

Single Schedule Market Pricing Issues

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**Phase 1 - Session 3
Module G: Market Power Mitigation
Appendix**

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Review of Implementation Details for Conduct and Impact Tests of North American ISOs

1. Conduct Thresholds – High Prices
2. Conduct Thresholds – Uneconomic Production
3. Impact Thresholds

1. Conduct Thresholds – High Prices

The NYISO's conduct thresholds for energy and minimum load bids in constrained areas are defined by the formula: ¹

$$(2\% * \text{Average price} * 8760) / \text{constrained hours}$$

For energy and minimum load bids for the day-ahead and real-time markets,

Where:

- The average price is the fuel price adjusted average price over the prior 12 months for the real-time or day-ahead market as applicable during intervals when an interface or constraint into the area is binding;
- Constrained hours is the number of hours in the prior year when an interface or constraint into the area was binding.

1. NYISO Tariff, attachment H, section 23.3.1.2.2.1

The real-time thresholds for November 2016 calculated using the formula above are shown below.

REAL TIME IN CITY LOAD POCKET THRESHOLDS			
Name	Adjusted LPTs from 11/15/16 HB 0 through Future	Weighted Price from 11/1/15 through 10/31/16	Constrained Hours from 11/1/15 through 10/31/16
DUNWOODIE SOUTH	\$51.77	\$20.56	141
STATEN ISLAND	\$36.80	\$20.21	195
EAST RIVER	\$46.30	\$18.39	141
IN CITY 345/138	\$24.25	\$21.44	314
ASTORIA EAST/COR/JAMAICA	\$20.69	\$18.31	314
ASTOR WEST/QUEENB/VERNON	\$19.70	\$18.48	333
ASTORIA WEST/QUEENSBRIDG	\$19.66	\$18.45	333
VERNON/GREENWOOD	\$26.25	\$23.21	314
GREENWOOD/STATEN ISLAND	\$9.80	\$23.87	864

The NYISO has additional conduct thresholds for constrained areas: ¹

- Start up costs – a 50% increase over reference;
- Operating reserve and regulation capacity bids – a 300% increase or an increase of \$50 per megawatt, whichever is lower, excluding bids less than \$5 per megawatt;
- Time based parameters – an increase of 3 hours or an increase of 6 total hours over multiple time based parameters (such as start-up times, minimum run times or minimum down times);
- Non-price/non-time parameters – a 100% increase for parameters that are minimums (such as minimum load megawatts) or a 50% decrease for parameters that are maximums (such as ramp rates or number of starts or stops).

1. NYISO Tariff, attachment H section 23.3.1.2.2.5

The NYISO also has conduct thresholds for generators located outside constrained areas that can only be applied after the fact: ¹

- Energy and minimum load bids – an increase exceeding 300% or \$100 per megawatt hours, whichever is lower, except for offers less than \$25 per megawatt hour;
- Start up costs – a 50% increase over reference;
- Operating reserve and regulation capacity bids; Time based parameters; non-price/non-time parameters – same as for constrained regions.

1. NYISO Tariff, Attachment H, section 23.3.1.2.1

Finally, the NYISO also has conduct thresholds for generators committed outside the normal economic evaluation process for local or system reliability (such as a Day-ahead reliability unit or a unit committed via a supplemental resource evaluation): ¹

- Incremental energy or minimum generation bid – 10% or \$10 increase per megawatt hour;
- Start up bid – 10% increase;
- Minimum run time, down-time and start-up time -- 1 hour increase in aggregate;
- Minimum generation level – 10% increase;
- Number of stops per day – decrease by 1 or to 1 stop.

