NYISO
Demand Response Resources

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Demand Response Resources

- MODULE OBJECTIVES:
  - Explain what Demand Response Resources are and benefits to their participation in NYISO markets and programs
  - Identify the various NYISO Markets and Programs that Demand Side Resources can participate in
  - List the basic participation requirements of Reliability Based Demand Response programs
  - Discuss participation of Demand Side Resources in the DER Aggregation Participation Model

Demand Response at the NYISO

- What do Demand Response resources do?
  - Reduce their power use for discrete periods of time as directed by the NYISO
- What are some of the advantages offered by Demand Response Programs?
  - Contribute to maintaining system reliability by
    - Effectively increasing the supply available to manage peak demand periods
    - Allow load to provide ancillary services to the wholesale electricity market
  - Maintain price stability in the market by
    - Allowing load to respond to wholesale market prices, which can moderate high prices in the NYISO Day-Ahead Market

Demand Response at the NYISO

- What are Demand Response resources?
  - Electricity consumers located in NYS that enroll to take part in a specific DR program
  - Examples:
    - Industrial companies
    - Commercial buildings
    - Big box stores
    - Small retail stores
    - Hospitals
    - Colleges/Universities

Demand Response at the NYISO

- How do resources provide Demand Response?

  Resources can provide load reduction by:

  - Decreasing power consumption in the facility (Interruptible loads) – Response Type C
  - Using a qualified behind-the-meter local generator to supply part of the resource's load – Response Type G
  - Using both load curtailment and a local generator – Response Type B
  - Using curtailment and/or a Behind-the-meter generation with additional capability of injection onto the grid – Response Type I*

*only for DER Aggregations

Demand Side Resources at the NYISO

- How can Demand Side Resources participate in NYISO markets and programs?
  - Demand Side Resources can participate in NYISO's Reliability based Demand Response Program
    - Emergency Demand Response Program (EDRP)
    - Special Case Resources (SCRs)
  - Qualified Demand Side Resources can participate as part of a DER Aggregation in the following markets:
    - Energy Market
    - Ancillary Services
    - Installed Capacity Market
- A Demand Side Resource may not simultaneously participate as a DER in an Aggregation and as an EDRP Resource or an SCR

Reliability – Based Programs

Reliability Based Demand Response Program

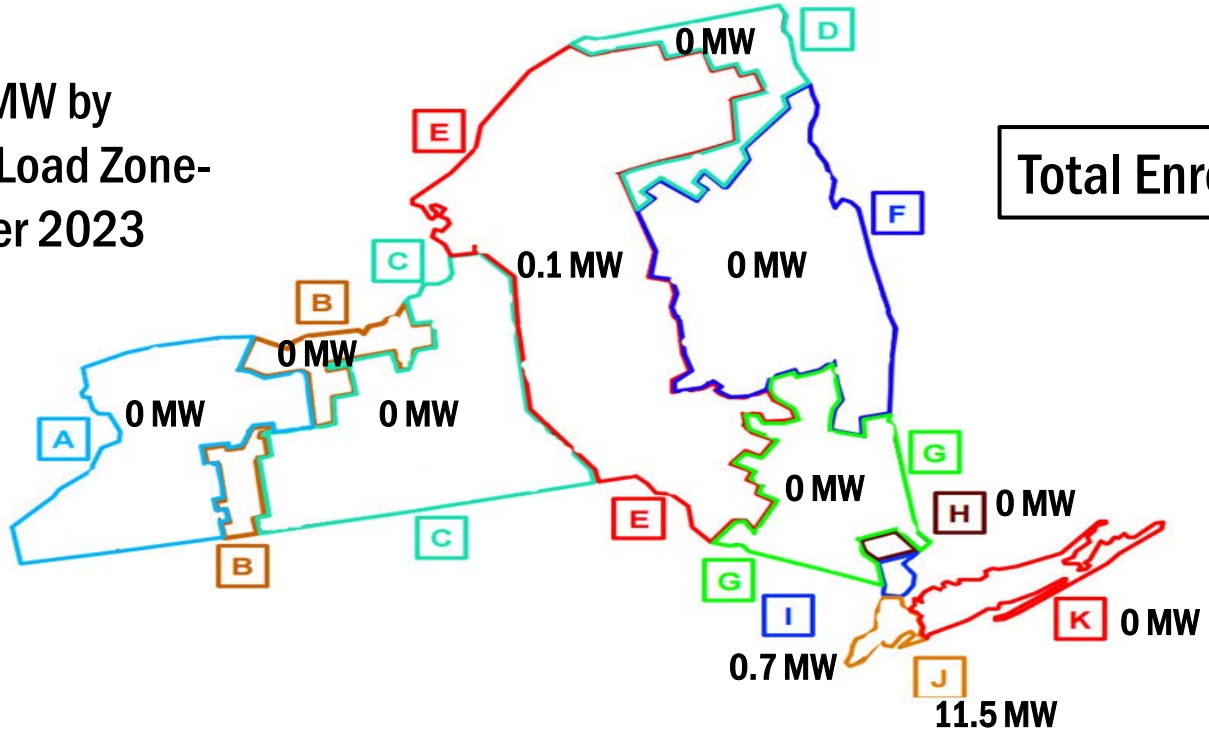
- Purpose: Provide load reductions in response to NYISO Operations instructions for a discrete period of time, to supplement generation when Operating Reserves are forecast to be short or when there is an actual Operating Reserve Deficiency or other system emergency
- NYISO determines activation
- Programs:
  - Emergency Demand Response Program (EDRP)
  - ICAP-Special Case Resources (SCR)
  - Targeted Demand Response Program (TDRP)

