



## **Joint Board of Directors & Management Committee Meeting – June 3 & 4 2019**

### **Background for Sessions**

New York's electricity system is in the midst of major change, driven primarily by a wide array of policies that affect the electric power system. Wholesale power markets, first established in the late 1990s as part of a broad deregulatory effort to lower customer costs through competition, have always been influenced by public policy, and in particular environmental policies at the federal, state or regional level. One of the main drivers behind wholesale markets was to shift the risk and cost consequences from consumers to the investors and owners of generation assets. Wholesale markets harness competitive forces to incent smart decision making by investors while also encouraging innovation. Those asset owners who are most efficient will thrive in the market and in turn result in lower costs for consumers, and those asset owners who make poor decisions leading to high costs bear the consequences of those decisions and exit the market without placing any additional cost burden on consumers.

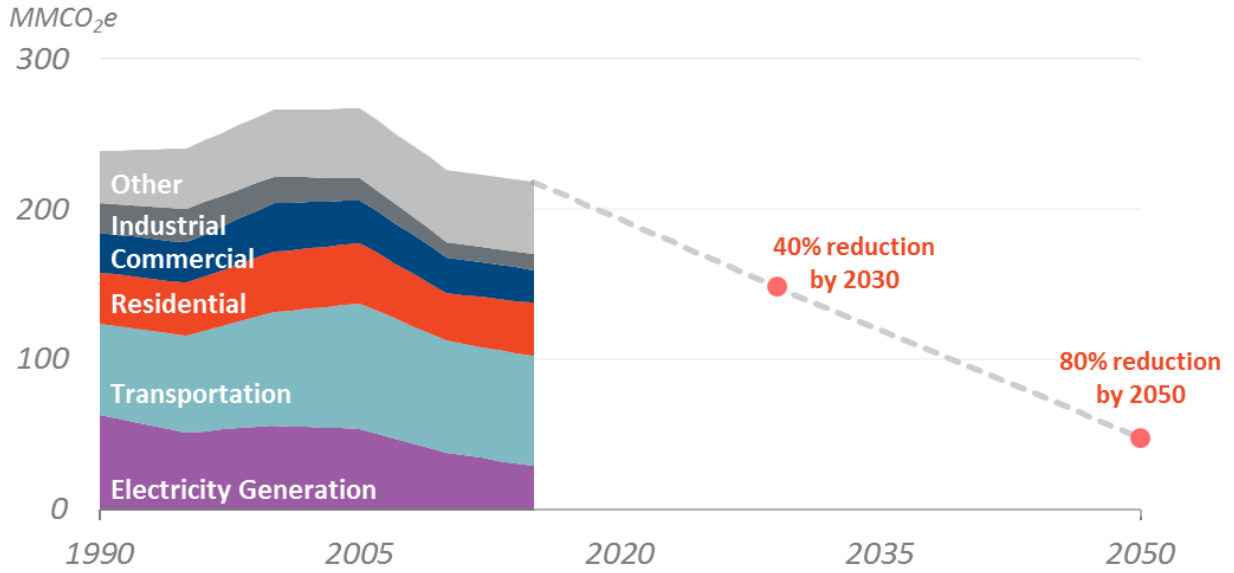
The NYISO's wholesale markets have met their objective of efficiently maintaining reliable service, reducing costs for consumers. Since 2000, the NYISO's markets have attracted competitive new entry, the risk of which is borne by the owners of new generation, to replace more than 7,000 MW of retirements while maintaining high operational reliability with limited out-of-market interventions. The NYISO's markets have consistently been deemed competitive according to its external Market Monitor Unit. They have attracted new investment below administrative estimates of the cost of new entry, reflecting the market's ability to provide innovative and low-cost solutions, such as improvements in existing resource efficiency, including uprates, advanced technologies including flywheels and batteries, and demand response.

