

Stakeholder Comments Template**RI Phase 2 – Day-of Market 7/6/11 Initial Straw Proposal**

Submitted by	Company	Date Submitted
Brian Theaker	NRG Energy, Inc. (“NRG”)	July 29, 2011

This template is for submission of stakeholder comments on the topics listed below, covered in the RI Phase 2 – Day-of Market 7/6/11 Initial Straw Proposal posted on July 6, 2011, and issues discussed during the stakeholder meeting on July 11, 2011.

Please submit your comments below where indicated. Your comments on any aspect of this initiative are welcome. If you provide a preferred approach for a particular topic, your comments will be most useful if you provide the reasons and business case.

Please submit comments (in MS Word) to phase2ri@caiso.com no later than the close of business on July 22, 2011.

1. Please provide any comments on the ISO's proposed schedule, timeline, or process for this stakeholder process.

[Please see below.](#)

2. Are there additional goals or operational challenges that the ISO should be addressing through this stakeholder process?

[Yes. While NRG hopes the CAISO will not implement the “nuclear option” of suspending intertie convergence bidding, if such suspension is sought and approved, NRG urges the CAISO to fast-track changes to the ways interties are settled in RIMPR-2 to put all market participants on even footing and to restore what the CAISO has acknowledged is a valuable complement to a multi-settlement market - convergence bidding – as soon as possible.](#)

3. Please indicate whether your organization agrees with the guiding principles listed in the straw proposal. If not, please indicate why not. If you would like to have other guiding principles added, please describe those additional principles.

Guiding Principles

- **Technology agnostic:** [NRG strongly supports the principle of “technology agnostic”. The CAISO’s market product design should be driven by operational needs, not by the capabilities of any particular technology. To that end, the CAISO’s proposed redesign of regulation service seems to be focused on encouraging provision of regulation service](#)

from fast-responding, energy-limited resources. However, the proposed creation of the Real Time Imbalance Service seems to act to complement the proposed regulation design.

- **Transparent:** NRG supports this principle.
 - **Deep and Liquid:** NRG supports this principle.
 - **Durable and Sustainable:** NRG supports this principle. However, the role of CAISO markets in attracting new investment, including expending capital for existing resources to produce or enhance the desired operational characteristics remains unclear. The interplay between the CAISO markets and other markets can lead to undesired outcomes (e.g., power purchase agreements negotiated outside of the CAISO’s markets that encourage variable energy resources to produce power in the CAISO markets at times when the CAISO doesn’t need or want the power and the CAISO’s market prices are negative). Consequently, resources that don’t depend on CAISO market revenues can negatively affect CAISO market prices for those that do. While NRG understands that the hybrid market structure in California is beyond the scope of the CAISO’s RIMPR2 design process, the meaningfulness of CAISO market prices will be in question as long as its market prices have no bearing on the financial viability of resources that can affect its market prices.
 - **Flexible and scalable:** NRG supports this principle.
 - **Cost-effective and implementable:** NRG supports this principle, but with some reservations.
 - First, market participants are not always aware of the limitations of CAISO market software design and implementation that affect how and when a market design element can be implemented (convergence bidding and using bid-in demand in the local market power mitigation process are the poster children for this concern).
 - Second, the extent to which California has been able - or willing - to lever the experience of other ISOs/RTOs is not apparent.
4. Please provide your organization’s views on any incremental ancillary services you believe are necessary to accommodate the intermittency of renewable resources.

NRG looks forward to a thorough discussion and examination of the CAISO’s RTIS proposal.

Additionally, understanding that the initial phase of the RIMPR-2 effort is focused on the “day-of” markets, NRG looks forward to discussing market structures that will be needed to sustain conventional dispatchable generation as increased penetration of variable energy resources further decreases energy prices.

5. Does your organization believe that Residual Unit Commitment should be performed more granularly than daily (i.e. on-demand RUC)? Is on-demand RUC needed if the 15 minute unit commitment, either in RTED (Option A) or RTPD (Option B) looks forward 8-10 hours?

