

# Integrating Public Policy: The ICAP Market – Final Findings and Sensitivities

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Meghan Castellano  
Nathaniel Gilbraith, Ph.D.

Installed Capacity Working Group

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# Agenda

- **Overview of the Integrating Public Policy Project and Phase 2**
  - IPP Project Description
  - Phase 2 Market Impact Assessment
- **ICAP Assumptions Overview**
- **Final ICAP Results**
- **Sensitivity Analysis Results**
- **Next steps**

# Background – ICAP IPP

Date	Working Group	Discussion points and links to materials
08-17-16	Business Issue Committee (BIC)	First discussion of the possibility of an <a href="#">Integrating Public Policy Project</a>
09-12-16	Budget & Priorities Working Group (BPWG)	Presentation of stakeholder feedback, <a href="#">proposed scope of the project</a>
10-19-16	Market Issues Working Group (MIWG)	Presentation providing more <a href="#">detail on the scope and timeline</a> of the project
11-22-16	Market Issues Working Group (MIWG)	Presentation <a href="#">updating project status</a> – consultant selection and goals of Phases 1 and 2
12-14-16	Market Issues Working Group (MIWG)	Consultant’s <a href="#">Project Introduction and solicitation of input</a> (Phase 1)
06-01-17	Installed Capacity Working Group (ICAPWG)	<a href="#">Phase 2: ICAP Study Description and Assumptions</a>
07-13-17	Installed Capacity Working Group (ICAPWG)	<a href="#">Phase 2: ICAP Preliminary Findings</a>

# Overview of the Integrating Public Policy Project

With a focus on the Market Impact Assessment  
(Phase 2)

# Integrating Public Policy

## Integrating Public Policy Project

### The Brattle Group Work

PHASE 1: “Pricing Carbon into NYISO’s Wholesale Energy Market to Support New York’s Decarbonization Goals”, including the on-going stakeholder process

### NYISO Work

PHASE 2: Market Impact Assessment 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

PHASE 3: Market Rule Assessment Study whether other market products or changes to the existing market structure will be necessary to meet the anticipated reliability needs

# Phase 2: Market Impact Assessment

- Today's presentation is focused on the capacity market and the effect of additional renewable capacity given today's ICAP market design and market rules
- NYISO's goal is to provide stakeholders with information regarding potential market dynamics related to the incorporation of additional renewable resources
  - This information will provide insight into what will be needed for the Phase 3: Market Rule Assessment
- The NYISO is evaluating these market dynamics with renewable resource additions sufficient to meet the CES goal of 50% renewable by 2030
- This study is not a planning study
  - The NYISO is considering only existing market rules and designs (i.e., will not consider potential market rules changes that might occur in the future)
  - The NYISO is considering only existing transmission (i.e., will not consider assumptions related to new or upgraded transmission)
- The study uses existing energy and capacity market systems and data applied consistent with existing rules

# ICAP Assumptions Overview

# Base Case Assumptions

- **Market parameters and conditions representative of current market conditions**
  - 2017 ICAP reference points, NYCA Minimum Installed Capacity Requirement, Locational Minimum Installed Capacity Requirements (LCRs), ICAP Load forecast, ICAP Demand Curves' respective zero crossing points
  - Estimated ICAP to UCAP translation factors
  - Representative levels of Generation, SCRs, UDRs, imports and exports, unoffered and unsold ICAP



