# 2018 ANNUAL REPORT

## OF THE CONSUMER INTEREST LIAISON

A Report by the
New York Independent
System Operator

May 2019

## The mission of the NYISO, in collaboration with its 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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## Message from the President and CEO

The electric grid in New York State is undergoing an unprecedented transition. Concepts like carbon pricing, Distributed Energy Resources (DER) participation and storage integration have taken center stage. We expect our wholesale energy markets will facilitate these innovations as they have since their inception, nearly 20 years ago. This transition also creates the need to consider the impacts of these concepts on consumers. I invite you to read through this report to understand the strong consumer focus that the NYISO and our consumer interest liaison provide for the competitive electric markets.

Analyzing the impact of incorporating the social cost of carbon into our market was a major effort of the past year. With the help of the Brattle Group, we created a comprehensive analysis that looked at both static and dynamic effects. We also analyzed how energy storage penetration will impact both energy and capacity prices. We evaluated the impact of storage resources on system reliability, the environment, and transparency of NYISO operations, and we began to analyze the impact of DERs on consumers.

This year, we continue these efforts. On carbon pricing, we have engaged new consultants to explore additional areas of potential value. Work on integrating DER is proceeding, and we presented a consumer impact analysis in January and February. We have also performed consumer impact analyses on a variety of other market transformation-related issues, as outlined in this report.

Together, these initiatives demonstrate our leadership in leading the grid's transition into the future. As we move forward we have the utmost confidence that markets are the strongest platform from which we can facilitate a modern, flexible grid that continues to provide benefits for the economy, the environment and consumers.

*Richard Dewey*

**President & CEO**

## Message from the Consumer Interest Liaison

The *Consumer Annual Report* is an opportunity for the NYISO to provide stakeholders with a summary of the activities of the Consumer Interest Liaison from the past year. 2018 turned out to be another extremely busy year, as the NYISO launched several projects that will have a lasting impact on the electricity grid for many years to come. The NYISO brought three major projects to stakeholders for discussion; storage integration, carbon pricing and Distributed Energy Resources (DER). A consumer impact analysis was conducted for all of these projects, two of which were presented in 2018 and one in early 2019.

The year started with an updated consumer impact in February 2018 on Alternative Methods for Determining LCRs using the 2018 base case. Most of the work on this project took place in 2017, with consumer impact presentations in October and November 2017. The next project for consumer impact analysis was Energy Storage Integration. The methodology to conduct the consumer impact for Energy Storage Integration was presented in July 2018. This was followed by the consumer impact analysis in August 2018. There was another consumer impact presentation on storage in October 2018, in response to additional information requested by stakeholders.

In August 2018, we presented the "Dynamic Change Case and Post-MAPS Analysis" to the Integrated Public Policy Task Force (IPPTF), describing how the consultant retained by the NYISO would conduct the consumer impact analysis of incorporating carbon into our energy markets. The presentation reviewed each component of the static and dynamic analysis and compared the proposed study approach with the analysis presented in 2017. The methodology for conducting the carbon study was followed by a summary of the actual analysis in September 2018.

Finally, we worked on the consumer impact of DER Participation during the second half of 2018, with presentations to stakeholders in January and February of 2019.

Although a large portion of our time is devoted to consumer impact analyses, we also support the end-use sector in other important ways. A weekly summary of all stakeholder committee and working group meetings is sent to the end-use sector and posted on the NYISO website. Additionally, we provide other services that are briefly discussed in the beginning of this report.

Many of the projects that started last year, like carbon pricing and DER participation will continue during 2019. In addition, a number of new projects will be introduced that will require a consumer impact analysis, which we discuss towards the end of the report. We are expecting another very busy year and look forward to continue supporting the end-use sector.

*Tariq Niazi*

**Consumer Interest Liaison**

## Role of the Consumer Interest Liaison

2018 marks the seventh year for the office of the NYISO Consumer Interest Liaison (liaison). The NYISO established the function of the liaison in the fall of 2011 and the position has been held by Tariq Niazi since its inception. While serving the public interest and providing benefits to consumers is enshrined in the NYISO's mission, there was also a realization that the complexity of the markets presents challenges for consumers, and groups representing consumers, to participate effectively in the NYISO governance structure. The ability to analyze the impacts resulting from market developments requires resources that may not be readily accessible to consumer groups. To address this limitation, the NYISO took several initiatives to improve the opportunities for consumer representation to engage in its governance process. The liaison was appointed to:[1]

- Assist end-use consumers in gaining valuable insight into proposed system changes.
- Provide consumers a communication link with the NYISO Board of Directors and senior management.
- Provide consumers with the short-term and long-term impact of NYISO initiatives and changes.
- Improve the education and outreach with end-use consumers.
- Improve overall transparency of NYISO actions and processes.

Since the establishment of the liaison function, the NYISO has devoted numerous resources to improving the participation of end-use consumers. Through several channels of communication and detailed consumer impact analyses, the NYISO provides the information needed for the end-use consumer to enhance the effectiveness of their participation in NYISO governance process.

There are several services provided by the liaison to assist in keeping end use consumers informed, as detailed below.

### Consumer Interest Liaison/Sector Meetings

Each year, the liaison meets separately with all of the stakeholder sectors participating in the NYISO's shared governance process. The objective of these meetings is to understand each sector's view of the consumer impact analyses that are presented at stakeholder meetings. These discussions cover both the consumer impact analyses presented in the previous year and also those planned for the coming year. The discussions with stakeholders from the different sectors help the liaison better understand what is important and relevant to the specific interest they represent. Hearing the viewpoint of each sector

[1] In 2011, the NYISO named Tariq Niazi as the consumer interest liaison. Mr. Niazi brought 30 years of experience with him from the New York State Consumer Protection Board (CPB). Mr. Niazi's experience as the former director of the CPB Utility Intervention Unit and Chief Economist uniquely qualifies him to assist New York's electricity consumers in understanding the complexities of the NYISO marketplace.

participating in the market helps the liaison obtain a much more complete picture of different aspects of each issue. This feedback helps the liaison conduct more comprehensive impact analyses that address the concerns of all sectors involved.

### Weekly Summaries

A very important aspect of the assistance to the end-use sector is the NYISO's weekly summary of stakeholder meetings. The NYISO sends the weekly summary to the end-use consumer mailing list and it is also posted on the Consumer Interest Liaison page of the NYISO website for everyone's review. The liaison's office attends all stakeholder committee and working group meetings to describe the discussions taking place at these meetings and other relevant issues that are brought up by stakeholders or NYISO personnel. The summaries are produced and sent out on a timely basis, in most cases the week following the stakeholder meetings, to keep consumer representatives current on the progress of issues through the governance process. The summaries also include other information, such as filings made to Federal Energy Regulatory Commission (FERC), and Orders to the NYISO from FERC. In addition, the weekly summaries highlight relevant notices such as meeting reminders, deadlines for input, and NYISO manual revisions, as well as other topics relevant to effective participation. The appendix to this report provides an example of a typical weekly summary covering stakeholder meetings during a week in the summer of 2018.

### Monthly End-Use Consumer Conference Calls

The liaison meets with representatives from the end-use sector and the staff of the New York State Department of Public Service (DPS) each month via conference call. The meeting usually starts with the liaison reviewing committee and working group topics tentatively scheduled for the upcoming months based on the schedule developed internally by the Market Structures team. Consumer representatives appreciate being able to focus their limited resources on issues that are most important to their interests. This information also helps them track issue progress and follow relevant milestones. These monthly meetings also serve as an opportunity for the end-use sector representatives to voice concerns regarding topics being discussed in the stakeholder process. The liaison addresses these concerns by taking it to a senior executive or relevant subject matter expert, or arranging for an information/training session.

### Consumer Inquiries

Given the complexity of issues confronting our stakeholders, it is not uncommon for the end-use sector representatives to approach the NYISO with questions and inquiries. For most other sectors, there are dedicated customer service representatives assigned to them. For the end-use sector, this responsibility falls on the liaison. Fortunately, the liaison is in a suitable position to answer these

inquiries directly, or seek the assistance of a subject matter expert to clarify and explain issues consumers may face. As part of the Market Structures department, the liaison has excellent access to subject matter experts that are working on the NYISO projects. Inquiries may range from basic committee status updates to in-depth inquiries about a complex concept proposal. Whenever asked, the liaison provides the information necessary for end-use consumer representatives to evaluate their position on critical issues.

### Email Reminders

Timely and reliable communications are paramount for effective participation in the NYISO governance process. To serve this end, the NYISO sends emails through several email databases on a daily basis. To avoid inundating market participants with emails that may be relevant only to specific groups of market participants, the NYISO provides many separate email lists for stakeholders to participate in. There are mailing lists for each committee and working group, as well as several specific mailing lists such as Generator Owners, Demand Response, Main Contacts, etc. The liaison receives emails from all of all these mailing lists and summarizes and resends relevant and pertinent emails to the end-use consumer email list. Although this could act as a duplicate mailing, it helps end users avoid missing important information.

### Training and Information Sessions

Given the complex nature of an issue confronting stakeholders or the potentially large impact expected from a proposed change in market rules, consumer representatives occasionally request more information on a particular issue. Based on the request by representatives of the end-use sector, the liaison determines if there is a need to provide the consumer representatives a more detailed explanation of specific areas of the NYISO markets. In these instances, the liaison offers an opportunity to the end-use sector for additional information and clarification to better prepare them for stakeholder discussions. An information/training session with Subject Matter Experts (SMEs) on NYISO markets, grid operations, and the planning processes, provides end-use consumer representatives an opportunity to improve their understanding of current market issues and be better prepared to more effectively represent their interests.

During 2018, several end-use consumer representatives and the staff of the state Department of Public Service (DPS) requested the NYISO provide an orientation session for several new employees with little or no experience in the energy industry who had recently joined their organizations. The NYISO Market Training Team offers a full-day New York Market Orientation Course, known as NYMOC, and a much more in-depth three-and-a-half-day NYMOC. It is recommended that participants in these course offerings have a basic familiarity with the energy markets prior to attending to receive the full value from the courses.

In this case, the liaison developed a two-hour orientation as an introduction to the markets, providing a starting point to learn the basic market fundamentals. Eight individuals, representing four organizations, participated in the orientation. With this basic introduction, these new consumer representatives developed an essential understanding of our complex markets to start participating in the stakeholder process.

## NYISO Governance

The NYISO has a shared governance structure where issues are debated and voted on by stakeholders, then sent to the NYISO Board of Directors for approval and the FERC for acceptance. All sectors of the NYISO shared governance structure, including end-use consumer representatives, play a significant role in the decision-making process. Stakeholders participate in NYISO's governance through three standing committees: the Management Committee (MC), the Business Issues Committee (BIC), and the Operating Committee (OC). Each of these committees oversees their own working groups, task forces and subcommittees. These committees provide stakeholders the forums to discuss, debate and vote on issues regarding the administration of the markets, the operation of New York's bulk power system, and the planning for system reliability, among other topics.

Like previous years, in 2018 the NYISO conducted more than 200 meetings, including monthly sessions of the three standing committees and near-daily meetings of subcommittees, working groups, and task forces.

The NYISO's three standing stakeholder committees perform their responsibilities in accordance with their bylaws and in coordination with work performed by NYISO management and staff. The NYISO's governing agreements establish their specific responsibilities. Stakeholders are responsible for a range of duties in the shared governance process, including:

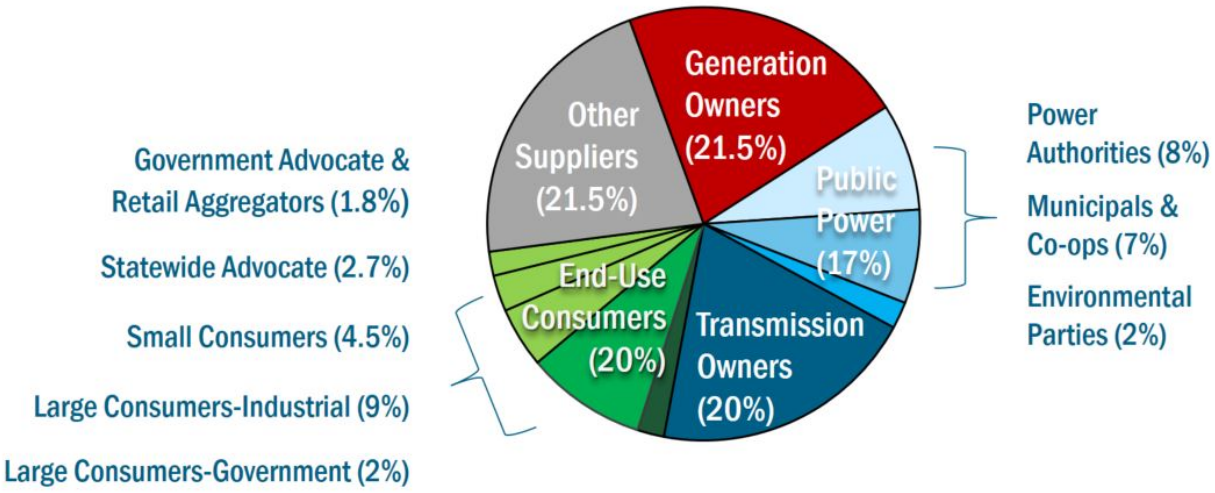
- Reviewing and recommending candidates for board vacancies.
- Developing and reviewing technical guidelines for the operation of the bulk power system.
- Developing and reviewing enhancements to market design.
- Developing and reviewing system planning reports.
- Reviewing the preparation of and approving the NYISO's annual budget.

The NYISO stakeholders and the NYISO Board of Directors share responsibility for developing and approving proposed changes to the NYISO's governing documents and federally accepted tariffs. The Management Committee must endorse any proposed change to the NYISO's governing documents before they can be approved by the Board of Directors and filed for review by FERC under Section 205 of the Federal Power Act. The FERC has noted the collaborative results of the NYISO's shared governance system, stating in 2008, "The Commission commends NYISO and the stakeholders for working together to resolve many issues…"[2]

Upon acceptance as a voting member, market participants will be assigned to a voting sector. Sector representatives, including transmission owners, generation owners, other suppliers, end-use consumers,

[2] New York Independent System Operator, Inc., 122 FERC ¶ 61,064 (2008) (January 29, 2008 Order).

and public power/environmental interests, vote in the stakeholder committees. Each stakeholder's vote in a committee is a percentage of its sector's allocated voting shares. Actions by the committees require a 58% vote of approval to pass. The voting shares in all three standing committees are allocated among the sectors and subsectors as follows:



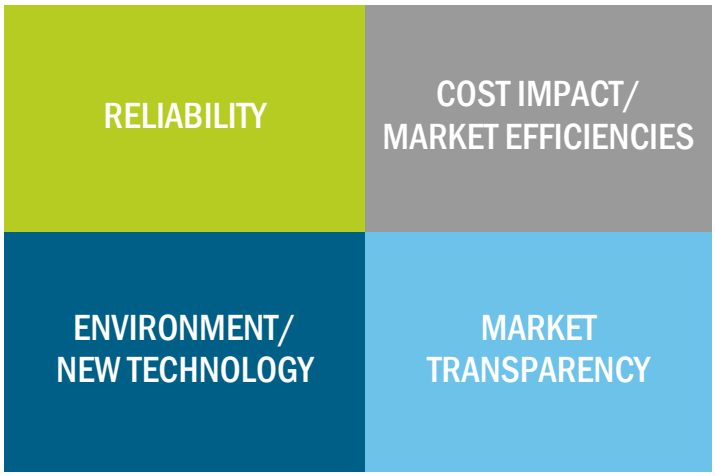

In addition to stakeholders with voting rights, entities with significant interests in the NYISO markets may join the shared governance process as non-voting members. Further, staff of the PSC and FERC regularly participate in and monitor issues addressed by the NYISO committees.

## Consumer Impact Analysis Process

The foremost responsibility of the liaison is to evaluate the impact of major market design changes on consumers. Consumer Impact Analyses are conducted for all major projects and presented to stakeholders. These analyses look at how a new market rule will impact reliability of the bulk power system, the impact on the competitiveness and efficiency of the market, the impact on transparency, and the impact of the market rule change on the environment.

The Consumer Impact Analysis is a formal process for systematically assessing a new market rule, designed to include qualitative and quantitative metrics for each of the areas analyzed. The analysis reviews the impacts of new rules under four evaluation areas: reliability, cost impact/market efficiencies, environment/new technology, and transparency. Each study area's impact is described below:

- **Reliability** analyzes how a new project improves the reliability of the current system. A project would not be implemented if it caused reliability issues or concerns.
- **Cost Impact/Market Efficiencies** analyzes the overall costs and benefits of implementing a project. It also reviews whether the project improves market operations and produces proper price signals to help spur investment.
- **Market Transparency** assesses the extent to which the project will impact the transparency and clarity of market rules.
- **Environment** reviews how the project may affect the environment, focusing primarily on emission levels.




The list of projects selected for Consumer Impact Analysis are a subset of all NYISO projects chosen during the annual Budget Project Prioritization Process. The list of projects identified for Consumer Impact Analysis is presented annually to both the Budget and Priorities Working Group (BPWG) and Business Issue Committee (BIC) for stakeholder input. This occurs during the annual Budget Project

Prioritization Process. The process typically begins in May and ends in the fourth quarter with the NYISO Board of Directors approval of the annual budget. Prior to the NYISO Board's approval, NYISO staff and stakeholders discuss the proposed projects and budgetary costs for the year during BPWG meetings. The projects that are included on the Consumer Impact Analysis Project list generally meet one or more of the following analysis guidelines:

- Anticipated net production cost impact of $5 million or more.
- Expected consumer impact from changes in energy or capacity market prices is greater than $50 million per year.
- Incorporates new technology into New York markets for the first time.
- Allows or encourages a new type or category of market product.
- Creates a mechanism for out-of-market payments for reliability.