1. NYISO Tariff Attachment H Section 23.3.1.2.3

MISO conduct thresholds are similar to those of the NYISO. The conduct thresholds for Broad Constrained Areas are:¹

- Energy and minimum generation offers – a 300% or \$100 per megawatt hour increase, whichever is lower, excluding offers of less than \$25 per megawatt hour;
- Start up costs offers – 200% increase relative to reference;
- 10 minute (contingency) reserves and regulation Reserve offers – 300% increase or \$50 per megawatt hour, whichever is lower, excluding offers of less than \$10 per megawatt hour;
- Operating reserves – 300% increase or \$50 per megawatt hour, whichever is lower, excluding offers of less than \$5 per megawatt hour;

- Time based parameters - An increase of 3 hours in a single parameter or 6 hours over multiple parameters (including start-up times, minimum run times, and minimum down times);
- 100% increase for non-price non-time based parameters that are minimums (such as minimum load operating levels);
- 50% increase for non-price non-time based parameters that are maximums (such as ramp rates);
- 10% increase in production and reserve cost for a resource committed for Voltage and Local Reliability over the duration of the commitment period;
- An increase of \$25 per megawatt hour or 25% in day-ahead or real-time uplift payments over the duration of the commitment period.

MISO Narrow Competitive Area Thresholds 2014-2016

(\$ per megawatt hour)

	2014	2015	2016
WUMS	\$87.31	\$47.86	\$25.73
North WUMS	\$62.08	\$26.74	\$22.31
SE Minnesota/N Iowa/ SW Wisconsin	\$23.78	\$31.88	\$43.83
Amite South	\$31.20	\$50.74	\$100.00
WOTAB	\$30.89	\$19.04	\$31.86

The MISO's conduct thresholds for energy offer prices in narrow constrained areas are shown above for recent years.

The thresholds are determined based on the formula: ¹

- (Net annual fixed costs per megawatt hour for a new peaking unit) / (total number of constrained hours for the narrow constrained area over the period 12 month period).
- The fixed costs are calculated net of energy and ancillary service market revenues and resource adequacy revenues.
- The number of constrained hours used in the denominator is capped at 2000 hours.

1. MISO Module D section 64.1.2c

Other MISO conduct thresholds for narrow constrained areas are:¹

- Start up costs offers – 50% increase relative to reference;
- Time based parameters – same as Broad Constrained Areas;
- Non-price/non-time based minimum and maximum parameters – same as for Broad Constrained Areas;
- Day-ahead or real-time uplift payments – same as for Broad Constrained Areas.

1. MISO Module D section 64.1.2c

Conduct Tests

The New York ISO and MISO determine the conduct thresholds for incremental and minimum load energy using formulas that depend on prices or estimated costs, and the frequency regions were constrained in a prior period.

- The use of a conduct and impact test does not require these methods of determining conduct thresholds, the thresholds could also be determined by other rules, such as a percentage increase or a fixed dollar per megawatt increase.
- This is the approach taken by ISO New England and SPP.

Several ISO New England conduct thresholds are similar to those of the NYISO and MISO. The conduct thresholds for general mitigation outside of a constrained area are:

- Energy and minimum generation offers – a 300% of \$100 per megawatt hour increase, whichever is lower, excluding offers of less than \$25 per megawatt hour; ¹
- Start up and no load cost offers – 200% increase relative to reference; ²
- Combined start up and minimum load cost (low load cost) – 200% increase relative to reference. ³

1. ISO New England, Market Rule 1, IIIA5.5.1.2

2. ISO New England, Market Rule 1, IIIA5.5.4.2

3. ISO New England, Market Rule 1, IIIA5.5.7.2

Two important differences between the ISO New England general conduct and impact thresholds and those in New York and MISO are:

- The general conduct thresholds are applied only to suppliers that are found to be pivotal in the overall ISO New England market;¹
- Ex-ante mitigation is applied to suppliers failing the conduct and impact test outside the constrained areas.

1. ISO New England, Market Rule 1, IIIA5.2

ISO New England also has conduct thresholds for constrained areas:

- Energy and minimum generation offers – a 50% or \$25 per megawatt hour increase, whichever is lower; ¹
- Combined start up and minimum load cost (low load cost) – 25% increase relative to reference. ²

A resource is considered to be located within a constrained area:

- In the day-ahead market if LMP at the resource location exceeds the price at the ISO New England trading hub by \$25; ³
- In real-time if its shift factor to relieve the constraint exceeds the threshold used for redispatch. ³

1. ISO New England, Market Rule 1, IIIA5.5.2.2
2. ISO New England, Market Rule 1, IIIA5.5.5.2
3. ISO New England, Market Rule 1, IIIA5.2.2.