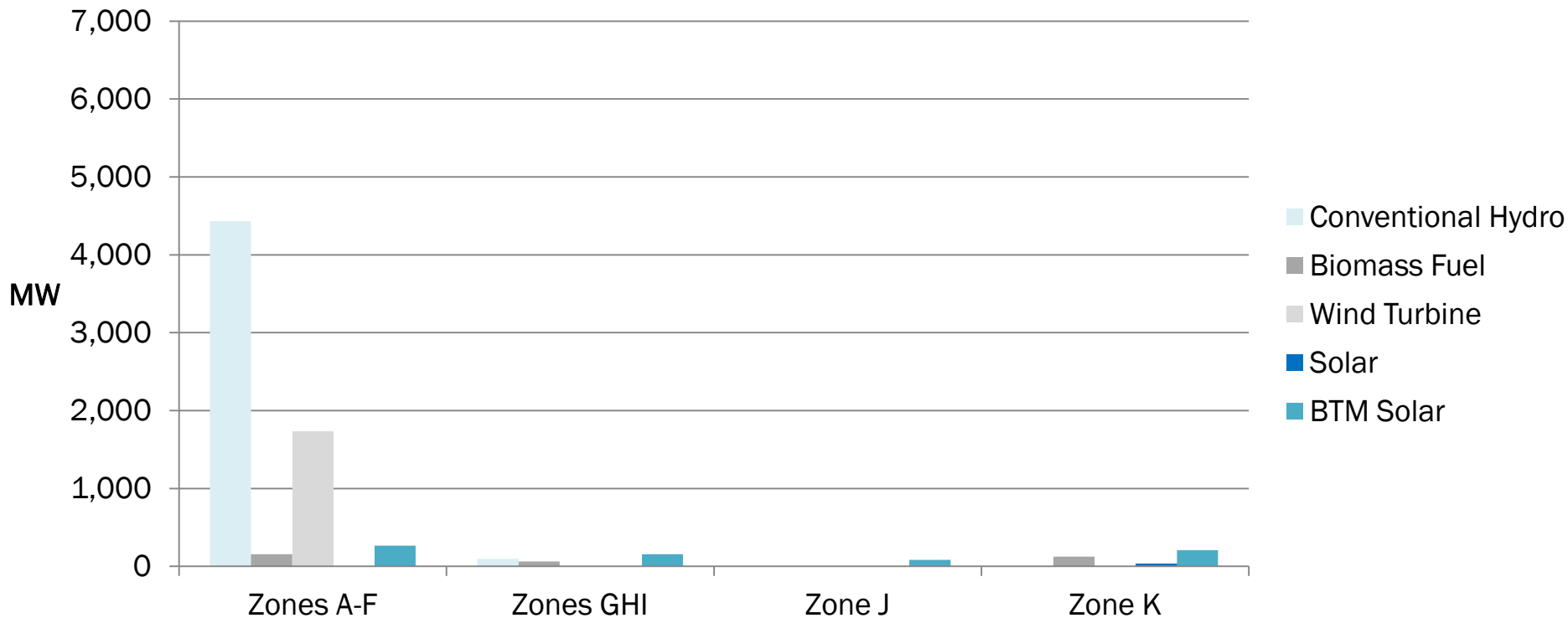
# Modeling the effect of additional renewable resources on the ICAP market

- ✓ **Identify the additional resources**
  - Quantity
  - Location
  - Characteristics (e.g., Unforced Capacity as a percentage of ICAP)
- ✓ **Model the effect of these resources on resource adequacy requirements**
  - Installed Reserve Margin (IRM)
  - LCRs
  - <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={039DE249-C6D9-4A80-8183-349261546F1B}> (NYISO comments in the NYS Clean Energy Standard Docket, including IRM discussion)
- ✓ **Model the effect of these resources on peak demand**
  - ICAP Load forecast
- ✓ **Model the effect of these resources on Demand Curve parameters**
  - Demand Curve reference points
    - Net Energy and Ancillary Services revenues of the Demand Curve peaking unit (i.e. assumed to be \$0/kW-y)
    - Winter-to-Summer ratio
  - NYCA and Locality translation factors