Reliability Based Demand Response Program

Emergency Demand Response Program (EDRP)	Special Case Resources (SCR)
Load Reduction through Interruptible loads or a qualified behind-the-meter local Generator	Load reduction through interruptible loads or loads with a qualified behind-the-meter Local Generator
Minimum 100kW reduction	Minimum of 100 kW reduction, in aggregate by Load Zone
Load reduction during a reliability event is voluntary	Mandatory response during reliability events for a minimum of four hours
Cannot participate in NYISO's Installed Capacity Market	Participates in NYISO's Installed Capacity Market as an ICAP Supplier • Must demonstrate maximum capacity obligation in each Capability Period
Enrolled by Curtailment Service Provider (CSP) • Serves as interface between NYISO and the resource	Enrolled by Responsible Interface Party (RIP) • Serves as interface between the NYISO and resource

EDRP Enrollment – Summer 2023

EDRP MW by NYISO Load Zone- Summer 2023

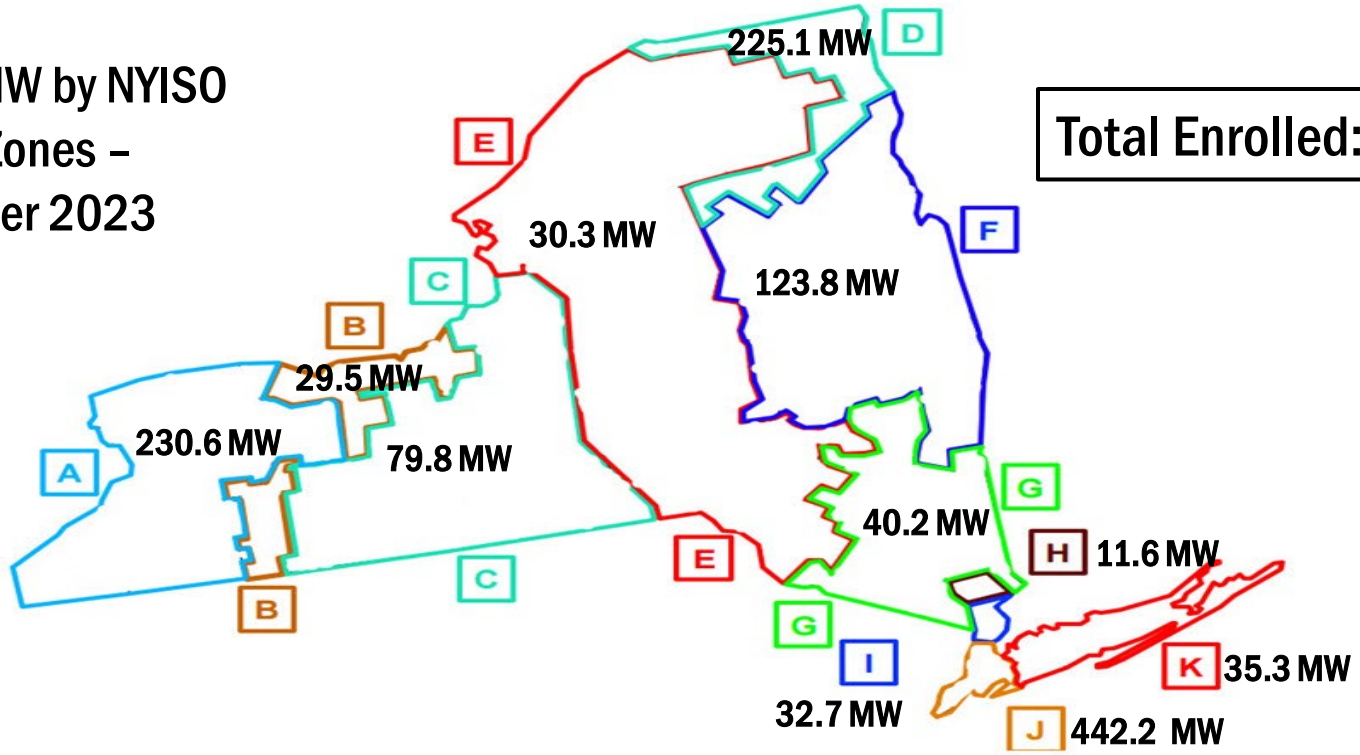


Total Enrolled: 12.3 MW

As reported in NYISO 2023 Annual Report on Demand Response Programs

SCR Enrollment – Summer 2023

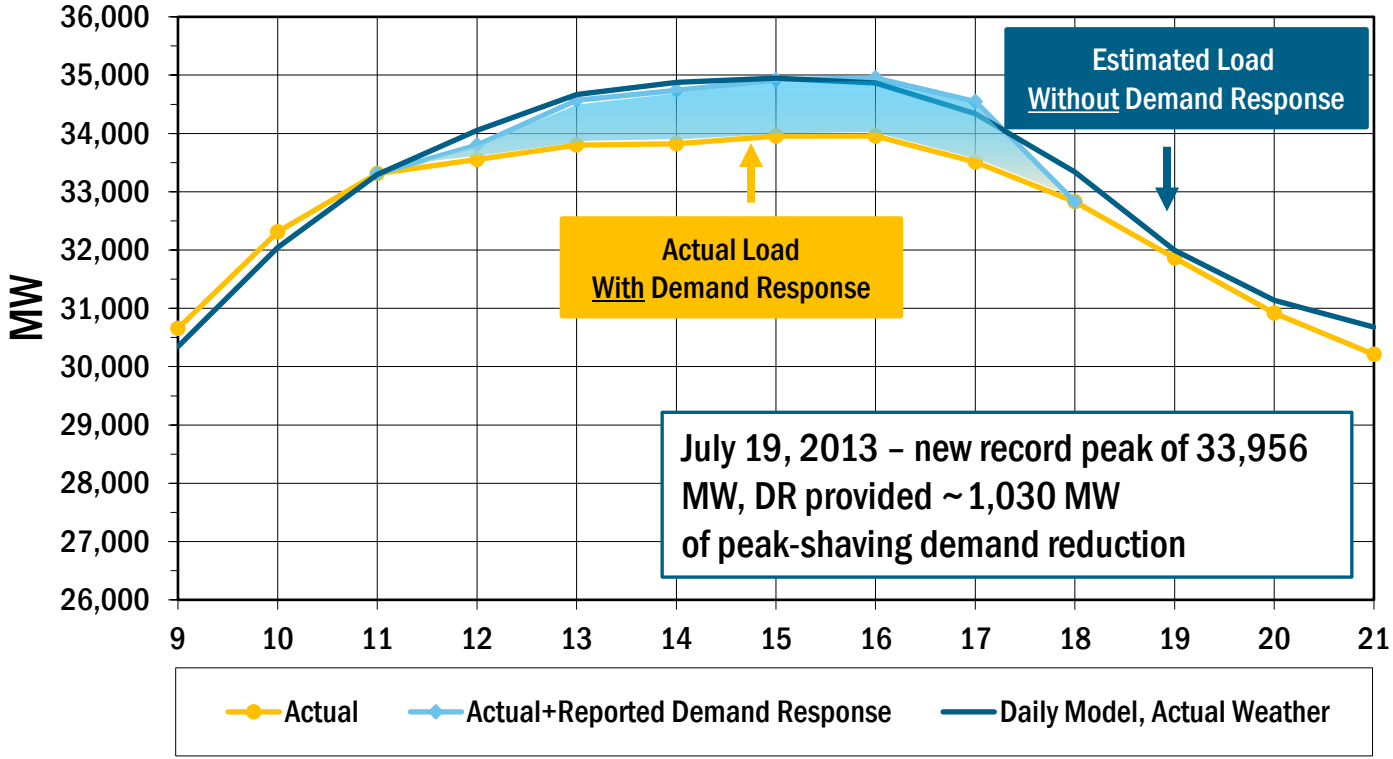
SCR MW by NYISO Load Zones – Summer 2023



