

Stakeholder Comments Template

Submitted by	Company	Date Submitted
Brian Theaker brian.theaker@nrg.com	NRG Energy, Inc. ("NRG")	January 6, 2017

Please use this template to provide your comments on the FRACMOO Phase 2 stakeholder initiative Supplemental Issue Paper posted on November 9.

Submit comments to InitiativeComments@CAISO.com

Comments are due January 6, 2017 by 5:00pm

The Supplemental Issue Paper posted on November 9 and the presentation discussed during the December 9 stakeholder web conference may be found on the [FRACMOO](#) webpage.

Please provide your comments on the Supplemental Issue Paper topics listed below and any additional comments you wish to provide using this template.

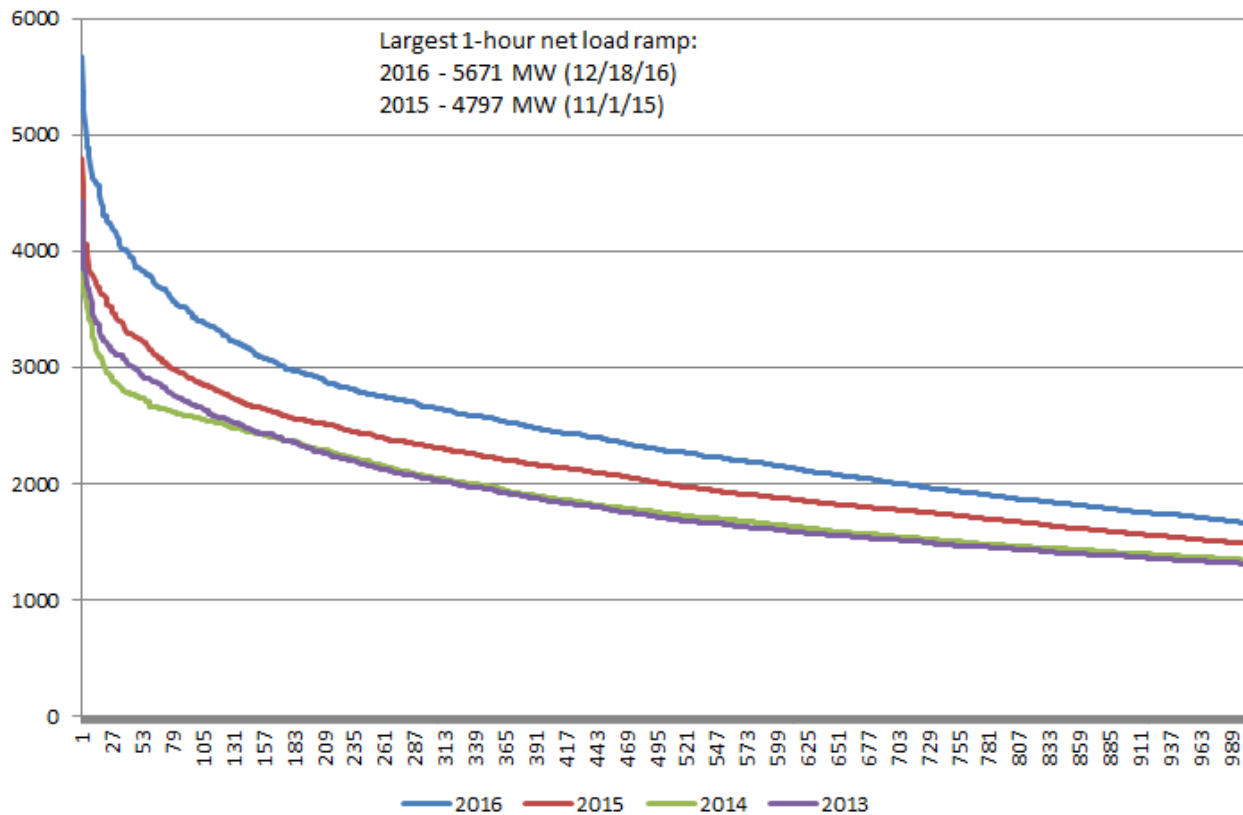
Identified opportunity for enhancing flexible capacity product

