Dynamic Delist Bid Threshold for FCA 13-15

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### Review of Dynamic Delist Bid Threshold (DDBT)

**WMPP ID:** 119

**Proposed Effective Date:** March 2018 (for FCA 13)

- ISO Tariff requires triennial review of the Dynamic De-list Bid Threshold.

- ISO is proposing to change the Dynamic Delist Bid Threshold (DDBT) for FCA 13-15 and set it to $4.22/kW-m

- **Today:** Design basis and the result of the analysis.
  - ISO requests feedback from market participants.
Tariff requirement and economic logic are the drivers of the change

- DDBT for FCA 10-12 is set at $5.50/kW-m
- In addition to the Tariff requirement to revisit DDBT triennially, ISO and IMM have concluded that the DDBT in FCA11 does not properly reflect the likely cost of the marginal resource for FCA13.
  - This presentation explains why this is important for setting DDBT.
- ISO relies on the same FERC approved economic framework used to establish DDBT for FCA9-12 for setting the DDBT for FCA13-15
- Data and parameters are updated to arrive the new DDBT value.
Agenda for Today

• Overview of Dynamic Delist Bid Threshold
  – Tariff and economic role of DDBT

• Competitive bid review
  – Competitive bid application to setting DDBT

• Review assumptions

• Appendix: Costs of obtaining a CSO
Dynamic De-List Bid Threshold

OVERVIEW OF DYNAMIC DELIST BID THRESHOLD
What is the Dynamic De-List Bid Threshold (DDBT)?

• Administrative threshold established to determine a price above which existing resources will have their de-list bids reviewed by the IMM for possible seller-side market power mitigation.

• Existing resources wishing to submit de-list bids at prices below DDBT to remove capacity, within the Forward Capacity Auction, can do so without IMM review.

• The DDBT is not a tariff rate that directly impacts auction prices (e.g., Net CONE, MRI demand curve).

• Tariff requires ISO to review DDBT triennially (III.13.1.2.3.1.A)
  – It is currently set at $5.50/kW-m
What is DDBT?

A hypothetical supply curve and the role of DDBT

What is DDBT?
Economic Objectives of DDBT

• Identify potential non-competitive and impactful de-list bids, while not impeding the normal competitive functioning of the market.

• These objectives are in tension, and require balancing two key considerations:
  1. If the DDBT is set too high, potentially impactful de-list bids, with the potential to exercise of market power, will evade the IMM’s review
  2. If the DDBT is set too low, there may be an additional administrative burden for those existing resources that are likely to be inframarginal
What would be the *ideal* DDBT?

- The competitive price from the marginal resource in the target auction is the ideal DDBT
  - Such a threshold would only target impactful noncompetitive conduct (along with resources that are competitively extra-marginal).
  - However, establishing such an ideal threshold is *not possible*: competitive price of the auction is impossible to know before the auction.
What does the DDBT represent?

Supply and Demand Curves - Forward Capacity Auction

FCA 11 Demand Curve  Hypothetical Supply Curve

DDBT For FCA11  DCA EOR Price

Marginal Offer

Capacity (GW)

$/kW-month

$0  $2  $4  $6  $8  $10  $12  $14  $16  $18  $20

32.0  32.5  33.0  33.5  34.0  34.5  35.0  35.5  36.0  36.5  37.0
Proposal: Set the DDBT close to the *likely* cost of the marginal resource

- ISO is proposing to set the DDBT close to (but slightly below) the *likely* cost of the marginal resource
- Framework is identical to that used for the previous Commission-approved DDBT
- Inputs are updated to calculate DDBT for FCA13-15
- We will analyze the cost of assuming a CSO for the marginal resource in the next section
  - The analysis is done under the PFP framework, similar to the analyses done for DDBTs in FCA9 and FCA10-12.
Current Tariff language

III.13.1.2.3.1.A Dynamic De-List Bid Threshold

The Dynamic De-List Bid Threshold for a Forward Capacity Auction is $5.50/kW-month. The Dynamic De-List Bid Threshold shall be recalculated no less often than once every three years. When the Dynamic De-List Bid Threshold is recalculated, the Internal Market Monitor will review the results of the recalculation with stakeholders.
## History of DDBT

