IPP Project Update & Next Steps

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Business Issues Committee

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Agenda

- NYISO's Efforts on Integrating Public Policy
- NYISO's Market Assessment
  - Market Study
  - Market Concepts
- Next Steps
- Q&A

Integrating Public Policy Project

Harmonizing Public Policy

Carbon Pricing:

Study whether incorporating a state policy defined cost of carbon in the wholesale market would improve the overall efficiency of the NYISO energy and capacity markets

Market Assessment for Accommodating Public Policy

Market Impact Assessment of 50% Renewable Generation:

Study the impacts of decarbonization goals on the current NYISO energy and capacity markets from the high penetration of low carbon or carbon-free resources

Market Structure Assessment of 50% Renewable Generation:

Study whether other market products or changes to the existing market structure will be necessary to meet the anticipated reliability needs

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Harmonizing Public Policy - IPPTF

- **Carbon Pricing**
  - Work largely based on the concepts described in the Brattle Report
  - Develop a work plan that will describe the tasks and deliverables required to develop a carbon pricing proposal
  - Work will also consider implications with existing market structures, including bill impacts
- **Task Force Charter creates an open forum and establishes role of the IPPTF**
  - IPPTF meetings are open to all interested parties including Market Participants
  - Feedback on the charter is welcome

Accommodating Public Policy – MIWG

The NYISO remains focused on Reliability through Markets. The purpose of these efforts are to identify market changes or enhancements that must be considered to support reliable grid operations in a future with large amounts of renewable generation

1. **Market Study** - The NYISO's goal is to provide stakeholders with information regarding potential market conditions with the incorporation of renewables resources to meet 50% of the NYCA load.
2. **Market Concepts** - The NYISO is considering a broad spectrum of market product and/or structure enhancements that may be necessary to incent resource characteristics or behaviors needed to achieve 50% renewable generation by 2030.

Market Study

Examples of Findings from the 50% Renewable Resource Penetration Study

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Energy Market Days Modeled

Day Ahead Date	Peak Load Forecast (MW)	Peak Hour	High-Low Temp. ALB/LGA	Gas Prices TNZ6/TZ6NY	Other
Tuesday, January 19, 2016	22,168	18:00	23-13/29-18	$4.20/$6.25	Winter Peak
Tuesday, March 22, 2016	18,638	20:00	51-27/55-35	$2.02/$1.30	Indian Point 2 Refueling
Monday, July 25, 2016	31,401	16:00	89-68/91-81	$2.91/$2.83	Summer
Thursday, November 10, 2016	19,131	17:00	51-32/57-43	$2.45/$1.90	High Wind

