DER Energy Market Design DR Cost Allocation

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Agenda

- **OATT 24 Review of Updates & Edits**
- **Appendix**
  - **Previously presented baseline examples**
    - **Last presented on December 2018**

Background

Date	Working Group	Discussion points and links to materials
06-01-18	Market Issues Working Group (MIWG)	DER Market Design: Updates
06-19-18	Market Issues Working Group (MIWG)	DER Market Design: Updates
07-26-18	Market Issues Working Group (MIWG)	DER Market Design Updates: Energy Market Bid to Bill Examples
10-09-18	Market Issues Working Group (MIWG)	DER Market Design Update: Wholesale Obligations for Dual Participation
10-10-18	Market Issues Working Group (MIWG)	DER Market Design Update
11-05-18	Market Issues Working Group (MIWG)	DER Market Design Updates
12-18-18	Market Issues Working Group (MIWG)	DER Overall Energy Market Design Review
02-04-19	Market Issues Working Group (MIWG)	DER Overall Energy Market Design Review Part I
02-06-19	Market Issues Working Group (MIWG)	DER Overall Energy Market Design Review Part II
02-28-19	Market Issues Working Group (MIWG)	DER Energy Market Design Dual Participation

Overview & Purpose

Purpose of the DER Roadmap Effort

12/18
MIWG

- Develop and enhance participation opportunities for DER in the NYISO-administered wholesale markets by creating:
  - A Dispatchable DER Participation Model; and
  - Dispatchable Homogenous Aggregations of DER
- Create a model that supports the **NYISO Market Design Vision** - ***Attract and retain*** the most efficient resources ***to meet NY's reliability needs.***

Purpose of this Presentation

- Review previous topics discussed with stakeholders to enable and enhance the participation of DER in the NYISO Wholesale Energy & Ancillary Services Market **only;**
- Identify the Market Administration and Control Area Services Tariff (Services Tariff) sections affected by the topic discussed for draft Tariff that has been posted
  - There are ministerial edits throughout the tariff to add in, “and Aggregations” where appropriate
  - Sections of tariff have been removed throughout for language pertaining specifically to DADRP and DSASP

DER Definition for the Market Design

12/18
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- DER: A Generator, Energy Storage Resource, Intermittent Power Resource, Energy Limited Resource, or Capacity Limited Resource participating in an Aggregation whose maximum physical injection is 20 MW or less and Demand Side Resources (including facilities that can reduce Load and inject Energy) that respond to the ISO's instructions.
- Dispatchable DER are a subset of DER that are capable of responding in real-time to NYISO dispatch instructions.

OATT 24

Overview

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Update

- **Existing OATT 24 has been edited and updated to reflect methodology & terminology changes**
  - Document previously reflected calculations and cost-allocation for the DADRP
  - Updates have been made throughout the document to reflect changes incorporating the transition from DADRP to Demand Response in DER

General Edits

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Terminology

- **The following edits have been made throughout OATT 24:**
  - The term “Distributed Energy Resource (DER)” has replaced “Day Ahead Demand Response Program (DADRP)”
  - The term “Aggregator” has replaced “Demand Response Provider (DRP)”
  - The term “Interval” has replaced “Hourly” where applicable
  - Other minor grammatical edits to support these changes

New Content

ECBL Updates

- The methodology for selecting the intervals used for calculating the ECBL in some instances has been updated
  - In-Day adjustment
    - Selection of Proxy Load value
  - Weekday/Weekend
    - Methodology of selecting Proxy Load values based on day of the week
  - Subsection 24.2.1

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Regulation Response Updates

- New methodology added for calculating the Baseline Load during an interval in which there was Regulation response by the DER
  - Subsection 24.2.2

Next Steps

- Review Topics and Tariff Edits Not Discussed Today

Feedback?