# 'Study Case' Assumptions

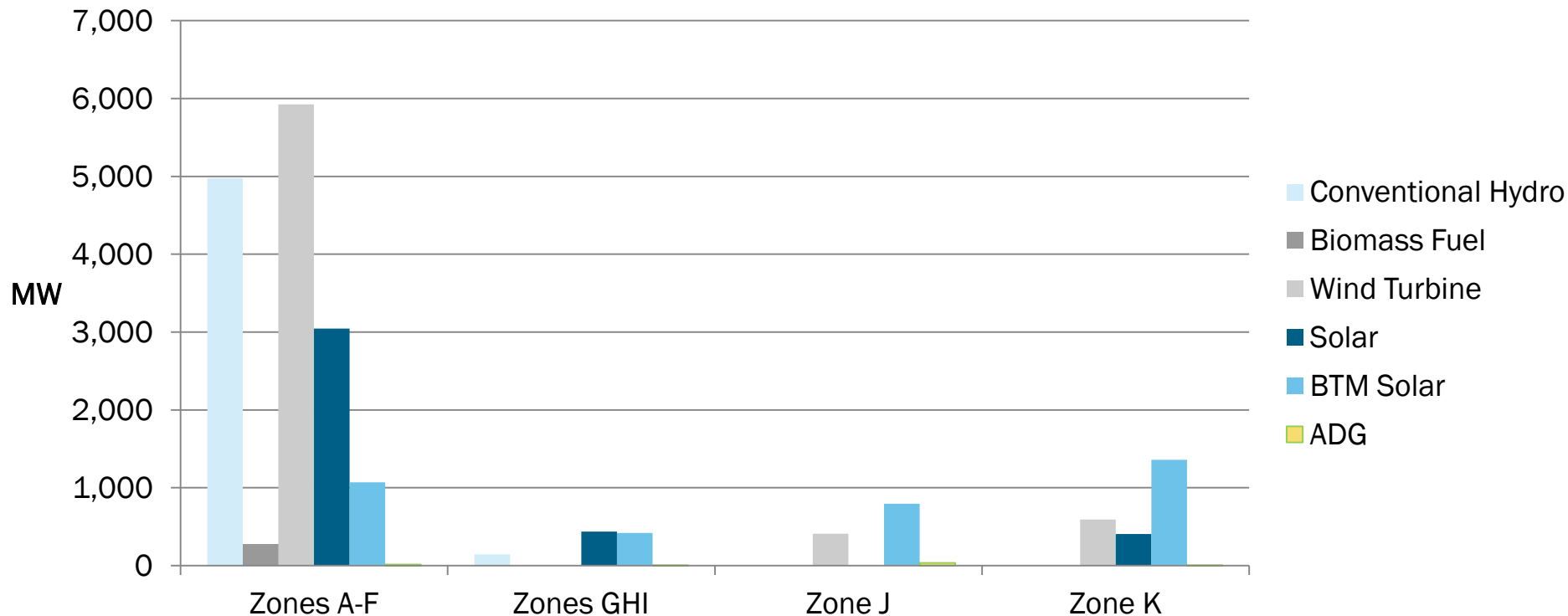
- Keep the same existing generation, SCR, UDR, capacity imports, exports, and unoffered, unsold capacity as the base case
- Add incremental renewable capacity, similar to the approach in the IPP - energy market study
  - The intent is to have the same resources modeled in both the energy market and capacity market studies
  - The primary source of projections for the quantity and location of qualified CES renewable generation is the NYSDPS Final Supplemental Environmental Impact Statement ("Final EIS") in CASE 15-E-0302 using the "Blend Base Case"  
<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={424F3723-155F-4A75-BF3E-E575E6B0AFDC}>
  - Start with nameplate capacity values as ICAP and then convert into UCAP (*i.e.*, the product transacted in the NYISO ICAP market)

# Renewable Capacity from the 2017 Gold Book (*i.e.*, Base Case)



BTM (*i.e.* retail level) solar MW are consistent with values presented at 3/28 and 4/24 MIWG meetings

