

NYISO's Distributed Energy Resource (DER) Roadmap & DER Pilot Program

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MANAGER, DISTRIBUTED RESOURCES OPERATIONS

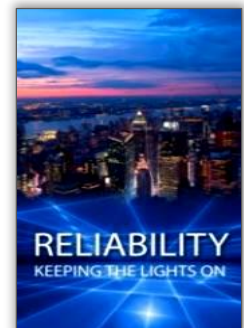
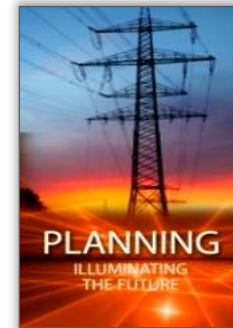
UVIG 2018 Spring Technical Workshop

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Roles of the NYISO

- **Reliable operation of the bulk electricity grid**
 - Managing the flow of power on 11,000 circuit-miles of transmission lines from hundreds of generating units
- **Administration of open and competitive wholesale electricity markets**
 - Bringing together buyers and sellers of energy and related products and services
- **Planning for New York's energy future**
 - Assessing needs over a 10-year horizon and evaluating projects proposed to meet those needs
- **Advancing the technological infrastructure of the electric system**
 - Developing and deploying information technology and tools to make the grid smarter