- Email additional feedback to: DER_Feedback@nyiso.com

Don’t forget the underscore

Appendix
Energy Baselines and Real-Time Response for Demand Reduction in an Aggregation

Use of Baselines for Demand Reduction within an Aggregation

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- As a reminder, the DER market design intends to allow an Aggregation to provide offers for energy, operating reserves, regulation service or combination of such if capable and qualified to do so
- As a result a Demand Reduction resource within an Aggregation may be contributing to an aggregated dispatch instruction of the Aggregation for energy, reserves and/or regulation service
  - Calculation methodologies for a Demand Reduction resource need to account for the ability to provide (1) energy and reserves, and (2) regulation

Proposed Energy Baseline Methodology for Demand Reduction within an Aggregation

4/26 MIWG

- To minimize the data exchange between the NYISO and the aggregator, the energy baseline will be calculated by the aggregator to support real-time operation and settlement purposes, and will not be reported to the NYISO in real-time
  - The energy baseline of each resource will be used by the aggregator to determine the energy response by each resource providing Demand Reduction within a Aggregation
  - Only the Demand Reduction response of the Aggregation as a whole is communicated to the NYISO in real-time via telemetry
- The NYISO intends to include the calculation methodology to determine the energy baselines to be used by the aggregator in its Tariffs, similar to EDRP, DADRP and SCR
- The aggregator will be required to retain these calculation results and make them available to NYISO upon request

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Proposed Energy Baseline Methodology for Demand Reduction within an Aggregation, cont'd

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- The NYISO is proposing that the aggregator use an adjusted 5-minute ECBL for calculating the Demand Reduction of a resource when the Aggregation is providing energy
- This proposal is akin to the DADRP ECBL methodology with a few key differences:
  - Calculation of the baseline will be at a 5-minute time granularity instead of hourly
    - Hourly ECBL was intended for DADRP, which is an hourly granular market (i.e., day-ahead)
    - Dispatchable DER are intended to be dispatched in real-time for energy and ancillary services, making a 5-minute granular baseline more applicable when capturing load variability and resource capability

Proposed Energy Baseline Methodology for Demand Reduction within an Aggregation, cont'd

4/26 MIWG

- **Other key differences to the DADRP methodology include:**
  - The 5-minute ECBL will have an in-day adjustment applied on the resource's unadjusted 5-minute ECBL during the entire dispatch period of the Aggregation based on the resource's load during the three 5-minute intervals, starting 60 minutes prior to operating hour and ending 45 minutes prior to operating hour of the Aggregation
    - To better determine the real-time capability of a resource, NYISO is proposing a baseline adjustment to be calculated during the Operating Day for the purposes of real-time telemetry
    - The in-day adjustment will be capped at ±20%
    - DNV GL has concluded with similar finding that real-time adjustments perform better when the look-back window proximity is closer and its duration is shorter compared to the dispatch time, and when the adjustment is calculated throughout the Operating Day[1]
  - The in-day adjustment is to be recalculated when there is sufficient post dispatch load data available that is not affected by a wholesale market instruction to reduce load

[1] ISO New England, Inc., Oct. 31, 2014 Filing, Docket No. ER15-257-000, Testimony of Henry Yoshimura at 49

Example Unadjusted 5-minute ECBL Calculation

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- Calculation of Unadjusted 5-minute ECBL for 11:05 interval on March 2, 2018 (weekday)

Day	Load at 11:05 interval
March 1	1.1 MW
February 28	1.0 MW
February 27	1.0 MW
February 26	3.1 MW
February 23 **Dispatch Day**	2.8 MW + 0.5 MW (add-back) = 3.3 MW
February 22	2.4 MW
February 21	2.5 MW
February 20	1.2 MW
February 19 **Dispatch Day**	1.3 MW + 0.5 MW (add-back) = 1.8 MW
February 16	1.2 MW

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Example Unadjusted 5-minute ECBL Calculation

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- **Calculation of Unadjusted 5-minute ECBL for 11:05 on March 2, 2018 (weekday)**
  - Sorted highest to lowest
  - Unadjusted 5-minute ECBL = average of 5th and 6th values from descending list
  - Unadjusted 5-minute ECBL @ 11:05 March 2, 2018 = average (1.8, 1.2) = **1.5 MW**

