeline

Planning for the Future		2021	2022	2023	2024	2025	2026
	Load Forecasting Enhancements						
29	BTM Solar Demand Forecasting Product Enhancements		FR	DEP			
30	System Demand End-Use and Electrification Forecasting Enhancements		SC				

Key			
CD	Continued Discussions	MDC	Market Design Complete
ID	Issue Discovery	FR	Functional Requirements
SD	Study Defined	SD	Software Design Specification
SC	Study Complete	DC	Development Complete
CP	Market Design Concept Proposed	DEP	Deployment

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Appendix III: 2021 Master Plan –Key Themes

Energy Market - Key Themes

- **Balancing Intermittency**
  - Increased intermittent resource output is necessary to address climate change and to satisfy the CLCPA.
  - However, this raises hourly, multi-day and seasonal balancing challenges due to the intermittent nature of these resources as both the net load and forecasted supply will tend to be more volatile and uncertain.

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Balancing Intermittency

- **To address the risks to reliability through time, firm generation available for balancing the grid needs to be flexible.**
- **Initiatives that support this theme:**
  - Dynamic Reserves
  - More Granular Operating Reserves
  - Reserves for Energy Security
  - Grid in Transition
  - Balancing Intermittency
  - Review of Real-Time Market Structure
  - Grid Services for Renewables

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Energy Market - Key Themes Contd.

- **Improving Price Formation**
  - With an increase in penetration of renewable resources, energy prices will be lower, on average, in a greater percentage of pricing intervals.
  - This reduction in energy market revenue, due to lower energy prices, places a greater emphasis on price formation to maintain efficient marginal incentives and to avoid reliance on out-of-market actions and uplift payments.

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Improving Price Formation

- **Robust energy and ancillary services price formation will provide incentives for resources to respond to real-time needs and to signal investment in resources with the necessary capabilities to support grid reliability, while also encouraging the entry of flexible resources that will be needed to balance intermittency of the future grid**
- **Initiatives that support this theme:**
  - Constraint Specific Transmission Shortage Pricing
  - Lines in Series Constraint Pricing
  - Eliminate Offline GT Pricing
  - Long Island Reserve Pricing
  - Adjustment of Energy Offer/Bid Floor
  - Enhance Operating Reserves Scheduling and Pricing

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Capacity Market - Key Themes

- **Comprehensive Mitigation Review**
  - To address the aggressive clean energy targets, the NYISO plans to focus on holistic review of the current mitigation framework in order to mitigate or eliminate buyer-side mitigation (BSM) risk for resources necessary to achieve New York's CLCPA objectives and simplify the BSM process.
- **Initiatives that support this theme:**
  - Comprehensive Mitigation Review

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Capacity Market - Key Themes Contd.

- **Capacity Accreditation Measures**
  - Valuing capacity resources accurately based on their contributions to resource adequacy allows market compensation for capacity suppliers to be properly aligned with each individual resource's expected reliability benefit to consumers while ensuring sufficient resources are procured to meet resource adequacy requirements.
    - Initiatives that support this theme:
      - Improving Capacity Accreditation
      - Capacity Value Study

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Capacity Market- Key Themes Contd.

- **Capacity Improvements to Support Reliability**
  - Numerous efforts to enhance various aspects of the capacity market to support reliability through efficient capacity market rules and outcomes
- **Initiatives that support this theme:**
  - Transmission Security in ICAP Market
  - Demand Curve Reset
  - Demand Curve Translation Enhancement
  - CRIS Expiration Evaluation

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New Resource Integration - Key Themes

- **Enabling New Resources and Capabilities**
  - New technologies have the potential to diversify the NYCA resource mix, support New York's clean energy and de-carbonization objectives, and make load more dynamic and responsive, providing an opportunity to improve overall system efficiency
  - The operational characteristics of renewable technologies, battery technologies, demand side technologies and distributed generation technologies may not fit the existing models used to represent supply resources in the wholesale markets

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Enabling New Resources and Capabilities

- To maximize the benefits new technologies are capable of providing, the NYISO is considering creation of new models that are sometimes needed to properly reflect characteristics such as limited energy capabilities or lack of fuel certainty
- Initiatives that support this theme:
  - DER Participation Model
  - Hybrid Co-Located Model
  - Hybrid Aggregation Model
  - Engaging the Demand Side
  - Internal Controllable Lines

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New Resource Integration – Key Themes Contd.

- **Improving Market Models**
  - Enhancements to current market models will enable the efficient scheduling of both current and future resources, and assist in providing additional flexibility to the market software by balancing intermittent resource output
  - Initiatives that support this theme:
    - Enhance Run Limited Resource Modeling
    - 5-minute Transaction Scheduling
    - Improve Duct Firing Modeling

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Planning Projects: Key Theme

- **Load Forecasting Enhancements**
  - The complexity of forecasting load and operating the bulk power system will increase as additional intermittent resources integrate onto the grid and customers reduce load with behind-the-meter (BTM) resources.
  - Additionally, electrification of other sectors such as transport and space conditioning (heating and cooling) is anticipated to increase in response to the CLCPA.

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Load Forecasting Enhancements

- To address this challenge, the NYISO plans to better account for the energy provided by behind the-meter resources in its planning processes to reliably operate the bulk power system
- The NYISO also plans to consider the impacts of electrification of various sectors as this could cause significant changes in the seasonal peaks, monthly energy and hourly patterns of electricity usage
- Initiatives that support this theme:
  - BTM Solar Demand Forecasting Product Enhancements
  - System Demand End-Use and Electrification Forecasting Enhancements

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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