

Submitted By	Company	Date Submitted
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NRG has reviewed the tables provided by the CAISO and has generally found them to be accurate. However, for Table 2, as NRG understands, the NYISO DA market closes at 5:00 AM.

**Table 1**  
**ISO-RTO real-time market energy bidding rules**

ISO/RTO	RTM close for energy bids	Rules for changing energy bids in real-time	Calculates reference levels?	Mitigation
CAISO	T-75 <sup>2</sup>	No limit <sup>3</sup>	Yes	Dynamic structural test (three pivotal suppliers)
ISO-NE	T-30 <sup>4</sup>	No limit <sup>5</sup>	Yes <sup>6</sup>	Conduct and impact test <sup>7</sup> ; restricted from fuel price adjustment for 2 (first offense) to 6 months (second offense) <sup>8</sup>
MISO	T-30 <sup>9</sup>	No limit <sup>10</sup>	Yes <sup>11</sup>	Conduct and impact test <sup>12</sup>
NYISO	T-75 <sup>13</sup>	If day-ahead schedule exists, increase in bid only <sup>14</sup> ; may revise fuel cost used to calculate reference levels <sup>15</sup>	Yes <sup>16</sup>	Conduct and impact test <sup>17</sup>
PJM	Day-ahead: 16:00 EST TD-1 <sup>18</sup>  If no day-ahead schedule: 18:00 EST TD-1 <sup>19</sup>	Can only change bids if no day-ahead schedule <sup>20</sup> ; proposing to allow fuel policy changes intra-day <sup>21</sup>	Yes <sup>22</sup>	Structural test (three pivotal suppliers) <sup>23</sup>

**Table 2**  
**ISO-RTO commitment cost bidding rules**

ISO/RTO	Last time to modify start-up / min load cost	Calculates reference levels?	Mitigation
CAISO	10:00 PST TD-1 / 10:00 PST TD-1	Yes	Bid caps <sup>27</sup>
ISO-NE	T-30 / T-30 <sup>28</sup>	Yes <sup>29</sup>	Conduct and impact test <sup>30</sup> ; restricted from fuel price adjustment for 2 (first offense) to 6 months (second offense) <sup>31</sup>
MISO	T-30 / T-30 <sup>32</sup>	Yes <sup>33</sup>	Conduct and impact test <sup>34</sup>
NYISO	Day-ahead: 11:00 EST TD-1 / 11:00 EST TD-1 <sup>35</sup>  If no day-ahead schedule: T-75 / T-75 <sup>36</sup> and may update fuel prices in reference levels <sup>37</sup>	Yes <sup>38</sup>	Conduct and impact test <sup>39</sup>
PJM	Day-ahead: 16:00 EST TD-1 / 16:00 EST TD-1 <sup>40</sup>  If no day-ahead schedule: 18:00 EST TD-1 / 18:00 EST TD-1 <sup>41</sup>  Daily bidding under cost-based option; 6 month hold for cost-based option. <sup>42</sup>  Proposing to allow intra-day changes to fuel cost methodology <sup>43</sup>	Yes <sup>44</sup>	6 month hold on using cost- or price-based option. <sup>45</sup>  Structural test (three pivotal suppliers) <sup>46</sup>

**[SECTION 1 – Bidding Flexibility]**

1. Should the ISO market disallow or reduce changes to real-time energy bids during an inter-temporal constraint?

NRG: It is reasonable to disallow changes to real-time energy bids for the period of the inter-temporal constraint during the time the constraint is binding. However, the CAISO should not disallow changes to real-time energy bids for periods in which the inter-temporal constraint is not binding and should provide as much flexibility to change bids as possible.

2. On the other hand, should the ISO market continue to allow real-time energy bidding flexibility but instead calculate bid cost recovery on the bid cost that the optimization used to make the commitment decision?

NRG: This is a reasonable approach, presuming that market participants have the ability, under all (not just most) circumstances, to reflect the *true* cost of running (or not running) their units to the CAISO through their bids.

3. What other options can the ISO consider including other limitations that are not compatible with energy bidding flexibility?

NRG: The entire bidding process needs to be discussed starting from how units are bid to be committed (Start-up and Minimum Load cost bidding) first and then move on to how energy bidding is treated. It is impossible to develop any specific proposals regarding energy bidding flexibility until what changes will be made to bidding the unit commitment process are known.

**[SECTION 2 – Gas Cost Bidding]**

1. Should the ISO continue to use a gas price index?

NRG: The use of a gas price index to screen or condition bids wrongly presumes that a market participant can acquire all of the gas needed to support the CAISO's dispatch instructions or market awards at the historical index price. Given that the CAISO's Day-Ahead market awards are not known until after the timely cycle nominations are due, market participants are often forced to transact gas in the intra-day market if the DA market awards or post-DA exceptional dispatch instructions are different than what the scheduling coordinator assumed they would be in setting up their gas portfolio. Tying CAISO bidding rules and mitigation to a historical gas price index ignores this reality.

2. If the ISO does retain use of the gas price index, should it permanently shift the close of the day-ahead market later in order to use the single ICE index? Does this mean the current manual process for a gas price spike should be retained? (This assumes that the ISO may or may not have additional market power mitigation for commitment costs.)