Day	Load at 11:05 interval
February 23 **Dispatch Day**	2.8 MW + 0.5 MW (add-back) = 3.3 MW
February 26	3.1 MW
February 21	2.5 MW
February 22	2.4 MW
February 19 **Dispatch Day**	1.3 MW + 0.5 MW (add-back) = 1.8 MW
February 20	1.2 MW
February 16	1.2 MW
March 1	1.1 MW
February 28	1.0 MW
February 27	1.0 MW

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Example Timeline when Applying the In-Day Adjustment

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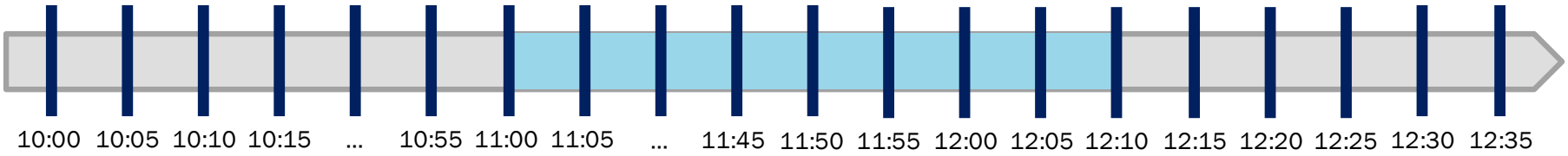
$Adj_{10:00,10:05,10:10}$ = (Average of Actual Metered Load Data) – (Average of Unadjusted 5-minute ECBL) for 5-min time intervals: 10:00, 10:05, 10:10

Start of Aggregation Dispatch

End of Aggregation Dispatch



Adjusted 5-minute $ECBL_{11:00}$ = Unadjusted 5-minute $ECBL_{11:00}$ + $Adj_{10:00,10:05,10:10}$

Adjusted 5-minute $ECBL_{11:05}$ = Unadjusted 5-minute $ECBL_{11:05}$ + $Adj_{10:00,10:05,10:10}$

and so on during dispatch period …

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Review of NYISO Ancillary Service Baseline for DSASP

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- Today the real-time response of a Demand Side Ancillary Service Program (DSASP) resource is calculated by taking its baseload prior to a dispatch event minus its actual metered load
- DSASP resources can provide 10-minute or 30-minute operating reserves and regulation service
- The baseload value is carried throughout the entire duration of the dispatch
- NYISO proposes to use the same methodology from DSASP to determine the response of a Demand Reduction resource contributing to a regulation dispatch of an Aggregation
  - The methodology used in DSASP adequately captures the response information needed by the NYISO for a resource providing regulation movement

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Response Calculation Methodology of Curtailment Resources within a Aggregation

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- **The NYISO proposes to use the aforementioned baselines to prescribe how an aggregator is to calculate the Demand Reduction response of a resource such that it can be incorporated into the Aggregation's total Demand Reduction response:**
  - When an Aggregation is dispatched for energy and reserves, the aggregator is to calculate any Demand Reduction response by taking the difference (MW) of (1) its Adjusted 5-minute ECBL and (2) its current 6-second resource load,
  - When an Aggregation is dispatched for regulation, the aggregator is to calculate any Demand Reduction response by taking the difference (MW) of (1) its baseload prior to start of dispatch for regulation service and (2) its current 6-second resource load, akin to the methodology used for existing DSASP resources
    - If the Aggregation was dispatched for energy only prior to being dispatched for regulation, the aggregator is to use a Demand Reduction resource's 6-second resource load during the time interval prior to dispatch plus its calculated response for the same time interval to calculate its "baseload prior to start of dispatch for ancillary regulation"

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Response Calculation Methodology of Demand Reduction Resources within an Aggregation – Energy Only Example

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	10:59:42	10:59:48	10:59:54	11:00:00	11:00:06	11:00:06
Agg Scheduled for Energy	Y	Y	Y	N	N	N
Agg Scheduled for Regulation	N	N	N	N	N	N
Resource Load	1.00	1.05	1.05	1.60	1.70	1.75
Unadjusted 5-min ECBL	2.00	2.00	2.00	1.50	1.50	1.50
In-Day Adjustment	-0.30	-0.30	-0.30	0.25	0.25	0.25
Adjusted 5-min ECBL	1.70	1.70	1.70	1.75	1.75	1.75
Demand Reduction Response	0.70	**0.65**	0.65	0	0	0