The RUC process is run after the Day-Ahead market to procure additional capacity needed to cover the difference between the demand that clears the Day-Ahead market and the CAISO's forecast demand. NRG assumes that if the RTPD looks forward and projects real-time demand 8 to 10 hours in advance, the RTPD will become a *de facto* RUC process, albeit only for quick-start resources.

6. Please provide your organization's views on replacing today's Hour Ahead Scheduling Process (HASP) for inter-ties with a simpler method that would not involve establishing separate hourly prices for the inter-ties and that would not include bid cost recovery. Please suggest proposals concerning what accommodations are necessary at the inter-ties to provide scheduling flexibility for western market entities.

NRG supports eliminating the current HASP process. The shortcomings of HASP (its systematic misalignment with the RTD and conflicts with the convergence bidding processes) are well known. Moreover, NRG does not favor markets or processes in which only certain market participants may participate.

The ideal participation for intertie suppliers would be in a fifteen-minute real-time market in which all market participants compete equally. Such a market is not a panacea, because resources still will be dispatched based on the CAISO's expectation of real-time conditions, which will, from time to time, be wrong. Yet, in a market in which all participants are settled at the same prices, all market participants will be affected by the CAISO's actions in the same way. This is different than the current markets, in which the CAISO can over-dispatch the ties in HASP, raising HASP prices but depressing real-time prices – or vice versa.

Conversely, should block-hour intertie scheduling be retained, the CAISO should settle hourly interties on the simple average of the real-time interval prices, be they fifteen-minute or five-minute intervals. Again, this will have the effect of putting all real-time suppliers on even footing.

The increased penetration of variable energy resources should put pressure to increase the frequency of intertie scheduling. However, the CAISO cannot change the frequency of interchange scheduling on its own. NRG hopes the CAISO will actively participate in WECC processes that consider interchange scheduling modifications.

Finally, while NRG hopes the CAISO will not implement the “nuclear option” of suspending intertie convergence bidding, if such suspension is sought and approved, NRG urges the CAISO to fast-track changes to the ways interties are settled to put all market participants on

even footing and to restore what the CAISO has acknowledged is a valuable complement to a multi-settlement market - convergence bidding – as soon as possible.

7. Does your organization prefer a two settlement market or a three settlement market? Please describe why.

Additional markets provide additional opportunities for market participants to shape and hedge their participation. A full hour-ahead market would be a substantial improvement over the current HASP process. However, the convergence bidding system would have to be expanded to provide full functionality over all three markets. Given the likely complexity of that expansion, adding a third full market seems unlikely. Regardless of the number of settlements, NRG wants to see CAISO markets in which all market participants can participate (unlike the current HASP process).

8. Please provide your organization's feedback on the concept of a 1 minute Real Time Imbalance Service (RTIS).

The CAISO has proposed to create a new ancillary service called “Real Time Imbalance Service” (RTIS). RTIS would be dispatched every minute to drive regulating units back to their POPs. RTIS would also be used to match generation with demand within the real-time dispatch intervals, be they five- or fifteen-minute intervals.

The CAISO has also proposed that the cost of RTIS would be the *de facto* cost of variability, and would be allocated, presumably to both demand and supply, based on how much each resource deviated from its RTED schedule. NRG believes this is a creative idea with regards to allocating the costs of variability in accordance with cost causation principles and should be further explored.

Given that the CAISO is proposing to separate “balancing” resources into two categories, a fast-responding category (regulation) and a slower-responding category, the CAISO has proposed to allocate the costs of regulation only to demand. NRG believes this approach makes more sense than, say, adding the costs of regulation to the costs of RTIS and allocating the combined costs on the basis of deviations from fifteen-minute schedules, especially if regulation is re-designed to be effectively a one-minute service.

- a. Does your organization agree that with RTIS, regulation should be changed to a bi-directional service?