Policy objectives have now evolved to include promoting intermittent renewable energy and accounting for environmental externalities related to carbon dioxide emissions, among other goals. The emerging policies vary with respect to compatibility with the current market design. Some policies are highly compatible with the current market design, while others impose challenges that may require larger market reforms to fully meet operational and reliability needs. The aggregate effect of these policies places new strains on the NYISO's ability to deliver reliable supply at competitive costs under the current market framework. Any enhancements to the market must try to balance the myriad of policy drivers and take into account their consequences for the wholesale market.

Across the slate of policies, both memorialized through mandate / order and proposed for consideration, New York's economy-wide decarbonization goals and clean energy goals stand out as having clear and substantial impacts on how the power system is operated and reliability needs are satisfied through the wholesale market. Figure 1 below illustrates New York State historical greenhouse gas emissions and a linear trajectory to meet the targeted reductions in 2030 and 2050. These policies will drive a transformational shift in coming years from the gas-fired power plants that provide the majority of New York's power today to considerably higher levels of non-emitting, weather dependent intermittent resources such as solar and wind. Achieving 40% and 80% economy-wide reductions of Greenhouse Gas ("GHG") emissions will likely require substantial electrification to decarbonize heating, transportation, heavy industry, and other non-energy sources such as agriculture and waste that

contribute to GHG emissions within the State; adding to the importance of addressing the impacts on the NYISO market design today.

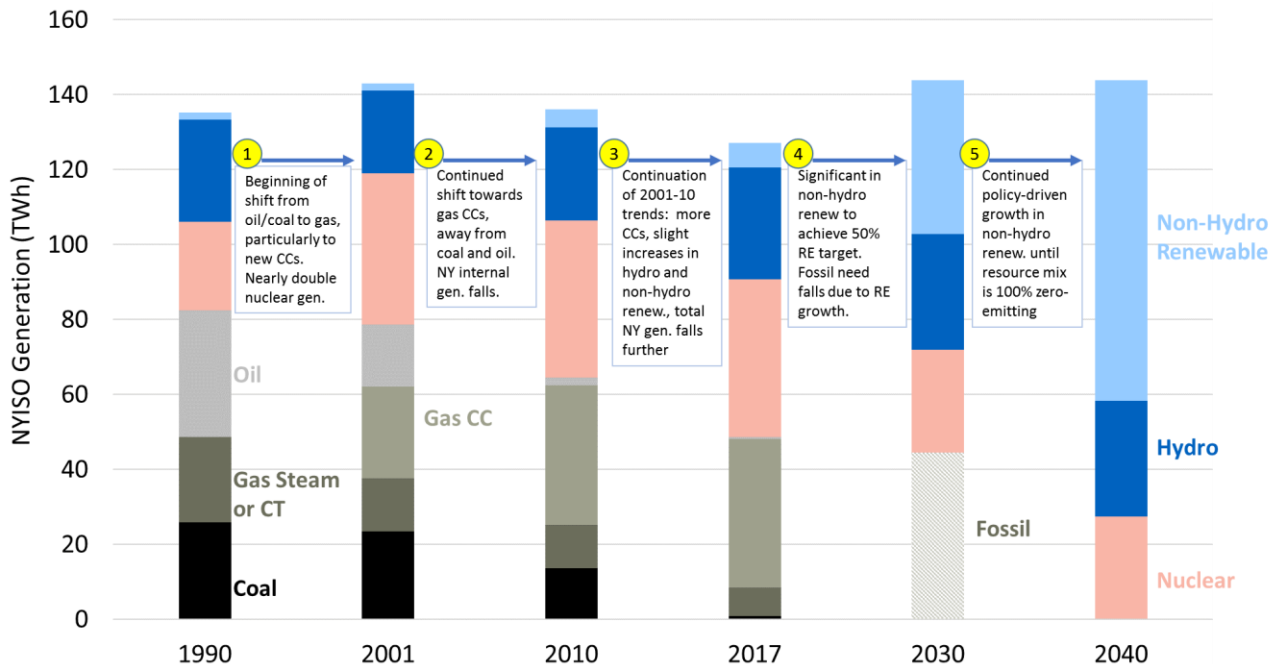
**Figure 1: New York State Economy-Wide GHG Emissions History and Future Reduction Goals**



Sources and Notes: NYSERDA / NY DEC. New York State Greenhouse Gas Inventory, 1990 – 2015 and Brattle analysis

By 2030, carbon-free resources could provide 50% to 90% of New York’s generation. By 2040, the electric system may be nearly 100% carbon-neutral in order to support an increasingly electrified and decarbonized New York economy.