Total Enrolled: 1281 MW

As reported in NYISO 2023 Annual Report on Demand Response Programs

Demand Response for Reliability



Targeted Demand Response Program (TDRP) - Reliability

- Effective July 1, 2007
- Con Edison can request NYISO to activate Demand Response for local reliability issues
- Participation
  - SCR and EDRP resources in specific locations in Load Zone J (NYC)
  - Voluntary for both SCR and EDRP
- Payments
  - Energy: Based on the payment calculation of the program in which the resource is enrolled
- Cannot set real-time market price

Reliability-Based Demand Response Program Participation Considerations

Key Program Components

- Curtailment Type
- Aggregations*
- Baselines
- Metering Requirements
- How Program Participants Enroll
- Managing Program Enrollments

* For Reliability-Based Demand Response

Curtailment Type

- Interruptible load and qualified behind-the-meter Local Generators (may be subject to DEC and/or local regulations)
  - Emergency Demand Response Program (EDRP) minimum 100 kW
  - Special Case Resources Program (ICAP/SCR) minimum 100 kW, in aggregate

Metering Requirements

- Revenue-grade (interval billing meter)
  - A meter that meets regulatory requirements for accuracy and has been certified for billing
  - Meter authorities have access to the data stored in the revenue meter
- Shadow meter
  - An additional metering device installed next to the existing revenue meter so that other entities may have access to the meter data
    - May be a revenue-grade meter that is not used for billing
    - May be another type of recording device using pulse outputs from the revenue meter (2% error or better)
    - Installed by a meter authority or a Professional Engineer
- Meter data may be submitted by the applicable TO or an MSE

Aggregations*

- Smaller resources with interval meters may be grouped within a zone in order to meet the minimum program participation requirements; individual resource performance still applies
  - Applicable for SCR resources
- Settlements are paid by the NYISO to the aggregators
  - Payments to individual DR resources enrolled by aggregators are managed between the aggregator and resource based on terms agreed between them
- The Small Customer Aggregation program allows for other validation methods such as statistical sampling to claim performance on a portfolio basis
  - Applicable for the EDRP and the SCR resources

* For Reliability-Based Demand Response

Reliability DR Baselines

Average Coincident Load (ACL)	Customer Baseline Load (CBL)
Baseline Load used by the NYISO to calculate the SCR capacity that can be offered in the Capacity Auctions during a specific Capability Period	Used to calculate energy market settlements for curtailment response during a Demand Response event or test
Program: SCR Capacity	Program: SCR Energy and EDRP
Reference period used: Prior Equivalent Capability Period	Reference period used: Ten “like” days prior to DR Event/test
Average of highest twenty resource loads during top forty SCR Load Zone peak load hours in same season (Summer/Winter) of previous year	Average of load for every Event/test hour for the highest five consumption days of last ten “like” days where DR event or schedule did not occur

How Program Participants Enroll

Retail Consumer

Registered NYISO Market Participant

Retail Consumers may be:

- *Industrial companies*
- *Big box stores*
- *Commercial buildings*
- *Hospitals*
- *Colleges/Universities*

Market Participants include:

- *Transmission Owner – local distribution utility*
- *Load-Serving Entity – competitive energy supplier*
- *Aggregator – company that transacts with NYISO on behalf of retail consumers*

Managing Program Enrollments

- Demand Response Information System (DRIS)
  - NYISO's automated system for enrollment and management of demand response resources
  - Accessible by Market Participants to enroll and manage the following data for their resources
    - Enrollment information
    - Aggregations*
    - Performance
    - Event responses
    - Settlement

* For Reliability-Based Demand Response

Demand Response Events, Performance Measurement, and Settlements

Demand Response Event

- Notification to NYISO's Market Participants is done through an automated system with a variety of message receipt options (e.g., e-mail, phone, etc.)
- The period when demand response resources reduce load pursuant to NYISO instruction
  - Zonal or sub-load pocket basis
- Events may be extended beyond initial time period or terminated early

Data Submission for Verifying Load Reduction

- ACL (Average Coincident Load)
  - Meter data for ACL is provided to NYISO by Responsible Interface Party (RIP) at the time of the retail consumer enrollment into the SCR program
- CBL (Customer Baseline load)
  - Meter data for CBL and event/test period is provided to NYISO by RIP/CSP within 75 days of reliability event/test