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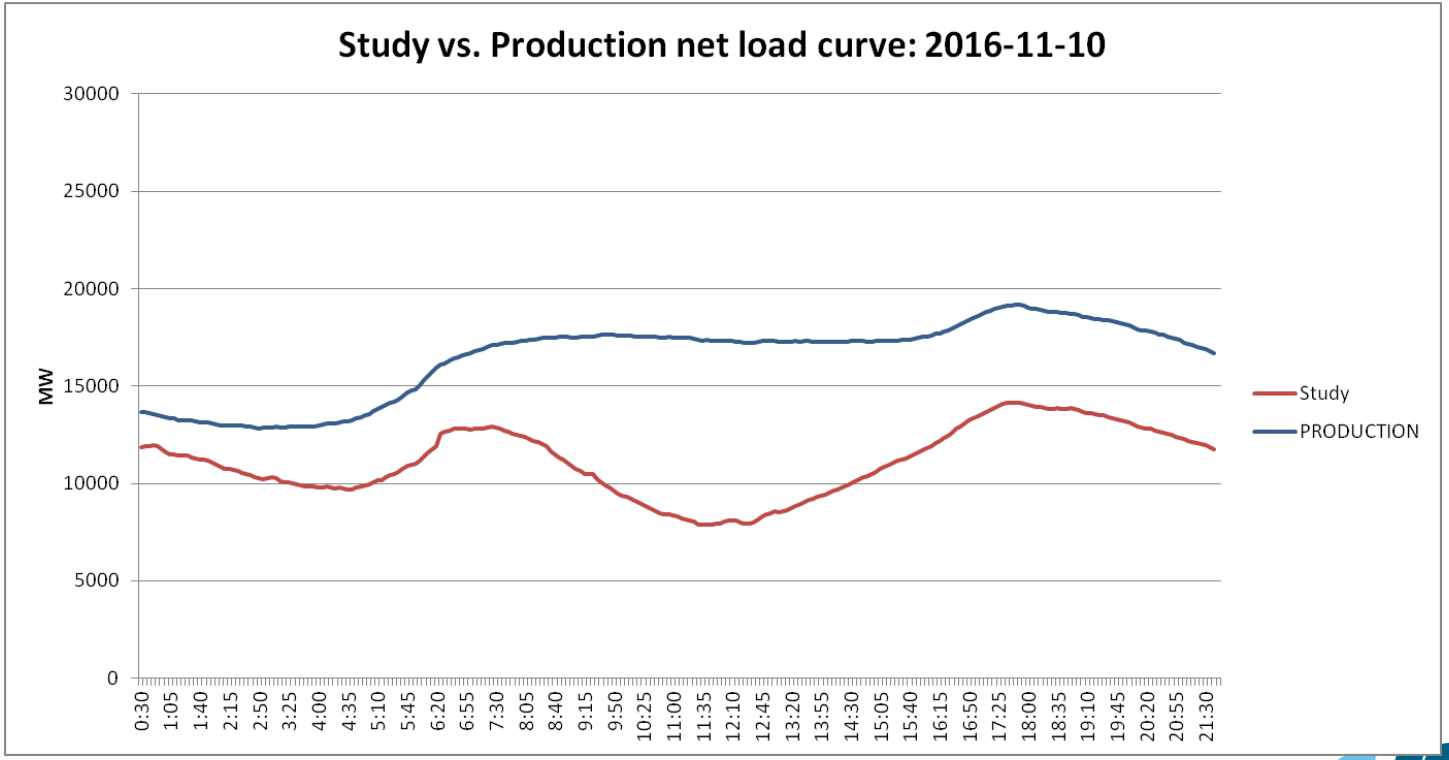
Study vs. Production net load curve: 2016-11-10



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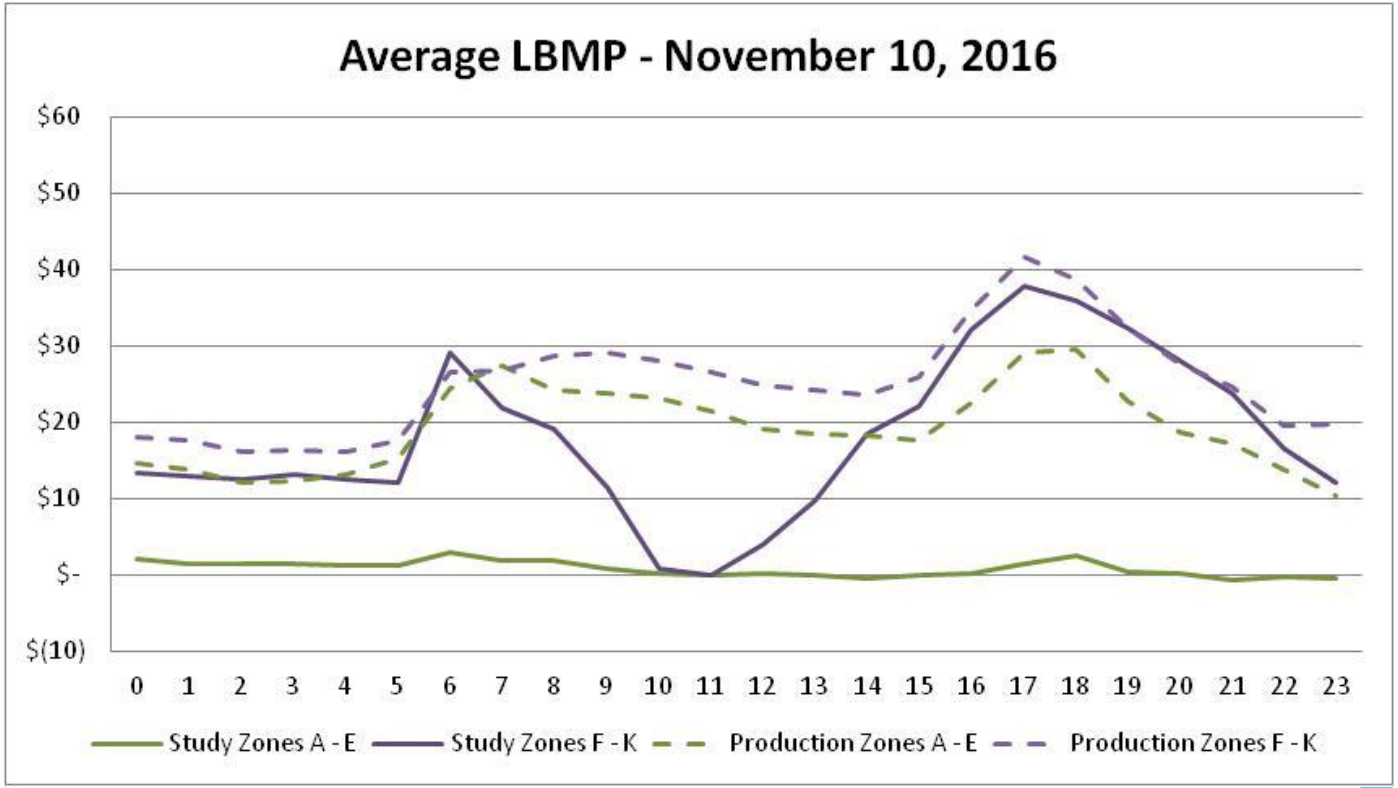
DAM Prices: 2016-11-10