<table>
<thead>
<tr>
<th>FCA #</th>
<th>Capacity Commitment Period</th>
<th>Dynamic De-List Bid Threshold</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCA8</td>
<td>2017-2018</td>
<td>$1.00</td>
<td>Administrative Price</td>
</tr>
<tr>
<td>FCA9</td>
<td>2018-2019</td>
<td>$3.94</td>
<td>Economic framework based on competitive bid method</td>
</tr>
<tr>
<td>FCA10</td>
<td>2019-2020</td>
<td>$5.50</td>
<td>Economic framework based on competitive bid method</td>
</tr>
<tr>
<td>FCA11</td>
<td>2020-2021</td>
<td>$5.50</td>
<td>Economic framework based on competitive bid method and data from IMM reviewed static de-list bids</td>
</tr>
<tr>
<td>FCA12</td>
<td>2021-2022</td>
<td>$5.50</td>
<td></td>
</tr>
</tbody>
</table>
Methodology – 3 Step Process

1. Determine Inputs using Observations, Tariff Parameters, Analysis and Forecasts

2. Apply the Commission Approved Economic Framework

3. Adjust Price for Future Commitment Period Parameters
Step 1: Determine Inputs

• ISO will use the same methodology and framework it did for establishing DDBT in FCA 9-12.

• The input to the formulas come primarily from three sources:
  – Observations: De-list bids of resources that are awarded CSO in FCA 11 and are ‘close’ to marginal resource
  – Tariff Parameters: Performance Payment Rate (PPR) for FCA13
  – FCA demand curve properties: expected number of hours with scarcity conditions
Step 2: Economic Framework of DDBT

- The economic framework is the basis for determining the competitive cost of the marginal resource to assume CSO

- It uses the method used for FCA 9-12, namely, the PFP framework and competitive bidding under this framework to formulate the cost of assuming CSO

- This framework properly takes into account the components of the bids under PFP as discussed in the next section

- It is used to impute some unobserved cost components of CSO holders’ bids
  - With $p_{FCA11}=$5.297/kW-m and $DDBT_{11}=$5.50/kW-m, bid components of resources with CSO were not observed separately by ISO or IMM in FCA 11.
Step 3: Adjust Price for future FCA

• Once unobserved components of the bid price are imputed, they are used, in conjunction with parameters updated for the target FCA, to estimate the likely cost of the marginal resource.

• The Performance Payment Rate for FCA 13+ will be higher (at $3,500/MWh) than for FCA 9-11.
Dynamic De-List Bid Threshold

ECONOMIC FRAMEWORK: COMPETITIVE BID IN THE FCA
Economic Framework: Competitive Bid in FCA

• What is an competitive bid?
  – It is the minimum price below which the resource is financially better off without a CSO and above which the resource is financially better off with a CSO

• Why do we need to calculate competitive bids?
  – It reflects the competitive cost of assuming CSO, and
  – IMM uses it to evaluate participants’ Static De-list Bids

• What variables impact the competitive bid?
  – Depends on whether the resource remains active in E&AS markets without a CSO or becomes inactive (mothball, retire. Etc.)
  – PPR, H, and Br impact the competitive bid for all resources
  – Resource’s costs and Infra-marginal Rent (IMR) can impact the competitive bid of resources that would become inactive if they don’t have a CSO.
Economic Framework: Competitive Capacity Bid Notation

— Before presenting the competitive bid formula we first present the (familiar) bidding formula notation:

<table>
<thead>
<tr>
<th>A</th>
<th>Average Performance (Avg. MWh delivered per CSO) of the resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC</td>
<td>Residual Component, inclusive of Net Going Forward Cost, Risk Premium and opportunity costs (if applicable)</td>
</tr>
<tr>
<td>Br</td>
<td>System Balancing Ratio</td>
</tr>
<tr>
<td>H</td>
<td>Capacity Scarcity Condition Hours</td>
</tr>
<tr>
<td>PPR</td>
<td>Performance Payment Rate</td>
</tr>
</tbody>
</table>
Constraints on FCA bid

Rational Capacity Resource Owners are facing two Constraints:

1. For resources that will stay in the energy market irrespective of having a CSO:
   
   \[
   \text{FCA Bid} \geq \text{Expected PFP Charges}
   \]
   