Demand Reduction Response at 10:59:48

= Unadjusted 5-minute ECBL @ 10:59:48 + In-Day Adjustment @ 10:59:48 – Resource Load @ 10:59:48

= 2.00 MW + (-0.30 MW) – 1.05 MW

= 0.65 MW

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4/26
MIWG

Response Calculation Methodology of Demand Reduction Resources within an Aggregation – Regulation Only Example

	10:59:42	10:59:48	10:59:54	11:00:00	11:00:06	11:00:06
Agg Scheduled for Energy	N	N	N	N	N	N
Agg Scheduled for Regulation	N	N	N	Y	Y	Y
Resource Load	1.75	1.85	1.70	1.60	1.70	1.55
Baseload Prior Regulation Dispatch				1.70	1.70	1.70
Unadjusted 5-min ECBL	2.00	2.00	2.00	1.50	1.50	1.50
In-Day Adjustment	-0.30	-0.30	-0.30	0.25	0.25	0.25
Adjusted 5-min ECBL	1.70	1.70	1.70	1.75	1.75	1.75
Demand Reduction Response	0	0	0	**0.10**	0	-0.15

Demand Reduction Response at 11:00:00

= Baseload Prior to Regulation Dispatch – Resource Load @ 11:00:00

= (Resource Load @ 10:59:54 + Demand Reduction Response @ 10:59:54) - Resource Load @ 11:00:00

= (1.70 MW + 0 MW) – 1.60 MW

= 0.10 MW

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Response Calculation Methodology of Demand Reduction

Resources within an Aggregation – Energy and Regulation

Example

4/26 MIWG

	10:59:42	10:59:48	10:59:54	11:00:00	11:00:06	11:00:06
Agg Scheduled for Energy	Y	Y	Y	Y	Y	Y
Agg Scheduled for Regulation	N	N	N	Y	Y	Y
Resource Load	1.00	1.05	1.05	1.60	1.70	1.55
Baseload Prior Regulation Dispatch				1.70	1.70	1.70
Unadjusted 5-min ECBL	2.00	2.00	2.00	1.50	1.50	1.50
In-Day Adjustment	-0.30	-0.30	-0.30	0.25	0.25	0.25
Adjusted 5-min ECBL	1.70	1.70	1.70	1.75	1.75	1.75
Demand Reduction Response	0.70	**0.65**	0.65	0.10	0	-0.15

Demand Reduction Response at 10:59:48

= Unadjusted 5-minute ECBL @ 10:59:48 + In-Day Adjustment @ 10:59:48 – Resource Load @ 10:59:48

= 2.00 MW + (-0.30 MW) – 1.05 MW

= 0.65 MW

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Response Calculation Methodology of Demand Reduction Resources within an Aggregation – Energy and Regulation Example, cont'd

4/26 MIWG

	10:59:42	10:59:48	10:59:54	11:00:00	11:00:06	11:00:06
Agg Scheduled for Energy	Y	Y	Y	Y	Y	Y
Agg Scheduled for Regulation	N	N	N	Y	Y	Y
Resource Load	1.00	1.05	1.05	1.60	1.70	1.55
Baseload Prior Regulation Dispatch				1.70	1.70	1.70
Unadjusted 5-min ECBL	2.00	2.00	2.00	1.50	1.50	1.50
In-Day Adjustment	-0.30	-0.30	-0.30	0.25	0.25	0.25
Adjusted 5-min ECBL	1.70	1.70	1.70	1.75	1.75	1.75
Demand Reduction Response	0.70	0.65	0.65	**0.10**	0	-0.15

Demand Reduction Response at 11:00:00

= Baseload Prior to Regulation Dispatch – Resource Load @ 11:00:00

= (Resource Load @ 10:59:54 + Demand Reduction Response @ 10:59:54) - Resource Load @ 11:00:00

= (1.05 MW + 0.65 MW) – 1.60 MW

= 0.10 MW

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