## Consumer Impact Presentations During 2018

- Alternative Methods for Determining LCRs Using the 2018 Base Case (ICAP – February 221, 2018).
- Methodology for Consumer Impact Analysis: Energy Storage Integration (ICAP – July 24, 2018).
- 2019 Consumer Impact Analysis Project List (BPWG – July 25, 2018).
- Carbon Pricing: Dynamic Change Case and Post-MAPS Analysis (Presented to the Integrated Public Policy Task Force – August 6, 2018).
- Consumer Impact Analysis: Energy Storage Integration (ICAP – August 30, 2018).
- Summarizing the Consumer Impact of Incorporating the Cost of Carbon Emissions in the Wholesale Electric Market (ICAP/MIWG – September 17, 2018).
- Additional Analysis of Energy Storage Integration (ICAP/MIWG – October 2, 2018).

# Consumer Impact Analysis Using the 2018 Base Case: Alternative Methods for Determining LCRs

## Background/Overview

The initial Consumer Impact Analysis for Alternative Methods for Determining Locational Minimum Installed Capacity Requirements was presented to stakeholders at the October 11, 2017 Installed Capacity Working Group (ICAPWG) meeting.[3] During that presentation, some stakeholders requested additional information, which was provided in another presentation, "Additional Consumer Impact Analysis," at the November 6, 2017 ICAPWG meeting. Both of these presentations used the 2017 base case.

At the February 6, 2018 ICAPWG meeting, the NYISO presented updated Locational Minimum Installed Capacity Requirements (LCRs) based on the 2018 base case. During the February 14, 2018 Business Issues Committee (BIC) meeting, some stakeholders requested that the consumer impact analysis be updated using the 2018 base case, since the prior analyses were based on the 2017 base case. This presentation updates the Consumer Impact Analysis based on the 2018 base case.

## Changes from the 2017 to the 2018 Base Case

As discussed at the February 6, 2018 ICAP meeting, the 2018 base case required more capacity in southeast New York to meet the reliability criteria of Loss of Load Expectation (LOLE) (<0.1 days/year) than the 2017 base case required. This was observed using both the current and optimized LCR methodologies. The need for more capacity from 2017 to 2018 was mainly a result of the following:

- Increase in load forecast uncertainty in Zones J and K.
- Changes in interface limits.
- Increased Equivalent Forced Outage Rate under Demand (EFORd) on underground transmission cables and Unforce Deliverability Rights (UDRs).

The following changes also occurred between 2017 and 2018, and were incorporated into the analysis:

- Increase in Demand Curve Net CONE cost curves.
- Updated Transmission Security LCR Floors.

[3] Locational Minimum Installed Capacity Requirements, or LCRs are defined as "The portion of the NYCA Minimum Installed Capacity Requirement provided by capacity resources that must be electrically located within a Locality (including those combined with a Unforced Capacity Deliverability Right except for rights returned in an annual election to the ISO in accordance with ISO Procedures) in order to ensure that sufficient energy and capacity are available in that Locality and that appropriate reliability criteria are met."

**Figure 1: 2017 and 2018 LCR Percentages**

| | Approved LCRs | | | Optimized LCRs | | |
|---|---|---|---|---|---|---|
| | G-J | J | K | G-J | J | K |
| 2017 | 91.5% | 81.5% | 103.5% | 90.7% | 80.2% | 104.2% |
| 2018 | 94.5% | 80.5% | 103.5% | 90.8% | 79.7% | 107.5% |

While both the current and optimized methodology required an increase in southeast New York capacity from 2017 to 2018, the optimized methodology was able to achieve a solution that minimizes this increase in capacity while also reducing total statewide cost, as shown in Figure 2.

**Figure 2: 2017 and 2018 LCRs (MW)**

| | Approved LCRs (MW) | | | Optimized LCRs (MW) | | |
|---|---|---|---|---|---|---|
| | G-J | J | K | G-J | J | K |
| 2017 | 14,696.1 | 9,511.1 | 5,617.0 | 14,569.8 | 9,354.7 | 5,652.5 |
| 2018 | 15,042.5 | 9,288.9 | 5,605.6 | 14,432.0 | 9,198.2 | 5,856.1 |
| Δ Locality MW | 346.4 | -222.2 | -11.5 | -137.9 | -156.5 | 203.6 |
| Δ Southeast New York MW | 334.9 | | | 65.7 | | |

### Cost Impact Analysis

The tables that follow provide the Consumer Impact Analysis based on the 2018 base case. The impact analysis follows the following format:

- Short-term consumer impact assumes no changes in generation from the 2017 Consumer Impact Analysis.
- Long-term cost impact:
    - Long-term equilibrium modelled at the level of excess condition (defined in the demand curve reset).
    - Historic excess defined as a percentage of excess above the requirement (observed in the last 3 capability years in each of the different localities).

This analysis, using the 2018 base case, looks only at the base case scenarios both in the short and long run. Sensitivities around changes in generation, transmission and net CONE that the NYISO provided in the previous analyses using the 2017 base case would require additional General Electric Multi-Area Reliability Simulation (MARS) runs.

The cost of capacity shown in the tables for both the current LCRs and optimized LCRs with the updated Transmission Security Limit (TSL) are based on the individual Locality requirement and total capacity that cleared in each Locality. Additionally, the tables that follow show the delta between the cost of capacity for the current and optimized LCRs.

### Assumptions for the analysis

- 2018 load forecast.
- 2018 approved and optimized LCRs.
- 2018 Reference prices.
- 2017 supply assumptions used for the Consumer Impact Analysis presented on November 6, 2017 ICAPWG meeting.

### 2018 Total Cost of Capacity

The costs presented below assume that all capacity is purchased at the spot market auction clearing price, and therefore could differ from observed costs if capacity was purchased through other methods (*i.e.*, bilateral contracts or self-supply). The cost of capacity presented is for the 2018 Capability Year, and provides a hypothetical outcome based on the described assumptions and optimization methodology. This analysis was based on the 2018 load forecast, projected 2018 reference prices, 2018 approved LCRs, and optimized LCRs — while utilizing the 2017 supply assumptions from the Consumer Impact Analysis presented at the ICAPWG on November 6, 2017.

**Figure 3: 2018 Short Term Cost**

| Methodology | 2018 Short Term Cost of Capacity (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| **Current Methodology** | $303 | $1,179 | $576 | $649 | $2,706 |
| **Optimized Methodology** | $553 | $668 | $308 | $649 | $2,178 |
| **Delta** | $251 | -$511 | -$268 | $0 | -$528 |

Given the slope of the demand curve, approximately 200 MW of additional capacity, load reduction, or a combination of additions and reductions in Long Island could return the Long Island cost back to that observed under the current method (i.e., about $303M), all else equal.

This analysis was based on the 2018 load forecast, 2018 reference prices, 2018 approved and optimized LCRs – while utilizing the 2017 supply assumptions from the Consumer Impact Analysis presented at the ICAPWG on November 6, 2017.

**Figure 4: 2018 Long Term Cost at LOE**

| Methodology | 2018 Long Term Cost of Capacity at LOE (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| Current Methodology | $765 | $2,061 | $972 | $2,017 | $5,815 |
| Optimized Methodology | $802 | $2,037 | $880 | $2,060 | $5,780 |
| Delta | $37 | -$23 | -$91 | $43 | -$35 |

This analysis was based on the 2018 load forecast, 2018 reference prices, 2018 approved and optimized LCRs while utilizing the 2017 supply assumptions from the Consumer Impact Analysis presented at the ICAPWG meeting on November 6, 2017

**Figure 5: 2018 Long Term Cost at Historic Excess**

| Methodology | 2018 Long Term Cost of Capacity at Historic Excess (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| Current Methodology | $383 | $1,121 | $521 | $551 | $2,576 |
| Optimized Methodology | $398 | $1,109 | $473 | $562 | $2,542 |
| Delta | $15 | -$11 | -$48 | $11 | -$34 |

This analysis was based on the 2018 load forecast, 2018 reference prices, 2018 approved and optimized LCRs while utilizing the 2017 supply assumptions from the Consumer Impact Analysis presented at the ICAPWG meeting on November 6, 2017

**Figure 6: 2017 Short Term Cost**

| Methodology | 2017 Short Term Cost of Capacity (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| Current Methodology | $313 | $1,011 | $348 | $714 | $2,385 |
| Optimized Methodology | $365 | $796 | $322 | $714 | $2,197 |
| Delta | $52 | -$215 | -$26 | $0 | -$189 |

These results were presented for the Consumer Impact Analysis at the November 6, 2017 ICAPWG meeting.

**Figure7: 2017 Long Term Cost at LOE**

| Methodology | 2017 Long Term Cost of Capacity at LOE (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| Current Methodology | $689 | $1,887 | $782 | $1,888 | $5,245 |
| Optimized Methodology | $697 | $1,855 | $789 | $1,893 | $5,234 |
| Delta | $8 | -$32 | $7 | $5 | -$12 |

These results were presented for the Consumer Impact Analysis at the November 6, 2017 ICAPWG meeting.

**Figure 8: 2017 Long Term Cost at Historic Excess**

| Methodology | 2017 Long Term Cost of Capacity at Historic Excess (Million) | | | | |
|---|---|---|---|---|---|
| | LI | NYC | GHI | ROS | Total |
| Current Methodology | $344 | $1,023 | $418 | $514 | $2,299 |
| Optimized Methodology | $347 | $1,007 | $423 | $516 | $2,293 |
| Delta | $3 | -$15 | $5 | $1 | -$6 |

These results were presented for the Consumer Impact Analysis at the November 6, 2017 ICAPWG meeting.

# Consumer Impact Analysis: Energy Storage Integration

## Project Description

Today, existing market products offer limited opportunities for Energy Storage Resources (ESRs) to provide energy and ancillary services. This is inconsistent with the NYISO's goal to integrate the full range of storage resources into the wholesale markets. Existing programs also do not account for operating constraints that have important performance implications for ESRs, such as upper storage limit, minimum load level, and transition time.[4]

To address these circumstances, the NYISO, as part of its Energy Storage Integration Project, is developing a participation model that will better enable the NYISO to economically schedule eligible ESRs for energy, capacity, and ancillary services in NYISO-administered wholesale markets.[5]

## Background

In 2017, the NYISO developed a market design concept for a participation model that would enable ESRs to offer their full capabilities into the NYISO's wholesale energy, capacity, and ancillary services markets.[5] The ESR Participation Model was prioritized as a Key Project with a deliverable of Market Design Complete in Q3 of 2018.

On February 15, 2018, FERC issued Order No. 841, directing "each RTO/ISO to revise its tariff to establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, facilitates their participation in the RTO/ISO markets."[6] The compliance filing deadline for Order No. 841 was December 3, 2018, with an implementation deadline of December 3, 2019.

[4] Energy Storage Integration: Market Design Concept Proposal, pg. 4 12/2017 @ https://www.nyiso.com/documents/20142/1404721/2017%20ESR%20Market%20Design%20Concept%20Proposal.pdf/7d0d243a-0ebb-f369-f196-3a52db0d1f35

[5] See NYISO, Energy Storage Integration: Market Design Concept Proposal (Dec. 20, 2017) at https://www.nyiso.com/documents/20142/1404721/2017%20ESR%20Market%20Design%20Concept%20Proposal.pdf/7d0d243a-0ebb-f369-f196-3a52db0d1f35

[6] Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 841, 162 FERC ¶ 61,127, at P3 (Feb. 15, 2018) ("Order No. 841") as amended by the Feb. 28, 2018 Errata Notice ("Order No. 841 Errata").

### Summary of Consumer Impacts

| | |
|---|---|
| **RELIABILITY**<br>From an operational perspective, additional supply, especially one that is flexible, could be a reliability benefit | **COST IMPACT/ MARKET EFFICIENCIES**<br>The increase in use of storage should reduce consumer costs |
| **ENVIRONMENT/NEW TECHNOLOGY**<br>The increase in use of storage, especially during system peak times should reduce emissions | **MARKET TRANSPARENCY**<br>No impact expected |

## Energy Market Analysis

Price volatility provides opportunities for ESRs to arbitrage energy: inject energy when prices spike; withdraw energy when prices are lowest. To approximate the short run energy market impact of storage, a spreadsheet analysis was conducted to test the impact that ESR energy arbitrage could have on energy market LBMPs. Two generator buses with high price volatility were selected:

- **Upstate:** Nine Mile Point Nuclear Station
- **Downstate:** Ravenswood 3

Since the amount of storage entering the wholesale market is unknown, the NYISO provided estimates over a range of expected values. The analysis took into account the way various quantities of energy storage would impact the real-time price spikes based on duration, efficiency and availability. Revised prices were developed using 2017 price intervals based on study assumptions about ESR size and opportunity costs:

- Used the change in hourly integrated real-time prices to approximate changes (up or down) to hourly Day-Ahead Market prices.
- The hourly changes to Day-Ahead Market prices (LBMPs) were multiplied by 2017 hourly time weighted load data for both upstate (Zones A-F) and downstate (Zones G-K) to estimate consumer impacts for multiple scenarios.

## Energy Market Analysis Assumptions

Unknowns about where and how ESRs will be deployed in the NYISO markets required key assumptions:

- **Duration – 4 hour**
  In order to become ICAP suppliers under current market rules, ESRs must be capable of 4 hours of sustained injection.
- **Location – High volatility load pockets**
  Price volatility provides best opportunities for arbitrage.
- **Availability – Tested different availability factors between 20% and 40%.**
  Unlikely that ESRs will be willing to perform every day of the year. Unlikely that ESRs will be positioned to capture every price spike throughout a day/month/year.
- **Roundtrip Efficiency**
  ESRs will not be perfectly efficient. Assumed 60%, 70%, and 80% roundtrip efficiency.
- **Technology Type**
  ESRs will be fast-ramping and able to take advantage of price spikes when they occur.
- **Capacity – 500 MW, 1,000 MW, 1,500 MW, 2,500 MW**
  5%, 10%, 15%, and 25% peak price shaving in load pockets used as a proxy for opportunity costs that may be offered by new storage capacity.

## Energy Market Analysis Methodology

- Compute the amount of 5-minute intervals expected to be impacted by storage. (4 hours*12 RTD intervals*365 days).
- Apply an availability factor (20% - 40%) to the above calculation to determine the top intervals impacted.
- In addition to the availability factor, apply an efficiency factor (60% - 80%) to determine the bottom intervals impacted.
- Adjust the prices of the impacted 5-minute intervals based on the amount of storage MW (500 MW – 2500 MW) and average them into hourly values. (See Figures 9 and 10).
- Subtract the adjusted hourly values from the original hourly averages (price delta).
- Multiply the price delta with its respective hourly average load value to compute the consumer impact for both upstate and downstate locations. (See Figures 11 – 17).

**Figure 9: Example of Peak Price Shaving for Downstate with Efficiency: 70% and Availability: 30%**

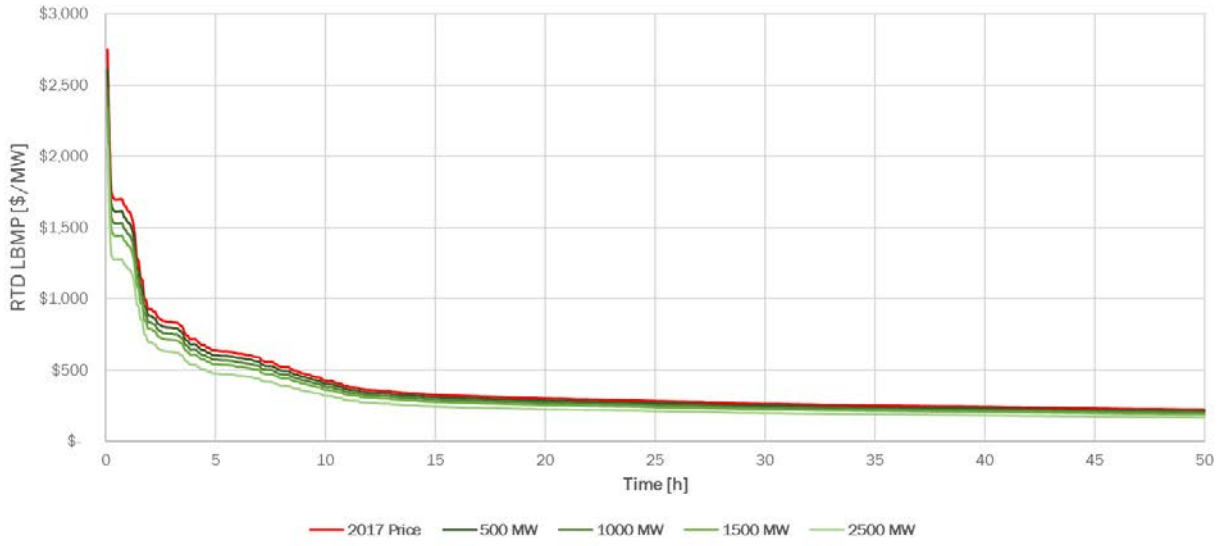
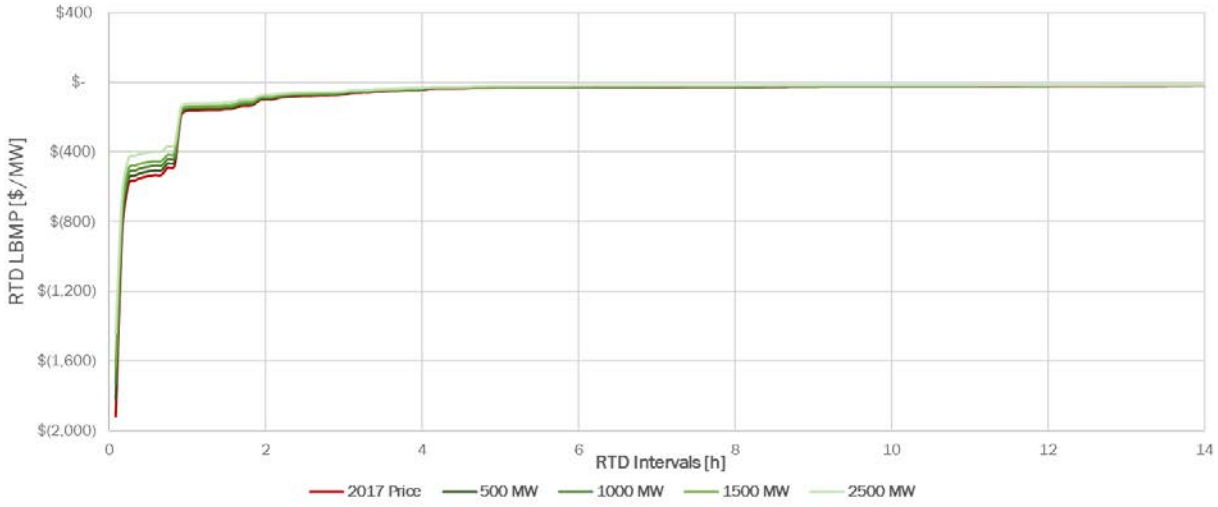



