ISO New England Energy and Commitment Mitigation

MIC Special Session – Fuel Cost Policy Enhancements

August 9, 2019

- The following is a description of ISO New England's mitigation approach to the best of our knowledge

- This presentation was put together at the request of PJM stakeholders

- We have tried to ensure the accuracy of all explanations

- Any errors that remain are solely the authors' responsibility, and corrections that refer to ISO New England's documentation would be appreciated

- Market Power Mitigation and Evaluation
    - Conduct Test & Reference Levels
    - Impact Test
    - Pivotal Supplier Test

- Types of Mitigation

- Mitigation Type Details

- Questions

- Offer rules established to ensure that outcomes below the offer caps are competitive

- Limits how much a resource can offer above its costs

- Evaluated using a:
    1) **Conduct** (offer) Test
    2) **Impact** Test
    3) **Pivotal Supplier** Test

- If a unit's offer exceeds the tests limits **and** impacts market outcomes, its offer is changed to one that reflects its costs

- Compares a resource's offer to its **reference level**

- **Reference Level** – reflects the actual cost to produce energy or the lost opportunity cost of producing energy now vs. later (i.e. hydro)

- Offer cannot exceed its reference level by more than a certain threshold

- Reference levels for start-up costs, no-load costs and offer blocks are calculated separately and assume that no costs from one component are included in another component

- In general, reference levels for each block of a supply offer are calculated according to the following hierarchy, under which the first method that can be calculated is used (except when in any hour the cost-based reference level is higher than either the accepted offer-based or LMP-based reference level, then the cost-based reference level is used):

  1) Accepted Offer-Based

  2) LMP-Based

  3) Cost-Based

- Reference levels for start-up costs and no-load costs are always cost-based

- The lower of the **mean** or the **median** of a generating Resource's Supply Offers that have been accepted and are part of the seller's Day-Ahead Generation Obligation or Real-Time Generation Obligation over the previous 90 days, adjusted for changes in fuel prices

- In summary:
  - Over the previous 90 days
    - Of all the accepted resource's supply offers in DA or RT
      - Take the lower of the mean and median
        - » Adjust for changes in fuel price

- The mean of the LMP at the Resource's Node during the lowest-priced 25% of the hours that the Resource was dispatched over the previous 90 days, adjusted for changes in fuel prices

- In Summary:
  - Over the previous 90 days
    - During the hours the resource was dispatched
      - Of the lowest-priced 25% of these hours
        » Take the mean of the LMP at the resource's node
        » Adjust for changes in fuel price

- Calculated by taking into account information on costs provided by the Market Participant though the consultation process

- Formulas are provided in ISO-NE Market Rule 1 – Appendix A, Section III.A.7.5.1

- A Market Participant may submit a fuel price, to be used in calculating the Reference Levels, whenever the Market Participant's expected price to procure fuel for the Resource will be greater than that used by the Internal Market Monitor in calculating the Reference Levels

- May be submitted for Supply Offers entered in the Day-Ahead Energy Market, the Re-Offer Period, or for a Real-Time Offer Change

- If a fuel price adjustment is submitted, then the cost-based reference level is automatically used

- If, within a 12 month period, a participant does not provide documentation to support the submitted fuel price within 5 business days and for that time period either:

  1) The Market Participant was determined to be a pivotal supplier

  2) The resource was determined to be in a constrained area

  3) The resource was committed for reliability

  – Then a fuel price adjustment should not be permitted for that resource for the following time periods:

Number of Incidents	Months Precluded
1	2
2+	6

- Resource's impact on the market price at its location cannot exceed a certain threshold

- Evaluated using a "shadow" pricing run, run in parallel with the actual pricing run

- In the "shadow" pricing run, a resource's offer is replaced with its **reference level**

- Examines whether a Market Participant has aggregate Energy Supply Offers $_{MW}$ (up to and including Ecomax) that exceed the Supply Margin $_{MW}$ for an applicable interval

- If Market Participant $_{Aggregate\ Energy\ Offers}$ > Supply Margin; then the Market Participant is considered a pivotal supplier

Supply Margin = Total System Capacity - Total System Load
(as adjusted for net interchange with other control areas, including operating reserves)

Supply Margin = System Capacity – [system load + reserves – imports + (exports)]

- Applicable interval is defined as follows:

  – Day-Ahead - any of the 24-hours

  – Current operating plan in the Real-Time energy market - any of the hours included in the plan

  – In the Short Term Unit Dispatch System (STUDS), it is the interval in which STUDS issues dispatch instructions

Mitigation Type	Day-Ahead	Real-Time
General Threshold Energy Mitigation (GTE)	✗	✓
Constrained Area Energy Mitigation (CAE)	✓	✓
Manual Dispatch Energy Mitigation (MDE)	✗	✓
General Threshold Commitment Mitigation (CM)	✗	✓
Constrained Area Commitment Mitigation (CACM)	✗	✓
Reliability Commitment Mitigation (RCM)	✓	✓
Start-Up and No-Load Mitigation (SU/NL)	✓	✓

