

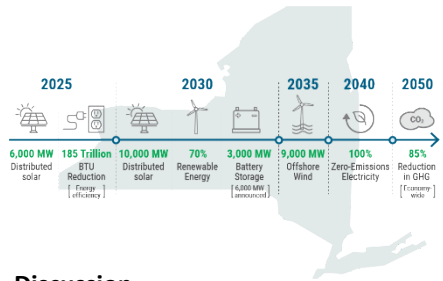
Study Committee C5
Electricity Markets and Regulation C5
 Paper ID_10236

Market Structure for a Decarbonized New York Electricity Market

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Motivation

- NYISO is developing a comprehensive set of market enhancements to facilitate the ambitious goals of New York State to decarbonize its electricity sector and achieve economy-wide decarbonization goals



Method/Approach

- A Grid in Transition Study was performed to evaluate the changing resource base needed to meet the policymakers decarbonization goals and identify areas to market enhancements.

Discussion

- Improvements to Load and Intermittent generation forecasting techniques are important to properly position dispatchable generating assets to preserve reliability
- Energy Market enhancements provide additional incentives for resources to perform in the real time to balance generation with load and preserve reliability
- Marginal Accreditation techniques allow Capacity Market resources to be valued based on their marginal reliability contributions and provides powerful investment signals resulting in a more optimal resource mix

Objects of Investigation

- The goals of these market enhancements are to incent resource performance in real-time and to provide sufficient revenues to attract and retain sufficient resources to meet reliability needs.
- Energy and Ancillary Services Market Enhancements were investigated, and a set of enhancements described were implemented
- Capacity Market Enhancements in the form of Marginal Accreditation of Capacity Resources are described and are being implemented
- A proposal for incorporating a social cost of carbon in the energy market was considered and is described in the paper

Conclusion

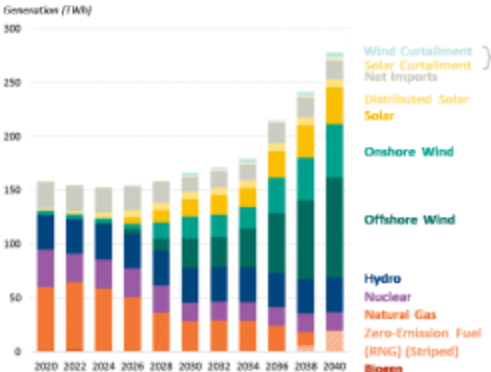
- NYISO has developed a comprehensive set of Market Reforms to facilitate the transition to a decarbonized grid
- These reforms sharpen the market signals to enhance the incentives for assets to perform in the real time as well as provide adequate revenues to attract needed levels new assets and preserve needed existing assets to preserve reliability
- While much work has been done, NYISO continues to evaluate future needs and develop market enhancements

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Transition to a Zero-Carbon Grid

- Wind and Solar become the primary source of energy
- Gas Fired Generation eventually switches to zero-carbon fuel such as Renewable Natural Gas (RNG)



The Importance of Accurate Load Forecasting

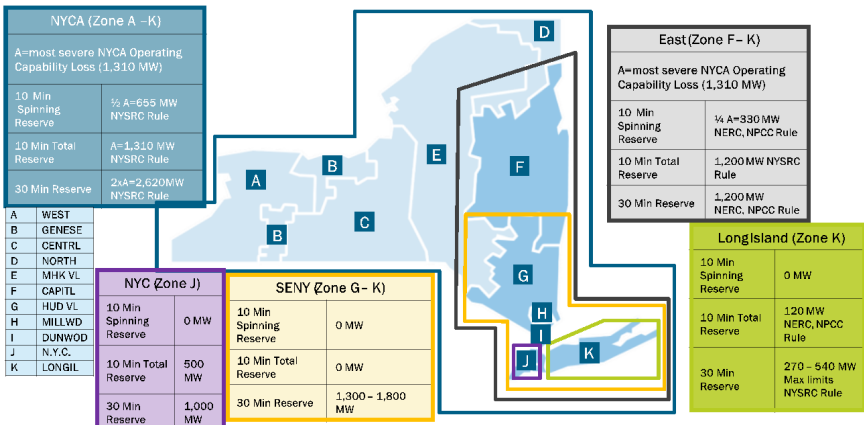
- Intermittent resource output needs to be forecasted accurately
- Distributed Resource output and price responsive demand also add complexity to be able to forecast Load accurately
- Net Load needs to be forecasted accurately to position dispatchable generation to maintain reliability

Price Formation in the Energy Market

- Ancillary services are increasingly important for price formation
- Set by defining granular areas for the procurement of reserves and regulation
- Guided by demand curves (anchored by the Value of Lost Load (VOLL))
- Quantity of resources procured need to be procured dynamically

NYISO Operating Reserve Areas and Requirements

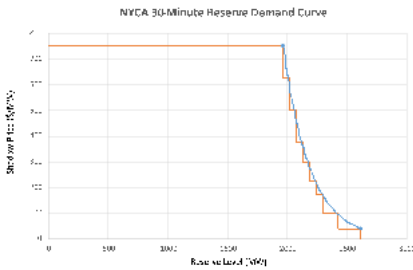
Current Operating Reserve Requirements



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NYISO Operating Demand Curve Example



Shortage Price (\$/MWh)	Reserve Level (MW)	Demand Curve (MW)
750	≤ 1,965 to 0	1,965
625	1,965 to 2,020	50
500	2,020 to 2,075	55
375	2,075 to 2,130	55
300	2,130 to 2,185	55
225	2,185 to 2,240	55
175	2,240 to 2,295	55
100	2,295 to 2,420	225
40	2,420 to 2,620	200

Note:
 * Highlighted shortage price cells indicate the values from the costs of operator actions analysis

Accreditation of Capacity Resources

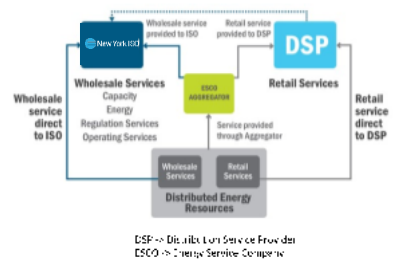
- Marginal Accreditation – valuing resources according to their marginal contribution to reliability
- 2-hour resource is worth less than a 4-hour resource
- Accreditation values change with resource penetration levels
- Accreditation values need to be re-evaluated periodically as the resource mix changes
- Marginal Accreditation values provide powerful investment signals and lead to a more optimal resource mix

Carbon Pricing

- NYISO has evaluated how internalizing the cost of carbon in energy offers provides a more efficient path to achieve policymaker’s decarbonization goals
- The Social Cost of Carbon can be added to energy offers and reflected in Locational Marginal Prices
- Addresses ‘leakage effects’ by removing the carbon component from exports and adding a carbon component to imports
- Adjusts the carbon related charges to Load Serving Entities in an equitable manner.

Integrating Demand Response and Distributed Energy Resources

- Flexible Demand and Distributed Resources are a key component of a zero-carbon grid



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