Measuring Participant Load Reduction

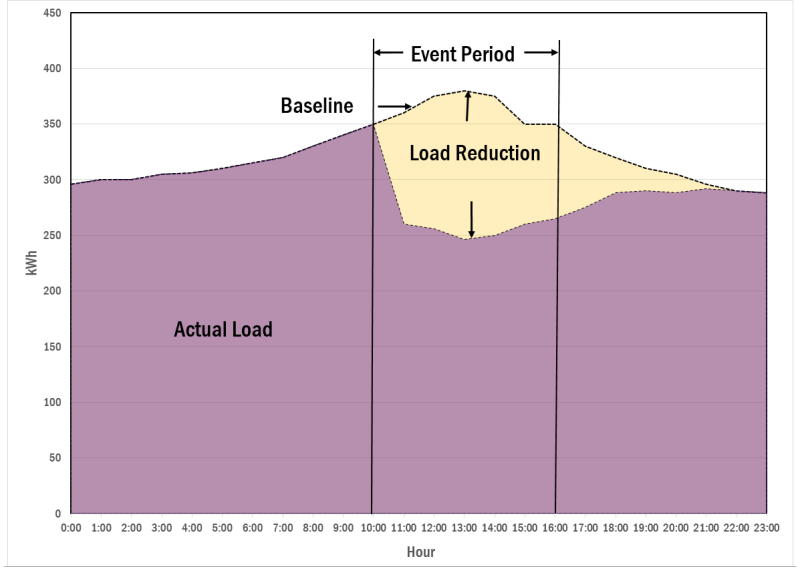
Step 1: Requires each resource establish a baseline load

- Estimates the amount of energy use expected if a load reduction had not occurred in response to the NYISO instruction or schedule, determines measurement interval

Step 2: Measure the Actual Meter Demand (AMD) for each interval

Step 3: Reduction for each interval =

Baseline Load – AMD for each interval



Sample Load Reduction Plan

A sample load reduction plan is shown below for a resource with a Declared Value of 300 kW:

Time with respect to SCR Event	Action	Load Reduction Achieved (kW)
2 hours prior	Pre-cool the office area from 70 degrees to 65 degrees	
15 minutes prior	Turn off the HVAC	150 kW
15 minutes prior	Transfer critical load to backup generator	100 kW
At the start	Dim the office lights	50 kW
15 minutes post	Return to normal operations	

DR Program Specific Settlements

Settlement for EDRP

- Paid for reducing energy consumption when called upon by the NYISO
- Energy: Based on measured energy reduction during an event, with a minimum rate of $500/MWh or the actual LBMP, if higher
- As participation is voluntary, penalties do not apply

DR Program Specific Settlements

New York ISO

Settlement for SCR

- Monthly Capacity: Based on capacity awarded through ICAP auctions as ICAP Supplier
  - UCAP payments calculated based on performance factors
  - All SCRs will have a 4-hour duration requirement and will be compensated commensurate with other 4-hour Resources
- Energy: Based on performance in events & tests
  - LBMP with daily guarantee of strike price recovery (Bid Cost Guarantee)
- Failure to respond to mandatory Demand Response events called by NYISO may lead to reduced future UCAP payments

Reliability Program Features

	EDRP	SCR
NYISO Market Participant	Curtailment Service Provider (CSP)	Responsible Interface Party (RIP)
Minimum Reduction	100 kW	100 kW, in aggregate
Performance Obligation	none	Minimum four hours for a mandatory event
Types of reduction	Load reduction through Curtailable Load and/or Local Generator	Load reduction through Curtailable Load and/or Local Generator
Event Notification	2-hour in-day notice	Day-ahead advisory and 2-hour in-day notice
Activation Priority	After SCR resources	Prior to EDRP resources
Capacity Payment	none	Monthly Based on ICAP auction
Energy Payment	Greater of real-time LBMP or $500/MWh and guaranteed 4-hour minimum	LBMP with a daily guarantee of Minimum Payment Nomination (strike price) recovery and guaranteed 4-hour minimum
Penalty for Non-compliance	none	Penalties and derated for non-compliance

Let's Review

NYISO can deploy SCR and EDRP events:

NYCA wide

At a zonal level

Both

Let's Review

In order to validate load curtailment response when must SCR metered data be submitted

- Within 15 days of event/test
- Within 30 days of event/test
- Within 55 days of event/test
- Within 75 days of event/test

DR Resources Participation in Energy Markets and Ancillary Services

DR Resources –Participation in NYISO Energy and Ancillary Services

- Economic Demand Response Programs
  - Demand Side Ancillary Service Program (DSASP) *
    - Participate in Ancillary Services to provide:
      - Operating Reserves and/or
      - Regulation Service and Frequency Response
- DER Participation Model
  - Participate in Energy, Ancillary Services and Installed Capacity Market

* DSASP will be available for a designated period, at the end of which all resources must transition into the DER Participation model to continue participation in applicable NYISO markets and services

Demand Side Ancillary Service Program* (DSASP)

New York ISO

- Participate in Ancillary Services to provide

  Operating Reserves and/or

  Regulation Service and Frequency Response

  - Economic evaluation and price setting capabilities identical to generation
- Participation is mandatory when scheduled
- Only Interruptible loads for Spinning Reserves or Regulation
  - Loads with a qualified behind-the-meter Local Generator may provide Non-Synchronous Reserves
- Minimum Reduction: 1 MW, in aggregate by Load Zone
- Minimum Energy Offer: Monthly Net Benefit Offer Floor

*Note: No new entry permitted since implementation of the DER Participation Model

Transition from DSASP to DER Participation Model

- DSASP provider must coordinate with NYISO Customer Registration to remove the DSASP resources from NYISO markets and the Market Information System (MIS) prior to participation as part of a DER Aggregation
- A DSASP provider must complete the DER Aggregator Registration process to participate as an Aggregator in the DER participation model
- DSASP resources that transition to the DER Participation model must be enrolled by an Aggregator in the NYISO's Agg system