- Energy Mitigations – evaluated every time a unit is dispatched

- Commitment Mitigations – evaluated at the time of commitment

- For the purposes of the **Constrained Area Test**, a unit is considered to be contributing to a binding constraint if the unit has a sensitivity (sometimes referred to as a shift factor) of -0.02 or less

- Mitigation is applied for RCM to any resource committed to provide or required to remain online to provide one or more of the following:
  - Local first or second contingency protection
  - VAR or voltage support
  - Special Constraint Resource Service

Mitigation Type	Conduct Test	Impact Test	Pivotal Supplier Test
General Threshold Energy Mitigation (GTE)	✔	✔	✔
Constrained Area Energy Mitigation (CAE)	✔	✔	✖
Manual Dispatch Energy Mitigation (MDE)	✔	✖	✖
General Threshold Commitment Mitigation (CM)	✔	✖	✔
Constrained Area Commitment Mitigation (CACM)	✔	✖	✖
Reliability Commitment Mitigation (RCM)	✔	✖	✖
Start-Up and No-Load Mitigation (SU/NL)	✔	✖	✖

Mitigation Type	Conduct Test	Impact Test	Pivotal Supplier Test
General Threshold Energy Mitigation (GTE)	min(300% or 100 $/MWh)	min(200% or 100 $/MWh)	N/A
Constrained Area Energy Mitigation (CAE)	min(50% or 25 $/MWh)	Min(50% or 25 $/MWh)	N/A
Manual Dispatch Energy Mitigation (MDE)	10%	N/A	N/A
General Threshold Commitment Mitigation (CM)	300% (Low Load Cost)	N/A	N/A
Constrained Area Commitment Mitigation (CACM)	25% (Low Load Cost)	N/A	N/A
Reliability Commitment Mitigation (RCM)	10% (Low Load Cost)	N/A	N/A
Start-Up and No-Load Mitigation (SU/NL)	200%	N/A	N/A

Mitigation Type Details

- Market Participant must be determined to be a **pivotal supplier**
- The **Conduct test** is
  - Applied to all offers greater than $25.00/MWh and
  - Applied to all offer blocks
- A **Conduct test** failure is determine by:

$$\text{Supply Offer}_{\text{energy block}} > \min(\text{RL} \times 4_{(300\% \text{ increase})}; \text{RL} + \$100 \text{ MWh})$$
$$\text{WHERE: RL} = \text{Reference Level}_{\text{energy block}}$$

- The **Impact test** is applied to all Supply Offers that fail the **Conduct test** for GTE by setting the Supply Offers to Reference Levels in Shadow STUDS

- **Impact test** failure is determined by:

$$LMP_{\text{Production Node (PN)}} > LMP_{\text{Impact Node (IN) Threshold}}$$

WHERE: $LMP_{\text{Production Node}}$ = LMP calculated using the Asset Supply Offers

AND $LMP_{\text{Impact Node Threshold}}$ = $\min(LMP_{IN} \times 3_{(200\%)}; LMP_{IN} + \$100/MWh)$

- NOTE:
  - Shadow STUDS runs in parallel to Production STUDS
    - Used to evaluate resources that fail **conduct tests** to determine if mitigation is warranted based on **impact test** results
  - Production Node (PN) and Impact Node (IN) refer to the generator node in each of the respective STUDS cases

- Both the **Conduct** and **Impact tests** must fail, and the Market Participant must be a **pivotal supplier** for mitigation to be imposed for GTE

- Mitigation is imposed by setting all financial parameters of the Supply Offer to Reference Levels in Production STUDS
  – Includes all energy offer blocks, and all types of Start-up (C = Cold; I = Intermediate; H = Hot) and No-Load

- Market Participant must be determined to be a **pivotal supplier**

- **Conduct test** failure is determined by:

$$(\text{Low Load Cost }_{Offer} \ / \ \text{Low Load Cost }_{Reference}\ ) > 3$$

- No impact test is performed

- Low Load Cost is determined by:

(Cold Start-up fee + (No-load fee x min run time)
+
($ energy @ Ecomin x MW @ Ecomin x min run time)

NOTE: Calculated with Supply Offers and Reference Levels

NOTE: if the combined min run and min down exceed 24-hours, the **Conduct test** above will use the greater of 24-hours or the Resource's min run time

- If a resource fails the **Conduct test** and if the Market Participant is a **pivotal supplier**, it will be evaluated with all financial Supply offer parameters set to Reference Levels for the commitment determination
  - Includes all energy offer blocks, all types of Start-up (C,I,H) and No-load