**Figure 10: Example of Energy Withdrawals for Downstate with Efficiency: 70%, Availability: 30% - Lowest prices were Increased for the Amount of Time Needed for Energy Withdrawals**

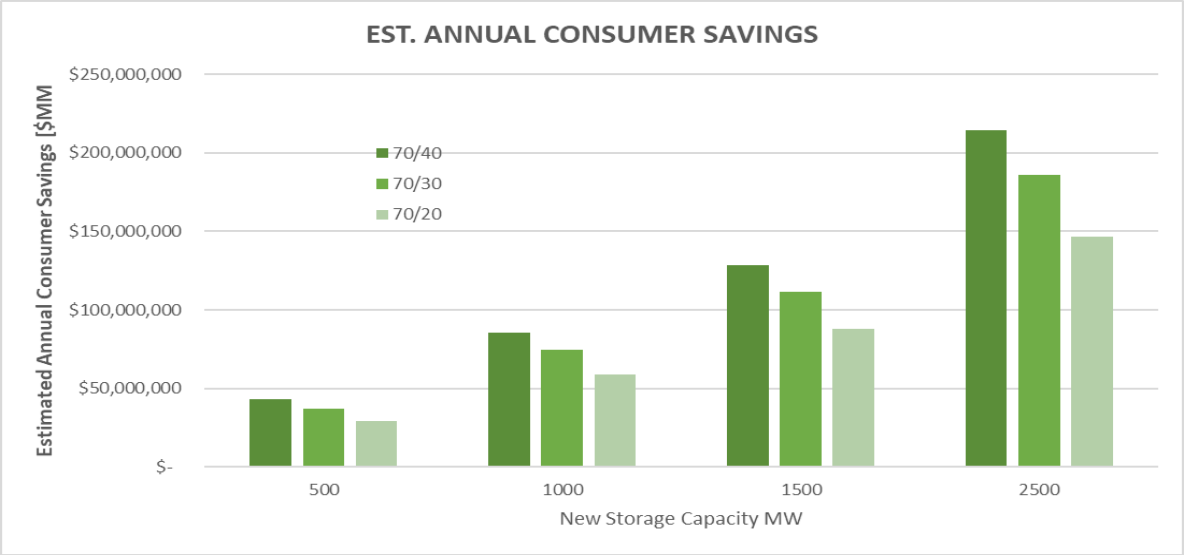



## Energy Market Impacts

The following tables and graphs show the energy market impact for various levels of storage MW additions (500MW, 1000MW, 1500MW & 2500MW). The impact for upstate and downstate are shown separately for different levels of assumed efficiency (60%, 70% & 80%). We also provide a sensitivity analysis for different levels of availability (40%, 30%, & 20%).

## Energy Market Results Statewide

**Figure 11: Statewide Results for Cases with Efficiency: 70% and Availability: 40%, 30%, or 20%**




## Energy Market Results Statewide

**Figure 12: Statewide Results for Cases with Efficiency: 70% and Availability: 40%, 30%, or 20%**

| ESTIMATED STATEWIDE CONSUMER IMPACT | | | | | |
|---|---|---|---|---|---|
| Peak Price Shaving Assumptions | | | | Est. Annual Savings | |
| Efficiency | Availability | % Shaved | Capacity [MW] | | |
| 70% | 40% | 5% | 500 | $ 42,881,591 | 0.9% |
| | | 10% | 1000 | $ 85,763,399 | 1.9% |
| | | 15% | 1500 | $ 128,645,208 | 2.8% |
| | | 25% | 2500 | $ 214,408,825 | 4.7% |
| | 30% | 5% | 500 | $ 37,207,612 | 0.8% |
| | | 10% | 1000 | $ 74,415,443 | 1.6% |
| | | 15% | 1500 | $ 111,623,273 | 2.4% |
| | | 25% | 2500 | $ 186,038,933 | 4.1% |
| | 20% | 5% | 500 | $ 29,321,249 | 0.6% |
| | | 10% | 1000 | $ 58,642,717 | 1.3% |
| | | 15% | 1500 | $ 87,964,184 | 1.9% |
| | | 25% | 2500 | $ 146,607,119 | 3.2% |

## Energy Market Results Downstate

**Figure 13: Zones G-K Results for Cases with Efficiency: 70% and Availability: 40%, 30%, or 20%**

| ESTIMATED DOWNSTATE CONSUMER IMPACT | | | | | |
|---|---|---|---|---|---|
| Peak Price Shaving Assumptions | | | | Est. Annual Savings | |
| Efficiency | Availability | % Shaved | Capacity [MW] | | |
| 70% | 40% | 5% | 500 | $ 27,744,143 | 0.9% |
| | | 10% | 1000 | $ 55,488,468 | 1.8% |
| | | 15% | 1500 | $ 83,232,792 | 2.7% |
| | | 25% | 2500 | $ 138,721,441 | 4.5% |
| | 30% | 5% | 500 | $ 24,182,096 | 0.8% |
| | | 10% | 1000 | $ 48,364,374 | 1.6% |
| | | 15% | 1500 | $ 72,546,651 | 2.4% |
| | | 25% | 2500 | $ 120,911,206 | 3.9% |
| | 20% | 5% | 500 | $ 18,766,246 | 0.6% |
| | | 10% | 1000 | $ 37,532,672 | 1.2% |
| | | 15% | 1500 | $ 56,299,099 | 1.8% |
| | | 25% | 2500 | $ 93,831,953 | 3.0% |

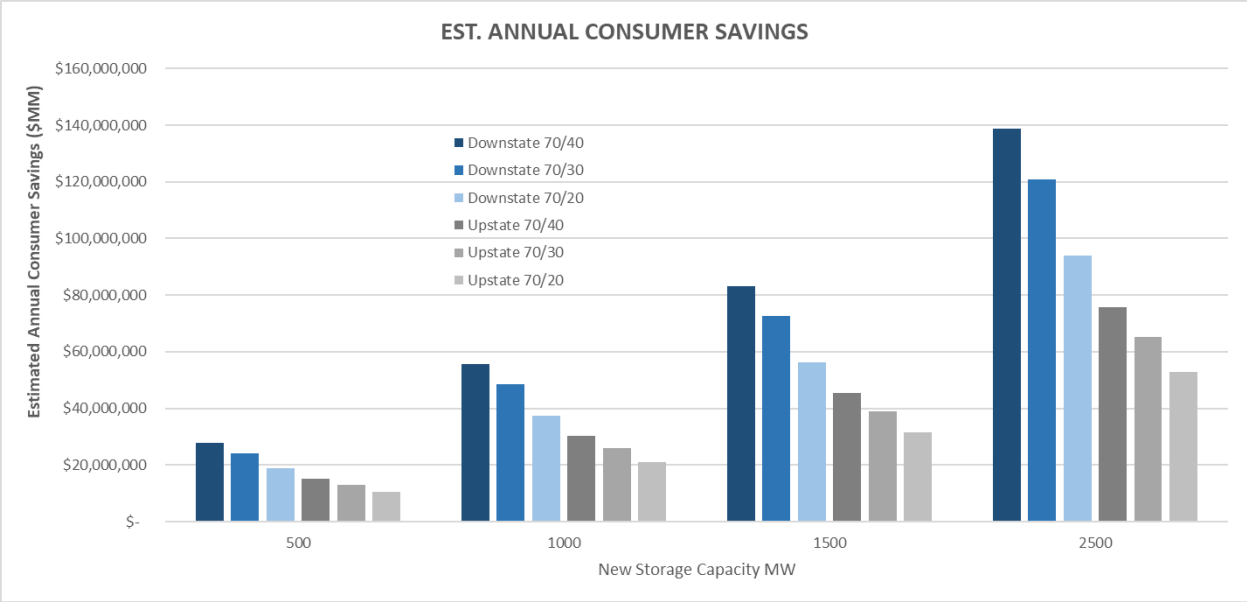
## Energy Market Results Upstate

**Figure 14: Zones A-F Results for Cases with Efficiency: 70% and Availability: 40%, 30%, or 20%**

| ESTIMATED UPSTATE CONSUMER IMPACT | | | | | |
|---|---|---|---|---|---|
| Peak Price Shaving Assumptions | | | | Est. Annual Savings | |
| Efficiency | Availability | % Shaved | Capacity [MW] | | |
| 70% | 40% | 5% | 500 | $ 15,137,447 | 1.0% |
| | | 10% | 1000 | $ 30,274,931 | 2.0% |
| | | 15% | 1500 | $ 45,412,416 | 3.1% |
| | | 25% | 2500 | $ 75,687,384 | 5.1% |
| | 30% | 5% | 500 | $ 13,025,516 | 0.9% |
| | | 10% | 1000 | $ 26,051,069 | 1.8% |
| | | 15% | 1500 | $ 39,076,622 | 2.6% |
| | | 25% | 2500 | $ 65,127,728 | 4.4% |
| | 20% | 5% | 500 | $ 10,555,004 | 0.7% |
| | | 10% | 1000 | $ 21,110,044 | 1.4% |
| | | 15% | 1500 | $ 31,665,085 | 2.1% |
| | | 25% | 2500 | $ 52,775,166 | 3.6% |

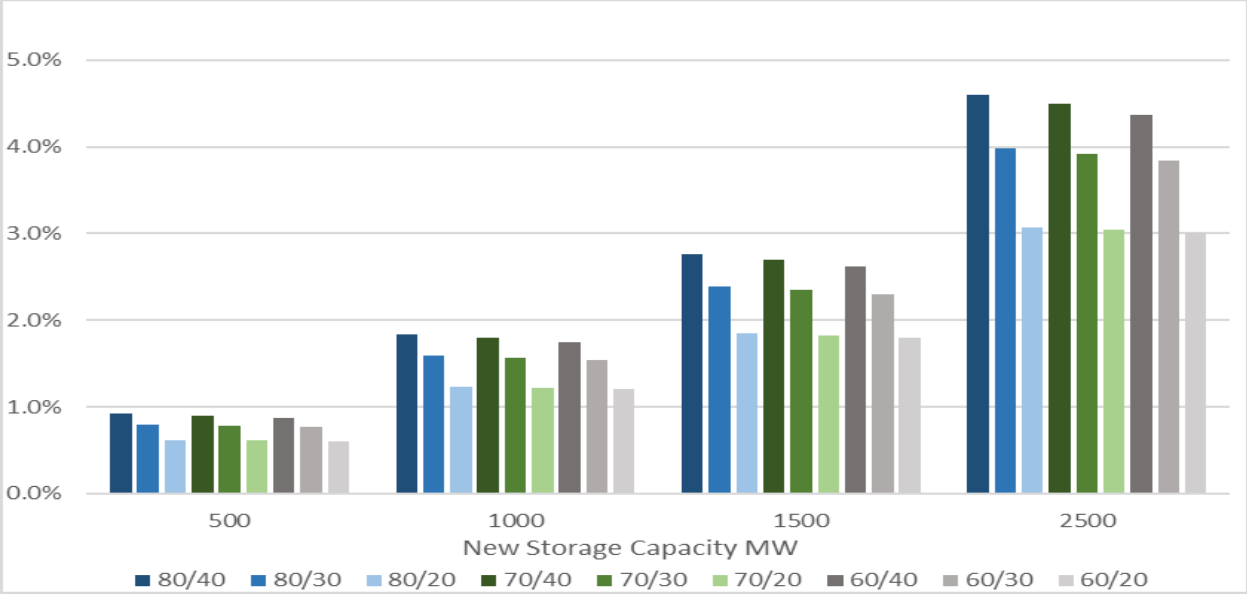
## Energy Market Results Upstate vs Downstate

**Figure 15: Comparison of Results for Cases with Efficiency: 70% and Availability: 40%, 30%, or 20%**



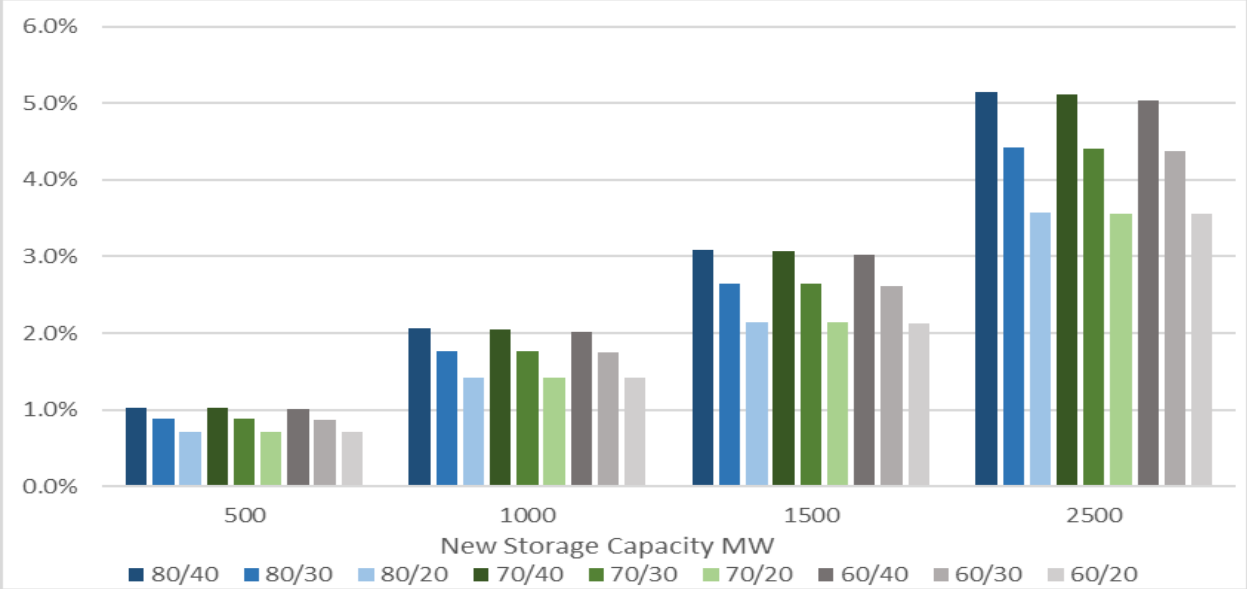

## Energy Market Results Downstate

**Figure 16: Comparison of Results for Cases with Efficiency: 80%, 70%, or 60% and Availability: 40%, 30%, or 20%**



## Energy Market Results Upstate

**Figure 17: Comparison of Results for Cases with Efficiency: 80%, 70%, or 60% and Availability: 40%, 30%, or 20%**




### Energy Market Results Conclusion

Roundtrip efficiency is less impactful than availability. Higher availability will lead to higher consumer impact for ESRs. Changes in roundtrip efficiency will have little impact on consumer costs. ESRs are not expected to influence prices significantly when withdrawing energy.

Although net injections from ESRs are negative, their consumer impact is expected to be positive. Uncertainty remains with respect to where ESRs will locate, how they will bid, their capacity and availability. These factors and others will ultimately shape the impact that ESRs have on consumer costs.

### Spreadsheet

An updated spreadsheet used for calculating the energy market results was provided to stakeholders with the meeting materials. Results from 18 cases were available on the "Results" tab. Stakeholders could change variables to explore the consumer impact on "Downstate Calculator" and "Upstate Calculator" tabs. Cells in green were unlocked and could be changed to update results. The workbook provided was not password protected, and could be unlocked for additional flexibility if desired.

| USER INPUT | |
|---|---|
| Injection Duration (h) | 4 |
| Roundtrip Efficiency: | 80% |
| Availability: | 20% |

| RTD End Time Stamp | Interval ID | RTD Gen Bus LBMP | 5-min Adjusted LBMP | | | |
|---|---|---|---|---|---|---|
| | | | 5% | 10% | 15% | 25% |
| 1/1/2017 0:05 | 77312 | $ 32.66 | $ - | $ - | $ - | $ - |
| 1/1/2017 0:10 | 70859 | $ 30.54 | $ - | $ - | $ - | $ - |
| 1/1/2017 0:15 | 81637 | $ 34.28 | $ - | $ - | $ - | $ - |

## Capacity Market Analysis

Since it is not known how much storage will be available, the NYISO provided estimates over a range of expected values. The cost impact of storage on capacity prices depends on the amount of MW available to the wholesale market. The NYISO assumed that all of the storage resources will participate in the wholesale market as capacity providers.