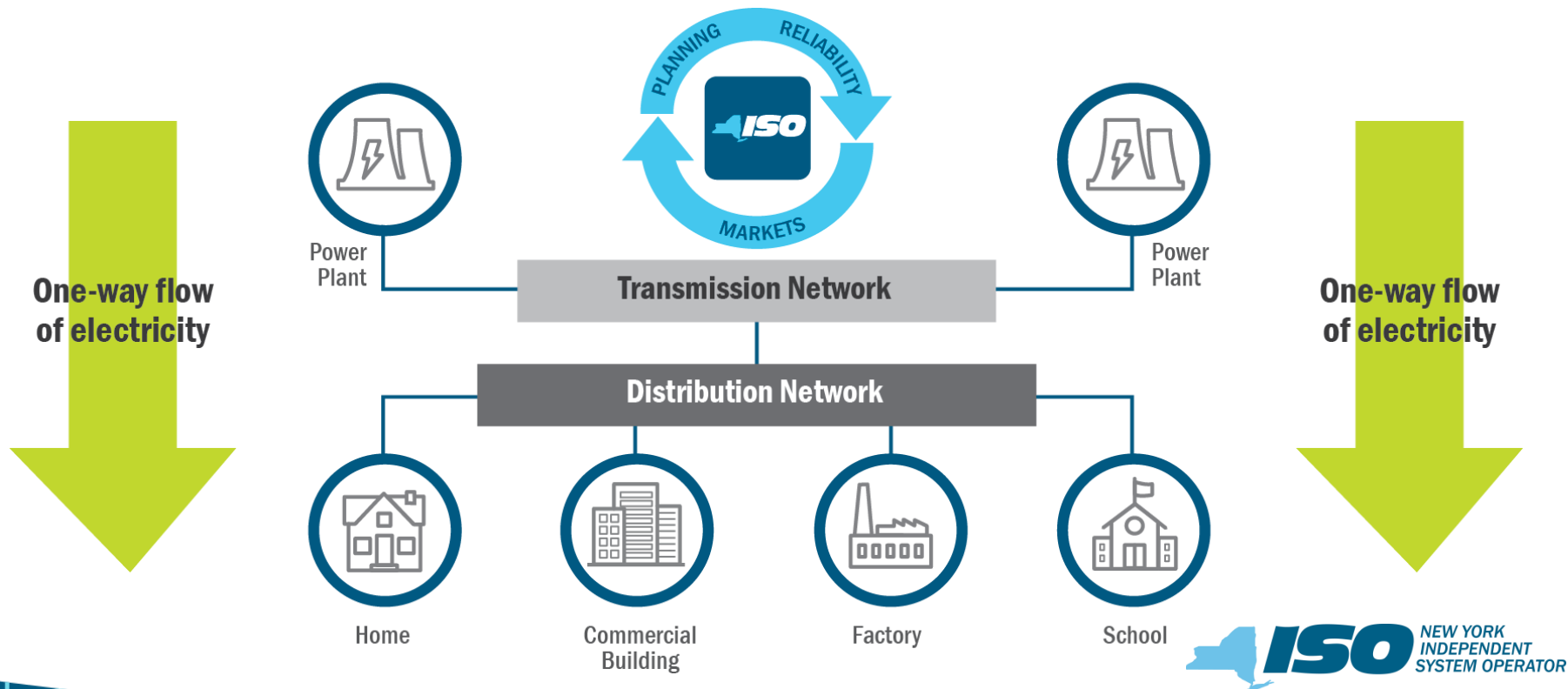


NYISO by the numbers

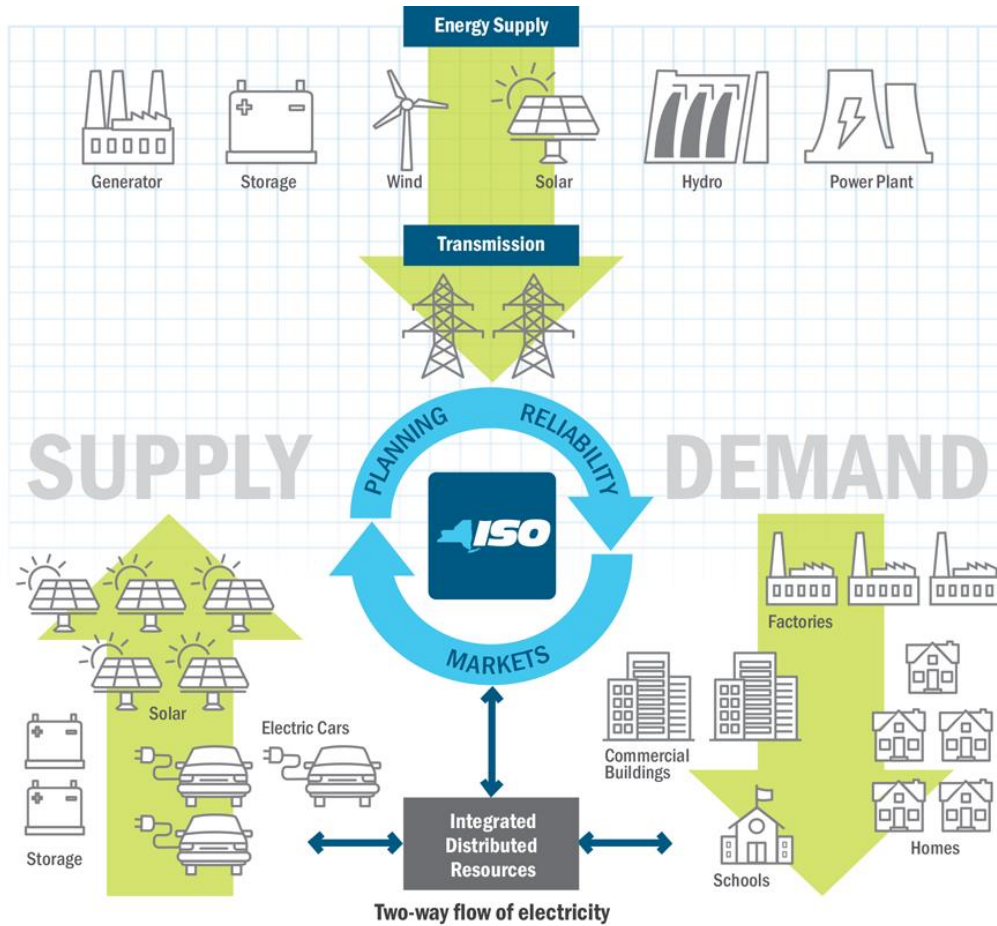
- New York population - **19 million**
- 2016 Energy Demand - **160,798 GWH**
- 2016 Required Installed Capacity - **39,198 MW**
- 2016 Peak - **32,076 MW**
- Record peak - **33,956 MW (July 19, 2013)**
- Transmission - **11,000+ circuit-miles**
- Power Generation - **700+ Units**
- Wholesale Market Participants - **400+**
- Average Annual Market Transactions - **\$7.5 Billion**



