NRG Energy, Inc. Comments on
CAISO June 18, 2019 *Price Performance in the CAISO's Energy Markets* Report
July 3, 2019

NRG Energy, Inc. ("NRG") submits these comments on the CAISO's June 18, 2019 report entitled "Price Performance in the CAISO's Energy Markets" ("Price Performance Report", or "PPR").

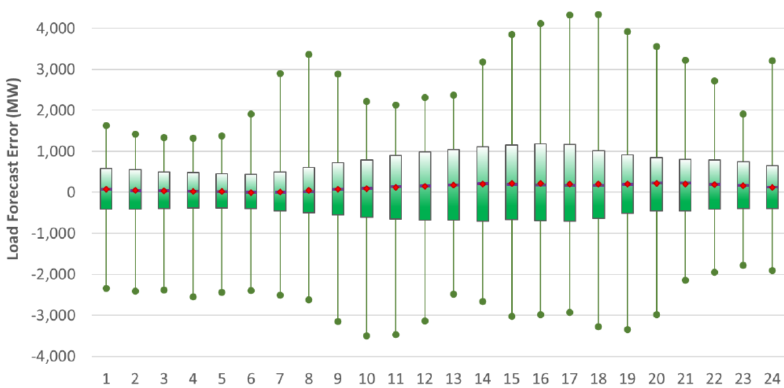
NRG commends the CAISO for its initial analysis. NRG appreciates that the CAISO incorporated comments from several stakeholders, including NRG, in conducting its price performance analysis. The initial analysis is a good first, but warrants further action, as will be described below.

Overall Price Performance

The information presented in the report points to the following reasons as to why the Day-Ahead Integrated Forward Market ("IFM") prices are consistently higher then real-time market ("RTM") prices:

- **Load forecast bias.** Though it is not clear as to which period the graph below (Figure 34, PPR at page 32) applies, the graph shows an inherent tendency to over-forecast demand in the afternoon hours (as NRG understands, the "forecast error" is forecast-actual, so that positive values mean over-forecast demand).

Figure 34: Hourly load forecast error in the day-ahead market



This information is consistent with NRG's own analysis of day-ahead load forecast error submitted in comments in the system structural competitiveness initiative, which showed a consistent over-forecast bias for July and August 2018.[1]

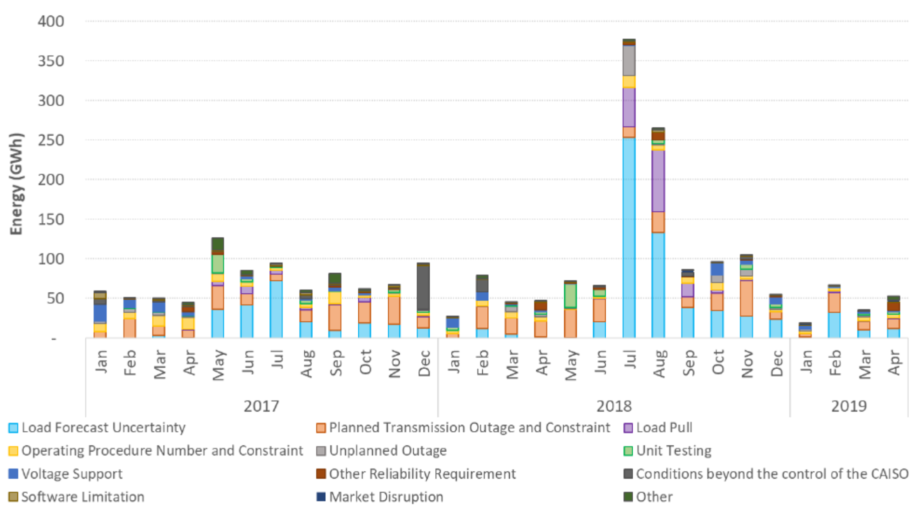
While it seems intuitive that the Day-Ahead demand forecast would show the highest amount of forecast error relative to the real-time market (because it is conducted well in advance of actual conditions using available at the time), it is not intuitive as to why that DA forecast error would be biased towards over-forecasting. NRG requests the

[1] http://www.caiso.com/Documents/NRGEnergyComments-SystemMarketPowerAnalysis.pdf.

CAISO provide some insight into the asymmetric nature of the CAISO's IFM load forecast error, especially as observed in July-August 2018.

- **CAISO operator actions taken to address uncertainty.** Figure 52 showed a significant amount of exceptional dispatch undertaken in July and August 2018 to address load forecast uncertainty and the afternoon load pull.