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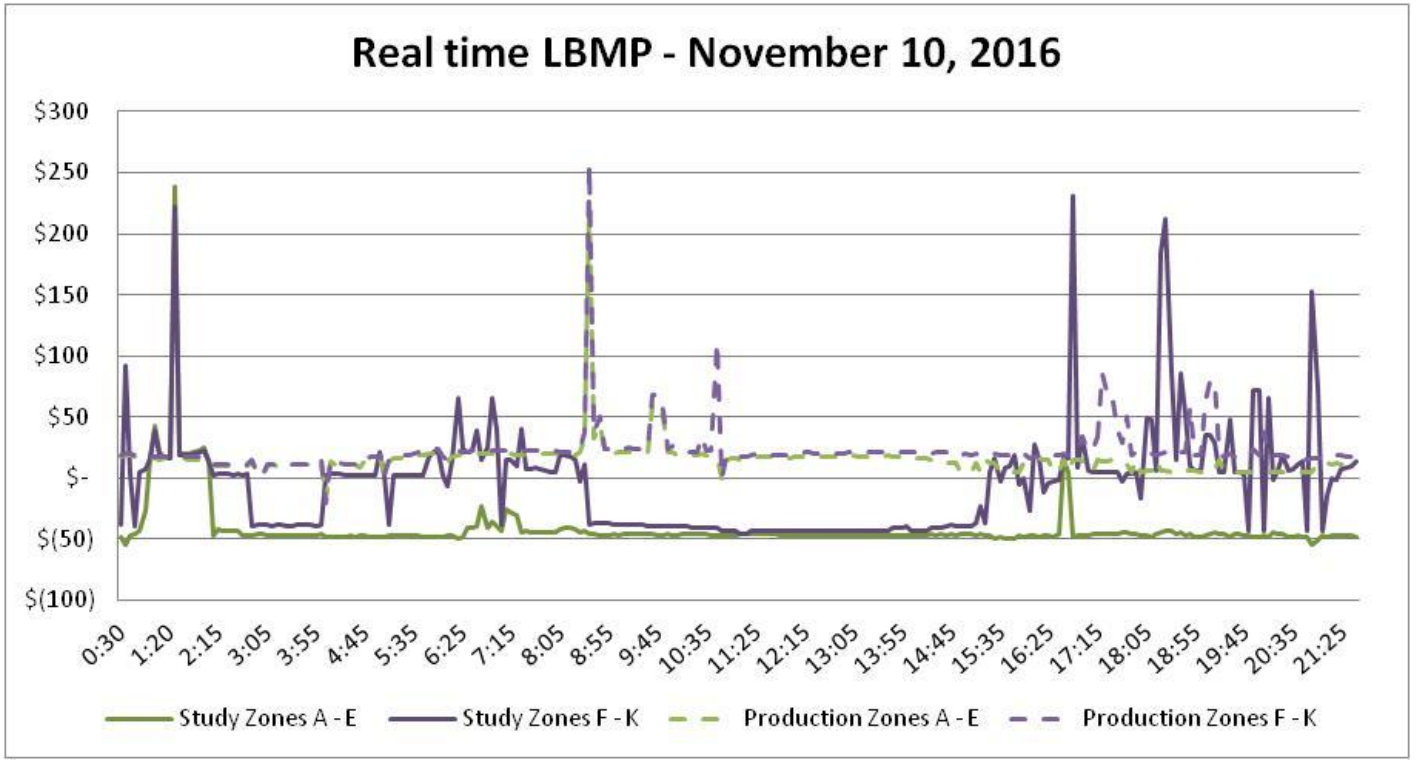
RTD Prices: 2016-11-10