NRG: While using the single ICE price would help address some of the problems associated with using a stale daily index, using an index presumes that market participants can acquire the gas needed to follow CAISO market awards or real-time dispatch instructions. While there would be some additional value in using the single ICE index as the basis for determining day-ahead proxy values relative to the current system, NRG does not support using an index-based approach as a permanent solution. Retaining a 2 to 4 day stale gas price index does not materially change the concerns listed above in the response to question 1.

3. If the ISO does not continue to use a gas price index, should there be a cap on what costs can be bid into the market or allow for after-the-fact cost recovery? Does this mean the current manual process for a gas price spike can be eliminated? (This assumes that the ISO will have market power mitigation beyond the current bid caps for commitment costs and will involve consideration of the complex interaction of minimum online commitment constraints, exceptional dispatch, and other tools used by the ISO that impact commitment.)

NRG: NRG expects the CAISO will always apply some cap to bidding costs similar in nature to eastern markets while simultaneously folding in conduct and impact thresholds. Under a conduct and impact system, the current manual process for switching to the ICE index would most likely no longer needed.

4. In the day-ahead timeframe (as well as real-time for short-start units), bids reflecting intra-day gas costs are estimates as the gas has likely not been procured. How can the ISO establish a *priori* a reasonableness threshold and not rely entirely on *ex post* verification?

NRG: If the CAISO insists on retaining an approach based on a bid cap derived from daily gas index prices, the only way to provide for a reasonableness threshold that does not leave suppliers exposed to being unable to recover gas procurement costs is to provide significant headroom in the level of the bid cap. To a large extent, gas purchased on a day-ahead basis (i.e. prior to ISO commitment) is always an estimate. Volumes never match completely. Consequently, NRG advocates the use of a "conduct and impact" system that provides suppliers the opportunity to revise cost bases and justify costs under volatile gas conditions.

5. If the ISO retains a bid cap, should it be differentiated among the various proxy cost components? For example, stakeholders have proposed a low bid cap on all non-gas items (O&M, greenhouse gas cost, etc.) and a higher one for gas.

NRG: NRG does not support the use of a hard bid cap. If one is used, it must ensure that suppliers can recover their gas costs under all circumstances, not just under most circumstances. NRG strongly prefers the use of conduct and impact screens to condition bids.

6. What process should the ISO institute to periodically review the cost cap (if retained) to ensure that it still enables headroom for market participants to accurately reflect their natural gas costs?

NRG: NRG does not support the use of a bid cap. If one is used, it must ensure that suppliers can recover their gas costs under all circumstances, not just under most circumstances. NRG prefers the use of conduct and impact thresholds coupled with an opportunity, under volatile gas price conditions, to justify offers that fall outside of the thresholds.

Bid caps carry the unavoidable risk that suppliers will have to procure gas at prices above the bid cap level under volatile conditions. NRG looks forward to a comprehensive re-examination of all aspects of bidding (commitment costs and energy bids) to determine and put in place a system that will allow suppliers to recover their costs in all, not just most, circumstances.

7. Some stakeholders have requested a breakup of the current three-day weekend gas “package.” If this is not currently an available index option, what, if anything, can the ISO do about it?

NRG: Eliminate the hard (static) bid cap, implement conduct and impact thresholds, and allow for an opportunity to cost justify bids outside of the thresholds as necessary.

### **[SECTION 3 – Resource Characteristics]**

1. What characteristics, if any, should allow for engineering judgment? How can ISO verify this assessment independently?

NRG: All resource characteristics should allow for the application of engineering judgment. The CAISO could monitor the application of this judgment by using an independent entity to screen changes to resource operating characteristics and to engage with the market participant seeking to make the change if the change causes a concern.

NRG’s fleet contains a number of aging steam turbine units that are approaching the end of their useful lives. As these units continue to age, NRG envisions it will be necessary to modify operating unit characteristics to reflect the fact that the units will not be undergoing additional restorative maintenance, and changes to operating parameters will be necessary to operate safely. NRG urges the CAISO to adopt a paradigm that allows for reasonable changes to unit characteristics as needed.

The ISO uses Potomac Economics to vet recently enacted major maintenance adders in order to compare those submissions to peer-group averages Potomac has seen used nationwide. That process seems reasonable and should continue.

2. How often should resource characteristics be allowed to change?

NRG: While NRG expects that resource characteristics would not change frequently, any arbitrary “lock down” period specified will likely restrict changes that may be needed due to some unforeseen events or circumstances. If the CAISO specifies a lock down period, it should be as short as possible, and should allow for changes due to unforeseen circumstances. Many markets only allow for changes to be made quarterly.

3. Should ISO establish default resource characteristics for different generation technology types and use these parameters when a resource is mitigated? For example, combined cycles of a certain vintage may have heat rates within one range but for every 10 years the heat rates will change to a different range.

NRG: NRG does not object to specifying ranges for certain operating characteristics based on a unit’s type and vintage, as long as there is a process for changing characteristics outside of these ranges in consultation with an independent entity, if needed.

4. Should the ISO establish upper and lower bounds for resource characteristics regardless if there is mitigation?

NRG: If the boundary range allows for reasonable engineering discretion, and the CAISO further provides the opportunity to make changes outside of the bounds after consulting with an independent entity, NRG would not object to establishing bounds for resource characteristics.