Energy Offer Verification Education Session

Melissa Pilong
Jennifer Warner-Freeman
Tech Change Forum
August 8, 2017
Agenda

- Energy Offer Verification Overview
- Energy Offer Verification example scenario
- Offer Entry and Validation Timelines
- Demand Response Resources
To comply with FERC Order 831, PJM is implementing a verification process for cost-based incremental offers above $1,000/megawatt-hour, effective November 1, 2017 (pending FERC approval).

Order 831 Requires:
- Offers above $1,000 need to be verified before being used to calculate LMPs
  - Until they are verified, offers will be capped at $1,000
- Hard Cap at $2,000 for setting LMP
Planned Offer Verification Timeline

Member Education
August 7, 2017 and September 15, 2017

Offer Verification Exercise
TBD
(Late September/Early October)

Implementation
November 1, 2017
(pending FERC approval)
Submit Template to PJM
(energyofferverification@pjm.com)

Submit offer > $1,000/MWh

Passed Segments
Eligible to set LMP

Offer Fails/Partially Fails
- Offer capped at the higher of $1,000 or highest verified segment
- Market seller to e-mail exception request, including template & documentation to PJM

Offer Fully Verified
Eligible to set LMP

*Offer Partially Verified
offer is capped at the highest verified segment

*Offer Fails Exception
no segments verified; offer is capped at $1,000

*Unverified Segments may indicate non-compliance with approved Fuel Cost Policies
Step 1 – Submission of offer > $1,000 prior to March 2018

- Market seller attempts to submit an offer into Markets Gateway with one or more segments > $1,000.
  - Markets Gateway: Notification window pops up starting offer cannot exceed $1,000.
  - XML File: Upload will be rejected
  - Market seller resubmits offer so that no segment(s) are > $1,000 and checks the 'switch to cost' flag in Markets Gateway.

- Offer will be defaulted to 'daily offer' or last successfully submitted offer.
• A Market Seller enters the following offer directly into Markets Gateway or through an XML upload:
$1,000+ offer segments will not be accepted…

- Once you enter this offer curve, a message will pop up advising you that no segments greater than $1,000 will be accepted.

- If the offer was submitted via XML, an error message like the one below will be generated.
…and must be set to $1,000 prior to submitting the offer.

- If the Market Seller wishes to submit their original desired offer, in Markets Gateway, they must set all segments that are currently greater than $1,000 to be equal to $1,000.
- Likewise, via XML, the entire file must be resubmitted with all segments that are desired to be greater than $1,000 set to be equal to $1,000.
• To have $1,000+ offer segments eligible to set LMP, Market Sellers must submit to PJM* the Offer Verification Template having filled in the first tab (“Energy Offer”) with their desired offer.

• If the user does not set segments to $1,000 in Markets Gateway or in their XML file and then proceed with the offer verification process, the offer will revert to the most recently accepted offer.

*Submission protocol is TBD
• The Offer Verification Template can be found here:

• Market Seller must fill in all contact information.
• Please be sure that the contact information is a direct line and not a general corporate number or hotline.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contact Info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Market Seller Name</td>
<td></td>
<td>XYZ Generation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Contact Name</td>
<td></td>
<td>John Doe</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Contact Email</td>
<td></td>
<td><a href="mailto:john.doe@xyzgen.com">john.doe@xyzgen.com</a></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Contact Phone</td>
<td></td>
<td>215-555-1212</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Market Unit</td>
<td></td>
<td>123456</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Schedule Identifier</td>
<td></td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Schedule Name</td>
<td></td>
<td>costNG</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Schedule Fuel Type</td>
<td></td>
<td>natural gas</td>
<td></td>
</tr>
</tbody>
</table>
- Enter offer information with desired MW/Price pairs.
- MW values must match those that were entered into Markets Gateway.
There is room in the template for four different time periods during the day. If more granularity is needed for a particular date, please submit additional templates.

Note that the template is good for only one date.
• Enter either heat input polynomial coefficients OR the heat input data in tabular format.

• Only complete rows as needed. You do not have to have four polynomials or ten input/output pairs.

• Your heat input polynomial does not have to be a 3rd order.
Summary – Step 1 (November 2017 through March 2018)

• For offer segments that are desired to be priced greater than $1,000/MWh, the Market Seller is responsible for submitting into Markets Gateway offer segments that are equal to $1,000/MWh.

• Market Seller is responsible for submitting to PJM, via the offer verification template, their desired >$1,000/MWh offer curve and any other information requested on the energy offer tab.

• PJM will send to the Market Seller notification of receipt of the >$1,000/MWh offer curve via email.
Step 1 – Submission of offer > $1,000 after March 2018
• Market seller enters into Markets Gateway their desired >$1,000/MWh offer. This offer will be reflected in the Markets Gateway screen.
Step 1

Market seller submits desired offer curve to energy offer verification team using template on pjm.com (filling out only the energy offer tab).

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Step 2 – Offer Screening

Offer verification screen runs to determine if offer is acceptable.

No

Offer verification review team notifies market seller via email that the offer could not be verified.