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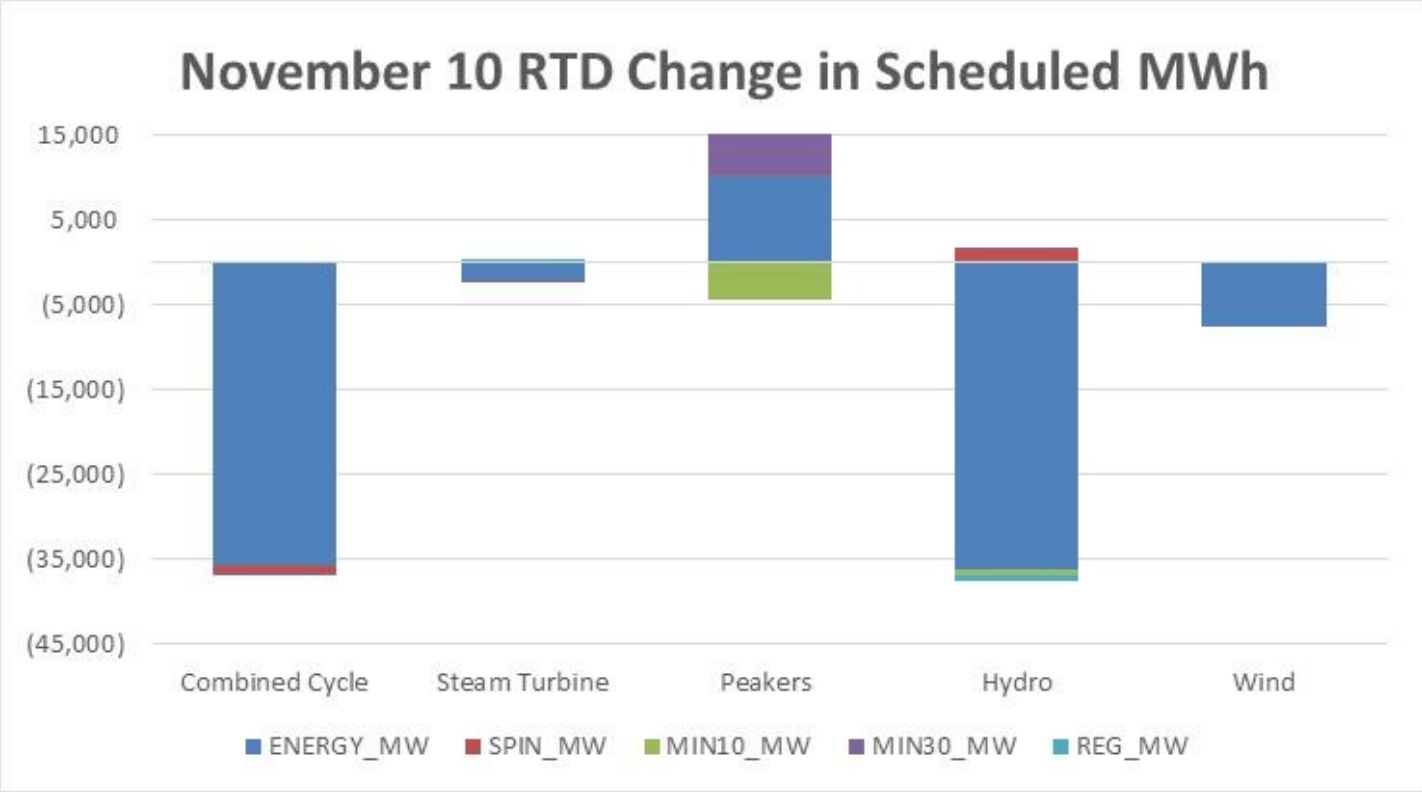
Overall Observations