### Capacity Market Analysis Assumptions

- **To illustrate the capacity cost impact, the NYISO assumed a range of storage resources; 500MW, 1,000MW, 1,500MW and 2,500MW entering the wholesale market.**
    - Resources were added at the five-year average NERC EFORd for pump storage which was 6.02%.
- **Since the impact of storage MW on the Installed Reserve Margin (IRM) and Locational Capacity Requirements (LCRs) had not been determined, the NYISO assumed a range of impacts on LCRs for the different levels of storage resources evaluated in the analysis.**
    - In establishing capacity requirements, it was assumed that a storage resource has either a 0%, 25%, or 50% of the nameplate MW increase on the capacity requirements
- **The NYISO assumed that two-thirds of storage was located in Zone J and one-third in Zone K.**
    - For example, in the 1,500 MW case at 25%, 1,000 MW of storage resources were added to the supply stack in NYC, increasing capacity requirements for NYC by 250 MW (25% * 1,000 MW), similarly, 500 MW of storage resources were added to the supply stack in LI increasing the capacity requirements for LI by 125 MW (25% * 500 MW)

### Short-Term Capacity Cost Impact

For the short-term, the NYISO modeled the 2018/19 Capability Year. For the summer supply stack, actual summer 2018 data was used. Since the winter 2018/19 supply stack data was not available, the winter 2017/18 actual data was used. The short-term impact analysis assumed no additional changes to generation.

The tables and graphs that follow show the short-term capacity cost impact for various levels of storage MW additions (500MW, 1000MW, 1500MW & 2500MW). The impacts shown in the short-term may not be sustainable, as retirements and other changes will result from the influx of large amounts of capacity additions. This is addressed in the long-term analysis that assumes a supply level based on the historic level of excess.

Both the state-wide impact and the impact on individual Localities, LI, NYC, GHI and ROS are shown separately. A sensitivity analysis is also provided for the assumed comparability of storage resources with traditional resources to account for the impact of storage on IRM and LCRs for all the different levels of storage discussed above (50%, 25% & 0% impact on capacity requirements).

**Figure 18: Short-Term Consumer Impact (Million) – 50% Impact on Capacity Requirements**

| Short-Term Consumer Impact (Million) | Base Case | 500 MW, 50% | 1000 MW, 50% | 1500 MW, 50% | 2500 MW, 50% |
|---|---|---|---|---|---|
| LI | $334 | $265 | $219 | $185 | $115 |
| NYC | $587 | $456 | $347 | $286 | $156 |
| GHI | $328 | $254 | $190 | $152 | $78 |
| ROS | $323 | $266 | $209 | $155 | $46 |
| Total | $1,572 | $1,240 | $965 | $779 | $396 |
| | | | | | |
| Short-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 50% | 1000 MW, 50% | 1500 MW, 50% | 2500 MW, 50% |
| Δ | $1,572 | -$332 | -$607 | -$794 | -$1,177 |

**Figure 19: 2018 System Cost – 50% Impact on Capacity Requirements**

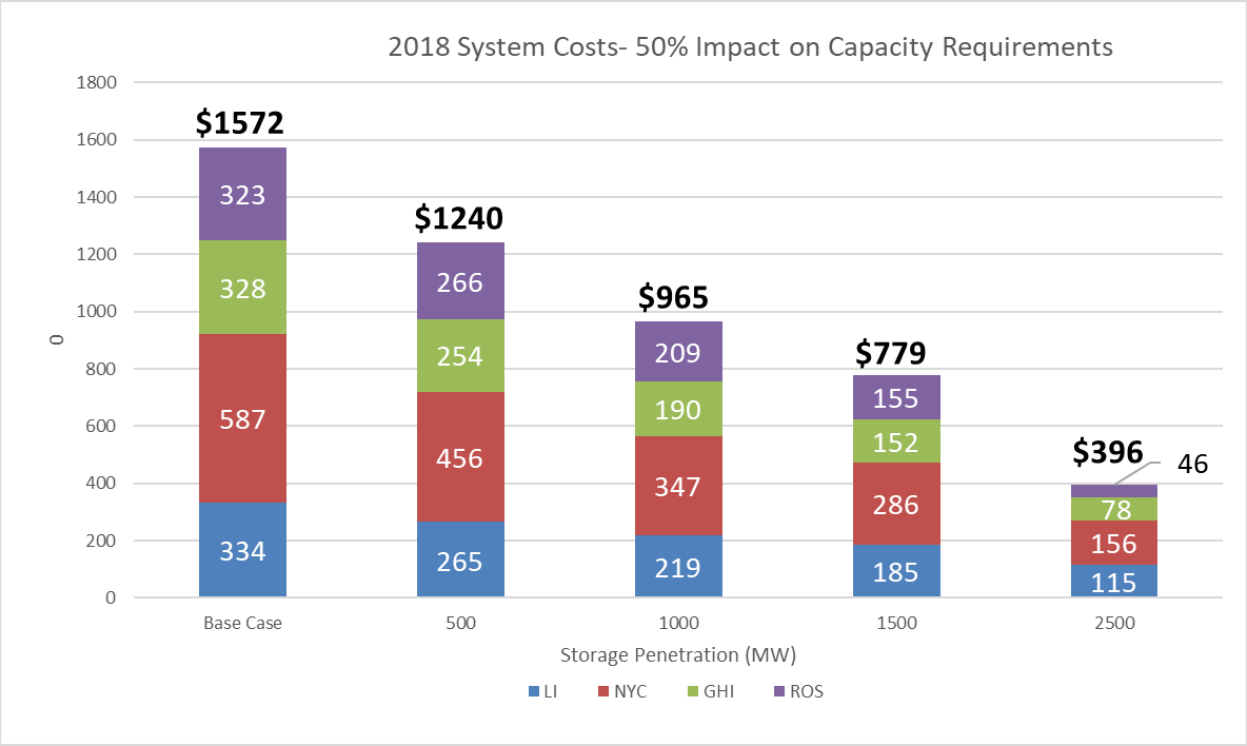



**Figure 20: Short-Term Consumer Impact (Million) -- 25% Impact on Capacity Requirements**

| Short-Term Consumer Impact (Million) | Base Case | 500 MW, 25% | 1000 MW, 25% | 1500 MW, 25% | 2500 MW, 25% |
|---|---|---|---|---|---|
| LI | $334 | $228 | $170 | $109 | $1 |
| NYC | $587 | $365 | $260 | $151 | $1 |
| GHI | $328 | $206 | $142 | $80 | $1 |
| ROS | $323 | $232 | $141 | $51 | $2 |
| Total | $1,572 | $1,031 | $713 | $392 | $5 |
| | | | | | |
| Short-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 25% | 1000 MW, 25% | 1500 MW, 25% | 2500 MW, 25% |
| Δ | $1,572 | -$541 | -$859 | -$1,180 | -$1,567 |

**Figure 21: 2018 System Costs – 25% Impact on Capacity Requirements**

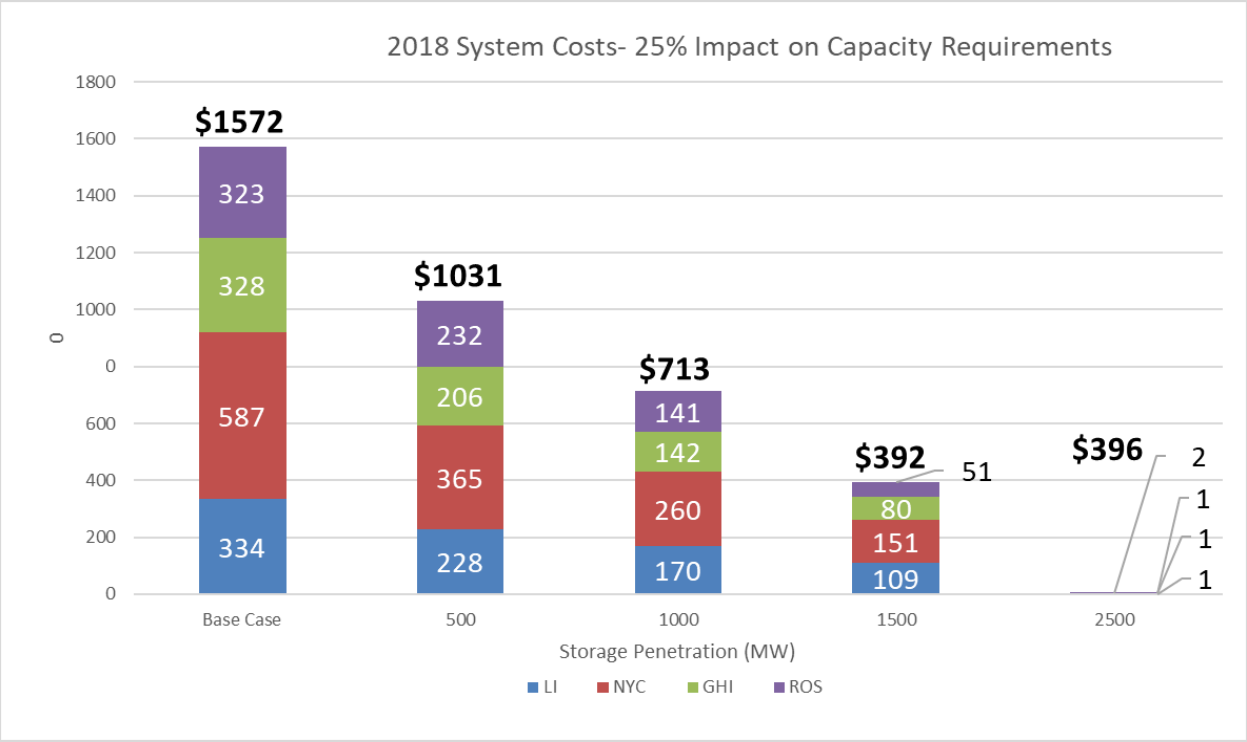
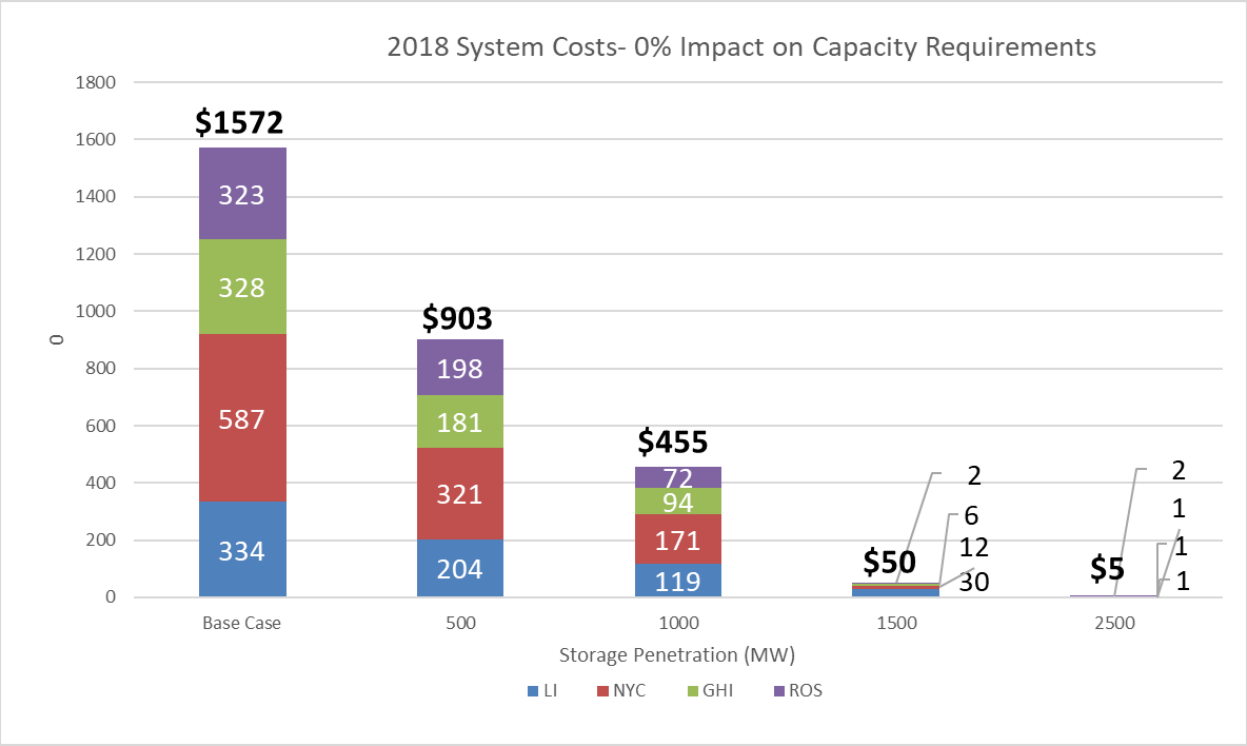



**Figure 22: Short-Term Consumer Impact (Million) -- 0% Impact on Capacity Requirements**

| Short-Term Consumer Impact (Million) | Base Case | 500 MW, 0% | 1000 MW, 0% | 1500 MW, 0% | 2500 MW, 0% |
|---|---|---|---|---|---|
| LI | $334 | $204 | $119 | $30 | $1 |
| NYC | $587 | $321 | $171 | $12 | $1 |
| GHI | $328 | $181 | $94 | $6 | $1 |
| ROS | $323 | $198 | $72 | $2 | $2 |
| Total | $1,572 | $903 | $455 | $50 | $5 |
| | | | | | |
| Short-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 0% | 1000 MW, 0% | 1500 MW, 0% | 2500 MW, 0% |
| Δ | $1,572 | -$669 | -$1,117 | -$1,522 | -$1,567 |

**Figure 23: 2018 System Costs – 0% Impact on Capacity Requirements**




### Long-Term Capacity Cost Impacts

For the long-term, the 2022/23 Capability Year base case was used, assuming:

- The capacity requirement percentages developed in the short-term impact analysis.
- The 2018 Demand Curve values.

For the supply level, we used the historic excess defined as a percentage of excess above the requirement observed within the last three capability years in each of the different Localities. The tables and graphs for the long-term analysis followed the same format as the short-term analysis. We provided the cost impact for different levels of storage MW and showed the impacts both on a state-wide and individual Locality basis. We also provided a sensitivity analysis based on different levels of assumed impact of storage on capacity requirements.

**Figure 24: Long-Term Consumer Impact (Million) -- 50% Impact on Capacity Requirements**

| Long-Term Consumer Impact (Million) | Base Case | 500 MW, 50% | 1000 MW, 50% | 1500 MW, 50% | 2500 MW, 50% |
|---|---|---|---|---|---|
| LI | $494 | $501 | $509 | $516 | $532 |
| NYC | $1,101 | $1,121 | $1,141 | $1,161 | $1,202 |
| GHI | $322 | $322 | $322 | $321 | $322 |
| ROS | $722 | $721 | $721 | $719 | $719 |
| Total | $2,638 | $2,665 | $2,693 | $2,718 | $2,774 |
| | | | | | |
| Long-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 50% | 1000 MW, 50% | 1500 MW, 50% | 2500 MW, 50% |
| Δ | N/A | $28 | $56 | $80 | $137 |

**Figure 25: 2022 System Cost – 50% Impact on Capacity Requirements**

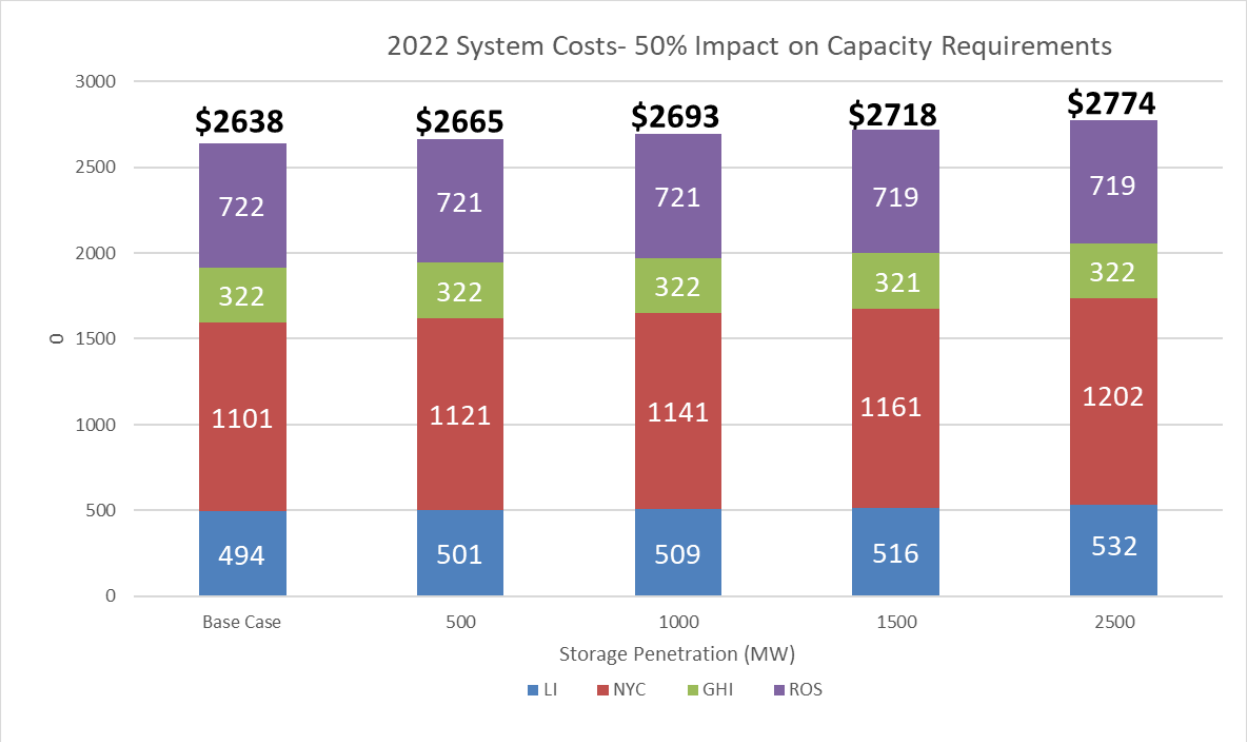


**Figure 26: Long-Term Consumer Impact (Million) – 25% Impact on Capacity Requirements**

| Long-Term Consumer Impact (Million) | Base Case | 500 MW, 25% | 1000 MW, 25% | 1500 MW, 25% | 2500 MW, 25% |
|---|---|---|---|---|---|
| LI | $494 | $497 | $501 | $505 | $513 |
| NYC | $1,101 | $1,111 | $1,121 | $1,131 | $1,151 |
| GHI | $322 | $322 | $322 | $321 | $321 |
| ROS | $722 | $722 | $721 | $720 | $720 |
| Total | $2,638 | $2,652 | $2,664 | $2,677 | $2,706 |
| | | | | | |
| Long-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 25% | 1000 MW, 25% | 1500 MW, 25% | 2500 MW, 25% |
| Δ | N/A | $14 | $27 | $39 | $68 |