Market seller requests exception to offer verification team using template on pjm.com.

No

The pricing engine will reflect the last verified offer and market seller will be subject to a potential audit.

Both will occur

Verified offer curve will be passed to the pricing engine to be eligible to set LMP.

PJM will notify market seller of:
- The approved offer curve
- Effective time that offer will be eligible to set LMP

Verified offer will be reflected in Markets Gateway.
• In this example, segments 2 and 3 were verified through the screening, however, segments 4 and 5 were not verified.

• Segments 4 and 5 must move on to the exception process to be verified using information in the Market Seller’s fuel cost policy.

<table>
<thead>
<tr>
<th>Segment</th>
<th>MW</th>
<th>Offer ($/MWh)</th>
<th>Verified?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>$990.00</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>$1,100.00</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>$1,200.00</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
<td>$1,300.00</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>$1,400.00</td>
<td>N</td>
</tr>
</tbody>
</table>
The currently verified offer

- At this point, PJM notifies the Market Seller that their offer is capped at the highest verified segment and request that they fill in the other tab of the Offer Verification Template.

<table>
<thead>
<tr>
<th>Segment</th>
<th>MW</th>
<th>Offer ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>$990</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>$1100</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>$1200</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
<td>$1200</td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>$1200</td>
</tr>
</tbody>
</table>
• PJM screens offer segments over $1,000/MWh
• PJM notifies Market Seller of segments that pass the screen.
• PJM notifies Market Seller of any segments that do not pass the screen and will request further information in order to proceed to the Exception Process.
• The Market Seller’s current verified offer will be reflected in Markets Gateway.
Step 3 – Exception Process

Market seller requests exception to offer verification team via email that the offer could not be verified.

Offer verification team reviews unverified cost-offer segments against the approved fuel cost policy.

Offer verification team will notify market seller of unverified segments and that offer will be capped at the higher of $1,000 or last verified segment.

Market seller must follow Attachment D in M-11 in order to be considered for make-whole.

Market seller may be penalized for not following the approved fuel cost policy.

Both will occur

Verified offer will be passed to the pricing engine to be eligible to set LMP.

PJM will notify market seller of:
- The approved offer curve
- Effective time that offer will be eligible to set LMP

Verified offer will be reflected in Markets Gateway.

Offer followed the approved fuel cost policy

Yes

Market seller will be eligible for make-whole.

No

No

Attach B

Offer verified in time to set LMP

Verified Segments

No

Yes

Offer verified Segments

Market seller requests exception to offer verification team using template on pjcm.com.
Exception Process

• If any segments do not pass the initial screen, PJM will request that the Market Seller provide additional information in the Offer Verification template on the Total Fuel Related Costs tab.

• In the Total Fuel Related Costs tab, the Market Seller provides:
  – The estimated fuel price, for which documentation must be provided
  – Other cost components that have already been identified in the fuel cost policy, which may include, but are not limited to:
    • VOM
    • Emissions
    • Transportation fees, storage fees, etc.
### Offer Verification Template - Total Fuel Related Costs tab

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>4</td>
<td>Estimated Commodity Pricing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>5</td>
<td>Estimated Commodity Cost</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>Fuel Loss Adjustment</td>
<td></td>
<td>0.00% of Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>Transport Fee Adjustment</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Storage Adjustment</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>Distribution Charges</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>Handling Fee</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>Additional Taxes ($/MMBtu)</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>Other Fuel Related Costs</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>6</td>
<td>Adders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td>Variable Operations and Maintenance (VOM)</td>
<td>$</td>
<td>-</td>
<td>/MMBtu</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td>Emissions Allowances ($/MMBtu)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>CO2 Allowance</td>
<td>$</td>
<td>0.0250</td>
<td>/MWh</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td>SOx Allowance</td>
<td>$</td>
<td>0.5000</td>
<td>/MWh</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>NOx Allowance</td>
<td>$</td>
<td>0.0350</td>
<td>/MWh</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>10% Cost Offer Adder (Yes/No)</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Drop down boxes for selecting the units of measure.**
Result of Exception Process

- Here it can be seen that segment 4 passes, but segment 5 does not. Thus, the offer is capped at $1,300.

<table>
<thead>
<tr>
<th>Segment</th>
<th>MW</th>
<th>Desired Incremental Offer ($/MWh)</th>
<th>Incremental Heat (mmBTU)</th>
<th>Emissions CO2 ($/MWh)</th>
<th>Emissions NOx ($/MWh)</th>
<th>Emissions SOx ($/MWh)</th>
<th>Offer w/ Cost Adder ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>$990.00</td>
<td>8,000.00</td>
<td>$0.025</td>
<td>$0.500</td>
<td>$0.035</td>
<td>$1,105.54</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>$1,100.00</td>
<td>8,000.00</td>
<td>$0.025</td>
<td>$0.500</td>
<td>$0.035</td>
<td>$1,105.54</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>$1,200.00</td>
<td>9,000.00</td>
<td>$0.025</td>
<td>$0.500</td>
<td>$0.035</td>
<td>$1,243.66</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
<td>$1,300.00</td>
<td>10,000.00</td>
<td>$0.025</td>
<td>$0.500</td>
<td>$0.035</td>
<td>$1,381.78</td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>$1,400.00</td>
<td>10,000.00</td>
<td>$0.025</td>
<td>$0.500</td>
<td>$0.035</td>
<td>$1,381.78</td>
</tr>
</tbody>
</table>