- **In general, flexible resources currently connected to the grid were dispatched down, replaced by both the behind the meter resources and the renewables modeled as virtual supply**
  - Units dispatched down include Conventional Hydro, Combined Cycle, Fossil Fuel Steam Turbine and existing wind resources.

Schedule Changes of Existing Resources



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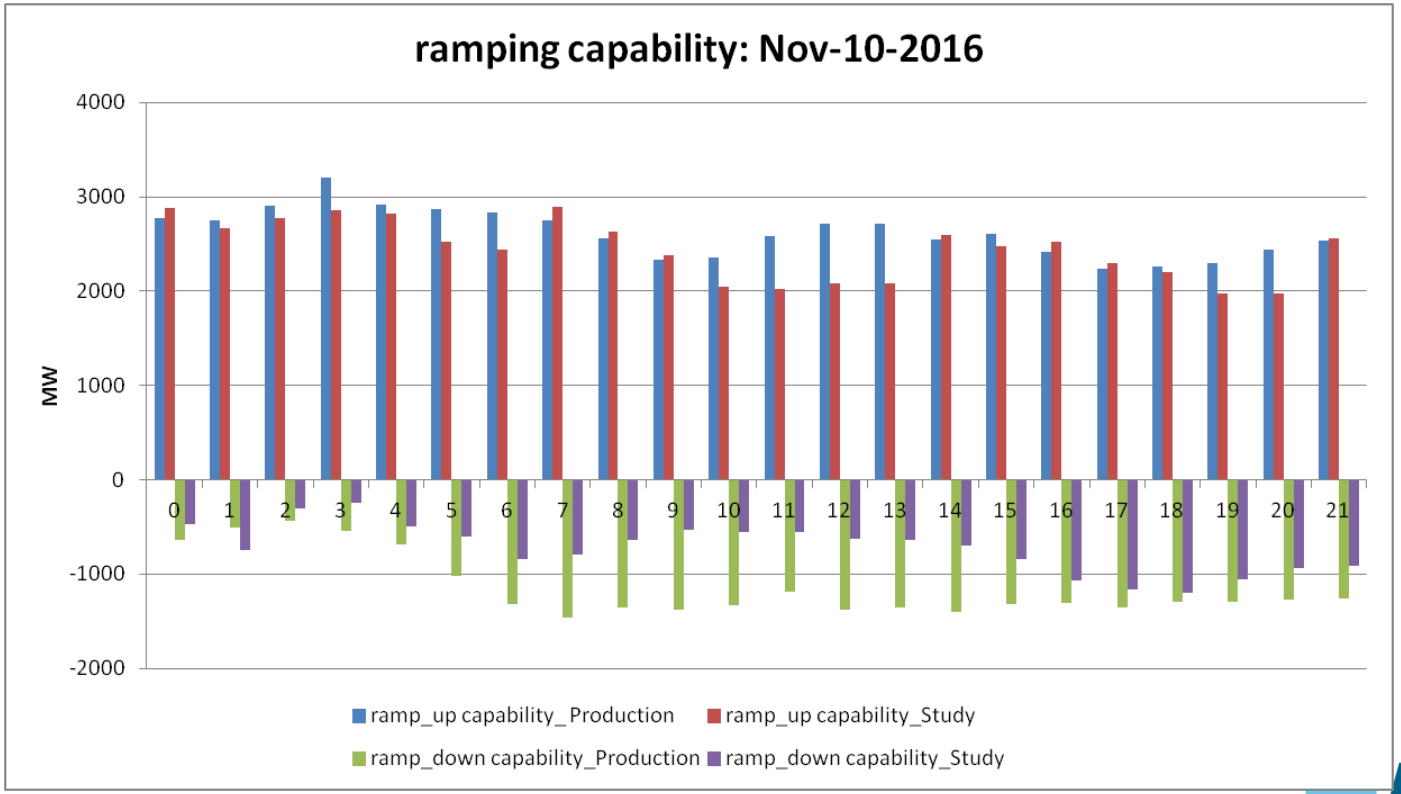
System ramp capability: 2016-11-10