**Figure 27: 2022 System Cost – 25% Impact on Capacity Requirements**

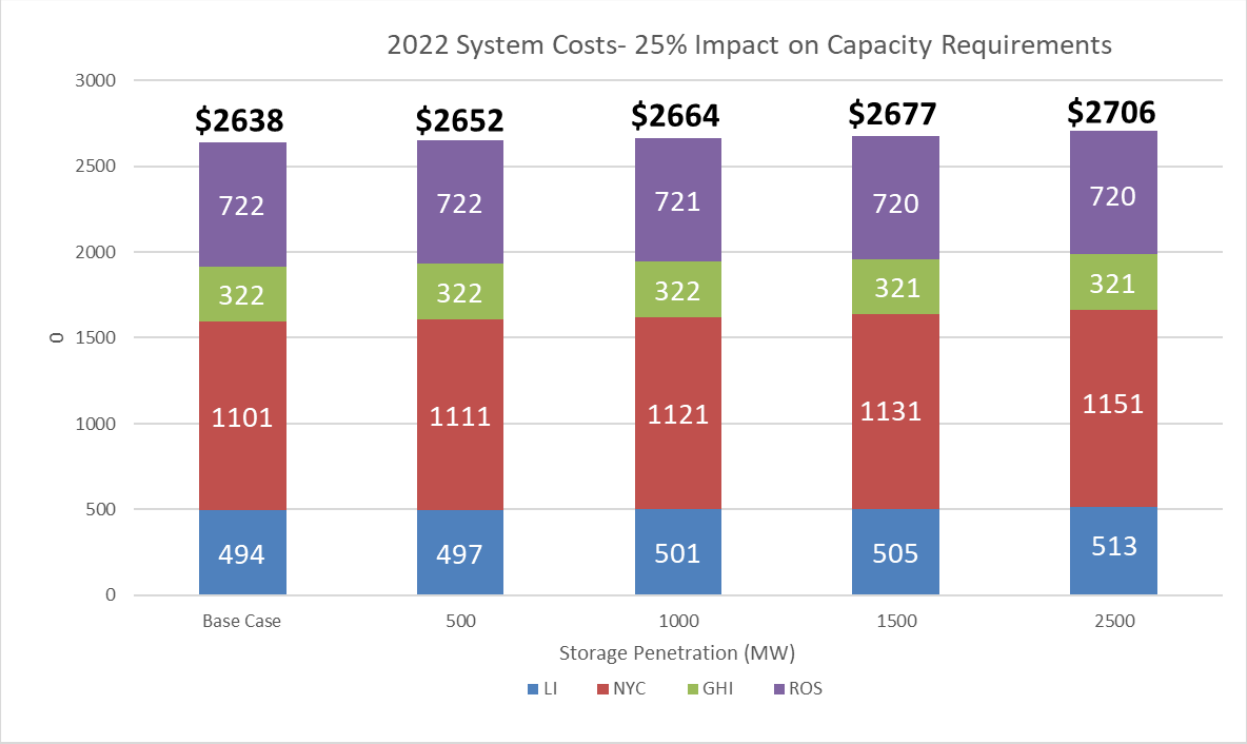
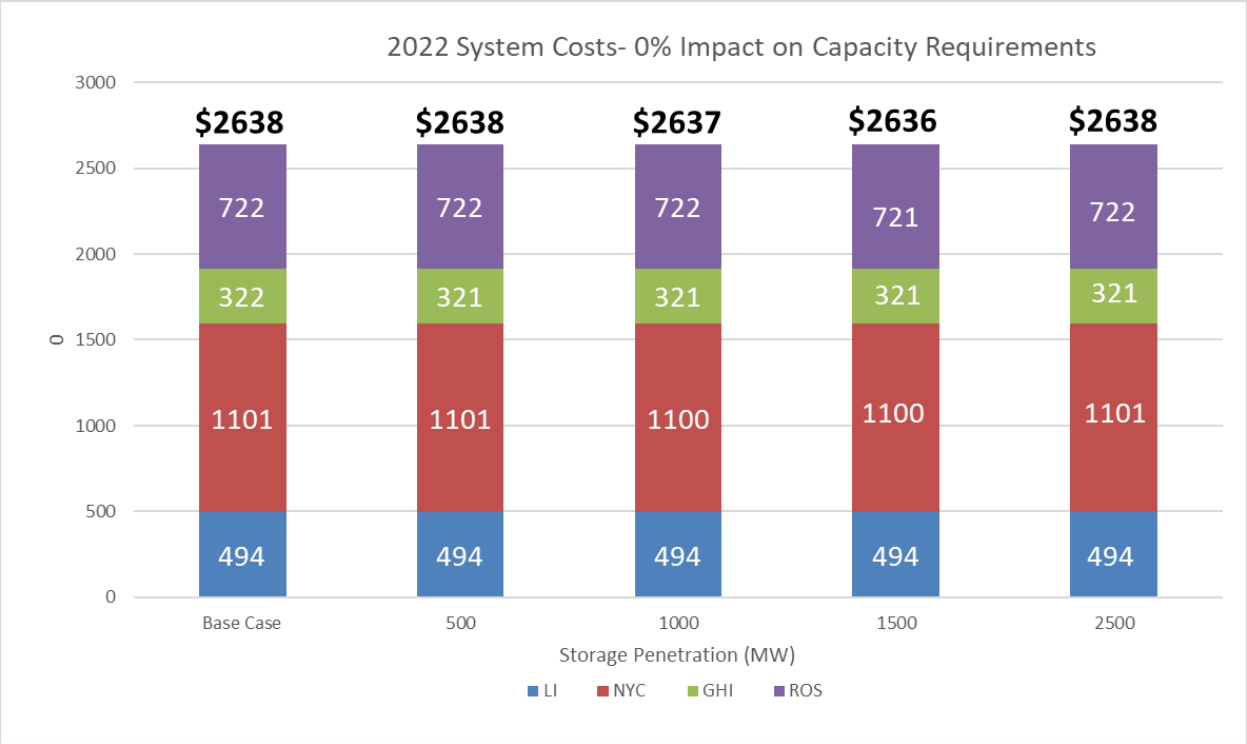


**Figure 28: Long-Term Consumer Impact (Million) – 0% Impact on Capacity Requirements**

| Long-Term Consumer Impact (Million) | Base Case | 500 MW, 0% | 1000 MW, 0% | 1500 MW, 0% | 2500 MW, 0% |
|---|---|---|---|---|---|
| LI | $494 | $494 | $494 | $494 | $494 |
| NYC | $1,101 | $1,101 | $1,100 | $1,100 | $1,101 |
| GHI | $322 | $321 | $321 | $321 | $321 |
| ROS | $722 | $722 | $722 | $721 | $722 |
| Total | $2,638 | $2,638 | $2,637 | $2,636 | $2,638 |
| | | | | | |
| Long-Term Consumer Impact NYCA Δ (Million) | Base Case | 500 MW, 0% | 1000 MW, 0% | 1500 MW, 0% | 2500 MW, 0% |
| Δ | N/A | $0 | -$1 | -$2 | $0 |

**Figure 29: 2022 System Cost – 0% Impact on Capacity Requirements**



### Environmental Impacts

The increase in use of storage, especially during system peak times should reduce emissions.

It is anticipated that ESRs will withdraw energy from the grid at times of low LBMPs, which generally corresponds with low emission periods and discharge at times of high load volumes, which would displace higher cost and likely higher emitting units.

Storage enables development of renewable resources, which should further increase de-carbonization. Pairing storage with renewables should also reduce renewable curtailment and have a positive environmental impact. Increased use of storage to provide ancillary services will add to carbon reduction.

### Reliability Impacts

From an operational perspective, additional supply is a reliability benefit. Moreover, depending on the location within the system, ESRs may be in a position to provide local reliability services. Additionally, the flexibility of ESRs (withdrawing and charging) could be a reliability benefit. However, the timing of withdrawal could add complexity in certain locations on the grid.

### Impacts on Transparency

We expect no impact on transparency.

# Carbon Pricing

### Dynamic Change Case and Post-MAPS Analysis: Introduction to "Dynamic Analysis"

The initiative to explore incorporating carbon costs in the NYISO energy markets began in the fall of 2016, when the NYISO introduced this concept in its stakeholder process. In August 2017, the Brattle Group, retained by the NYISO, presented a high-level analysis of the impacts of a carbon charge on the wholesale electrical markets. The analysis provided a snapshot of the NYISO market in 2025 using a spreadsheet model. The analysis compared customer costs and emissions in New York with the introduction of a carbon charge to a base case without a carbon charge. The impact on customers was based on both a static and a dynamic analysis. The static analysis looked at the impact on customer costs assuming no changes to generation investment and system dispatch. The increased energy market clearing prices were based on the emissions rate of the marginal, price-setting unit that was estimated using 2015 data. The dynamic analysis looked at additional adjustments beyond the static analysis by assuming changes in operations and investments. The dynamic analysis accounted for how a carbon charge in the wholesale markets may provide incentives for investments in generation and consumption patterns that would reduce customer costs and carbon emissions.

The Integrating Public Policy Task Force (IPPTF), which commenced in October of 2017, served as a forum for the joint NYISO and New York State teams to develop a plan to harmonize New York State policy and the New York wholesale electricity markets. The initial focus of the IPPTF was to develop a work plan. The work plan identified five Issue Tracks to incorporate the cost of carbon into the NYISO's wholesale markets.

Issue Track 1 was tasked to develop a straw proposal, while Issue Track 5 was responsible for developing customer cost impact estimates. The straw proposal was developed with input from all interested parties. In April 2018, the IPPTF issued a Carbon Pricing Straw Proposal that outlined a potential design for incorporating the cost of carbon emissions in the NYISO's wholesale markets.

Issue Track 5 consisted of modeling and analysis to refine the customer cost impact estimates of incorporating the price of carbon in the NYISO's wholesale markets as outlined in the straw proposal. The NYISO once again retained the Brattle Group to assist with the Issue Track 5 analysis. GE Multi-Area Production Simulation (MAPS) production cost modeling served as the basis for computing wholesale energy prices and carbon residuals for a "most likely" scenario and some additional scenarios. However, supplemental analyses would be needed to estimate "dynamic" effects that change customer costs beyond direct effects on LBMP and refunded carbon charge residuals.

## Overview

This presentation reviews each component of both the August 2017 Brattle Report and the proposed analysis, starting with the computation of wholesale energy prices and residuals as a result of incorporating carbon into our energy markets. The presentation introduces each component of the static and dynamic analysis and reviews how each component was estimated in the August 2017 Brattle Report that used a spreadsheet model. Next it summarizes all the refinements in the proposed approach for each of the static and dynamic components as outlined in Issue Track 5, comparing the proposed study approach with the previous analysis presented in 2017. The proposed approach will primarily rely on MAPS production cost modeling. The presentation reviews each of the following components:

- Impact on wholesale energy prices.
- Carbon residuals.
- Lower Zero Emission Credit (ZEC) prices.
- Lower Renewable Energy Credit (REC) prices.
- Increased Transmission Congestion Credit (TCC) value.
- Adjustments to static analysis due to new entry of resources.
- Carbon price-induced carbon abatement (avoids RECs).

## Impact on Wholesale Energy Prices

**Assumption:** A carbon charge would generally increase wholesale energy prices when carbon-emitting resources are on the margin.

### Previous Analysis Approach

- Analyzed a snapshot of the NYISO market in 2025 using a spreadsheet model.
- Wholesale energy price increases based on the emissions rate of the marginal, price-setting resources in the market based on 2015 data.
- Used historical data on marginal units to inform 2015 Marginal Emission Rates (MER) estimates.
- Assumed historical 2015 MERs are indicative of 2025 MERs, given that reduction in generation from Indian Point will be offset by increased renewable generation from the Clean Energy Standard (CES).
- Assumed $40/ton carbon charge in 2025, approximately consistent with the $58/ton Social Cost of Carbon from the NY PSC's Clean Energy Standard Order, minus an assumed $17/to RGGI price.

### Proposed Updates

- Evaluate 2022, 2025, and 2030 and some additional alternative scenarios with high and low load assumptions.
- Estimate effects on customer costs and emissions using MAPS to simulate LBMPs given assumed carbon charges and emissions rates.

- LBMPs increase based on carbon charges and MERs.
- Assume carbon charges are the gross and net carbon charges as presented by DPS staff during the April 23, 2018 IPPTF presentation.[7]
    - $41/ton in 2020, $48/ton in 2025, $57/ton in 2030.
- Emission rates are part of the MAPS analysis.
- For external resources, model "Option 1" by freezing imports/exports, hence making the economics of external transactions unaffected by the incorporation of carbon in the wholesale market.

## Carbon Residuals

**Assumption:** NYISO would return to Load Serving Entities (LSEs) all carbon charge residuals collected from Carbon Emitting Resources and imports.

### Previous Analysis Approach

- Assume historical 2015 New York Control Area (NYCA) carbon emissions are indicative of 2025 emissions, given that reduction in generation from Indian Point will be offset by increased renewable generation from CES.
- Assume $40/ton carbon charge in 2025, approximately consistent with the $58/ton Social Cost of carbon from the CES Order, minus an assumed $17/ton RGGI price.

### Proposed Updates

- Directly use emissions results from GE MAPS analysis.
- Use the gross and net carbon charges as presented by DPS staff during the April 23, 2018 IPPTF presentation.
    - Calculate carbon charges on a unit-specific basis (generators <25MW charged at Gross Social Cost of Carbon (Gross SCC), other generators charged at SCC net of Regional Greenhouse Gas Initiative (RGGI)).

## Lower Zero Emission Credit (ZEC) Prices

**Assumption:** A carbon charge would increase wholesale energy prices, decreasing ZEC prices.

### Previous Analysis Approach

- The CES Order established ZEC payments for at-risk upstate nuclear units based on a formula that would automatically adjust the price of ZECs based on changes in wholesale energy and capacity prices.
- Use the ZEC price equation from CES and a forecast of upstate energy and capacity prices to estimate 2025 ZEC prices with and without a carbon price.

[7] https://www.nyiso.com/documents/20142/1393516/IPPTF%20CO2%20Value%204%2023%202018%20final%20%20pd.pdf/9b8ad8e6-8766-368e-43cd-171b55391a1d

- Estimate 2025 upstate energy prices by adjusting 2015 prices for anticipated changes in gas prices and RGGI prices.
- Estimate 2025 upstate capacity prices based on the DPS forecast.

**Proposed Updates:**

- Continue to use ZEC price equation with updated LBMPs informed by GE MAPS analysis.
- Estimate upstate capacity prices based on the predicted capacity supply and expected demand.

### Lower Renewable Energy Credits (REC) Prices

**Assumption:** A carbon charge would increase energy market revenues for new Tier 1 renewable resources supported by RECs, reducing the REC prices needed for renewables to enter and reducing REC payments by customers.

**Previous Analysis Approach**

- Estimate change in energy revenues based on assumed MERs when renewables are generating and assumed generation shape.
- Assume increased energy revenues reduce REC prices.

**Proposed Updates**

- Estimate increased energy revenues using updated LBMPs informed by GE MAPS analysis and renewable generation shapes, or direct renewable energy revenue outputs.
- Review assumptions on locations of renewable additions.
- Assume carbon price only reduces customer costs for future CES Tier 1 REC procurements (not procurements already conducted).
- Assume future CES procurements reflect the carbon price in the energy market, maintaining price reduction assumption.

### Increased TCC Value

**Assumption:** A carbon charge may increase transmission congestion costs, increasing the Transmission Congestion Contract (TCC) revenues returned to customers.

**Previous Analysis Approach:**

- Estimate increases in congestion across Central-East constraint, based on assumed Upstate/Downstate MERs.

**Proposed Updates**

- Use GE MAPS outputs to inform change in NYCA-wide congestion costs.

### Adjustments to Static Analysis Due to Entry of Combined Cycles

**Assumption:** A carbon charge would reward the relative efficiency of combined cycles (CCs), attracting additional investment and reducing the capacity price at which resources will enter, reducing customer capacity costs.

**Previous Analysis Approach**

- Assume a percentage likelihood of CCs entering the market.
- Assume 67% chance that CCs would enter.
- Assume if CCs enter, their energy revenue increases, thereby reducing their capacity market offer price and the market equilibrium price. Estimate reduction in state-wide capacity prices using historical demand curve shapes.
- Assume if no CCs enter, customers reduce energy demand due to higher energy prices. Estimate based on assumed elasticity of demand.

**Proposed Updates**

- Estimate upstate capacity prices based on the predicted capacity supply and expected demand.
    - Evaluate the likelihood of several different technologies entering (e.g., Combustion Turbines (CTs), renewables, storage), based on each technology's Net CONE and forecasted capacity price.
        - Evaluate how each technology benefits from a carbon charge.
        - Evaluate how energy and capacity prices respond to additional investment.
- Re-evaluate assumptions regarding energy conservation induced by higher energy prices (and therefore the impact on the peak load).