# Renewable Capacity in the Study Case



# Renewable Capacity Added by Zone

Zone(s)	Nameplate MW added
A-F	8,978
GHI	905
J	1,235
K	2,326
A-K (NYCA)	13,444

# Study Case ICAP to UCAP derating factors

Resource	Summer DF	Winter DF	Source	Sensitivity performed?
On-shore wind	0.90	0.70	ICAP Manual, pg. 4-23	Yes
Off-shore wind	0.62	0.62	ICAP Manual, pg. 4-23	Yes
Solar (utility scale and BTM)	0.54	0.98	ICAP Manual, pg. 4-25	Yes
Run-of-River Hydro	0.50	0.40	Approximate NYCA average	No
Biomass/Landfill Gas	0.40	0.40	Approximate NYCA average	No

# Final ICAP Results

# Effect of Incremental Renewable Resources – ICAP Demand Curves

- **ICAP reference points increased**
  - Driven by the use of the assumption that the Demand Curve peaking plant receives 0\$/kW-y net EAS (see the sensitivity analysis for alternate assumptions)
- **ICAP minimum requirements increased for the NYCA, remained nearly flat for the Localities**
  - Adding renewable resources increases the derating factor (locational EFORD) and thus increases the requirement
  - Adding BTM solar decreases peak load and thus decreases the requirement
- **Demand Curves became steeper**
  - Driven by higher reference points
- **The NYCA results are shown on the next slide**
  - Locality results are shown in the spreadsheet posted with this presentation
  - Results did not change from the 7/13 preliminary results presentation, except minor rounding changes