Market Concepts

Examples of Market Themes & Potential Concepts
50% Renewable Resource Penetration

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General Themes driving Market Concepts

- Availability
- Dispatchability (Ramping)
- Predictability (Accuracy of Forecasts)
- Flexibility (Cycling)

Number of Starts by Unit Type							
Study	*22-Mar*	*25-Jul*	*10-Nov*	***Production***	*22-Mar*	*25-Jul*	*10-Nov*
Combined Cycle	23	30	20	*Combined Cycle*	9	18	6
Combustion Turbine	16	77	24	*Combustion Turbine*	15	76	7
Jet Engine	31	49	58	*Jet Engine*	18	39	19
Internal Combustion	2	1	3	*Internal Combustion*	1	1	0
Steam Turbine (Fossil)	2	12	0	*Steam Turbine (Fossil)*	2	9	0
Conventional Hydro	0	3	4	*Conventional Hydro*	0	3	4
Pumped Storage Hydro	7	10	8	*Pumped Storage Hydro*	2	3	0

- Let's not forget the need for transmission!

Energy Market Potential Concepts

- **Concepts for new energy market products:**
  1. Separate products for regulation up and regulation down
  2. Ramping product to cover forecast error
- **Energy market products or rules that could be modified or enhanced:**
  1. Revisions to offline fast start pricing
  2. More dynamic ancillary service requirements and shortage pricing levels

Capacity Market Potential Concepts

- **Capacity market products or rules that could be modified or enhanced:**
  - DA bidding obligations
  - Output duration requirements
  - Initial performance factors for new resources

Next Steps

Market Participant Engagement

Remaining IPP Project Tasks for 2017

- **Carbon Pricing**
  - Joint IPPTF meetings on November 20th and December 18th
    - Continue to develop a work plan for developing a carbon pricing proposal, including areas that require additional analysis and discussion
  - Technical Conference on December 11th
    - Focus on principles for addressing Border Leakage and Allocation of Costs
  - MIWG meetings beginning December 5th
    - Opportunities for detailed discussion of concepts or questions being considered in the work plan
- **Market Study & Market Concepts for Accommodating Public Policy**
  - MIWG on December 5th and 20th
    - Continue to discuss all possible market concepts that should be considered to support reliable grid operation with large penetration of renewable resources
    - Release report on market study, findings and design concepts

IPP Project Plan for 2018

- **Carbon Pricing**
  - Joint IPPTF meetings
    - Complete initial work plan for developing a carbon pricing proposal by the end of January 2018
  - Technical Conferences as needed
- **Market Concepts for Accommodating Public Policy**
  - MIWG meetings
    - Establish a subset of concepts from the full set of concepts identified in the 2017 report to vet further by the end of Q1 2018
    - Begin developing those concept proposals for further vetting and market participant feedback

Deliverable for IPP Project is MDCP by the end of Q2 2018

IPP Master Plan

The NYISO with its Market Participants will develop a master plan to identify market concepts proposed to harmonize the State's Clean Energy Standard and the wholesale energy and capacity market design. The plan will identify the market design changes and products to be pursued for maintaining needed existing and incenting new resources necessary to sustain reliable grid operations over the long run including

- Carbon Pricing
- Market Concepts for Accommodating Public Policy
  - Focus will be on the subset of concepts identified from the 2017 Market Assessment report

Deliverable for IPP Master Plan is a final report by the end of Q2 2018

Questions?

We are here to help. Let us know if we can add anything.

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The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits 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 policy makers, stakeholders and investors in the power system

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