NRG does not yet have a position as to whether making regulation and RTIS bi-directional is preferred. Making these services bi-directional will have implications for providing these services. In order to provide the same magnitude and speed of movement in both directions (which would seem a prerequisite for running a market for a bi-directional service), resources will have to be positioned in the center of their ramp-rate ranges. As an example, if a unit has a 5 MW-minute ramp rate from 200-300 MW but a 3 MW-minute ramp rate from 100-200 MW, a unit that is providing 50 MW of bi-directional RTIS service would have to be positioned at 250 MW; if it were positioned at 230 MW, it could provide 50 MW of

RTIS up in ten minutes but only 42 MW of RTIS down over the same 10 minute period. NRG looks forward to additional discussion on making these services bidirectional.

b. Is one minute the correct dispatch interval for RTIS?

On an absolute basis (i.e. independent of any other consideration), it is difficult to comment on whether a one minute dispatch interval is appropriate for RTIS. Additionally, the response lag (the time between when the dispatch instruction is given and the time when a unit begins to respond) is not known, but should factor into the selection of the dispatch interval. Intuitively, the RTIS dispatch interval has to be the same interval as the time interval in which regulation resources are expected to be moved back to their preferred operating points. However, the CAISO's expectation that regulation resources are to be moved back to the POPs every minute seems (1) intended to make regulation a product that can only be provided by fast-moving, energy-limited resources and (2) aggressive in light of the ten-minute period over which control performance standards are measured.

c. How should RTIS be bid, selected, and dispatched? Should a mileage bid be used for dispatch with a market clearing mileage price determined each minute?

It's not apparent how the forward procurement of RTIS would be optimized if bids to provide RTIS include both a bid-based capacity and a bid-based mileage payment. To do so, the CAISO would have to have some expectation of how much it plans to move the RTIS resources in real-time. If the CAISO did not expect to move resources much, it could optimize costs by selecting resources that have lower capacity bids but higher mileage bids – and vice versa. NRG does not know whether the additional degree of complexity added by having both bid-based capacity and mileage payments would improve market efficiency and is warranted.

d. Does your organization's opinion on RTIS differ depending on whether Option A or Option B is chosen?

No. NRG feels RTIS is a concept worth exploring. Flexibility will become an increasingly important operational quality as the amount of power provided by variable intermittent resources increases.

9. Please comment on your organization's preference for Option A or Option B with regard to the real time market. If neither option is feasible in your view, please provide input on how the real time market should be configured.

The CAISO has proposed two options for real-time market pricing:

- Option A involves 15-minute dispatch and settlement intervals. Additionally, the CAISO is considering, with this option, a ten-minute ramp period for each fifteen minute dispatch interval (resources would be ramped to their new 15-minute levels starting at five

minutes prior to the start of the interval and ending at five minutes into the dispatch interval).

- Option B involves retaining the current five-minute dispatch intervals.

The advantages of Option A are:

- Unit commitment, ancillary services and energy dispatch are co-optimized
- The settlement interval could be fully aligned with the dispatch interval
- Better alignment of the short-term unit commitment process with real-time dispatch
- If 15-minute interchange scheduling is implemented, the CAISO's real-time dispatch and settlement intervals would be aligned with this timing.

The disadvantages of Option A are:

- It would be a change from the current five-minute dispatch, ten-minute settlement interval paradigm
- The CAISO would have to procure more RTIS to cover variations in production and demand over a longer period.

NRG notes that the timing mismatch between the HASP process (which uses 15-minute intervals) and the RTED (which uses five-minute intervals) has contributed to what have been systematic and substantial differences between HASP prices and RT prices. Based on that experience, aligning the STUC, RTED and, possibly, the interchange scheduling intervals, would be a benefit. While moving to 15-minute interval would increase the amount of RTIS that would be needed (because the time between re-dispatches would be longer, 15-minute dispatch and settlement intervals would more explicitly and may more appropriately value ramping capability, a capability that should become increasingly valuable as the resource mix evolves). Based entirely on these presumptions, without any empirical evidence (such as a comparison of the amount of RTIS that would be needed in a 15-minute market versus a 5-minute market), at this time NRG prefers Option A.

- a. Would 15 minute real time prices enable price responsive demand or demand response?

While price, rather than settlement period, seems the most critical factor in enabling demand response, a different question is – would it be reasonable expect demand response resources to respond – either by curtailing demand or restoring it – within 15 minute periods?