1. Ramping speed
 - a. Large single hour net load ramps

Comments:

NRG agrees that the magnitudes of one-hour net load ramps are increasing. The graph below shows the largest 1,000 one-hour net load ramps for the last four years obtained using data available from the CAISO's web site (load data is from OASIS, while wind and solar data is from CAISO Today's Outlook):

Largest 1000 1-hour Net Load Ramps



The size of the largest single net load ramp increased by 18% from 2015 (4797 MW) to 2016 (5671 MW).

b. The transition from low net loads to steep ramps

Comments:

The CAISO has a number of options it could consider to address this transition problem – increasing the amount of regulation produced in the likely transitions hours, or adding ramping-based constraints to its market optimization to ensure the availability of quick-start resources or to ensure that resources are properly positioned to be able to ramp effectively.

This question, which posits the CAISO’s “leaning on the interconnection”, highlights a question: under what conditions is the CAISO willing to lean on the interconnection rather than fully meet its ramping needs, and under which conditions is the CAISO unwilling to lean on the interconnection rather than fully meeting its ramping needs? The CAISO should also clarify what value it puts on being able to meet its ramping requirements. In the design of its Flexible Ramping Product, the CAISO explicitly provided that it was willing to lean on the interconnection (e.g., not meet its ramping requirements) for some intervals if the cost of acquiring flexible capacity was above a certain threshold. If the CAISO is willing to lean on the

system when it deems the cost of acquiring ramping capability to be “too high”, market participants should be able to understand what cost is “too high” so they can work to provide the CAISO with ramping capability below that threshold price.

c. Intra-hour variability

Comments:

NRG does not dispute the CAISO’s assertion that intra-hour variability is an increasing concern, but does not have the time-granular information necessary to evaluate the CAISO’s observations and concerns. NRG respectfully urges the CAISO to make time-granular (e.g., one-minute) aggregated wind, solar and load data (such as the data the CAISO posted in accordance with the market notice available at http://www.caiso.com/Documents/LoadWind_SolarData_013116AvailableforLimitedTime.html) available to market participants on a regular basis to help market participants understand the nature and magnitude of the CAISO’s intra-hour variability challenges.

2. Cycle time and flexible capacity qualifications

Comments:

NRG supports the CAISO’s proposal to clarify what resources must be able to provide two starts (as opposed to two ramps) per day. Further, given the increasing challenge of low net load periods and single-hour net load ramps, NRG supports re-examining the nature of the flexible capacity product.

