Stakeholder Comments Template

Subject: Commitment Cost Enhancements Phase 3 (CCE3)

Submitted by	Company	Date Submitted
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This template has been created for submission of stakeholder comments on the Commitment Cost Enhancements Phase 3 Technical Workshop that was held on July 20th, 2015. Upon completion of this template please submit it to initiativecomments@caiso.com. Submissions are requested by close of business on **July 30th, 2015**.

NRG has also provided a number of general comments – please see those comments at the end of this document.

1. Please provide feedback on input variables.
    a. Comments on LMP stream used (FMM and/or DA)

    Generators do not look at just the DA market or just the real-time market to try to manage their resources – all markets are used in order to manage and optimize assets. Consequently, using either only the DA prices or only the FMM prices to produce an opportunity cost will not yield a reasonable outcome.

    Comments on methodology used to

        i. Estimate implied heat rate

        ii. Forecast LMPs

        During the July 20 call, the CAISO noted that it was confident that its price forecasts were largely accurate in most of the price range, but expressed concern that its price forecasts in the top 5% of prices were not as accurate as prices in the other 95% of the range.

        NRG notes that generators often earn disproportionate amounts of their annual energy market revenues in these high price hours (i.e., a generator may earn a lot more than 5% of its annual revenues in the top 5% of price

hours). The inability to accurately forecast LMPs in this narrow range will have a significant impact on the model's ability to calculate a reasonable opportunity cost.

iii. Should the ISO consider incorporating future power prices into the estimated LMPs?

Yes. While historical prices are readily available, they are still historical and based upon specific market conditions (both physical and financial). They will reflect constraints that may no longer bind, and certainly won't reflect constraints that have not yet begun to bind. What happened the year before may or may not be an accurate predictor of what will happen in the year ahead. For instance, it would be wrong to use pricing that was strongly impacted by the Path 15 constraint experienced in Q2 of 2015 in a forward looking opportunity cost calculation.

1. What would be the optimal method of incorporating the future power prices into the estimated LMPs and/or model.

The optimal method would be for the CAISO and market participants to agree on a credible public set of forward prices to be used to set the opportunity costs.

b. Other comments

2. <u>Please provide feedback on modeling.</u>

a. Comments on how GAMS model calculates opportunity cost for each limitation

b. Comments on SAS model
   i. How it determines dispatch

   ii. How it calculates opportunity costs for each limitation

c. Comments on preference towards SAS model or optimization solver such as GAMS

NRG is concerned that if the model is not an optimizing model that the opportunity cost calculation may not be "correct". Assume that a unit has an annual start-up limitation of 100 starts. Now assume that, based on forward prices, the unit could start up 125 times in that year. If the opportunity cost is not determined as the margin between the 124th most profitable start, and the 125th most profitable start (for example, if it determined as the margin between the 99th and 100th most profitable starts), it will be understated.

That said, SAS has the benefit of faster execution times, which allows for the model to be re-run more often and with less burden as the year progresses. If SAS

reliably captures all of the projected unit runs over the course of a year, and produces results comparable to those produced by GAMS, SAS should be used.

d. Other Comments

3. Is there additional testing of the models that would be informative for the remaining stakeholder process?

4. Please provide feedback on future policy options.

   a. Comments on use limitation registration for emissions or fuel usage limits. Should the SC translate these into estimated starts/run/MWH limits?

      No. Translating an emissions or fuel usage limit to a start/MWH/run hour limits will add a layer of complexity that could affect the development of the opportunity cost. Given that emissions and fuel usage can be calculated from production, is it necessary to run the opportunity model using electrical production as the constraining variable, or can the model be run using the actual constraining variable?

      Translating these limits into production limits

   b. Comments on how calculated opportunity costs will be incorporated into bid caps

      This is a key issue. As further noted below, NRG is concerned about the direction the CAISO appears to be headed in the Bidding Rules process – to scale back the 25% daily bidding headroom that was implemented in December 2013. NRG would be similarly concerned if the calculated opportunity cost was included in the proxy cost cap as an absolute, precisely correct figure without allowing for some headroom in this value. NRG suggests any bid caps be calculated by adding in the opportunity cost figure first, then apply the 25% headroom adder to that sum.

   c. Comments on scheduled re-runs to update opportunity costs

      i. General comments on scheduled re-runs

      ii. Preference and comments on three options presented to update limits

      Of the three options presented, NRG strongly prefers Option 1. Both Options 2 and 3 ignore what has actually taken place.