### Carbon Price-Induced Abatement (Avoids RECs)

**Assumption:** A carbon charge would incentivize low-cost carbon abatement opportunities not subsidized by the CES. These reductions could reduce the quantity of RECs needed to meet New York's de-carbonization goal.

**Previous Analysis Approach**

- Evaluate four potential ways in which a carbon charge could spur emission reductions.
    - Tilting renewable investment to locations with greater carbon abatement rates.
    - Supporting investment in CCs

- Incorporating storage and demand response.
- Incentivizing energy efficiency and conservation.

**Proposed Updates**

- Use GE MAPS results to calculate emissions reductions due to shifts in commitment and dispatch.
- Evaluate likelihood of carbon charge spurring investment in technologies other than CCs (e.g. renewables or storage).

# Summarizing the Consumer Impact of Incorporating the Cost of Carbon in the NYISO Wholesale Energy Market

## Project Description

The Brattle Group was retained by the NYISO to perform an assessment of the effects of carbon charges on consumer costs. This presentation summarizes the findings of the Brattle Group. The cost impact analysis presented by the Brattle Group was based on the design outlined in the straw proposal and presented to stakeholders in May of 2018 and other discussions with the IPPTF. The straw proposal outlines a potential design for incorporating the cost of carbon emissions into the wholesale electricity markets.[8] The cost of carbon emissions could be incorporated into the NYISO-administrated wholesale energy markets using a carbon price per ton of $CO_2$ emissions. The NYISO would apply a carbon price by debiting each energy supplier a carbon charge for its carbon emissions at the specified price as part of its settlement. The NYISO would credit the carbon charge residuals, which are the sum of the carbon charges debited from suppliers, to the LSEs. The NYISO would apply carbon charges to external transactions such that they compete with internal resources (and each other) on a status quo basis, as if the NYISO was not applying a carbon charge to internal suppliers. Imports would earn the LBMP without the carbon effect, at the relevant border; similarly, exports would buy energy at the LBMP without the carbon effect[9].

## Background

In September 2017, the Brattle group presented an analysis of "Pricing Carbon into the NYISO's Wholesale Energy Market."

- The analysis used historic data on marginal units to compute the marginal emission rates (MERs) and a $40/ton cost of carbon based on the Social Cost of Carbon net of Regional Greenhouse Gas Initiative (RGGI).
- The increase in wholesale energy prices was based on Marginal Emission Rate (MER) times carbon charge.
- Computed wholesale energy prices and carbon residuals for 2025.

The analysis presented to the September 17, 2018 IPPTF meeting was an update and refinement of the previous analysis.[10]

- GE Multi-Area Production Simulation (MAPS) production cost modelling served as the basis of the current analysis.
- LBMPs and MERs were based on MAPS analysis, while carbon charges were taken from DPS Staff's April 23, 2018 presentation to the IPPTF.
- Computed wholesale energy prices and carbon residuals for a "most likely" scenario for 2020, 2025 and 2030, two additional 2025 scenarios with high and low load assumptions and three alternative scenarios (A, B and C) for 2030.

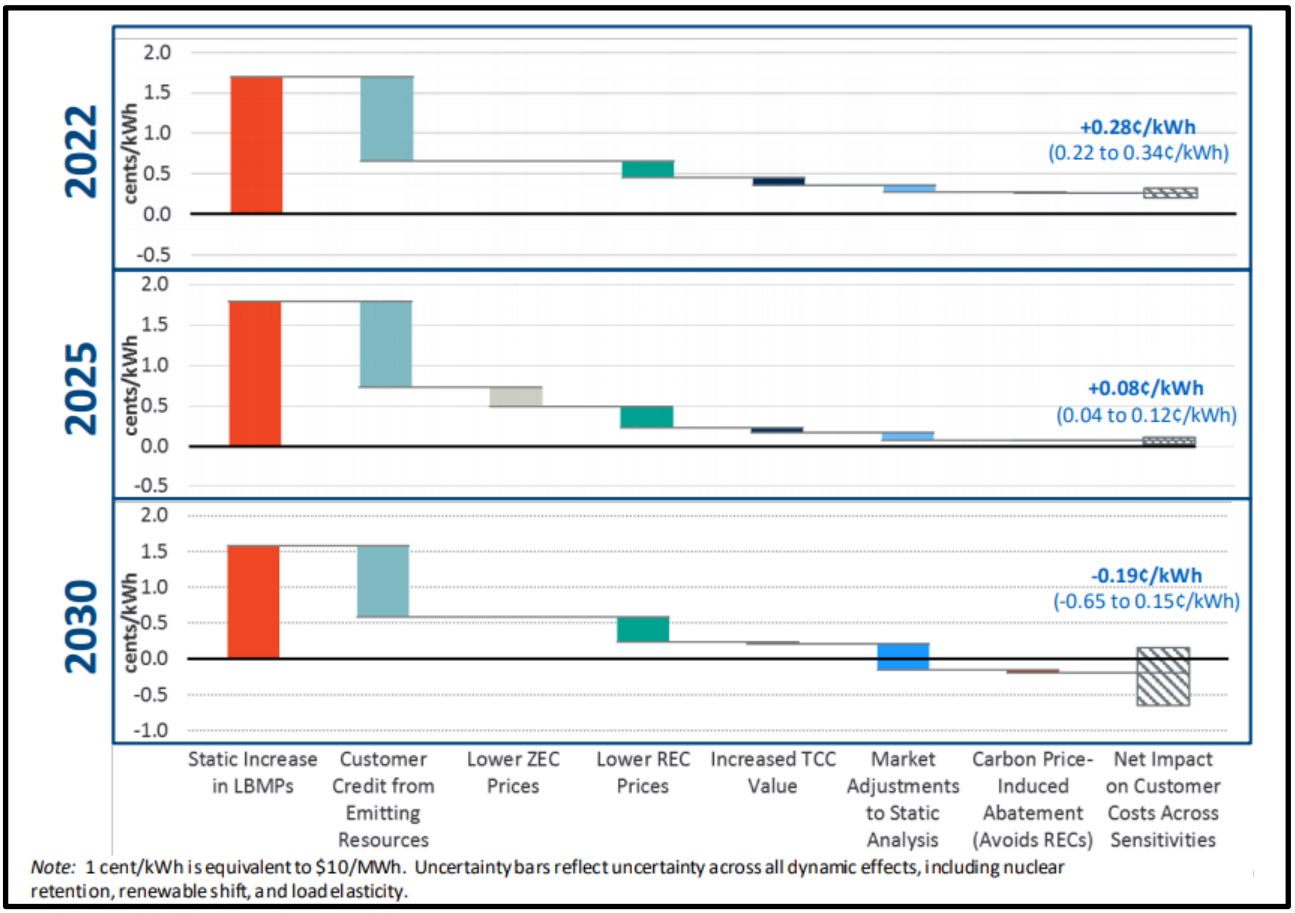
## Summary of Consumer Impacts

| RELIABILITY | COST IMPACT/MARKET EFFICIENCIES |
|---|---|
| Incorporating the cost of carbon into the wholesale energy market will help attract and maintain needed resources in a competitive manner | Small cost increase anticipated in 2020 and 2025, followed by small cost decrease in 2030 |
| **ENVIRONMENT/NEW TECHNOLOGY** | **TRANSPARENCY** |
| Carbon emissions reductions of approximately 3% by 2030 | Incorporating the cost of carbon in the wholesale market will enhance transparency |

### Cost Impact/Market Efficiencies

Wholesale energy prices increase as carbon is incorporated into the market, ranging from approximately 1.70 cents/kWh in 2022, 1.79 cents/kWh in 2025 and 1.58 cents/kWh in 2030 (red bar shown in Figure 30 taken from the Brattle Group analysis). However, based on static and dynamic analyses, other impacts off-set the increase in LBMP as shown in the remaining bars in Figure 29. Customer credit from emitting resources offsets approximately 60% of the increase in LBMPs. The remaining off-sets to LBMP increases come from lower ZEC and REC prices, increased TCC values and dynamic market impacts.

**Figure 30: LBMP Increase and Overall Cost Impacts**

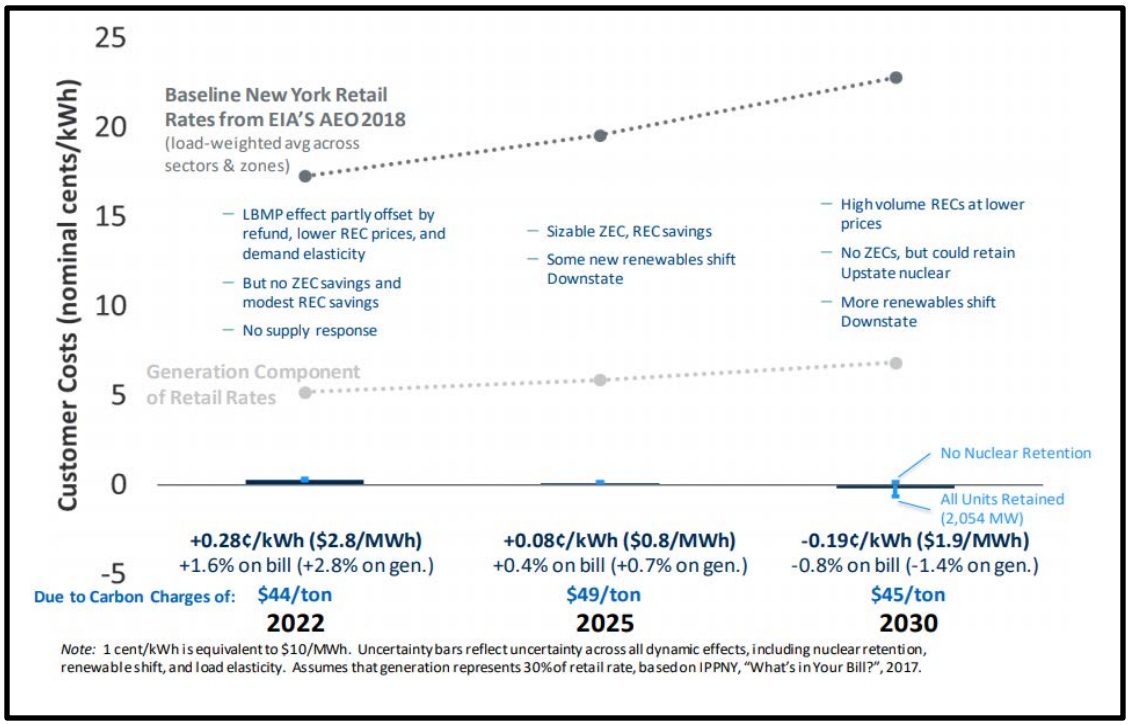



*Note:* 1 cent/kWh is equivalent to $10/MWh. Uncertainty bars reflect uncertainty across all dynamic effects, including nuclear retention, renewable shift, and load elasticity.

## Cost Impact

Figure 31, also taken from the Brattle Group analysis, shows the overall cost impacts after taking into account all the static and dynamic impacts for the "most likely" scenarios in 2022, 2025 and 2030. There is a small increase of approximately 0.28 cents/kWh in 2022, as most of the off-sets are just starting to fall in place. The increase in 2025 is approximately 0.08 cents/kWh as the static and dynamic off-sets start to kick in. By 2030 there is a slight decrease of -0.19 cents/kWh in the overall impact as the static and dynamic impacts are fully in place.

**Figure 31: Cost Impacts After Static and Dynamic Effects**




## Environmental Impacts

The addition of carbon charges results in incremental emissions reductions of approximately 6% by 2030. The MAPS runs indicated limited fuel switching as a result of adding the carbon charge. The majority of the emission reductions result from dynamic effects that include renewable shifts, nuclear retention, and price responsive load. The reductions in emissions could potentially be greater to the extent carbon prices enable the market to find and take advantage of innovative solutions beyond those modelled, e.g., more low-cost renewables, storage, and efficiency gains in the fossil fleet.

## Reliability Impacts

As the state continues to gain more renewable resources in the future, incorporating the cost of carbon into the wholesale energy market will help attract and maintain needed resources in a competitive manner.

## Transparency

Incorporating the cost of carbon in the wholesale market will enhance transparency. The NYISO plans to develop a calculation to estimate the carbon impact on LBMP. Marginal units will be used to calculate the LBMP carbon impact based on their emissions. The availability of this information will provide transparency to the market place. Hopefully, this will lead to more innovative solutions as the market deals with the cost of carbon.

## Consumer Impact Analyses: 2019 Project List

### Analysis Guidelines

In selecting projects for conducting Consumer Impact Analyses, the NYISO uses the following general guidelines:[11]

- Anticipated net production cost impact of $5 million or more per year.
- Expected consumer impact from changes in energy or capacity market prices is greater than $50 million per year.
- Incorporates new technology into NY markets for first time.
- Allows or encourages a new type or category of market product.
- Creates a mechanism for out-of-market payments for reliability.

In addition to using the analysis guidelines listed above, the NYISO also considers the following:

- FERC directives (compliance filings) where the NYISO has implementation flexibility.
- Emerging stakeholder issues.

### 2019 Proposed Projects for Consumer Impact Analysis

- Constraint-Specific Transmission Shortage Pricing.
- Distributed Energy Resource Participation Model.
- Enhanced Fast-Start Pricing.
- More Granular Operating Reserves.
- External Capacity Performance and Obligations.
- Enhancing Fuel and Energy Security.
- Buyer-Side Mitigation Repowering.

### Constraint Specific Transmission Demand Curves

**Description**: Currently the NYISO uses a single, graduated transmission-constraint pricing mechanism to set prices under transmission constraint conditions. However, some transmission constraints are not resolved using this graduated mechanism. This project will continue the 2018 efforts to develop enhancements to the current graduated transmission pricing mechanism. In 2019, the NYISO

[8] Link to the 4/23 DPS IPPTF meeting presentationhttps://www.nyiso.com/documents/20142/1393516/IPPTF%20CO2%20Value%204%2023%202018%20final%20%20pd.pdf/9b8ad8e6-8766-368e-43cd-171b55391a1d

[9] Carbon Pricing Straw Proposal, A Report Prepared for the Integrating Public Policy Task Force, April 30, 2018

[10] Carbon Pricing Straw Proposal Overview, Presented to the May 12, 2018 Integrating Public Policy Task Force

[11] The analysis presented by The Brattle Group on September 17, 2017 was updated and presented at a subsequent IPPTF meeting on November 21, 2018. The discussion in this report is based on the updated analysis.

will seek stakeholder approval of a completed market design for the proposed enhancements, including any required tariff language revisions. This effort was identified as potentially beneficial by the Market Monitoring unit (MMU), the 2017 Securing 100+ kV Facilities whitepaper, and the "2017 Integrating Public Policy Market Assessment Report."

**Benefit**: More efficient pricing of transmission constraints should potentially result in reduced price volatility and more efficient resource scheduling.

**Screen**: Emergent stakeholder issue.

### DER Participation Model

**Description**: The NYISO released its Distributed Energy Resource (DER) Roadmap in February 2017, as a first step to enhancing its market rules for DER participation in the NYISO's energy, ancillary services, and capacity markets. The NYISO is also currently evaluating potential modifications to its existing demand response programs as part of this effort. This project will include the design of DER performance obligations, metering and telemetry requirements, baseline and performance measurement and verification rules, resource modeling, and the development of an understanding of how to balance the simultaneous participation of DER in retail-level programs, as well as the NYISO's wholesale markets.

**Expected Benefit**: Provide opportunities for Distributed Energy Resource Participation in Wholesale Markets. Alignment with NYS PSC's REV initiative.

**Screen**: Allows or encourages a new type or category of market product.

### Enhanced Fast Start Pricing

**Description**: On December 20, 2017, FERC instituted a proceeding in Docket No. EL18-33-000, pursuant to FPA Section 206 concerning fast-start pricing in NYISO markets. Consistent with the commission's instructions, the NYISO filed an initial brief on February 12, 2018 outlining the NYISO's proposed approach to amend its tariffs and revise its market software to:

- Modify pricing logic to allow fast-start resources' commitment costs (i.e., start-up costs and minimum generation (no-load) costs) to be reflected in prices.
- Allow the relaxation of all dispatchable fast-start resources' economic minimum operating limits by up to 100 percent for the purpose of setting prices. This project will begin developing the market design changes discussed in the NYISO's initial brief.

**Expected Benefit**: Improve price formation.

**Screen**: FERC directive where the NYISO has implementation flexibility.

### More Granular Operating Reserves

**Description**: This effort will pursue a study to determine whether the NYISO should establish and secure a distinct 10-minute reserve requirement for New York City. Exploring load pocket reserves, as well as reviewing and evaluating potential enhancements to current scheduling practices to ensure deliverability of reserves from resources located within load pockets, would further enhance the location-specific value of maintaining short notice responsive resources in desirable locations. This effort has been identified as potentially beneficial in both the "2018 Performance Assurance Management Response" and the "2017 Integrating Public Policy Market Assessment Report."

**Expected Benefit**: Incentives for better resource performance should enhance grid resilience and improve price formation.

**Screen**: Allows or encourages a new type or category of market product.

### External Capacity Performance and Obligations

**Description**: This effort will build upon the performance assurance project developed with stakeholders in 2018. In particular, Analysis Group recommended, in its report, that the NYISO review the rules by which external resources participate in the NYISO capacity market, including eligibility requirements and offer obligations and terms. In 2018, the NYISO worked with stakeholders on the "Deliverability Requirements for Capacity Imports" effort. This effort enhanced the notice required for transmission service from external capacity resources in PJM to the NYISO. The 2019 effort would continue to evaluate what, if any, additional performance requirements and obligations are needed, including an evaluation of documentation requirements to demonstrate deliverability to the NYCA border at other interfaces. This project will evaluate the potential enhancement of requirements for external capacity resources to improve their comparability to internal resources.