3. High minimum operating levels from both RA and flexible RA

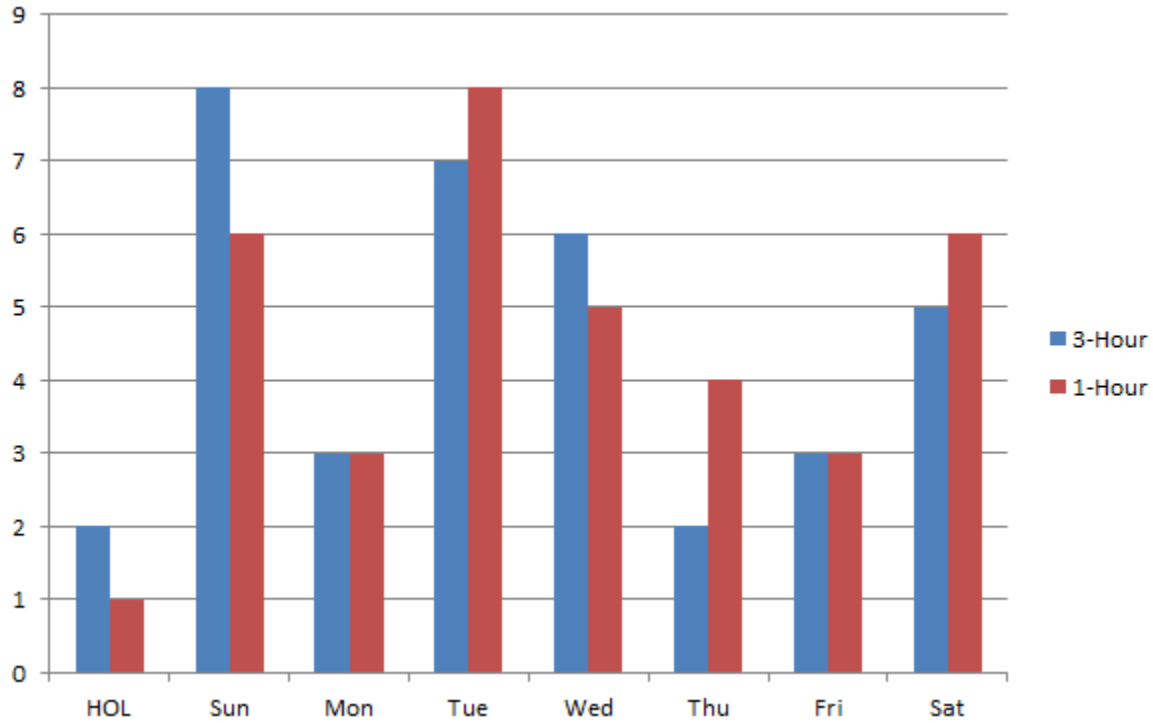
Comments:

See comments on item 5 below.

4. Most significant net load ramps occur on weekends or holiday weekdays

Comments:

Using CAISO hourly data, NRG determined the daily maximum 3-hour and 1-hour net load ramps for 2016, and developed a histogram plot of the top 10 (10%) daily 3-hour and 1-hour net load ramps by weekday, including holidays. Here are the results:



	3-Hour NL Ramps	1-Hour NL Ramps
Holiday-Sunday-Saturday	15	13
Weekday	21	23

In 2016, the maximum 3-hour and 1-hour net load ramps both occurred on the same Sunday (12/18/16). However, the data indicate that, while a disproportionate number of large net load ramps occur on holidays, Saturdays and Sundays, it’s not clear that *most* significant net load ramps occur on holidays, Saturdays and Sundays (depending on what “most” means).

In any case – NRG agrees that it is reasonable to re-evaluate exempting a category of flexible capacity from having to offer on weekend days and holidays.

- 5. Significant quantities of long start resources may limit the ISO’s ability to address real-time flexibility needs

Comments:

First, given the looming retirement of the steam turbine once-through-cooled fleet due to the state’s regulations, it’s not clear that operational flexibility problems created or exacerbated by taking flexible capacity from steam turbine units will persist.

Second, there is no market product – forward or real-time – that sends any kind of actionable price signal to address this problem.

Third, the CAISO should provide to market participants clear information that indicates the nature and extent of this problem.

6. There is currently no means in place for the ISO to assess the likelihood that the flexible RA showings will adequately meet all ramping needs

Comments:

Given that there appears to be no appetite among regulators or market participants for changing the current flexible capacity paradigm (i.e., developing products to address ramping needs beyond the three-hour ramping requirements and the ramping products based on the three-hour net load ramp), the CAISO should (1) provide market participants with clear information on the nature and magnitude of all its ramping needs; and (2) consider Southern California Edison Company’s proposal to develop a “simultaneous feasibility” test that would evaluate the ability of the flexible capacity shown by the load serving entities to meet all of the defined ramping needs. It is important that step (1) be completed before step (2) is attempted.

Other comments

Please provide any additional comments not associated with the topics above.

Comments:

NRG has no other comments.