   – Otherwise resource would be better off without CSO

2. For resources that will exit the energy market without a CSO:
   
   \[
   \text{FCA Bid + expected PFP Performance Payment} \geq \text{Expected PFP charges + going forward costs}
   \]
Economic Framework: Competitive Bid Formula

We can re-arrange the two conditions on the prior slide and combine them into a single formula, with two components:

1. Expected PFP financial obligation charges
2. Part of RC that is not covered by PFP performance credits (if any)

\[ b_{FCA} \geq \frac{PPR \times Br \times H}{PPR} + \max \left\{ 0, RC - PPR \times A \times H \right\} \]

Expected PFP financial obligation charges
Part of the NGFC not covered by PFP performance credit

ISO’s [April 2013 PFP presentation](http://example.com) derives this formula.
What is observable in the competitive bid formula

- **PPR**: is a value set by the Tariff. It was $2,000/MWh for FCA 11 and will be $3,500/MWh for FCA 13.
- **A**: historical average performance during scarcity conditions of an existing resource is observable to the IMM and the ISO
- **H**: ISO has estimated the number of hours with scarcity conditions and has presented the relationship of cleared capacity with this value (see ISO’s December 19, 2016 memo on “Operating Reserve Deficiency Information”)
- **b_{FCA}**: de-list bid price. If a resource de-lists at any point during FCA 11, its bid was observed by the ISO. For resources that did not delist capacity in the FCA, an upper-limit to this price is the EOR price of the closing round
- **Br**: Based on prior data analyses and FERC filings (consistent with Net CONE filing)
- **RC**: this value is *not* directly observed by the ISO or the IMM
How is competitive bid formula used in setting the DDBT

All of the components in the formula are observed by the ISO/IMM, except for the RC term of CSO holders with bids and offers ‘close to’ the marginal resource (many of which were in the dynamic delist range in FCA 11).

Therefore: The competitive bid formula is used in two steps:

1. First we use the formula, to ‘back-solve’ for the RC components of historical bids

2. Once this is known, we can forward solve for the DDBT in the target FCA with the higher future PPR
Back-solve step: Example of how competitive bid formula is used to solve for unobservable cost component

Assume:

- $Q=200\text{MW}$
- $\text{PPR}=$$2,000/\text{MWh}$
- $A=0.75$
- $Br=0.85$
- $H=5\text{hrs/yr}$
- Resource’s submitted bid=$4.50/\text{kW-m}=$$54,000/\text{MW-yr}$ in FCA11:

$$b_{11} = \text{PPR}_{11} \times Br \times H + \max(0, RC - \text{PPR}_{11} \times A \times H)$$

Or:

$$54,000=2,000 \times 0.85 \times 5 + \max(0, RC - 2,000 \times 0.75 \times 5)$$

$$\iff RC=$$53,000/MW-yr or $RC=$4.417/kW-m
Forward-solve step. Example of use of competitive bid formula (cont’d)

• ISO uses the residual component with updated parameters to obtain an ‘updated’ bid for each resource
  – ISO only updates PPR from $2,000/MWh to $3,500/MWh (applicable for FCA13)

\[ \hat{b}_{13} = \text{PPR}_{13} \times \text{Br} \times H + \max(0, RC - \text{PPR}_{13} \times A \times H) \]

Or:

\[ \hat{b}_{13} = 3,500 \times 0.85 \times 5 + \max(0, 53,000 - 3,500 \times 0.75 \times 5) \]

\[ \hat{b}_{13} = $54,750/MW-yr \text{ or: } \hat{b}_{13} = $4.56/kW-m \]
Dynamic De-List Bid Threshold

REVIEW ASSUMPTIONS AND CALCULATIONS
Overview

• Review formula and data selection process
• MW-Weighted Price Calculation
• Hours (H) Assumption
• Performance (A) Assumption
• Residual Component
• Dynamic De-List Bid Calculation