- Mitigation is applied for CAE to Supply Offers for a resource determined to be within a constrained area

- The **Conduct test** is applied to all offer blocks

- A **Conduct test** failure is determined by:

$$\text{Supply Offer}_{\text{energy block}} > \min(\text{RL} \times 1.5_{(50\% \text{ increase})}; \text{RL} + \$25 \text{ MWh})$$
$$\textbf{WHERE: } \text{RL} = \text{Reference Level}_{\text{energy block}}$$

- The **Impact test** is applied to all Supply Offers that fail the **Conduct test** for CAE by setting the Supply Offers to Reference Levels in Shadow STUDS

- **Impact test** failure is determined by:

$$LMP_{Production\ Node\ (PN)} > LMP_{Impact\ Node\ (IN)\ Threshold}$$

WHERE: $LMP_{Production\ Node}$ = LMP calculated using the Asset Supply Offers

AND $LMP_{Impact\ Node\ Threshold}$ = min(LMP_{IN} x 1.5 $_{(50\%)}$; LMP_{IM} + $25/MWh)

- Both the **Conduct** and **Impact tests** must fail for mitigation to be imposed for CAE

- Mitigation is imposed by setting all financial parameters of the Supply Offer to Reference Levels in Production UDS
  - Includes all energy offer blocks, and all types of Start-up (C,I,H) and No-Load

Constrained Area Commitment Mitigation (CACM)

- Mitigation is applied for CACM to any resource determined to be within a constrained area in the Real-Time energy market

- Conduct test failure is determined by:

$$(\text{Low Load Cost }_{Offer} \;/\; \text{Low Load Cost }_{Reference}) > 1.25$$

- Only the **Conduct test** must fail for mitigation to be imposed for CACM

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- Low Load Cost is determined by:

> (Cold Start-up fee + (No-load fee x min run time)
> +
> ($ energy @ Ecomin x MW @ Ecomin x min run time)
>
> NOTE: Calculated with Supply Offers and Reference Levels

> NOTE: if the combined min run and min down exceed 24-hours, the **Conduct test** above will use the greater of 24-hours or the Resource's min run time

Constrained Area Commitment Mitigation (CACM)

- Resource failing the CACM **Conduct test** will be evaluated with all Supply Offer financial parameters set to Reference Levels for the commitment determination

    - Includes all energy offer blocks, all types of Start-up (C,I,H) and No-load

- Mitigation is applied for RCM to any resource committed to provide or required to remain online to provide one or more of the following:
  - Local first or second contingency protection
  - VAR or voltage support
  - Special Constraint Resource Service
- A **Conduct test** failure is determined by:

$$(\text{Low Load Cost}_{\text{Offer}} / \text{Low Load Cost}_{\text{Reference}}) > 1.10$$

- Low Load Cost is determined by:

> (Cold Start-up fee + (No-load fee x min run time)
> +
> ($ energy @ Ecomin x MW @ Ecomin x min run time)
>
> NOTE: Calculated with Supply Offers and Reference Levels

> NOTE: if the combined min run and min down exceed 24-hours, the **Conduct test** above will use the greater of 24-hours or the Resource's min run time

- Only the **Conduct test** must fail for mitigation to be imposed for RCM

- Resource failing the RCM **Conduct test** will be evaluated with all Supply Offer financial parameters set to Reference Levels for the commitment determination

  - Includes all energy offer blocks, all types of Start-up (C,I,H) and No-load

- **Conduct test** failure is determined by:

> Start-up $_{(C,I,H)}$ or No-load Offer > (RL $_{Start-up\ (C,I,H)\ or\ No-Load}$ x 3 $_{(200\%\ increase)}$)
> **WHERE:** RL = Reference Level $_{Start-up\ (C,I,H)\ or\ No-Load}$

- Only the **Conduct test** must fail for mitigation to be imposed for SU/NL mitigation

- Mitigation is imposed at the time of commitment decision by setting all financial parameters of the Supply Offer to Reference Levels
  - Includes all energy offer blocks, and all types of Start-up (C,I,H) and No-Load

- Applies when a resource is manually dispatched above its economic minimum limit and the energy price parameter of its Supply Offer at its Desired Dispatch Point is greater than the Real-Time Price at the Resource's Node

- A **Conduct test** failure is determined by:

$$\text{Supply Offer}_{\text{energy block}} > \text{RL} \times 1.10_{(10\% \text{ increase})}$$

$$\textbf{WHERE: } \text{RL} = \text{Reference Level}_{\text{energy block}}$$

- Only the **Conduct test** must fail for mitigation to be imposed for MDE

- Mitigation is imposed by setting all financial parameters of the Supply Offer to Reference Levels in Production UDS
  - Includes all energy offer blocks, and all types of Start-up (C = Cold; I = Intermediate; H = Hot) and No-Load