DER Participation Model

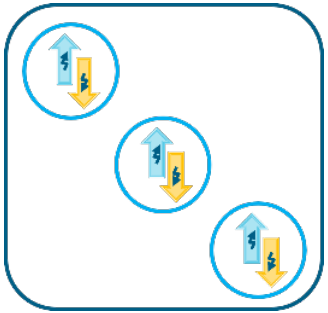
DER Participation Model - Terms

New York ISO

Distributed Energy Resource (DER)	A Distributed Energy Resource may be one of the following category of facilities electrically located in the NYCA: • A facility comprising two or more different technology types located behind a single point of interconnection with a maximum Injection Limit of 20 MW, • or a Demand Side Resource, • or a Generator with a max Injection Limit of 20 MW
Aggregation	An Aggregation is a Resource, comprised of two or more individual Generators, or Distributed Energy Resources, or one or more individual Demand Side Resources, at separate points of interconnection and that are grouped and dispatched as a single unit by the ISO • All DER Aggregations will be settled as a single entity
Aggregator	Entity that registers as a NYISO Customer • Responsible for enrollment of Aggregations, facility enrollment, bidding, scheduling, submitting meter data and settlements corresponding to participation in NYISO markets

DER Aggregation Participation Model

- Demand Response resources can participate as a DER Aggregation in the following configurations:
  - Aggregation comprising only of Demand Response resources
    - Example: One or multiple DR resources at separate points of Interconnection, mapping to the same Transmission node *
  - Aggregation comprising of Demand Response resources and other resource types
    - Example: DR resource(s) and an Energy Storage Resources (ESR) at separate Points of Interconnection, mapping to the same Transmission Node *



* Transmission Nodes reflect a collection of designated load buses on which individual DERs are located and may participate together in an Aggregation

DER Aggregation Participation Model

- One or more qualifying individual Demand Side Resource(s) can take part as a DER Aggregation in the following NYISO Markets:
  - NYISO Energy Markets
    - Day-Ahead
    - Real-Time
  - Ancillary Services
    - Operating Reserves
    - Regulation
  - Installed Capacity Market

Aggregation Size Requirement

- Min Size requirement for participation as an Aggregation in Energy, Ancillary Services and Installed Capacity is 100 kW
  - If an Aggregation offers a combination of Energy injections, Energy withdrawals, and/or Demand Reductions, the Aggregation must offer the minimum offer level of 100 kW for each response type
  - Each Demand Side Resource participating as a DER must have a minimum capability of 10 kW
- Demand Side Resources that participates as a DER has no maximum size limitation
  - For example: A Demand Side Resource can have a 50 MW load reduction capability

Participation Type

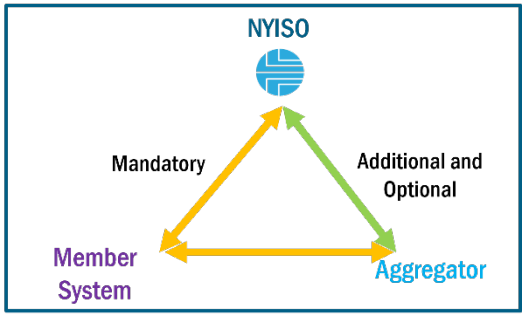
- Demand Side Resources can participate as a DER as one of the following types, depending on how they facilitate their load reduction:
  - Decreasing power consumption in the facility (Interruptible loads) – Response Type C
  - Using a qualified behind-the-meter local generator to supply part of the resource's load – Response Type G
    - Non-controllable generation cannot be the local generator (e.g., solar and other IPRs)
  - Using both load curtailment and a local generator – Response Type B
  - Using curtailment and/or a Behind-the-meter generation with additional capability of injection onto the grid – Response Type I

Metering and Telemetry Requirements

- Must comply with telemetry and metering standards identified in the MST, Sections 4 and 13
- Metering and telemetry data submitted for entire Aggregation
  - Aggregate sum of demand reduction provided by all Demand Side Resources within an Aggregation
- Revenue grade hourly interval metering at Point of Interconnection to NYS Transmission or Distribution System
  - Wholesale metering and/or meter data services must be obtained from Meter Authority

Metering and Telemetry Requirements

- 6 second Real-Time telemetry
  - Six second telemetry basepoints from the NYISO to the aggregation
  - Real time aggregated operational data from each aggregation to the NYISO
  - Acceptable configurations for two-way communications
    - Mandatory: Aggregators communicate with the NYISO through their respective Member System
    - Additional and Optional: Direct communication between the Aggregator's control center and NYISO



Baseline for Measuring Demand Reduction

New York ISO

- ECBL: Economic Customer Baseline Load
  - 5-minute baseline calculation for Demand Side Resources participating in Aggregation dispatched for Energy and Operating Reserves
  - Represents typical Load of DER facility
  - Uses a combination of historical data from the same time on similar days and a near-term adjustment used to incorporate the conditions of the specific operating day
- Regulation Baseline
  - Baseline calculation for Demand Side Resources participating in Aggregation dispatched for Regulation Service
  - Calculated as Load of DER facility 6-seconds prior to Aggregation receiving a Regulation dispatch

Actual Demand Reduction

- Actual Demand Reduction will be the greater of:
  a) The Demand Side Resource's adjusted ECBL or Regulation Baseline if dispatched for Regulation service for each five-minute interval minus the actual metered load for each six-second interval, and
  b) Zero
- Will only be calculated when Aggregation is dispatched by NYISO, and the Demand Side Resource responds to meet the dispatch
  - Otherwise Demand Reduction response of the DER facility will be zero

DER and Market Participation- Energy Market

- DER Aggregations are Dispatch only Resources
  - No commitment parameters required
- Aggregators must be able to operate its Aggregation(s) such that it can meet 5-minute basepoints from the NYISO in Real Time
- DER Aggregations shall be expected to follow NYISO dispatch signals consistent with the Aggregation's bid-in operating range

DER and Market Participation- Ancillary Services

New York ISO

- Qualified Demand Side Resources as part of a DER Aggregation can offer the following Ancillary Service products:
  - Regulation
  - Operating Reserves
    - Spinning Reserves
    - 10 Minute Non-Sync reserve
    - 30 min Reserves