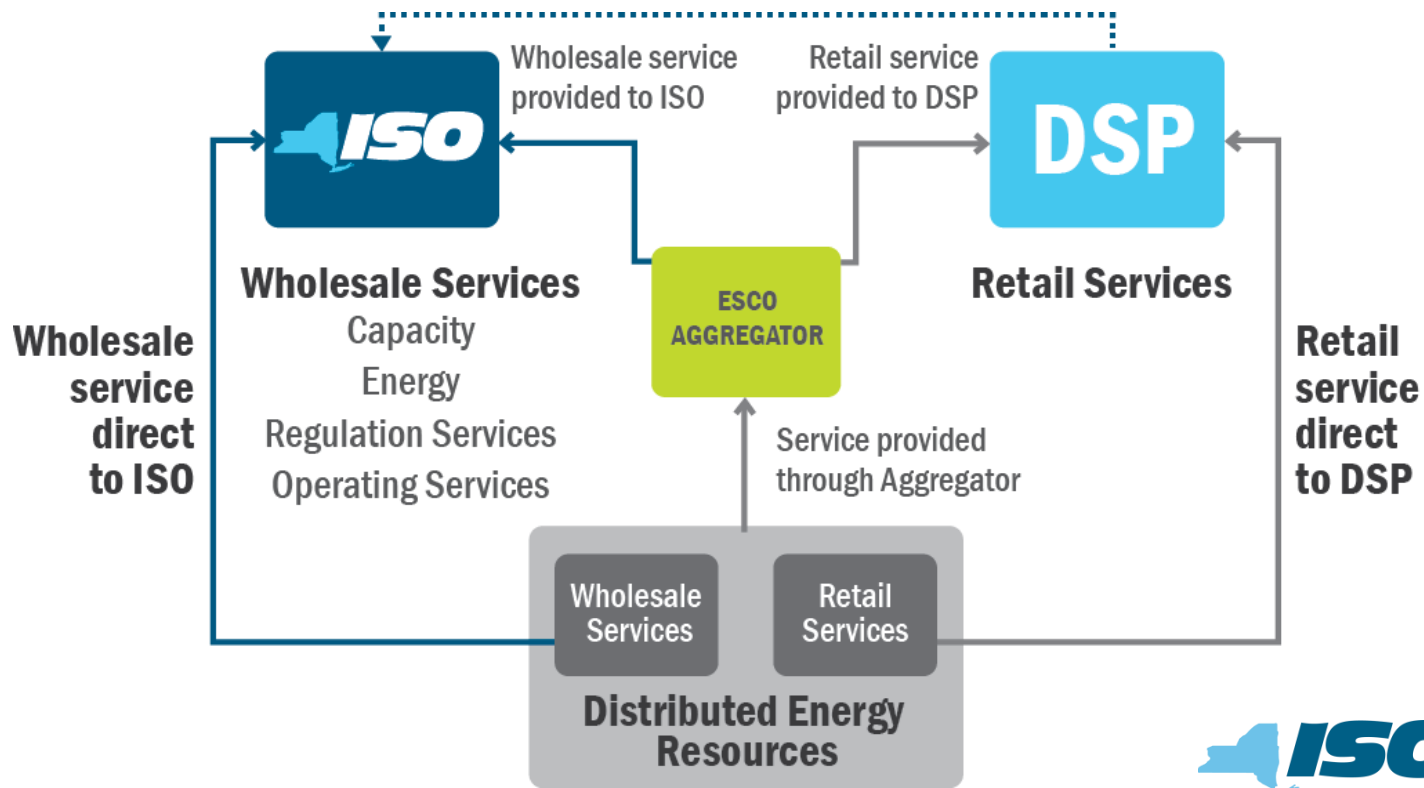
Today's Power Grid



Tomorrow's Electric Grid



Integrating DER in Wholesale Markets



DER Roadmap Objectives

- Integrate dispatchable DER into Capacity, Energy, and Ancillary Services Markets