**Figure 2: Change in New York Supply, 1990 - 2040**



Sources and Notes: 2001, 2010 and 2017 data from SNL Energy. 2030 data is adapted from 2030 MAPS modeling (offshore wind scenario). 2040 shows assumed resource mix needed to achieve 100% zero-emissions goal.

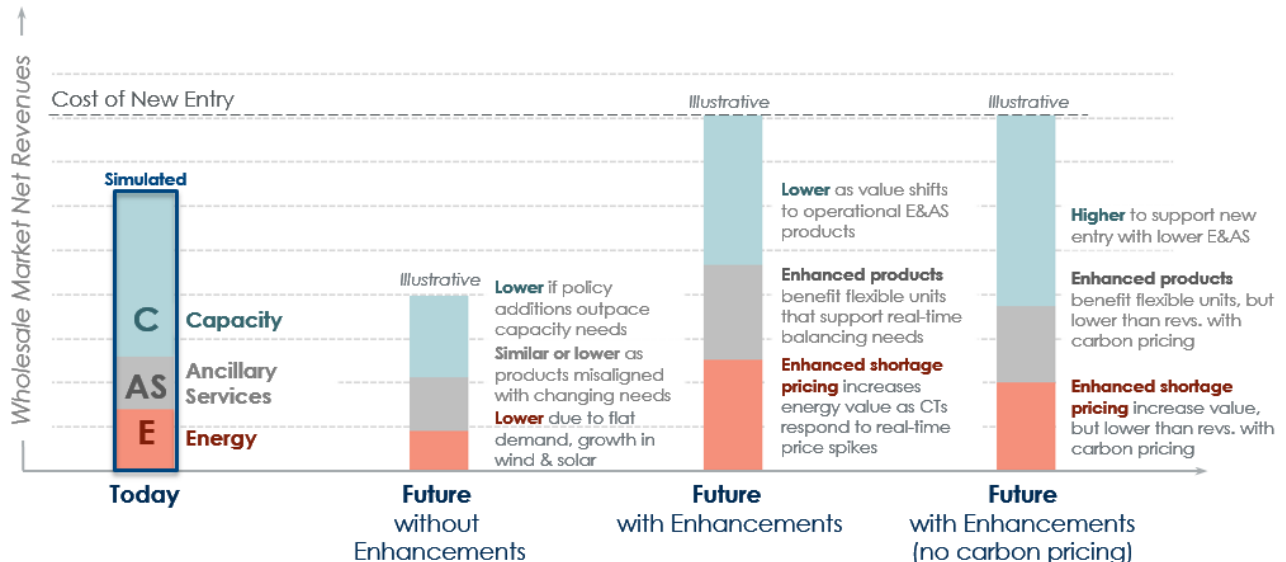
Figure 2 illustrates how the New York supply mix has changed since 1990 and may continue to evolve into the future. From 1990 to today New York faced large scale changes, emissions markets and wholesale electric markets, working together, achieved a fuel and technology mix transition that was unimaginable in 1990. Looking forward from 2019 to 2040, renewable procurements and long-term decarbonization will drive larger growth in non-hydroelectric renewable resources. The retirement of Indian Point and potentially other nuclear facilities will cause a decline in nuclear generation shown by 2030.

The grid is evolving away from historical patterns of supply and demand, and towards emerging trends that reflect dramatic advances in how electricity is generated and consumed. The convergence of new technologies, changing economics and compelling public policy are precipitating growth of renewable and distributed energy resources to levels which may require significant modification of the wholesale markets including expanding market products that support essential grid reliability services.