DER and Market Participation- Installed Capacity Market

New York ISO

- Aggregators may qualify Aggregations as ICAP Suppliers in the NYISO market by complying with the requirements of Services Tariff Sec. 5.12, including, but not limited to:
  - Outage scheduling and reporting
  - Meeting Day-Ahead Market bidding requirements, and
  - Performing applicable DMNC tests (Performance tests)
- Demand Side Resources may participate in an Aggregation with an Energy Duration Limitation (EDL) of 2, 4, 6, or 8 hours
  - DER in one Aggregation can time stack their daily energy durations to meet the EDL requirements of the Aggregation
- Demand Side Resources can either participate as SCRs or as part of a DER Aggregation, but not both

Transitioning to and from the DER Participation Model

Transitioning from SCR program into DER Participation Model

New York ISO

- A resource may not simultaneously participate as a DER in an Aggregation and as an SCR
- An SCR is allowed to transition to the DER Participation model on a monthly basis
- Enrollment in Agg System
  - SCR must be enrolled by Aggregator
  - If RIP wants to transition to Aggregator, must complete DER Aggregator Registration prior to enable access to Agg system
- SCR must be separated from DRIS prior to start of participation a DER
  - End effective date in DRIS – day prior to start of 1st month of energy market participation
  - Separation from DRIS must be coordinated between the RIP, NYISO's Distributed Resources Operation team and the Aggregator (if different from the RIP)

Transitioning from the DER Participation Model to SCR

New York ISO

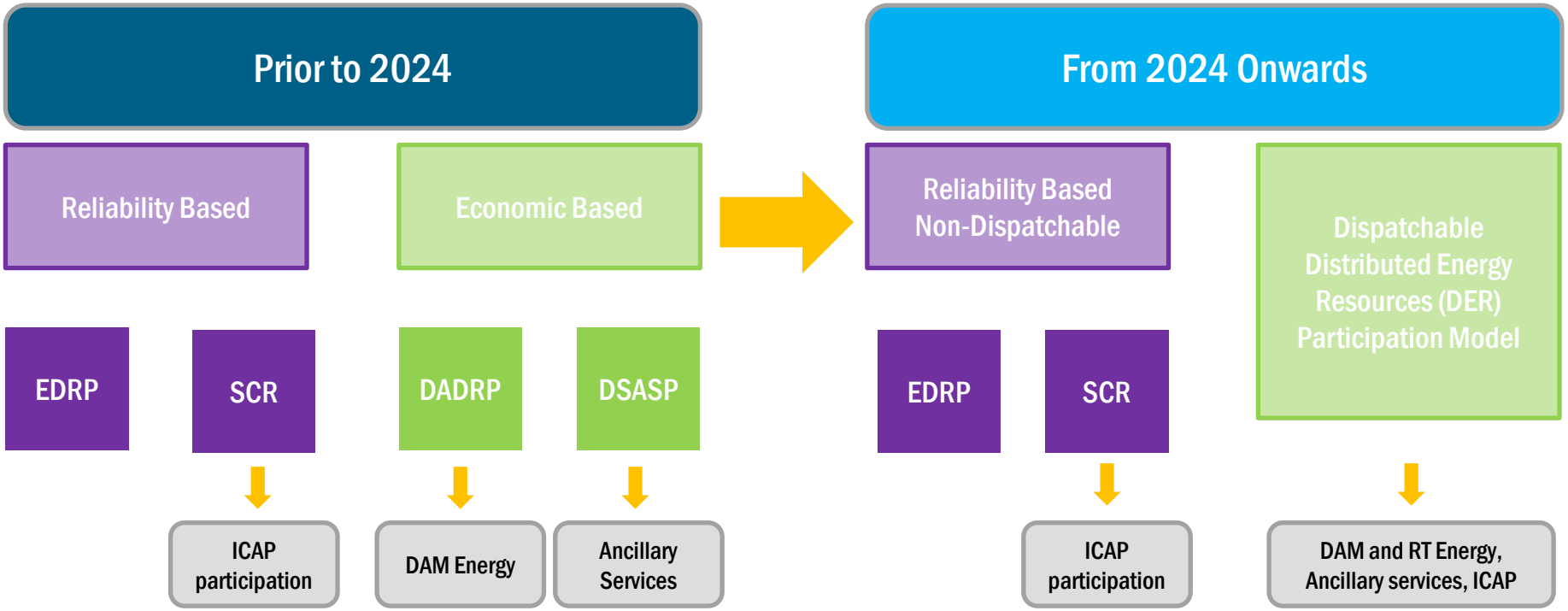
- A Demand Side Resource that is part of an Aggregation is allowed to transition to the SCR program
  - The Aggregator must separate the facility from the Aggregation in the NYISO's Agg System according to the rules of the DER participation model
  - Aggregator must work with NYISO's DRO team to effective end date the facility as a DER in the various NYISO systems including the MIS
  - The applicable RIP must enroll the resource as an SCR in DRIS according to the rules of the SCR program
  - ICAP Event Calendar provides accurate and up-to-date deadlines for ICAP market participation as an SCR and DER, and steps that are involved in transitioning from or to a DER Participation model