**Expected Benefit**: Providing resources incentives to be available during critical times should improve performance.

**Screen**: Emergent stakeholder issue.

### Enhancing Fuel and Energy Security

**Description**: This project would examine fuel and energy security for the bulk power system looking over a ten-year horizon in order to assess potential grid resilience concerns. The NYISO is concerned that future changes to New York's fuel supply mix as well as the expected increased demands for natural gas may challenge the ability to meet electric system demands under certain stressed-system conditions, such as a prolonged cold weather event and/or natural gas supply/transportation disruptions. The study would also report on similar fuel and energy security studies and initiatives underway by other

ISOs/RTOs. Depending on the results of the study, the NYISO would separately develop recommendations for potential operational and/or capacity and energy market enhancements to achieve desired improvements in grid resilience as related to fuel and energy security.

**Expected Benefit**: Enhance grid resilience and improve fuel and energy security.

**Screen**: Emergent stakeholder issue.

### Buyer Side Mitigation (BSM) Repowering

**Description**: A focused BSM-repowering exemption may be appropriate in order to revise market rules so that they do not discourage or prevent replacements, while adequately protecting the integrity of the wholesale markets. This project would seek to evaluate and develop a proposal for a buyer-side mitigation exemption that specifically addresses the concerns with replacement (repowered) generation projects and encourages private investment.

**Benefit**: A specially-tailored BSM evaluation process may be able to reduce the potential for over-mitigation of repowering projects.

**Screen**: Emergent stakeholder issue.

## Key 2019 Electrical Industry Initiatives

The markets for electricity, both at the wholesale and retail level are going through a period of tremendous change. During the past year, the NYISO worked with our stakeholders on several significant new initiatives, ranging from incorporating carbon pricing, to storage integration to distributed energy resource participation. The liaison supports the end use sector by, among other things, providing information necessary to keep current with the ever-changing electricity market and facilitating informed decisions on relevant issues. As the NYISO market rules change, new products become available, and new technology affects the markets, the liaison will continue to inform consumers of these changes.

As we enter 2019, there are more changes on the horizon, some continuing from the initiatives that were launched last year and others emanating from the continuing technological change and innovation taking place in the electricity markets. Harmonizing NYS public policy with wholesale energy markets, offshore wind, and AC Transmission are just a few of the areas that will have a large effect on New York's grid. Listed below are some areas of interest that the NYISO is currently addressing. The liaison office is closely monitoring these areas of interest for possible future analysis.

### Distributed Energy Resource Participation

The effort to develop Distributed Energy Resource (DER) participation was launched with the DER Roadmap Kickoff in May of 2016. The purpose of the DER Roadmap was to help guide the integration of DER and evolutionary changes in the demand response programs. The objectives of the DER Roadmap were to:

- Integrate DER into energy, ancillary services, and capacity markets.
- Align with goals of NYS REV.
- Develop appropriate DER measurement and verification methods.
- Align payments with performance.
- Focus on wholesale market while accommodating dual participation.

The NYISO has continued the development of a robust DER program and on December 18, 2018 presented the majority of the rule set to stakeholders for a complete DER participation model. At this time, the NYISO is continuing to develop the final set of rules for DER in order to advance a complete participation model through the governance process in anticipation of a vote for project implementation.

### Energy Storage Resource Participation

Energy storage is defined by FERC as "a resource capable of receiving electric energy from the grid and storing it for later injection of electricity back to the grid regardless of where the resource is located

on the electrical system."[12] Examples include, among others, pumped hydroelectric storage, compressed air energy storage, flywheels, and batteries.

In December, 2017 the NYISO released "The State of Storage"[13] report to continue to look for better ways to integrate Energy Storage Resources (ESRs) into New York's wholesale electricity markets and harness the value that ESRs can bring to the grid. The NYISO intends to create a new participation model for ESRs.

In June 2018, the DPS released the New York State Energy Storage Roadmap to develop an approach and a series of recommended actions that are intended to achieve the Governor's 1,500 MW energy storage target for 2025 and the 3000MW statewide goal by 2030.[14]

The NYISO is currently engaged in developing a new market design concept that reflects ESR technological advancements and policy development to allow wholesale grid operators and ESR managers to take better advantage of ESR capabilities, in compliance with FERC Order No. 841.[15] The "Energy Storage Integration Phase" was developed through 2018 in coordination with stakeholders to create an ESR participation model that captures unique storage characteristics.

### Integration of Renewables

The "2015 State Energy Plan"[16] (SEP) stated that 50% of all electricity used in New York be generated by renewable resources by 2030 (commonly referred to as the "50-by-30" goal). Governor Andrew Cuomo directed DPS to convert the SEP targets to mandated requirements. In the following year, the PSC issued an Order Adopting a Clean Energy Standard (CES).

The NYISO continues to prepare for changes in the electrical grid that will occur as New York State works to bring the CES goals to fruition. Higher renewable resource penetration will affect how the New York power system performs, how market participants behave, and outcomes in the market. In order to continue to meet its responsibilities, the NYISO must prepare for and adapt to the increased level of renewable resources.

In 2008, the NYISO introduced the Day-Ahead Energy Market Wind Forecast, to determine the amount of expected wind contribution in meeting load. The NYISO was the first grid operator to fully integrate wind resources with economic dispatch of electricity suppliers through implementation of its

[12] Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Notice of Proposed Rulemaking, 157 FERC ¶ 61,121, Nov. 17, 2016. https://ferc.gov/whats-new/comm-meet/2016/111716/E-1.pdf

[13] https://www.nyiso.com/documents/20142/2225293/2017-State-Of-Storage-Report.pdf/c80da6ff-b239-3464-3b6d-f191bf62c597

[14] https://www.nyserda.ny.gov/All%20Programs/Programs/Energy%20Storage

[15] Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 841, 162 FERC ¶ 61,127, at P3 (Feb. 15, 2018) ("Order No. 841") as amended by the Feb. 28, 2018 Errata Notice ("Order No. 841 Errata")

[16] New York State Energy Plan, "The Energy to Lead", https://energyplan.ny.gov/

wind energy management initiative. If needed, the NYISO system operators can dispatch wind plants down to a lower output to maintain system security. This approach was accepted by FERC and implemented by the NYISO in 2009.[17] With experience, the NYISO continues to improve on its wind forecast capabilities.

The experience gained through the wind forecasting initiative enabled the NYISO to introduce a solar forecasting tool into system operations. The NYISO monitors inventories of solar PV sites across the state in order to develop the historic time series and short-term forecast of installed solar PV across the state. The NYISO subscribes to a service that monitors, in real-time, solar PV inverter data for about 8,000 sites, aggregates the data into small regions, and makes it available to NYISO's solar forecasting service. The monitored sites are closely representative of the entire population of non-wholesale solar PV sites in New York, numbering around 80,000. NYISO's solar forecasting service develops solar forecasts (irradiance and MW) that feed the NYISO's overall load forecasts, developed at 15-minute intervals and updated hourly, as well as load forecasts that extend over the next seven days. NYISO now has the capability to integrate non-wholesale solar PV forecasts into the 5-minute load forecasts.[18]

The ability to accurately forecast these intermittent resources assists in the integration of higher levels of renewable energy resources, which will assist New York State in meeting the renewable energy requirements of the CES policy.

### Integrating Public Policy – Carbon

The Integrating Public Policy Task Force (IPPTF) was created as a forum for the NYISO, New York State Department of Public Service (DPS), New York State Research and Development Authority (NYSERDA), electricity market participants, members of the public, and interested stakeholders to explore concepts and proposals for incorporating the social cost of carbon emissions in wholesale energy markets. The objective is to better harmonize the state's energy policies and the operation of wholesale markets.[19] The IPPTF delivered the Carbon Pricing Proposal on December 17, 2018.[20]

As proposed in the Carbon Pricing Draft Recommendations, the NYISO would incorporate the social cost of carbon emissions into the NYISO-administered wholesale energy markets using a carbon price in dollars per ton of carbon dioxide emissions. The NYISO would apply the carbon price by debiting each

[17] Growing Wind, Final Report of the NYISO 2010 Wind Generation Study; https://www.nrc.gov/docs/ML1233/ML12339A588.pdf

[18] http://www.nysrc.org/pdf/Meetings/DER%20Meeting%2011-7-18/DER%20Workshop_3.2B_Operations_2018-11-07.pdf

[19] IPPTF Carbon Pricing Proposal https://www.nyiso.com/documents/20142/2244202/IPPTF%20Carbon%20Pricing%20Proposal.pdf/60889852-2eaf-6157-796f-0b73333847e8

[20] IPPTF Carbon Pricing Proposal https://www.nyiso.com/documents/20142/2244202/IPPTF%20Carbon%20Pricing%20Proposal.pdf/60889852-2eaf-6157-796f-0b73333847e8

energy supplier a charge for its carbon emissions at the specified price as part of its settlement. Suppliers would embed these additional carbon charges in their energy offers (referred to as the supplier's carbon adder or adjustment in $/MWh) and thus the carbon price factors into unit commitment, dispatch, and price formation through the NYISO's existing processes.[21]

The IPPTF Carbon Pricing Draft Recommendations in 2018 will be advanced through the stakeholder process as part of the Market Issues and Installed Capacity Working Groups in the stakeholder governance structure. At this time, the NYISO and stakeholders are working toward a 2021 deployment into the NYISO wholesale markets.

### Implementing the NYISO Master Plan

"The Master Plan: Wholesale Markets for the Grid of the Future," was released in June 2018. The "2018 Master Plan" endeavors to bring multiple efforts underway into a cohesive market design strategy for the next five years.[22] With the help and input of NYISO stakeholders, the document discusses the NYISO's recommendations for evolving the wholesale markets that the NYISO administers. The Master Plan attempts to strike a balance between aggressive pursuit of market evolutions desired to meet the needs of the grid of the future, with the time necessary to thoroughly develop and evaluate the market designs.

The "2018 Master Plan" presented a schedule of more than 20 market design initiatives proposed by the NYISO for development and implementation between 2018 and 2023. The NYISO understands the stakeholders' expectations to allocate sufficient time to develop a market design and evaluate the effectiveness and cost implications. The schedules discussed will provide the parties involved an opportunity to consider the market designs.[23]

This Master Plan explains how the various market design concepts discussed in these documents can come together strategically to best position the NYISO's markets to remain robust and efficient as the grid evolves. Consideration was given to:

- Resource flexibility
- Grid resilience
- Price formation

[21] Carbon Pricing Straw Proposal, 4/23/2019
https://www.nyiso.com/documents/20142/1393516/Carbon%20Pricing%20Straw%20Proposal%2020180430.pdf/e9003d1e-0557-5292-0f7f-24dbcfd68ac5

[22] https://www.nyiso.com/documents/20142/1393310/Master%20Plan%206.12%20MC%20presentation.pdf/a3824f48-4625-342e-997b-ca47f4162d91

[23] https://www.nyiso.com/documents/20142/4347040/2018-Master-Plan.pdf/88225d15-082b-c07a-b8ef-ccac3619a1ce

Considering stakeholder input, including the survey results from the 2019 Project Prioritization Process, the 2018 Master Plan priorities were adjusted at the end of 2018 to better reflect a coordinated timeline between the NYISO and stakeholders.

### Offshore Wind

In his January 2017 State of the State address, Governor Cuomo called for the development of up to 2,400 MW of offshore wind to be constructed by 2030. In his 2018 address, the governor called for a solicitation for as much as 800 MW of offshore wind. In 2019, Governor Cuomo expanded this goal further, calling for 9,000 MW of offshore wind development by 2035. On January 29, 2018, New York State Energy Research and Development Authority (NYSERDA) filed a report titled "Offshore Wind Policy Option*s"* which is a component of New York State's Offshore Wind Master Plan. This Offshore Wind Master Plan was developed after two years of in-depth research, analysis, and outreach by NYSERDA, to inform a path to meet the goal of 2,400 MW of offshore wind energy facilities by 2030. The options paper includes various procurement program design features intended to broadly apply to the development of multiple projects, over time, in different locations with the ability to deliver electricity to be consumed by New Yorkers.[24]

The NYISO provided comments to the PSC stating that it welcomes the opportunity to continue working constructively with DPS staff and the PSC to pursue achievement of the state's clean energy goals, including any new offshore wind generation goals, in a manner that maintains the efficiency of competitive wholesale electricity markets. By leveraging competitive markets, the state can pursue its goals in an efficient manner, while maintaining the high degree of reliability New Yorkers have come to expect.[25]

In August 2018, the New York Power Authority (NYPA) was authorized to conduct a study of successful offshore wind transmission models — with a specific focus on largescale European projects — to determine how their experience can guide the state's procurements of offshore wind generation. The study includes collaboration with the NYISO, Consolidated Edison, NYSERDA, and Long Island Power Authority (LIPA). The findings of the study will help guide New York's offshore wind development, marking another major step toward the governor's offshore wind goals.[26]

In November 2018, NYSERDA issued its first solicitation for 800 MW or more of new offshore wind projects for New York. This first solicitation is intended to stimulate the development of the domestic

[24] http://www3.dps.ny.gov/W/PSCWeb.nsf/All/FEA2FE2050D53D578525824E0049B196?OpenDocument

[25] Case 18-E-0071, In the Matter of Offshore Wind Energy, Notice Soliciting Comments (April 11, 2018).

[26] https://www.governor.ny.gov/news/governor-cuomo-announces-study-guide-cost-effective-offshore-wind-development-new-york-state

offshore wind industry. As of December 2018, five major developers submitted notices of intent to propose. This positive response supports a competitive bidding process for New York State's first offshore wind energy solicitation, which could help further reduce offshore wind cost and increase benefits for New Yorkers.[27] The NYISO looks forward to continuing to work closely with DPS staff and the PSC to fashion an economic solution to a clean energy future that fully leverages the benefits of wholesale competitive electricity markets, while maintaining system reliability on behalf of all New York electricity customers.[28]

### AC Transmission

In December 2015, the PSC advanced its AC Transmission proceeding to a competitive process managed by the NYISO by identifying a public policy transmission need to increase transfer capability on the Central East (Segment A) and UPNY/SENY (Segment B) interfaces, which run from central New York, through the Capital Region to the lower Hudson Valley. The PSC action limited the new transmission lines to replacing and upgrading existing lines within existing rights-of-way, which is intended to reduce or eliminate adverse environmental, landowner, and economic impacts.

In April 2016, developers submitted 16 projects in response to NYISO's solicitation of proposed solutions. Following a detailed evaluation of the benefits and costs of the proposals, and careful consideration of stakeholder comments, the NYISO's Board of Directors issued a decision on April 8, 2019, finding that a joint proposal by North American Transmission and the New York Power Authority (NYPA) was the more efficient or cost-effective solution for Segment A. For Segment B, the Board found that the more efficient or cost effective solution was a joint proposal by National Grid and New York Transco. The new transmission will provide resiliency to the grid, reduce carbon emissions, lower installed capacity costs, and reduce overall system congestion and production costs. Both the Central East and UPNY/SENY interface projects are expected to enter into service by December 2023.[29]

[27] https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-Solicitations/Generators-and-Developers/2018-Solicitation

[28] https://www.nyiso.com/documents/20142/1392482/20180604_NYISO_OSWComments_18E0071_cmplt.pdf/7a527b75-2d43-e735-c7e3-2886a9f6df5e

[29] See: https://www.nyiso.com/documents/20142/1390750/Board-Decision-AC-Transmission-2019-04-08.pdf/32323d32-f534-a790-1b03-2cb110033320, NYISO BOARD OF DIRECTORS' DECISION ON APPROVAL OF AC TRANSMISSION PUBLIC POLICY TRANSMISSION PLANNING REPORT AND SELECTION OF PUBLIC POLICY TRANSMISSION PROJECTS APRIL 8, 2019

# Appendix

## Sample Weekly Summary of NYISO Activity

# NYISO Consumer Interest Liaison Weekly Summary

## July 23 – July 27, 2018

## Notices:

- We are pleased to announce that NYISO's Training Team will be offering the, in-class, MT-101 **Market Overview Course** on Thursday, September 13, 2018. The **registration** deadline is close of business on Tuesday, September 4, 2018.
- The NYISO announced on July 26, 2018, the **selection of three pilot projects to demonstrate the capabilities of Distributed Energy Resources (DERs) and options for their integration into its wholesale markets**. These pilot projects support the NYISO's **DER Roadmap**, which establishes a clear path for integrating DERs and, in so doing, will help the state of New York achieve its goals for Reforming the Energy Vision (REV).
- As discussed at the August 25, 2018 Management Committee meeting, the NYISO Board will be conducting a **new search for the current NYISO Board member vacancies**. As part of that new search, the Board Selection Subcommittee (BSSC) will need to be convened, which is composed of two members from each of the NYISO Governance Committee Sectors. Please provide two representatives from your Sector to serve on the Board Selection Subcommittee to Leigh Bullock at **lbullock@nyiso.com** and Erin Hogan at **Erin.Hogan@dos.ny.gov** by August 1, 2018

## Meeting Summaries:

**Tuesday, July 24, 2018**

**Joint Market Issues/Installed Capacity/Price Responsive Load Working Group**

**Securing 100+kV Transmission Facilities in the Market Model**
Ethan Avallone of the NYISO provided an update on the project to secure 100+kV facilities in the market model. This presentation is in response to stakeholder requests, at the June 13, 2018 MIWG meeting, that the NYISO update the 100+kV timeline and facilities list previously posted to the February 21, 2018 MIWG meeting. The NYISO proposes to present a Market Design Complete presentation to the BIC in September.

The NYISO is currently targeting to begin securing four facilities identified for November 2018 in the energy market models by November 30, 2018.