      The CAISO has expressed a concern that Option 1 creates an incentive to bid lower in the early part of the year, run through starts so as to increase a resource's opportunity cost for later in the year. Rational suppliers,

*however, are **not** interested in simply increasing their opportunity costs. Rational suppliers **are** interested in maximizing the amount of profit they can make with the limited amount of service available from their resources. Increasing a resource's opportunity cost allows the supplier to increase the bid for that resource, but that strategy is counter-productive if raising the bid price forces the unit out of the money so that it does not run – and thereby earns no profit. This is a concept SCs are intimately familiar with from the days of Registered Cost. A generator could use Registered Cost to hedge against the possibility of having to buy gas at a loss, but doing so would price the resource out of the market. A resource owner would have to have high confidence that their unit has to run regardless of cost in order to exploit this strategy. Moreover, the early-in-the-year predatory pricing that a supplier would have to engage in in order to try to exploit this strategy should be easy enough for the CAISO's market monitoring unit to detect.*

d. Comments on necessity and triggers of impromptu re-runs

i. What metrics or triggers should the ISO consider to initiate an impromptu re-run.

Metrics the CAISO could consider –

- *A X% disparity between the actual use of the unit and the projected use of the unit, as measured by the binding limitation (starts, hours, MWh)*

ii. If re-runs are scheduled monthly, would that minimize need for impromptu re-runs

Probably, depending on what option the CAISO used the basis for the re-runs.

iii. If LMPs incorporate future power prices, would that minimize need for impromptu re-runs

Yes, if those future power prices were reasonably accurate and no unanticipated conditions arose.

iv. Other comments

It may not be possible to limit or avoid the need for re-runs if the conditions that give rise to the unit's operation (or lack of operation) were not or could not have been included in the opportunity cost model – e.g., a transmission outage that affects a unit's operation.

e. Comments on modeling MSG resources

NRG agrees that owners of MSG units should be allowed to negotiate opportunity costs with the independent entity.

5. Any additional comments on CCE 3

Providing for daily bidding up to 125% of proxy cost was a very positive step (originally intended to be temporary) in allowing suppliers to rationally manage their generating units. (In a related matter, NRG is concerned about the CAISO's direction to remove or limit the 25% headroom for certain proxy cost components, has already noted its concerns in comments, and will continue to express its concerns about this proposed direction in the Bidding Rules stakeholder process.)

While NRG understands the CAISO's motivation in this initiative (to develop a way to reliably model opportunity costs so as to be able to put all units, including limited-use resources, on the proxy cost structure and eliminate the registered cost structure), NRG remains concerned about aspects of the direction in which the CAISO is headed. To be clear, NRG supports including opportunity costs in use-limited resources' bids on the proxy cost option. However, NRG does not agree with certain assumptions and philosophies underlying this stakeholder process.

First, NRG could become more comfortable with this effort if the opportunity costs are used in a way that preserved or even enhanced a resource owner's bidding flexibility – for example, as noted above, by considering the opportunity cost as part the unit's "total proxy" cost, and allowing the owner reasonable bidding headroom above that "total proxy" cost. NRG would be concerned if the CAISO-calculated opportunity cost is erroneously assumed to be absolutely accurate and thereby used to unduly limit an owner's bidding flexibility.

*Second, NRG believes that the CAISO, in and of itself, cannot develop an opportunity cost that accurately reflects the generator owner's – **not the CAISO's** – risk-adjusted view on forward market conditions and the conditions of its generating unit. The generator owner, not the CAISO, ultimately bears the consequences of not having its unit available for service because the unit has reached a use limit. Capping bids on the basis of the CAISO's opportunity cost, not the generator's opportunity cost, could be catastrophic for the generator owner if the generator owner's view of the future, not the CAISO's view of the future, ultimately materializes. While NRG does not object to the CAISO calculating its own view of what a resource's opportunity cost is, the generator owner's viewpoint with regards to its resources' opportunity cost must inform the opportunity cost that is ultimately adopted.*

At the heart of the opportunity cost proposal (and the CAISO's view of the markets) is the expectation that a generator unit owner will run its unit if there is ANY margin to be made by doing so. While this may be classic economic theory, it fails to account for reality. Generating units are real-world machines that break and have non-zero risk profiles. It may be very difficult, if not impossible, to factor a generator owner's individual risk tolerance into numerical opportunity costs, but this risk is an opportunity cost nonetheless, and cannot be ignored. The CAISO's proposed model ignores it.

Second, basing a unit's opportunity cost calculation solely on merit order operation ignores the reality that many units will operate out of merit order (as NRG well knows) because they are needed to do so as a result of network constraints. Where units are committed at minimum load to address network constraints, the resulting locational marginal prices do not reflect the need for that unit to operate. An opportunity cost model that bases the opportunity cost on LMPs will have an inherent bias for this reason.

For all of these reasons, NRG is concerned that about the possibility that the CAISO's view of a resource's opportunity cost will always prevail over the generator owner's view of their resource's opportunity cost. Regardless of what methodology the CAISO adopts to calculate opportunity cost as a result of this process, the CAISO must provide a way for the generating unit owner to be able to argue for, negotiate, and use, its own risk-adjusted opportunity cost. The forum in which these discussions take place must provide a reasonable and timely opportunity for the generator owner's opportunity cost position to be considered.