ISO New England also has conduct thresholds for resources dispatched or committed out of merit for reliability:

- Energy and minimum generation offers (manual dispatch) – a 10% increase relative to reference; ¹
- Combined start up and minimum load cost (low load cost) – a 10% increase relative to reference. ²

1. ISO New England, Market Rule 1, IIIA5.5.3.2

2. ISO New England, Market Rule 1, IIIA5.5.6.2

ISO New England has conduct thresholds for time based and other non-price parameters similar to NYISO and MISO but mitigation is applied differently.

- Time based offers have a threshold of 2 hours for an individual parameter or 6 hours over all parameters (minimum run time, minimum down time, start-up time and notification time); ¹
- Non-price, non-time parameters have a threshold of a 100% increase for minimums or a 50% decrease for maximums. ²

1. ISO New England, Market Rule 1, IIIA6.1

2. ISO New England, Market Rule 1, IIIA6.3

Instead of applying an impact test to these non-price parameters, ISO New England market software limits the parameters that can be submitted to those satisfying these rules.

Offers that violate the conduct rules but are not limited by the market software are subject to possible enforcement action. ²

1. ISO New England, Market Rule 1, IIIA6

Similar to the other ISOs applying a conduct and impact test, SPP has conduct rules covering resources located in frequently constrained areas, resources located outside the frequently constrained areas and resources committed for local reliability.¹

- Frequently constrained areas are regions identified in advance by the market monitor that are expected to be impacted by binding transmission or reserve zone constraints for at least 500 hours over a 12 month period and within which one or more suppliers are pivotal;
- There are currently two frequently constrained areas: the Texas Panhandle and Woodward.

1. SPP Attachment AF Section 3.1

Mitigation can be applied to resources located outside a frequently constrained area if the resource has a shift factor of 5% or more to resolve a binding transmission constraint or if it is located in a binding reserve zone.¹

1. SPP Attachment AF Section 3.1

All SPP conduct thresholds for energy offers are specified as percentage increases relative to mitigated offer prices: ¹

- 10% threshold for resources committed to address local reliability;
- 17.5% threshold for resources located within a frequently constrained area and not committed for local reliability;
- 25% for other resources subject to mitigation.

However, energy offers less than \$25 per megawatt hour are not subject to mitigation. ²

1. SPP Attachment AF, section 3.2 A
2. SPP Attachment AF, Section 3.2 B

SPP conduct thresholds for start-up costs, no-load costs,¹ and transition state offers² are also specified as percentage increases relative to mitigated offers:

- 10% threshold for resources committed to address local reliability;
- 25% for other resources subject to mitigation.

1. SPP Attachment AF, section 3.3 A
2. SPP Attachment AF, section 3.3.1

SPP also applies conduct thresholds for reserve offers relative to a mitigated offer.¹ The mitigated offer is specified to be zero for spinning reserves provided by resources other than combustion turbines, reciprocating engines and hydro resources operating as a synchronous condenser.² The conduct thresholds are:

- 10% threshold for resources committed to address local reliability;
- 25% for other resources subject to mitigation.

Offers below \$10 per megawatt hour are not be subject to mitigation.³

1. SPP Attachment AF, section 3.4A
2. SPP Attachment AF Section 3.4C
3. SPP Attachment AF, section 3.4B

Like the other ISOs utilizing conduct and impact tests, SPP has conduct thresholds for time based and other non-price parameters that are similar to those of the other ISOs.