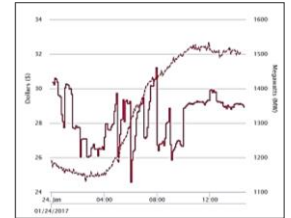
- Align with New York State's REV Goals



- Enhance Measurement and Verification



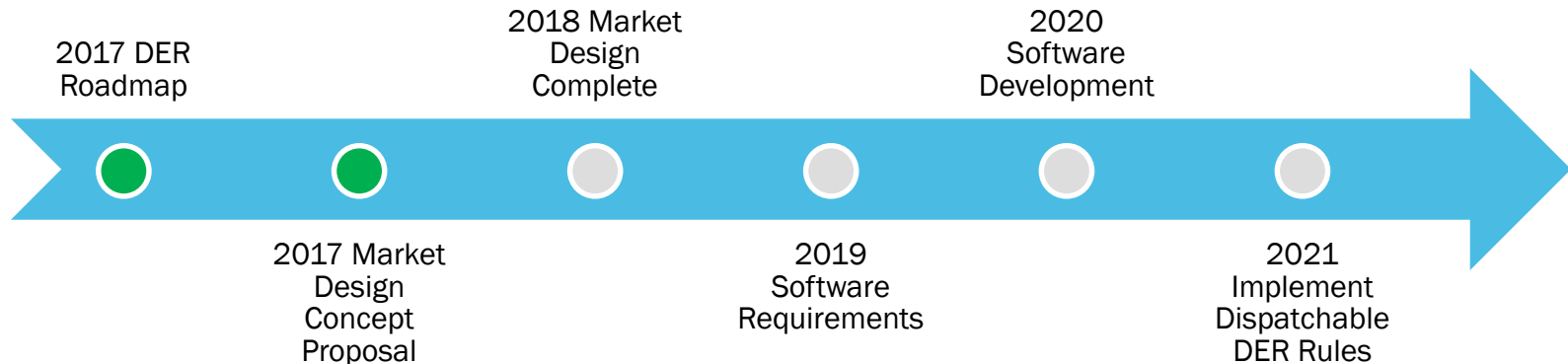
- Align Compensation with System Requirements



- Focus on Wholesale Market Transactions



Timeline



Distributed Energy Resources Roadmap for New York's Wholesale Electricity Markets:

http://www.nyiso.com/public/webdocs/markets_operations/market_data/demand_response/DER_Roadmap/DER_Roadmap/Distributed_Energy_Resources_Roadmap.pdf

NYISO Distributed Resources Market Design Concept Proposal:

http://www.nyiso.com/public/webdocs/markets_operations/market_data/demand_response/DER_Roadmap/DER_Roadmap/Distributed-Energy-Resources-2017-Market-Design-Concept-Proposal.pdf



Today

		Current Wholesale DER Participation		
		Capacity	Energy	Ancillary Services
Reliability	Non - Dispatchable	Special Case Resource (SCR) Program <ul style="list-style-type: none"> • <i>Manual Activation</i> • <i>Receives Capacity Payment</i> 	Emergency Demand Response Program (EDRP) <ul style="list-style-type: none"> • <i>Manual Activation</i> • <i>Voluntary Load Reduction</i> 	
		Load Modifier <ul style="list-style-type: none"> • <i>Self-managed Load Reductions to Reduce Capacity Obligation</i> 	Price Capped Load Bid <ul style="list-style-type: none"> • <i>Economic Day Ahead Load Procurement</i> 	
Economic	Real -Time Dispatchable		Day-Ahead Demand Response Program (DADRP) <ul style="list-style-type: none"> • <i>Scheduled in Day-Ahead Energy Market</i> • <i>Receives Energy Payments</i> 	Demand Side Ancillary Services Program (DSASP) <ul style="list-style-type: none"> • <i>Scheduled in Day-Ahead and Real Time Ancillary Services Market</i> • <i>Receives Ancillary Services payments</i>
		Behind-the-Meter Net Generation <ul style="list-style-type: none"> • <i>Comparable to a Generator</i> • <i>Fully integrated in Energy, Ancillary Services and Capacity Markets</i> • <i>Capacity with Daily Energy Must-Offer Obligation</i> 		