Transitioning from EDRP to the DER Participation Model

New York ISO

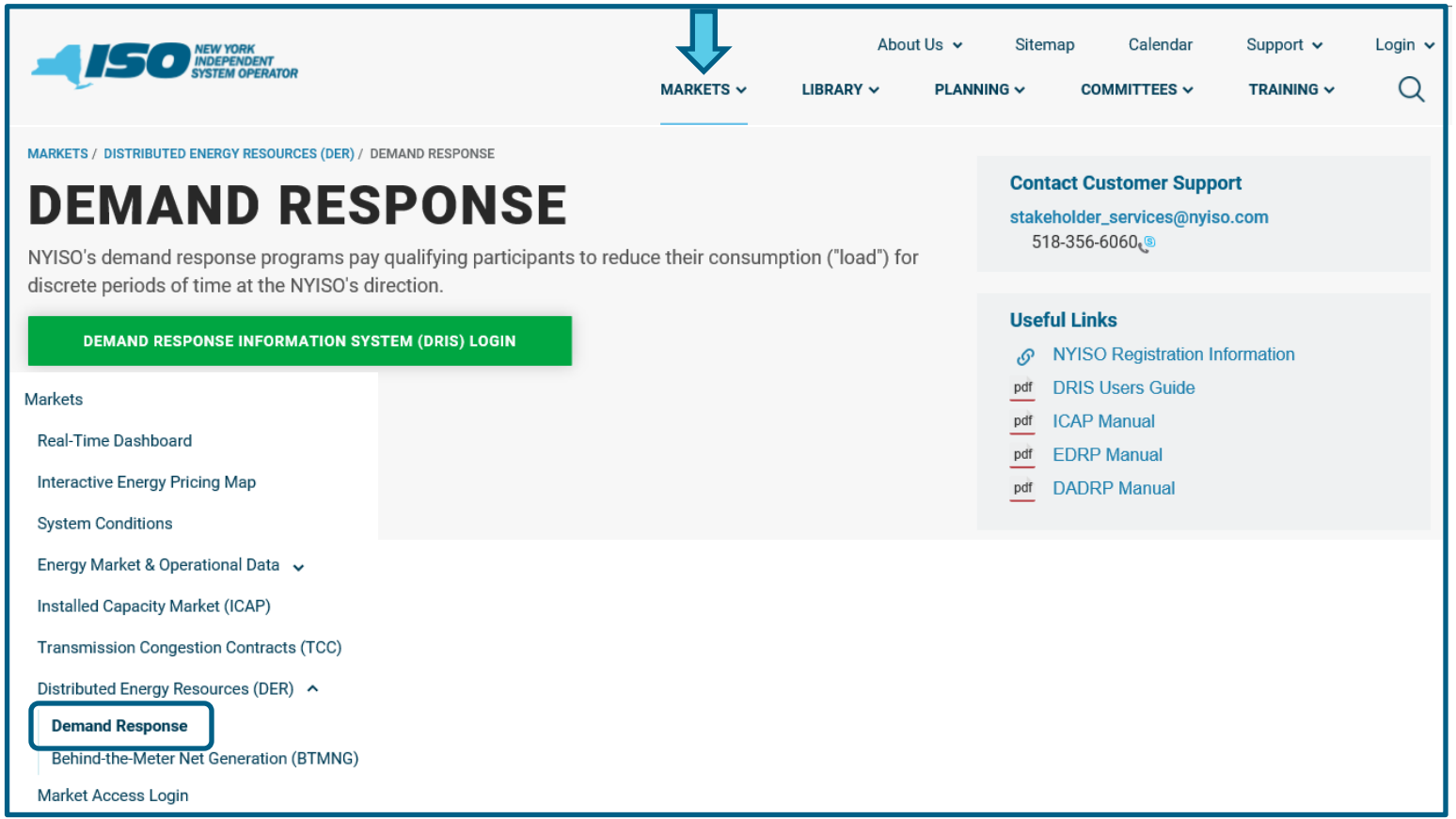
- A Resource may not simultaneously participate as a DER in an Aggregation and as an EDRP Resource
- An EDRP Resource is allowed to transition to the DER Participation model on a monthly basis
- An EDRP intending to transition to DER must unenroll and set an end effective date in DRIS that is prior to its intended start date as a DER
- The Aggregator responsible for the Resource must complete enrollment of the resource as a DER in the NYISO's Agg System
  - The Resource will be treated as a new DER during enrollment