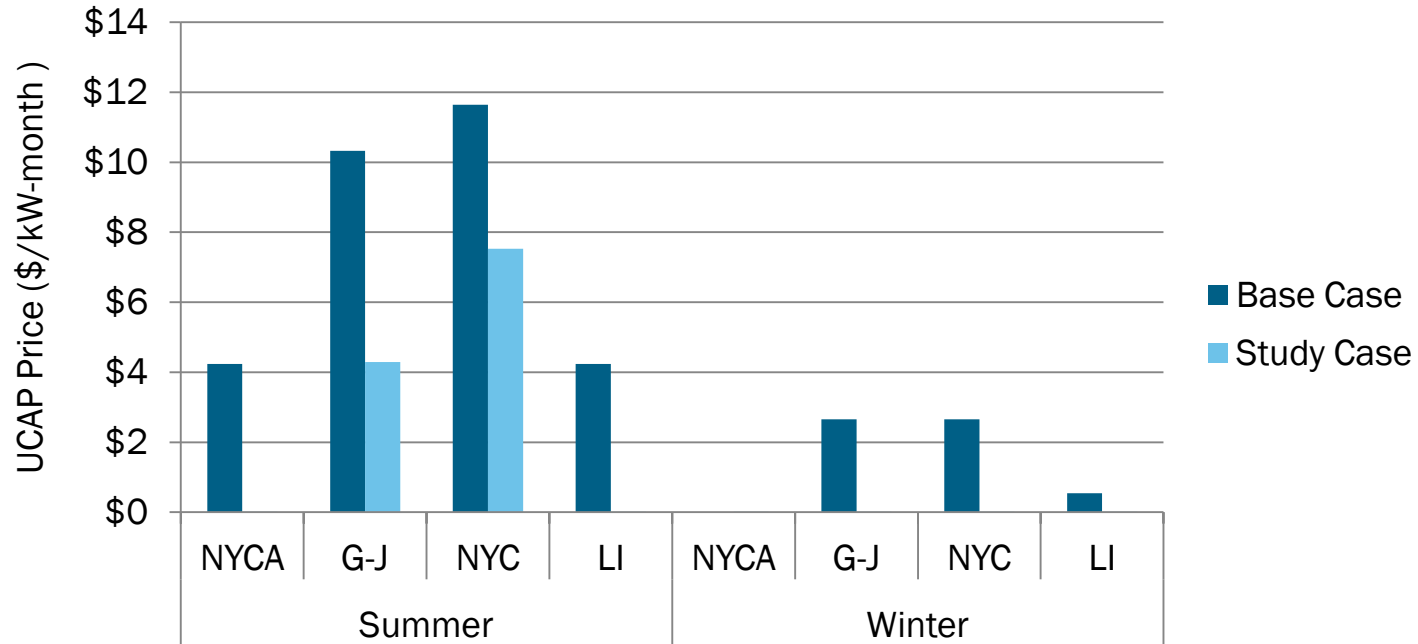
# NYCA Final Results

NYCA Results	Base Case		Study Case		Difference	
<i>MW values, except load, are in UCAP MW</i>						
	Summer	Winter	Summer	Winter	Summer	Winter
Spot Auction Price (\$/kW-Month)	\$4.24	\$0.00	\$0.00	\$0.00	-\$4.24	\$0.00
Load Forecast 2017	33,177.8	33,177.8	31,503.5	31,503.5	-1,674.3	-1,674.3
LCR/IRM Percentage	118.00%	118.00%	138.80%	138.80%	20.80%	20.80%
Demand Curve ICAP Ref Point	\$9.08	\$9.08	\$12.19	\$12.19	\$3.11	\$3.11
ICAP/UCAP derating factor	9.68%	7.90%	21.64%	20.95%	11.96%	13.06%
UCAP Ref Point	\$10.05	\$9.86	\$15.56	\$15.42	\$5.51	\$5.56
UCAP Requirement	35,361.4	36,058.8	34,264.2	34,565.0	-1,097.2	-1,493.8
Demand Curve Zero Crossing	112.00%	112.00%	112.00%	112.00%	0.00%	0.00%
UCAP at \$0	39,604.8	40,385.9	38,375.9	38,712.8	-1,228.9	-1,673.1
Demand Curve Slope	(0.0024)	(0.0023)	(0.0038)	(0.0037)	(0.0014)	(0.0014)
Generation/SCR UCAP Available**	36,647.7	39,805.0	39,617.9	41,971.9	2,970.2	2,166.9
Imports	1,413.7	1,172.9	1,413.7	1,172.9	0.0	0.0
Exports	138.3	146.1	138.3	146.1	0.0	0.0
Unoffered MW	101.7	177.5	101.7	177.5	0.0	0.0
Unsold MW	4.6	164.1	4.6	164.1	0.0	0.0
Total MW Cleared***	37,816.8	40,490.2	40,787.0	42,657.1	2,970.2	2,166.9
MW Cleared Above Requirements	2,455.4	4,431.4	6,522.8	8,092.1	4,067.4	3,660.7
% Cleared Above Requirements	6.94%	12.29%	19.04%	23.41%	12.10%	11.12%

# Market dynamics

- **Summer supply and demand balances shift most dramatically in the NYCA and Long Island**
  - Due to additional MW of renewable capacity (both wholesale and BTM) in these locations
- **Winter supply exceeds the zero crossing point in all locations**

# UCAP Price in the Base and Study Cases



# Sensitivity Analysis

# Sensitivity analysis

- Stakeholders presented various comments on the Base Case and Study Case assumptions
  - Renewable resource derating factors
  - Base case conditions (e.g., what if transmission capability increased)
  - Alternate Demand Curve peaking plant Net EAS revenue assumptions
- The sensitivity analysis enables a review of the model's performance across alternate assumptions suggested by stakeholders
- The sensitivity analysis also recognizes the general uncertainty an alternate resource mix could introduce in the market through components such as estimating the IRM and LCRs

# Sensitivity Cases

1. Increase NYC LCR +5%
2. Decrease offshore wind derating factor -10% (increases UCAP)
3. “Uncleared” MW necessary to return to base case prices (see next slide)
4. Increase IRM, all LCRs +5%
5. Decrease onshore wind derating factor from 90% to 78%
6. Alternate Net EAS assumption: 33% of demand curve reset value
7. Alternate Net EAS assumption: 66% of demand curve reset value
8. Increase solar derating factor (decreases UCAP)