- b. In Option A, with 15 minute RTED, what is your organization's opinion about a 10 minute ramp period?

10. How often should renewable resources be allowed to schedule?

Allowing variable energy resources to schedule more frequently will help allow them to reduce their imbalance energy charges. However, the maximum allowable scheduling frequency is a complex question that involves issues in the scheduling process such as:

- Whether submitting new schedules is an option or mandatory
- The capability of the CAISO's market systems and market participants' interface systems
- The capability of data storage and processing systems, including back-office settlement systems
- The scheduling frequency for interchange schedules (as the CAISO has noted, FERC has sought comment on 15-minute interchange scheduling)
- How far in advance of the operating interval the scheduling takes place

NRG does not offer any particular scheduling frequency at this time. However, as noted in the response below, NRG believes more salient question is – what does it mean to allow certain resources to schedule more frequently than other resources?

- a. In Option A does every 15 minutes make sense?

Perhaps, depending on the resolution of the issues mentioned above.

- b. In Option B should renewable generation be able to schedule every 5 minutes, 15 minutes, or some other time interval?

Unless scheduling is permitted right up to the operating interval, five-minute scheduling seems too granular. If scheduling has to take place substantially before the operating interval, then five-minute granularity seems of little benefit.

- c. Does it make sense to limit this scheduling opportunity to only renewable resources, or should it apply more generally? Who should be able to schedule more granularly than hourly?

The Proposal indicates that an open question is whether variable energy resources could submit revised schedules every five minutes, fifteen minutes, or some other period. (Proposal at 16.)

Schedules serve important, different functions. They serve to provide the CAISO with advance notice of what to expect during real-time operations, and this certainty promotes

reliability. They also serve as the reference points from which real-time deviations are measured.

At present, scheduling requirements are not universally applied. Conventional resources that meet Resource Adequacy obligations are required to submit bids in the Day-Ahead market. These bids could establish Day-Ahead schedules, which would then serve as the reference points from which real-time deviations are measured. There is a financial settlement associated with these day-ahead schedules. If a unit trips after day-ahead schedules are established, there is no opportunity for that resource’s scheduling coordinator to revise its day-ahead schedules. This exposes conventional units to real-time price risk – a risk which can be hedged, to some extent, through convergence bidding.

However, other resources which similarly count towards meeting RA obligations are not required to bid into the Day-Ahead market. For example, PIRP resources are forbidden from submitting bids or obtaining day-ahead schedules. Instead, the CAISO establishes “schedules” for PIRP resources a few hours prior to real-time based on forecasts. Unlike Day-Ahead schedules for other RA resources, these schedules have no financial settlement. Like Day-Ahead schedules, these schedules serve as reference points for measuring real-time balancing energy deviations.

It is clearly understood that the closer to real-time schedules for variable energy resources can be established, the more accurate those schedules should be. However, the accuracy and dependability of schedules from all resources increases as real-time approaches. Thermal generators whose maximum capability depends on ambient air temperature will be able to produce more accurate schedules (assuming they are loaded to full load, a reasonable assumption for efficient combined cycle plants on hot summer days) if they can establish those schedules closer to real-time than the day-ahead market.

Resources that can control their output – apart from deviations due to real-time outages – are locked into day-ahead schedules as their balancing energy reference points, while the CAISO proposes to afford additional opportunities to resources that cannot control their output additional opportunities to reduce their exposure to balancing energy deviations.

NRG – which has both conventional and variable energy (solar) resources, and, recognizing that the current proposal is focused on day-of markets – offers that, rather than focusing on expanding scheduling opportunities for one particular class of resources (in seeming violation of the first guiding principle of technology agnosticism), there should be in RIMPR-2 a broader conversation about the purpose of schedules and RA bidding/scheduling requirements. Perhaps the ultimate goal of that conversation would be the creation of market and RA rules that treat all resources equally from a market perspective but still meet the CAISO’s reliability planning needs.