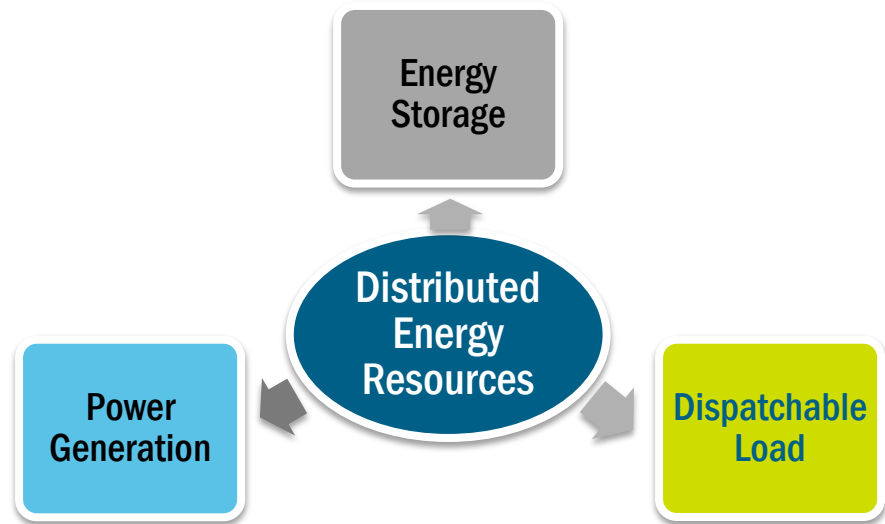
Future

Future Wholesale DER Participation			
	Capacity	Energy	Ancillary Services
Reliability	Special Case Resource (SCR) Program <ul style="list-style-type: none"> • <i>Manual Activation</i> • <i>Receives Capacity Payment</i> 	Emergency Demand Response Program (EDRP) <ul style="list-style-type: none"> • <i>Manual Activation</i> • <i>Voluntary Load Reduction</i> 	
	Load Modifier <ul style="list-style-type: none"> • <i>Self-managed Load Reductions to Reduce Capacity Obligation</i> 	Price Capped Load Bid <ul style="list-style-type: none"> • <i>Economic Day Ahead Load Procurement</i> 	
Economic	Behind-the-Meter Net Generation <ul style="list-style-type: none"> • <i>Comparable to a Generator</i> • <i>Fully integrated in both Capacity and Energy Markets</i> <ul style="list-style-type: none"> • <i>Capacity with Daily Energy Must-Offer Obligation</i> 		
	Dispatchable Distributed Energy Resources <ul style="list-style-type: none"> • <i>Comparable to a Generator</i> • <i>Fully integrated in Energy, Ancillary Services and Capacity Markets</i> <ul style="list-style-type: none"> • <i>Capacity with Daily Energy Must-Offer Obligation</i> • <i>Flexible performance & payment options</i> 		

DER and Aggregations

What is DER?

- DER can consist of:
 - Dispatchable load
 - Power generation
 - Energy storage



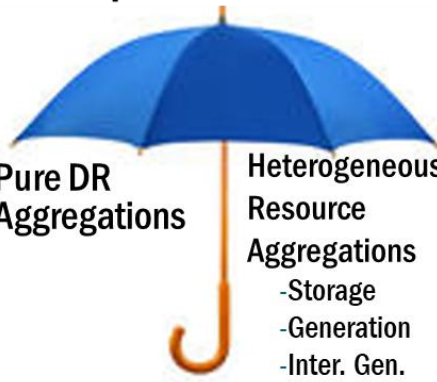
Participation Models Available to DER

Non-Dispatchable DER



SCR EDRP

Dispatchable DER



Pure DR Aggregations Heterogeneous Resource Aggregations
 - Storage
 - Generation
 - Inter. Gen.
 - DR

In Front of the Meter



Homogeneous Resource Aggregations
 - Storage
 - Generation
 - Inter. Gen.