- If the Market Seller cannot provide sufficient documentation for why their offer is higher than what PJM calculates it to be using the information in their fuel cost policy, then they may be eligible for a penalty.
### Result of the Exception Process

<table>
<thead>
<tr>
<th>Segment</th>
<th>MW</th>
<th>Offer $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>$990</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>$1100</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>$1200</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
<td>$1300</td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>$1300</td>
</tr>
</tbody>
</table>

The unverified segment is set to the value of the highest verified segment.

- If the Market Seller is able to submit additional documentation so that PJM can verify their offer after the market closes, then they may be made whole through settlements after the fact.
Market Seller completes and submits the Total Fuel Related Costs tab of the Offer Verification template.

PJM confirms receipt of information.

PJM uses the submitted information, along with the fuel cost policy, to attempt to confirm the unverified segments.

PJM notifies the Market Seller of the final verified offer.

The final verified offer will be reflected in Markets Gateway.
What if?

- What if I submit an offer over $1,000 and have it verified and then I want to change my offer so that is still over $1,000 but lower than my original offer? Do I need to be re-verified?
  - YES. All offers over $1,000 need to be verified and a new template will need to be submitted.

- What if I don’t change my offer curve but do change my no-load cost? Do I need to be re-verified?
  - YES. All offers over $1,000 need to be verified and a new template will need to be submitted.
Day-Ahead and Real-Time Offer Entry Timelines

**Day-Ahead**

- Desired Energy Offer Curve must be **submitted by 10:30** to the Energy Offer Verification Team.
- *Submit as early as possible for timely verification, but offers will not be accepted after 10:30.*

**Real-Time**

- Desired Energy Offer Curve must be **submitted 65 minutes prior to the Operating Hour** to the Energy Offer Verification Team.
- *Submit as early as possible for timely verification, but offers will not be accepted after 65 minutes prior to the operating hour.*

*Offers not verified in time to set LMP may be eligible for make-whole*
Market Sellers will be required* to follow Manual 11, Attachment D for Offers > $1,000 when:

• Offer is not verified in time to set LMP
• Offer is verified after the Effective Start Time
  – Only for hours that offer was not eligible to set LMP
• Offers greater than $2,000
• Partial hours do not need to submit Attachment D

*Requirement is for Market Sellers seeking make-whole
Verification Timing and Make-Whole

Offer >$1,000 submitted Intra-day with an effective time of 04:00 – 10:00

Offer verified at 06:00

Market Seller must follow Manual 11, Attachment D for make-whole

Offer eligible to set LMP
Demand Response Implementation Overview

For Economic DR and Load Management Resources with Cost Offers > $1,000/MWh

<table>
<thead>
<tr>
<th></th>
<th>November 2017- Future Compliance Filing Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Collection</strong></td>
<td>• CSP submits Incremental Cost ($/MWh) summary by category in DR Hub which will establish offer curve cap in Markets Gateway &gt;$1,000/MWh and &lt;=2,000.</td>
</tr>
<tr>
<td><strong>Offer Verification</strong></td>
<td>• CSP must certify accuracy of incremental cost and provide detailed support for development of cost for offer hours prior to offer. Energy offers in Markets Gateway will be capped at incremental offer amount.</td>
</tr>
</tbody>
</table>

Implementation details may change based on FERC approval of compliance filing
DR Hub Entry Screen

**Capacity**
- **Peak Load Contribution (kW):** 1111
- **Winter Peak Load (kW):** N/A
- **Winter Managed Load (kW):** N/A
- **Summer Managed Load (kW):** 100,000
- **Summer Nomination ICAP (kW):** 1,7777
- **Winter Weather Adj. Factor:** N/A
- **Winter Nomination ICAP (kW):** N/A
- **Annual Nomination ICAP (kW):** N/A

**Energy**
- **Strike Price ($/MWh):** 1,000.00
- **Shut Down Costs ($):** 0

**Incremental Cost Description**
- **Incremental Cost ($/MWh):**
  - Labor cost – employees sent home with pay, no work/product produced. **$900.00**
  - Damaged product net cost - Product cannot be sold and material needs to be recycled (i.e: bottle caps in injection molds damaged and need to be recycled). Net cost = Cost to make product minus recycle value. **$250.00**

**Incremental Cost Summary**
- **Total Incremental Cost:** $1,150

**CBL Method**
- **CBL Test:** 3 Day Types with SAA (DEFAULT)
Next Steps

• Education Session #2
  – September 15, 2017
• Offer Verification Exercise
  – TBD Late September/Early October
• Process Implementation
  – November 1, 2017 (pending FERC Approval)
If you have any questions about today’s education session, about offer verification in general, or if you would like to be involved in the simulation taking place this fall, please reach us here:

EnergyOfferVerification@pjm.com