11. Please provide any other comments your organization would like the CAISO to consider through this initiative.

Automatic Unit Response

The CAISO has offered that two separate, additional “automatic response” products could be created:

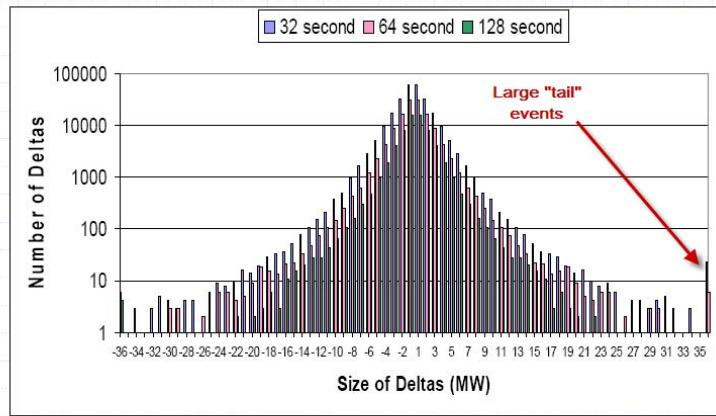
- Inertia. While inertia plays a role in dampening frequency excursions, inertia also plays a role in ensuring sufficient transfer capability to the LA Basin. This role should not be ignored.
- Frequency Response. The FERC presentation at the July 14, WECC Joint Standing Committee Meeting (see below) emphasized the critical role primary (e.g., automatic governor action) plays in limiting the change in frequency from a contingency. Primary frequency control need not be limited to governor response, but could be integrated into the response of energy storage devices. Given that NERC is currently developing a proposed standard for frequency response¹, the CAISO should be prepared to “marketize” the provision of frequency response if and when a requirement for frequency response is implemented.

Operational Challenges

- “Following” (load or generation)
 - NRG agrees with the CAISO that large VER ramps will become a greater challenge as the penetration of VERs increases. At the July 14 Joint WECC Standing Committee meetings in Denver, FERC’s Eddy Lim shared a presentation that indicates the distribution of VER ramping events (ramp size in MW over a period of time) is not Gaussian (i.e., not normally distributed). Instead, the “tails” of the distributions of ramping events away from the central mean include some very substantial ramps. That means that the likelihood for large ramping events is greater than would be anticipated if the distribution were normal. Consequently, the CAISO must expect such events to happen more than rarely.

¹ See http://www.nerc.com/filez/standards/Frequency_Response.html.

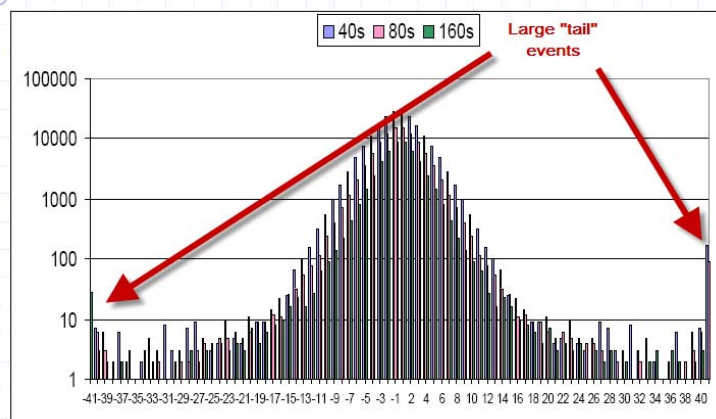
Frequency distribution of wind deltas at short time scales (ERCOT winter).



This does not represent the opinion or policy of the Federal Energy Regulatory Commission

Page 30

Frequency distribution for PJM wind power deltas at short time scales



This does not represent the opinion or policy of the Federal Energy Regulatory Commission

Page 31

“Use of Frequency Response Metrics to Assess the Planning and Operating Requirements for Reliable Integration of Variable Renewable Generation” presented to WECC Joint Standing Committee Meeting, July 14, 2011. This presentation cites the December 2010 Ernest Orlando Lawrence Berkeley National Laboratory Study “Analysis of Wind Power and Load Data at Multiple Time Scales”, available at <http://www.ferc.gov/industries/electric/indus-act/reliability/analysiswindpowerload.pdf>. Figures used by permission.