Inputs to calculate both Residual Component and DDBT
## Assumptions

<table>
<thead>
<tr>
<th>Formula Component</th>
<th>Description</th>
<th>Data Source</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive Bid (DDBT&lt;sub&gt;13&lt;/sub&gt;)</td>
<td>Competitive bid as a proxy for the DDBT</td>
<td>Calculation</td>
<td>$4.22/kW-m</td>
</tr>
<tr>
<td>Performance Payment Rate (PPR)</td>
<td>Payment or charge based on deviations</td>
<td>Tariff</td>
<td>$2,000/MWh (FCA11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$3,500/MWh (FCA13)</td>
</tr>
<tr>
<td>Balancing Ratio (Br)</td>
<td>System performance relative to CSO position</td>
<td>Consistent with expectations used in Net CONE study</td>
<td>0.85</td>
</tr>
<tr>
<td>Capacity Scarcity Condition Hours (H)</td>
<td>Total number of hours during which the system was deficient in operating reserves</td>
<td>Expected H, provided by ISO-NE memo</td>
<td>5 hr/yr</td>
</tr>
<tr>
<td>Performance Value (A)</td>
<td>Expected Performance during CSC</td>
<td>Reserve Constraint Penalty Factor (RCPF) analysis</td>
<td>0.69</td>
</tr>
<tr>
<td>Residual Component (RC)</td>
<td>Going Forward Costs, Opportunity Cost, and Risk Premium</td>
<td>Implied</td>
<td>$3.99/kW-m</td>
</tr>
</tbody>
</table>
Observations: MW-Weighted Price

• MW-weighted price is comprised of offers observed and implied in FCA 11
  – Offers from inframarginal existing generating resources within dynamic round (resources that obtained a CSO), and
  – All other inframarginal offers assumed to be priced at $3.999/kW-m ($0.001/kW-m below the end of round price of the closing round in FCA11)
    • Specific resources were not selected, only a quantity was used
  – Quantity limited to the difference between the cap and foot of the demand curve - 3,567 MW
    • Mutes the impact of lowest priced offers
    • Represents the largest swing relative to price that can occur in a single auction
    • Satisfies pre-defined goals of being a quantity larger than the single largest supplier portfolio and of sufficient size to minimize the potential impact of participants with market power
  – MW-Weighted price resulting from foregoing is $4.12/kW-month
Observations: MW-Weighted Price

Observed Offers - FCA11

Quantity difference between Cap and Foot = 3,567 MW
MW-Weighted Price = $4.12/kW-month

Observed Infra-marginal Offers

Implied Infra-marginal Offers = $3.999/kW-month
Analysis: Hours Assumption

• Using market price - $5.297/kW-m – we interpolated the market’s expected Capacity Scarcity Condition hours coincident with ISO studies which support the Installed Capacity Requirement process.

• The excess is plotted against the $f(Q_t)$ as represented by FCA 11 cleared quantity of 35,835 MW against a Net ICR of 34,070 MW – 1760 MW of excess

• ISO-NE Operating Reserve Deficiency Information (December 19, 2016)
Forecast: Hours Assumption

- $H_{11} = f(Q_{11}) = 5$ hours - Given $Q_{11} = 35,835$ MW

![Estimated Reserve Deficiency Hours Annually](chart)

**Estimating H using $f(Q_t)$**

- **FCA 11**
  - Excess Supply = 1,760 MW
Analysis: Performance Assumption

• Compared resource performance during recent (2014-2016 calendar years) RCPF activations to CSO

• The MW-weighted average of existing generating resources that obtained a CSO in FCA 11 was 0.69
**Calculated: Residual Component**

- Represents the implied GFC, Risk Premium, and Opportunity Cost not included elsewhere in the formula.
- If we can know all other assumptions, the RC and be set to a variable for which we can solve.
- Competitive bid formula used to infer the RC:
  \[ P = \text{PPR} \times Br \times H + \max(0, RC - \text{PPR} \times A \times H) \]
  - Where:
    - \( P = 4.12/\text{kW-m} \) (or $49,440/MW-yr) MW-weighted offers
    - \( \text{PPR} = 2,000/\text{MWh} \) for FCA11
    - \( Br = 0.85 \)
    - \( H = 5 \text{ hrs/yr} \)
    - \( A = 0.69 \)
    - \( RC = \text{Variable} \)
Implied: Residual Component

\[ 49,440 = 2,000 \times .85 \times 5 + \max(0, RC - 2,000 \times .69 \times 5) \]

\[ 49,440 = 8,500 + \max(0, RC - 6,900) \]

\[ RC = \$47,840/\text{MW-yr} \]