- Time based offers have a threshold of 3 hours for an individual parameter or 6 hours over all parameters (minimum run time, minimum down time, start-up time and notification time);¹
- Non-price, non-time parameters have a threshold of a 100% increase for minimums or a 50% decrease for maximums;²
- 25% increase for minimum operating level for resources committed to address a local reliability issue.³

1. SPP Attachment AF, Section 3.6
2. SPP Attachment AF, Section 3.6
3. SPP Attachment AF, Section 3.6

2. Conduct Thresholds – Uneconomic Production

The New York ISO and MISO also have conduct thresholds for uneconomic production. The NYISO thresholds are: ¹

- Energy scheduled at a location where the LMP price is less than 20% of reference and contributes to, or causes, transmission congestion;
- Real-time output from a generator in excess of the NYISO's dispatch instructions that contributes to or causes transmission congestion if the additional output exceeds:
 - The 15 minute ramp rate of the resource; or
 - 100 megawatt for a generator; or,
 - 200 megawatts from the market party and its affiliates.

1. NYISO Tariff, Attachment H, section 23.3.1.3

The MISO conduct thresholds for uneconomic production are:

- Energy scheduled at a location where the LMP price is less than 50% of reference and causes a transmission or reserves zone constraint to bind and:
 - The energy offer is less than 50% of reference; or
 - The minimum load level is more than 25% higher than the reference level;
 - The time or other non-price conduct thresholds are violated.

- Real-time output exceeds dispatch instructions by 10% or more and causes a transmission constraint to bind;
- Energy offers are priced at less than 50% of reference in an output range scheduled to provide contingency reserves, regulation, or up ramp capability and the energy offer prices is less than the LMP.

ISO New England and SPP do not have mitigation policies applying to uneconomic production.

3. Impact Thresholds

The NYISO's impact thresholds are: ¹

- The same as the applicable conduct threshold for price impacts in a Narrow Constrained Area;
- A 50% increase in uplift payments to the generator over the day.

It should be noted that while the conduct thresholds have criteria for non-price parameters, the impact for all types of conduct violations is evaluated with respect to energy market prices and uplift payments.

1. NYISO Tariff, Attachment H, section 23.3.2.1

The MISO's impact thresholds are: ¹

- An increase of 200% or \$100 per megawatt hour, whichever is lower, for price impacts in a Broad Constrained Area;
- The same as the applicable conduct threshold for price impacts in a Narrow Constrained Area;
- \$0 for day-ahead or real-time revenue sufficiency guarantees for resources committed in Broad or Narrow Constrained Areas or for any resource committed for Voltage and Local Reliability.

1. MISO Module D, Section 64.2.1

ISO New England's energy offer impact thresholds are:

- An increase of 200% or \$100 per megawatt hour, whichever is lower for price impacts outside a constrained area; ¹
- An increase of 50% or \$25 per megawatt hour, whichever is lower, for price impacts within a constrained area. ²
- The impact is calculated relative to the price at the ISO New England trading hub in the day-ahead market and relative to the price at the resources location using reference prices in real-time. ³

1. ISO New England, Market Rule 1, IIIA5.5.3
2. ISO New England, Market Rule 1, IIIA5.5.2.3
3. ISO New England, Market Rule 1, IIIA5.3 and A.5.4

ISO New England does not apply an impact test for offers failing the conduct test for out of market energy dispatch or reliability commitment costs, all failing offers are mitigated to the reference value. ¹

Similarly, all offers failing the general or constrained area commitment cost test based on low load cost are mitigated to the reference value. ²

1. ISO New England, Market Rule 1, IIIA5.5.3.2 and IIIA5.5.6.2
2. ISO New England, Market Rule 1, IIIA5.5.4.2 and IIIA.5.5.5.2

SPP's energy and uplift cost impact thresholds are:

- An increase of \$25 per megawatt hour for energy prices, an increase of \$25 per megawatt hour for MCP or uplift payment of \$25 per megawatt hour, both for resources located within and outside frequently constrained areas. ¹
- The impact threshold is zero for resources committed to address local reliability. ²

1. SPP Attachment AF, Section 3.7 and 3.2B.

2. SPP Attachment AF, Section 3.2B.