Separately, the NYISO is working with market participants on a proposed tariff update that would permit the use of a non-zero constraint reliability margin (CRM) that is less than 20 MW, which was discussed at the June 13, 2018 and July 18, 2018 MIWG meetings. The ability to apply a CRM value less than 20 MW will facilitate the continued pricing of smaller 115 kV facility constraints.
The NYISO's Market Power Assessment of 115 kV facilities indicated that it is not necessary to pursue mitigation rules tied to the 100+kV project at this time.

On August 7, 2018, the NYISO will provide an update confirming the facilities that will be secured starting November 2018 in the Autumn TCC market auction and the NYISO energy market.
The Market Model: Market Design Complete will be presented at the September 12, 2018 BIC meeting.
The four facilities identified for November 2018 in the energy market models will be targeted by November 30, 2018 with an additional target to begin securing eighteen facilities identified for December 2018 in the energy market models, pending the completion of the Niagara modeling enhancements.

To see the complete update by Mr. Avallone, please go to:
https://www.nyiso.com/documents/20142/2181113/100+kV%20July%2024%202018%20MIWG%20FINAL.pdf/2423d6f5-e620-1e63-c03c-c19649f7ba7e

**Niagara Generation Modeling Update**
David Edelson of the NYISO presented an update on the modeling enhancement of the Niagara Power Project in the Real-Time and Day-Ahead Markets planned for the end of 2018. Mr. Edelson led a review of the original modeling of the Niagara Power Project and the enhancement of the model completed in 2016. The current 2018 enhancement enables RTD/RTC/SCUC to more effectively address transmission constraints consistent with the available generation capabilities, and it will make the dispatch of the plant predictive of the actions taken, rather than reactive. Mr. Edelson explained the enhancements to the model and provided examples of the anticipated results providing constraint relief. Some stakeholders requested additional detail on the steps within the optimization process, which the NYISO will consider for a future working group presentation. The NYISO is targeting December 2018 to have the necessary work completed and ready for implementation. To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2181113/Enhancements%20to%20the%20Niagara%20Model%20vJuly24_2018vFINAL.pdf/9340e3b7-26a6-813a-0998-e1252622d1d1

**Energy Storage Market Design Update**

Whitney Lesnicki of the NYISO provided updates to the Energy Storage Resources (ESR) energy market design. Ms. Lesnicki led a review of the energy market design concepts including the resource's option of NYISO-monitored energy level or Self-monitored energy level. The concept of ESRs requiring a transition period between injecting and withdrawing was introduced and described. Some ESRs, such as lithium-ion batteries are able to transition directly from withdrawing to injecting with no down time required. Other ESRs, such as pumped storage, require a minimum withdrawal or minimum injection level to operate and cannot be scheduled to operate in a region between certain withdrawal and injection levels. This requirement allows a resource to have three states of operation available; withdrawal, injection or off. The three state-of-operation requirement, along with other parameters required for efficient ESR operation, adds complexity to the model solution.

The NYISO is currently working closely with ABB to develop a prototype for the ESR market design with a focus on:

- Modeling non-continuous ESRs that have infeasible operating regions between Min Load and Min Gen
- Adding operating parameters, Ancillary Services and increasing ESR participation gradually to evaluate the effects on solution time

The results of this evaluation are expected from ABB by September 30, 2018 and will inform stakeholders on the initial participation model for ESRs in the wholesale markets. A timeline was provided illustrating the steps leading to a December 3, 2018 compliance filing deadline.
To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2181113/ESR%20Market%20Design%20Update.pdf/725cf4d3-c18d-cb26-3709-9bf55f820152

**ESR Settlements**

Pallavi Jain of the NYISO provided updates on settlements for Energy Storage Resources (ESRs). Ms. Jain explained that the following settlement rules will be applied to ESRs and require no changes for ESR eligibility:

- Balancing Energy Payments
- Regulation Revenue Adjustment Charges/Payments

Day Ahead Margin Assurance Payment eligibility rules were reviewed with stakeholders. Ms. Jain then explained that ESR's participating as Self-monitored would be eligible to receive DAMAP when offering as Self-Committed Flexible or ISO-committed Flexible Generators that are either online and dispatched by RTD or available for commitment by RTC. The rationale for the proposal was provided as:

- *Consistent with current treatment of Generators.*
- *Because the NYISO's market optimization software will not consider State of Charge (SoC) for Self-monitored ESR's, existing eligibility criteria will require few changes.*
- *Existing incentives to offer flexibly in RT will remain unchanged.*
- *Calculation must be revised to calculate DAMAP during withdrawal periods.*

The NYISO proposes that ESR's participating as NYISO-monitored not be eligible to receive DAMAP.

Discussions on the complete participation model for ESRs will continue through Q3 2018 in preparation for a Q4 FERC Filing. To see the complete presentation on settlement updates, please go to:
https://www.nyiso.com/documents/20142/2181113/ESR%20Settlements_07_24_MIWG.pdf/d1915ad2-5727-aca5-3e32-03f941c22a88

**Methodology for Consumer Impact Analysis: Energy Storage Integration**

Tariq Niazi of the NYISO presented the methodology to be used for the Consumer Impact Analysis of the Energy Storage Integration participation model. The NYISO has committed to providing a presentation on the methodology to be used for each Consumer Impact Analysis to give stakeholders an opportunity to comment on the methodology.

Mr. Niazi began by providing a brief background on the development of the participation model for Energy Storage Resources (ESRs) and noted that the analysis for ESRs would be very similar for the impending Consumer Impact Analysis of the Distributed Energy Resource (DER) participation model. Mr. Niazi explained that since the NYISO does not know how much energy storage will be available for implementation, estimates over a range of expected values will be provided. To approximate the short run energy market impact of storage, upstate and downstate historical energy prices will be used. Assumptions to be used for the analysis were provided to and discussed with stakeholders, with Mr. Niazi noting feedback for consideration.

In the evaluation of the impacts on the capacity market, again a range of expected values will be used. Storage resource values of 500MW, 1,000MW, 1,500MW and 2,500MW will be assumed to be entering the wholesale market. Details were provided concerning de-rate factors for ESRs, effects on Locational Capacity Requirements (LCRs), and zonal distribution of resources.
A short-term case (2017/2018) and a long-term case (2021/2022) will be evaluated for analysis.
To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2181113/CIA%20-%20Methodology%20for%20Storage%20Integration.pdf/ce541bea-59ce-7b8a-f15a-a918524943e5

**Valuing Capacity for Resources with Energy Limitations**

Wes Hall of GE Energy Consulting (GE) provided an update on the study to develop a methodology for calculating the Capacity Value of resources with energy limitations. GE will develop a GE MARS post processing routine to schedule resources subject to the energy limiting parameters against the hourly NYCA capacity margin for each replication and load level of the GE MARS simulation.
Each replication's hourly NYCA capacity margin will be adjusted by the schedule, and the reliability indices recalculated. Capacity will be removed until the relevant reliability index is returned to base case levels.

Mr. Hall detailed the assumptions to be used in the study and provided stakeholders with an opportunity to give feedback for refinement.

GE is working with the NYISO to validate preliminary base case results for presentation at a later stakeholder meeting. To see the complete presentation, please go to: https://www.nyiso.com/documents/20142/2181113/Capacity%20Value%20of%20Resources%20with%20Energy%20Limitations.pdf/5d19cf9d-eb56-d893-e437-2085323df3e2

**Wednesday, July 25, 2018**
**Management Committee**

**Motion #1:**
Motion to approve the draft May 30 and June 12, 2018 Management Committee meeting minutes.
**The motion passed unanimously by show of hands.**

**Motion #2:**
The Management Committee ("MC") hereby: (i) approves revisions to the Open Access Transmission Tariff, as more fully described in the presentation entitled "Historic Congestion Data: Proposed Enhancements" made to the MC on July 25, 2018; and (ii) recommends that the NYISO Board of Directors authorize the NYISO staff to file such revisions under Section 205 of the Federal Power Act.
**The motion passed unanimously by show of hands with abstentions.**

**Motion #3:**
The Management Committee hereby determines that a new Cost of Service study should NOT be conducted during late 2018 and 2019 to inform a decision on whether a modification of the 72%/28% cost allocation between Withdrawal Billing Units and Injection Billing Units is warranted, pursuant to OATT Section 6.1.2.3
**The motion passed unanimously by show of hands with an abstention.**

**Wednesday, July 25, 2018**
**Budget and Priority Working Group**

Proposed FERC Fee Recovery
Cheryl Hussey of the NYISO addressed the proposed amount for the 2019 FERC fee recovery. Ms. Hussey led a review of FERC's budget requirements for recent years to illustrate the historical trend in increases. The proposed amount for Fiscal Year 2019 FERC fee recovery is $13.1M which represents an increase of approximately four percent from Fiscal Year 2018. To see the complete presentation, please go to: https://www.nyiso.com/documents/20142/2817988/02%20FERC%20FEE%20%20Estimate.pdf/f2d96ef7-d455-8528-e567-1efae17f3da6

2018 Project Schedule Milestone Update
Robb Pike of the NYISO provided an update on the 2018 Project Schedule milestones. Mr. Pike highlighted several projects with an updated commitment status. Explanations were provided for stakeholders for projects with the status of At Risk/Delayed or Cancelled. Mr. Pike also noted, for stakeholder awareness, the projects which will be discussed in stakeholder forums in the near future:

- Public Website Content Management Platform & Redesign
- Automate ICAP Import Rights
- Alternative Methods for LCRs (SOM)
- Performance Assurance
- Competitive Entry Exemption for Increased CRIS
- BSM Repowering
- DER Participation Model

- NYISO Pilot Framework
- Model 100+kV Transmission Constraints (SOM)
- Energy Storage Integration & Optimization
- Integrating Public Policy
- FERC Order 844
- Comprehensive System Planning Process Review

To see Mr. Pike's complete presentation, please go to:
https://www.nyiso.com/documents/20142/2817988/2018%20Project%20Schedule%20Milestone%20Update.pdf/db9877d4-819f-6ed3-4891-f06d8b7bce8c

**2019 Project Prioritization and Budget Process**

Brian Hurysz of the NYISO presented the initial project recommendations for the 2019 budget process. Mr. Hurysz led a review of the project scoring methodology and highlighted the scoring of the Carbon Pricing project. The proposal for Phase 1 of the Climate Change Impact and Resilience Study was discussed in depth with stakeholders. The scope of the study was clarified and the NYISO responded to stakeholders as to the progression of the study following Phase 1 in 2019.

Mr. Hurysz provided the project recommendations based on the appeal of stakeholder survey results prior to a review of project recommendation by product area. The total estimated cost of the recommended projects, less the EMS/BMS cost, is $32.52 Million and is subject to budget approval.

Written feedback on the 2019 Project Budget Recommendation may be provided until August 4, 2018 and can be sent to lbullock@nyiso.com and Bhurysz@nyiso.com. To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2817988/2019%20Project%20Prioritization%20Process%20Revised.pdf/0324dee7-ae63-c668-c182-a9d06482cb32

**Consumer Impact Analysis: 2019 Project List**

Tariq Niazi of the NYISO presented the initial list of 2019 projects that will be subject to Consumer Impact Analysis. Mr. Niazi led a review of the guidelines for selecting projects for analysis prior to introducing the projects for 2019:

- **Constraint Specific Transmission Shortage Pricing**
- **Enhanced Fast Start Pricing**
- **More Granular Operating Reserves**
- **External Capacity Performance and Obligations**
- **Enhancing Fuel and Energy Security**

Mr. Niazi provided descriptions of each project with the anticipated benefit to the market and gave the criteria for selection for analysis. Stakeholders provided suggestions on potential methodology for analysis and other projects for additional consideration.
The NYISO will consider feedback received and return to the BPWG with a finalized list of projects. A presentation will also be made to the BIC or MC meeting to provide the information to a larger audience.

To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2817988/CIA%202019%20Project%20Listpdf.pdf/23a42994-b65f-c951-3f66-acecc8f0f457

**Thursday, July 26, 2018**
**Joint Market Issues/Installed Capacity/Price Responsive Load Working Group**

**NYISO Pilot Program Update**
Brian Yung of the NYISO provided an update on the Distributed Energy Resources (DER) Pilot Program. The purpose of the program is to demonstrate DCEA/DER capabilities, integration, coordination, and dual participation in a test environment. The deadline to submit proposals was January 31, 2018.

Three proposals have been selected by the NYISO for the Final Review Process and include aggregations comprised of the following:

- High-rise buildings capable of curtailing load
- In-front-of-the-meter battery energy storage facilities co-located with solar
- In-front-of-the-meter battery energy storage facilities

Mr. Yung detailed the proposed projects, with a total of 5.5MW, including the anticipated objectives that the projects will demonstrate. A timeline was provided with the anticipation of the first pilot beginning its demonstration in January 2019. The NYISO is currently in the Final Review Process which includes evaluating the facility interconnection and other details, discussion of program expectations and formalizing the pilot plan. The NYISO will announce at later MIWGs when a pilot is formally accepted into the program and has executed NYISO's Pilot Participation Agreement.
To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2180936/NYISO%20Pilot%20Program%20MIWG%20072618.pdf/171ad5d8-1f52-6c40-3323-ca59bd43bc2e

**Capacity Market Rules for Distributed Energy Resources**
Zachary T. Smith of the NYISO provided stakeholders with an opportunity to discuss the development of Distributed Energy Resources (DERs) capacity market participation model rules. Mr. Smith led a review of current capacity market eligibility rules, capacity amount calculations, and obligations of capacity suppliers. DERs could have the ability to contribute to NYISO capacity requirements but may not meet current eligibility rules. The NYISO is seeking input from stakeholders to facilitate the participation of DERs into the wholesale capacity market. Some additional issues that will require consideration in the development of the DER market design for capacity include:

- Aggregations
  - Rules to allow aggregations of other types of capacity resources could also be developed
- Duration Requirements and Partial Capacity
  - Evaluate and change, if necessary, the duration requirement of limited resources from the current 4 hour requirement
  - Consideration of resources that cannot meet the duration requirement for payment
- Dual Participation
  - As part of the DER effort, the NYISO is evaluating what types of Dual Participation models are permissible

Mr. Smith noted stakeholder feedback and encouraged additional comments that can be sent to ztsmith@nyiso.com and/or deckels@nyiso.com. To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2180936/DER%20Capacity%20Rules%20Revised.pdf/3f72e1af-878d-3943-c1be-950cd6cf108e

**DER Market Design Updates & Energy Market Bid to Bill Examples**

Michael Lavillotti of the NYISO provided updates to the Distributed Energy Resources (DER) participation model and led a review of the DER energy market proposal materials to date. Mr. Lavillotti lead a review of the market entry process including:

- Registration
- Interconnection
- Metering Configurations
- Performance Measurement
- Application of FERC Order 745
- Bidding and Settlements

In each process area, Mr. Lavillotti spoke to updates made since the original subject presentations. Detailed numerical examples of bidding and the accompanying settlement rules were provided to clarify several aspects of the process.

The NYISO will continue to develop and refine rules for energy and capacity market offer requirements, mitigation, forecasting and interconnection. The NYISO will evaluate the implementation of rules through the pilot program. NYISO plans to conclude development of rules in 2018 for the eventual implementation of DER in 2021.

To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2180936/DER%20Market%20Design%20-%20Updates%20and%20Energy%20Market%20Bid%20to%20Bill_V9.pdf/34bed692-5e91-7d50-762f-95a348b73f89

**Friday, July 27, 2018**
**Joint Electric System Planning Working Group/Transmission Planning Advisory Subcommittee**

**Public Policy Transmission Needs Study: Transmission Constrained Renewable Generation Pockets**

Yachi Lin of the NYISO presented the results of the Public Policy Transmission Needs Study of transmission constrained renewable generation pockets. On August 1, 2018, the NYISO will initiate its Public Policy Transmission Planning Process for the 2018-2019 transmission planning cycle by issuing a solicitation to Market Participants and all interested parties over a 60-day period to submit to the NYISO their proposals on Public Policy Requirements that may drive to Public Policy Transmission Needs.

NYISO conducted a transmission constraint assessment, at the request of the Department of Public Service, related to the significant injection of renewable generation resources into various locations in the New York Control Area ("NYCA") to satisfy the 50-by-30 goal of the State's Clean Energy Standard ("CES"). Ms. Lin described the scope of the study and noted that this study was not undertaken with the depth of an interconnection study.

The assumptions and methodology of the study were explained in detail, such as the transmission upgrades and generation dispatch options. For the purpose of this study, resources were added to satisfy the CES at the direction of DPS. The MW amount of each resource type, such as grid-connected solar and wind, zonal allocations and interconnection points were provided in the presentation.

Two load conditions were developed to represent possible system conditions and load-generation balance; summer peak load and summer light load conditions. Renewable generation was analyzed at full output. The study identified potential thermal violations, and four groups of overloads ("pockets") were found from study scenarios, as well as the curtailment of renewable generation necessary to relieve these constraints. A chart was provided to illustrate the potential un-bottling of curtailed renewable generation.

Under the studied "snapshot" system conditions, a substantial amount of additional renewable generation in these zones may need to be curtailed to prevent overloading transmission facilities.
The study indicates a need for transmission upgrades in order to transmit the full power from the renewable generation pockets to NYCA load to achieve the CES.
To see the complete presentation, please go to:
https://www.nyiso.com/documents/20142/2176070/PPTN_genpockets_ESPWG_20180727.pdf/27ba1fee-59ed-6602-02ba-1cc7ad8ffa60

**FERC Filings**
**July 27, 2018**

Niagara Mohawk Power Corporation filing of a notice of cancellation of a superseded interconnection agreement with the Village of Ilion, NY

**FERC Orders**
**July 25, 2018**

FERC order granted NYISO's request for waiver of certain OATT sections that make available for sale, in NYISO-administered Transmission Congestion Contract (TCC) Auctions, all transmission capacity that is not needed to serve existing and valid TCCs

**Filings and Orders:**
http://www.nyiso.com/public/markets_operations/documents/tariffviewer/index.jsp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