The NYISO wholesale markets have thus far maintained reliability and done so at competitive costs. Indeed, there is currently no shortage of capacity or other necessary grid services. Our assessment of the current markets' ability to meet future resource adequacy and operational needs focuses on appropriateness and completeness of product definition for key reliability services, price formation, and revenue adequacy. For example, carbon pricing may increase energy and ancillary services revenues to resources such as renewables, battery storage and gas-fired combined cycles that typically emit less carbon than the marginal resource and can thus profit from higher energy prices. Additional market product and pricing enhancements may further increase revenues to flexible resources such as battery storage and gas peaking generators that can provide those grid services that will be increasingly needed to balance intermittent renewable resources.

We consider how wholesale market revenue sources, with and without market enhancements, might evolve over the next decade as 50% to 70% of energy is generated from renewable resources. Figure 3 below illustrates revenues for a Frame Simple Cycle gas-fired generator in the next decade under three different scenarios.

**Figure 3: Illustrative Change in Revenues, Frame Gas Simple Cycle (Assuming New Entry is Needed)**



The addition of distributed and renewable resources expected as a result of the Clean Energy Standard and proposed Green New Deal will create a more dynamic grid, where supply is heavily influenced by daily weather patterns. This necessitates an examination of the need for strategic transmission investments that enhances the operational flexibility of the grid and ensures electricity can reliably be delivered to customers, and improved market incentives for flexible resources that will be needed to balance non-emitting, weather dependent intermittent resources such as solar and wind.

**Figure 4: New York’s Grid in Transition (Integrating Distributed and Renewable Resources)**



Increases in renewables will also place pressure on the wholesale markets to incent new or existing flexible resources. These flexible resources will run less often but will be necessary to maintain grid reliability when production from renewable energy is unavailable or insufficient. Operating characteristics such as availability, flexibility, and willingness to cycle are important to long-term grid stability and will need to be incentivized.

As the NYISO evaluates opportunities to enhance wholesale market products and expand transmission investments to maintain the reliable operation of New York’s bulk power system, how to efficiently and reliably serve New York will be at the forefront of our decision making. The changing portfolio of resources requires a careful and comprehensive review of the existing market design, including operational and planning practices, to ensure the continued ability to efficiently and reliably serve New York’s electricity requirements. In the coming years the NYISO, its market participants, and other key stakeholders will work to assess and address the *Reliability and Market Considerations for a Grid in Transition*.

## **Session 1: Reliability Considerations for a Grid in Transition**

The goal of this session is to gain a better understanding of the concerns our stakeholders have regarding maintaining the reliability of electric grid as the fleet transforms incorporating more weather dependent renewable and distributed resources.

### ***Table Discussion: Seed questions***

1. Which essential reliability services will be key to ensure the grid can be operated reliably through the transition? Why?
2. What role should Fuel Security play in maintaining grid reliability while supporting New York's clean energy policy goals?
3. What improvements could increase flexibility and resilience of transmission system operations? What timing should these improvements be considered?
4. What role must transmission investment play to support the grid in transition?
5. How can distribution connected distributed resources assist in the reliable operation of the transmission system?
6. What additional concerns do you have regarding meeting reliability into the future?

## **Session 2: Market Considerations for a Grid in Transition**

The goal of this session is to elicit feedback from stakeholders to help assess the types of wholesale market changes and adjustments the NYISO must consider in order to support the necessary resource flexibility and grid resilience required as the electric grid transforms.

### ***Table Discussion: Seed questions***

1. Can evolving the wholesale ancillary service markets improve and incent resource flexibility?
2. What is the role of ancillary service versus capacity revenues for satisfying revenue adequacy over the longer term?
3. Are there any "no regrets" initiatives or market enhancements that the NYISO should consider that would promote resource flexibility? How quickly are these enhancements needed?
4. As the needs of the grid evolve, what mechanisms would best incent necessary resource development?
5. How should market incentives and transmission investment be coordinated in order to support grid reliability at the least cost?
6. What concerns you most with respect to the markets during this period of transition?