Demand Side Resources- Participation in NYISO Markets and Services

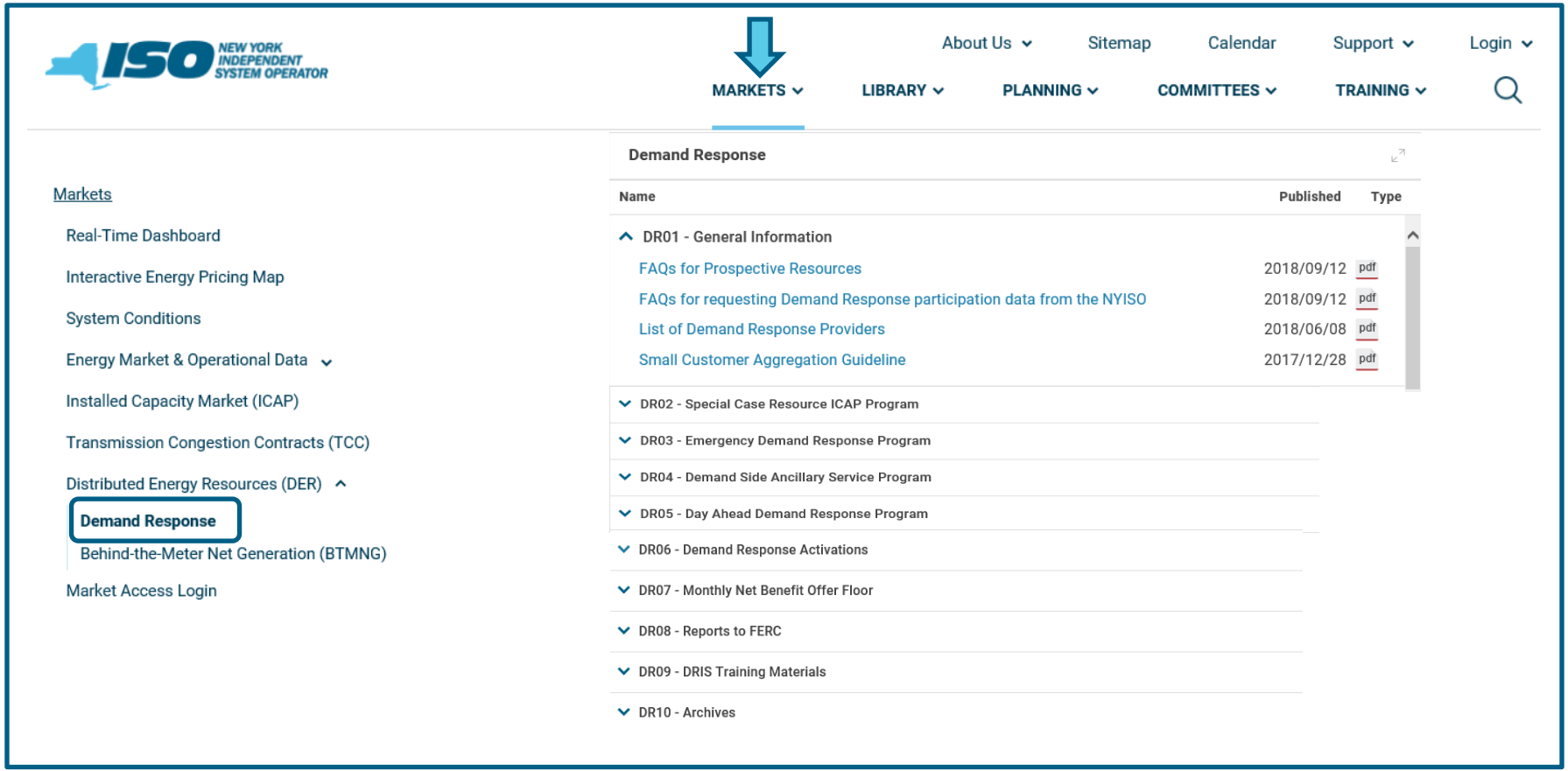


Demand Response
NYISO Website Data

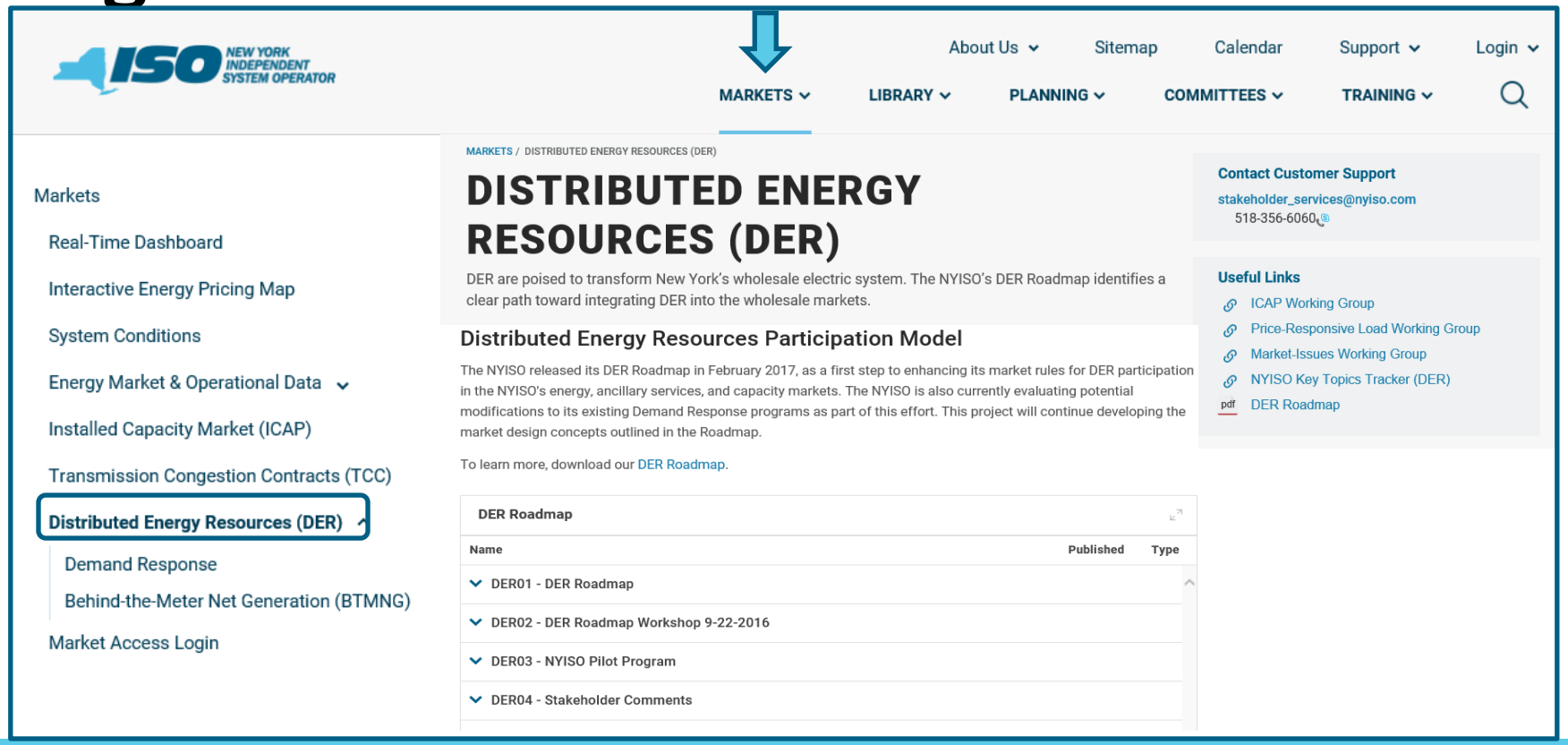
Demand Response – Main Page



Demand Response - Documents



Distributed Energy Resources (DER) Main Page



Demand Response Module Objectives:

- Explain what Demand Response Resources are and benefits to their participation in NYISO markets and programs
- Identify the various NYISO Markets and Programs that Demand Side Resources can participate in
- List the basic participation requirements of Reliability Based Demand Response programs
- Discuss participation of Demand Side Resources in the DER Aggregation Participation Model

Additional Resources

- Tariffs –MST and OATT
- Emergency Demand Response Program Manual
- Installed Capacity Manual
- DRIS Users Guide
- Aggregation Manual
- Aggregation System User's Guide
- Market Training Resources:
  - DER Participation Model- Onboarding Suite
  - Aggregation System Training e-learning Module
  - DER Participation Model e-learning Module