Or simply:

\[ RC = \$3.99/\text{kW-m} \]
Dynamic De-List Bid Threshold calculation

Formula:

\[ DDBT_{13-15} = PPR_{13} \times Br \times H_{11} + \max(0, RC - PPR_{13} \times A \times H_{11}) \]

Inputs:

- \( PPR = \$3,500/MWh \) for FCA13
- \( Br = 0.85 \)
- \( H = 5 \text{ hr/yr} \)
- \( A = 0.69 \)
- \( RC = \$3.99/kW-m \) (or: \( \$47,840/MW-yr \))

\[
DDBT_{13-15} = 3,500 \times 0.85 \times 5 \\
+ \max(0, 47,880 - 3,500 \times 0.69 \times 5) \\
\leftrightarrow DDBT_{13-15} = \$50,680/MW-yr \text{ or: } DDBT_{13-15} = \$4.22/kW-m \]
Next Steps

• **Anticipated timeline** for 2017:

  • August–October: Markets Committee discussions
  • October: Markets Committee vote
  • November: Participants Committee vote
  • November/December: FERC filing

• **Implementation:**

  • Targeting FCA 13, to be conducted in February 2019
  • Retirement bids are due March 2018
Questions

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Acronyms and Abbreviations in this Presentation

• CSO: Capacity Supply Obligation
• DDBT: Dynamic Delist Bid Threshold
• FCA: Forward Capacity Auction
• FCM: Forward Capacity Market
• Net CONE: Net Cost Of New Entry
• PPR: Performance Payment Rate
• ROP: Rest-of-Pool Capacity Zone
APPENDIX 1

Indicative FCA 10 curves and results:

Cost of obtaining a CSO under PFP and how to model it
Costs and revenues of a CSO

Capacity Related Costs

- Net Going-Forward Costs (i.e., net of energy market revenue)
- PFP financial obligation
- Opportunity cost
- Risk premium

Capacity related benefits

- Forward revenue (e.g. FCA price)

Available revenues to all resources (with or w/o CSO):

- PFP performance revenues
Pay-For-Performance in the Forward Capacity Market: Summary

PFP is a two-settlement design:

• CSO includes a *financial position* to cover energy or reserves during *scarcity hours*
  – *Financial position*: A share of system requirements (pro-rata to CSO).
  – *Scarcity hours* are when the New England system is unable to meeting reserve requirements (*i.e.* the system is short of operating reserves, RCPF appears in the LMP)

• Adds a 2\textsuperscript{nd} settlement for deviations, settled at Tariff-specified Performance Payment Rate ("PPR")
Risks and rewards of having CSO in a PFP world

• The upside is that the resource gets a forward revenue (*e.g.* FCA auction price).
  – This is common among all forward markets

• Downside is that CSO comes with a financial obligation to cover a share of the system’s energy + reserve requirements during a CSC (pro-rata to CSO)
PFP in the FCM: Example 1

- Total system CSO 30 GW, unit CSO 300 MW
  - share of system = 1%

- Scarcity lasts 1 hr when requirements (energy plus reserves) = 27 GW
  - unit forward position = 270 MWh

- If energy + reserves delivered by the unit > 270 MWh
  - Performance credits for delta (at PPR)

- If energy + reserves delivered by the unit < 270 MWh
  - Performance charges for delta (at PPR)

- Resource’s financial obligation is: $PPR \times 270$
PFP Modeling: Balancing Ratio

- In the previous examples, the resources’ financial obligation was only to (financially) cover 90% of its CSO during the hour-long capacity scarcity condition (CSC).
- This 90% is the ratio of total requirement to total CSOs in the system, known as the *Balancing Ratio, B*:

\[
Br = \frac{\text{Load} + \text{Required Reserve}}{\text{Total CSO}} = \frac{27\, \text{GW}}{30\, \text{GW}} = 0.9 \text{ (or 90%)}
\]

- *If total requirement is 90% of the total CSO, the resource needs to cover 90% of its CSO*
Modeling PFP Financial Obligation

With definition of $Br$ from previous slide, financial obligation in example 1 can be expressed as:

$$(3,500 \times 0.9 \times 1) \times 300$$

Or more generally:

$$\left(PPR \times Br \times H\right) \times CSO$$

- This is also true for a resource with CSO=0.
- We will use this formula, along with additional components reflecting resource-specific information, to determine the DDBT