# Sensitivity results

- **Sensitivities generally showed the model results were robust across a range of assumptions**
  - NYCA and LI prices remain at zero
  - G-J Locality and NYC prices remain at or below historically observed ranges
- **Sensitivity 4 shows the “uncleared” UCAP necessary to return to Base Case levels of UCAP excess and also Base Case prices**
  - “uncleared” UCAP is the amount of UCAP that remains in the market and is considered in market processes, such as the requirement setting processes, but does not clear in any auction or in a certified bilateral
  - ~25% of ICAP added in NYCA, G-J Locality, NYC and
  - ~35% of ICAP added in Long Island
- **Full results tables are posted with this presentation as an Excel spreadsheet**

# Sensitivity results

Sensitivity 4 – Uncleared MW <i>MW values, except load, are in UCAP MW</i>	New York Control Area							
			G-J Locality					
					New York City		Long Island	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Spot Auction Price (\$/kW-Month)	\$4.24	\$0.00	\$10.33	\$2.65	\$11.64	\$2.65	\$4.24	\$0.54
Load Forecast 2017	31,503.5	31,503.5	15,503.9	15,503.9	11,305.3	11,305.3	4,802.1	4,802.1
LCR/IRM Percentage	138.80%	138.80%	93.60%	93.60%	83.40%	83.40%	114.30%	114.30%
Demand Curve ICAP Ref Point	\$12.19	\$12.19	\$18.95	\$18.95	\$24.98	\$24.98	\$26.05	\$26.05
ICAP/UCAP derating factor	21.64%	20.95%	10.22%	9.53%	6.75%	7.40%	14.58%	16.51%
UCAP Ref Point	\$15.56	\$15.42	\$21.11	\$20.95	\$26.79	\$26.98	\$30.50	\$31.20
UCAP Requirement	34,264.2	34,565.0	13,029.2	13,128.8	8,792.2	8,731.2	4,688.3	4,582.7
Demand Curve Zero Crossing	112.00%	112.00%	115.00%	115.00%	118.00%	118.00%	118.00%	118.00%
UCAP at \$0	38,375.9	38,712.8	14,983.6	15,098.1	10,374.8	10,302.8	5,532.2	5,407.6
Demand Curve Slope	(0.0038)	(0.0037)	(0.0108)	(0.0106)	(0.0169)	(0.0172)	(0.0361)	(0.0378)
Generation/SCR UCAP Available**	39,617.9	41,971.9	14,607.2	15,846.0	9,942.8	10,943.9	6,301.7	6,530.3
Imports	1,413.7	1,172.9	0.0	0.0	0.0	0.0	0.0	0.0
Exports	138.3	146.1	0.0	0.0	0.0	0.0	0.0	0.0
Unoffered MW	101.7	177.5	16.8	13.1	9.1	8.9	6.7	21.4
Unsold MW	4.6	164.1	4.0	14.3	4.0	18.4	0.6	1.8
<b>Uncleared MW</b>	<b>3,532.0</b>	<b>3,880.0</b>	<b>559.0</b>	<b>970.0</b>	<b>242.5</b>	<b>694.0</b>	<b>872.3</b>	<b>1,113.8</b>
Total MW Cleared***	37,255.0	38,777.1	14,027.4	14,848.6	9,687.2	10,222.6	5,422.1	5,393.3
MW Cleared Above Requirements	2,990.8	4,212.1	998.2	1,719.8	895.0	1,491.4	733.8	810.6
% Cleared Above Requirements	8.7%	12.2%	7.7%	13.1%	10.2%	17.1%	15.7%	17.7%

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# Next steps

- Consider stakeholder input received during today's meeting and sent to [IPP\\_feedback@nyiso.com](mailto:IPP_feedback@nyiso.com)
- Prepare and present to stakeholders a draft whitepaper

# Questions?

# 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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