- >=100kW**
- Capacity | - Energy
 - Energy | for
 - for reliability
 - reliability based
 - based events

- >=100kW**
- Capacity | - Capacity
 - Energy | - Energy
- >=1MW**
- Capacity | - Capacity
 - Energy | - Energy
 - Ancillary | - Ancillary

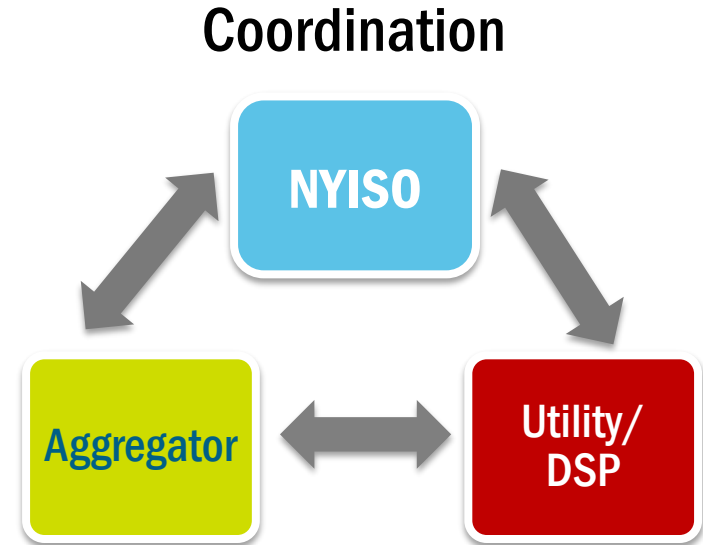
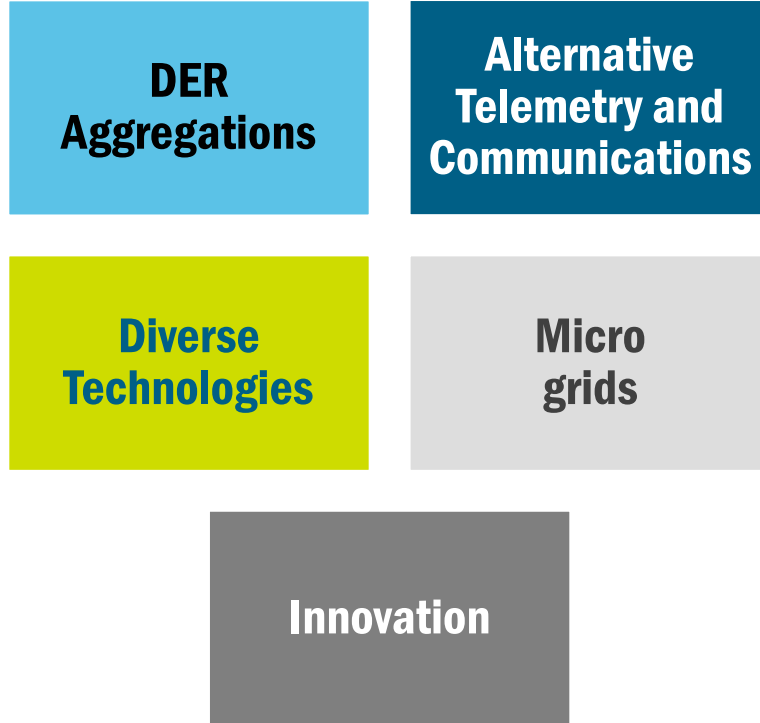
- >=100kW**
- Capacity |
 - Energy |
- >=1MW**
- Capacity |
 - Energy |
 - Ancillary |

NYISO Pilot Program

NYISO Pilot Program Objectives

1. Assess the capability of homogeneous and heterogeneous DER aggregations, and aggregations of other small resources, to provide energy and ancillary services and the associated benefits to the wholesale markets
2. Develop and evaluate DER and DCEA measurement and verification (M&V) and monitoring and control (M&C) requirements
3. Establish and evaluate an operational coordination framework between NYISO, utilities, DCE, and resources
4. Establish and evaluate DER and DCEA registration processes
5. Provide an opportunity for aggregators to test their capabilities without financial penalties for under performance

NYISO Pilot Program is looking for:



The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



www.nyiso.com