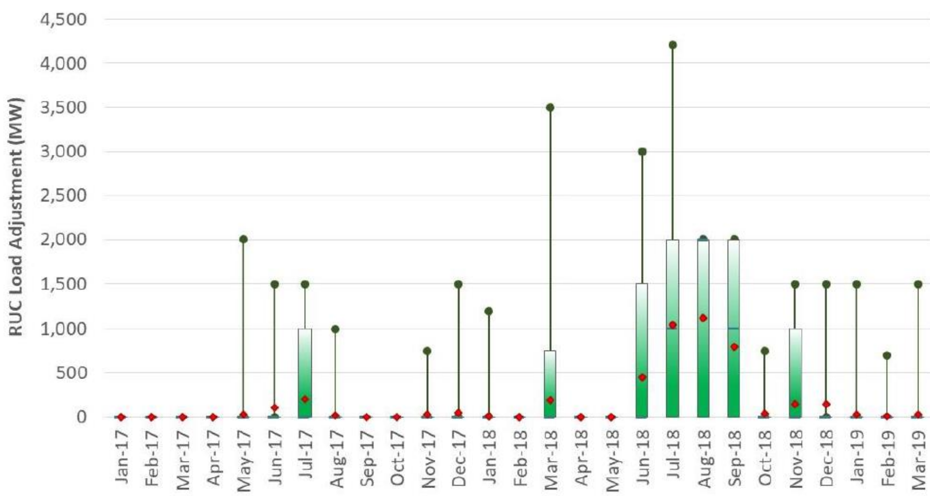
Figure 52: Volume of Exceptional Dispatches in the CAISO market



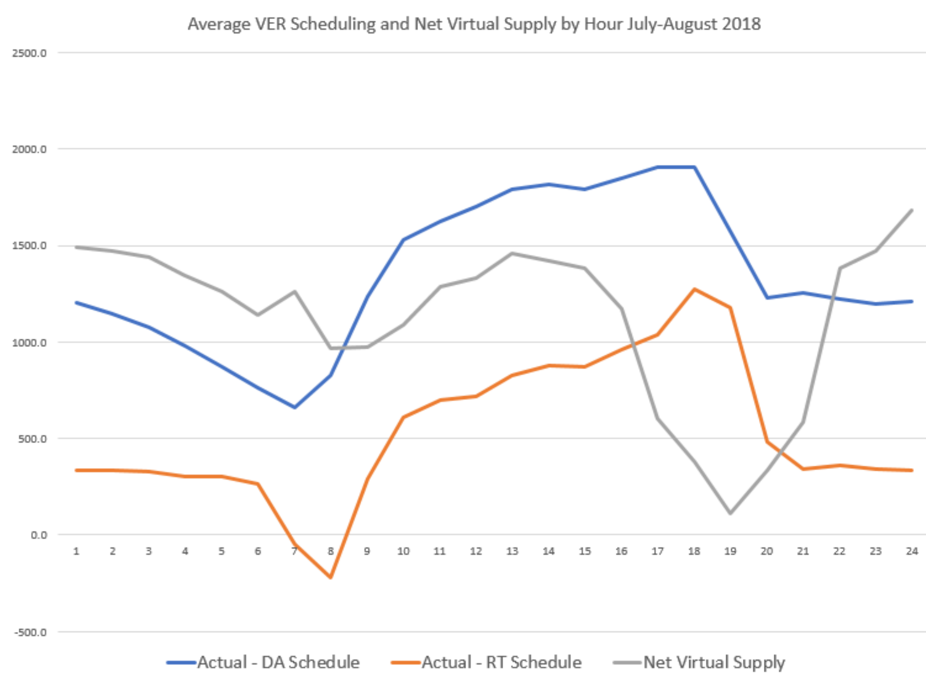
NRG requests that the CAISO clarify the category "Load Pull", which NRG believes to be exceptional dispatch conducted to position units in ranges in which they can better ramp to meet the afternoon/evening net load ramp. If that is correct, NRG offers that the term "Position Units to Ramp" would better describe that kind of exceptional dispatch.

The PRR also discusses the RUC net short adjustments, in which the CAISO operator increases the RUC forecast to account for uncertainty. The CAISO's data shows that this RUC net short adjustment was substantial in June and Q3 2018. The net short adjustment, coupled with the IFM demand over-forecast, demonstrates that the CAISO significantly over-commits the IFM as a hedge against uncertainty. It seems intuitive, therefore, that this over-commitment drives the divergence between IFM and RT prices, a divergence that is not overcome by virtual supply.

Figure 23: Monthly profile of RUC load adjustments



- **Under-scheduling of Variable Energy Resources (VERs).** The daily Wind and Solar Daily Market Watch data files published by the CAISO clearly demonstrate the extent to which VERs under-schedule in the IFM (and in RT) – an extent which is not overcome by virtual supply across the peak demand hours:



In the PPR (page 36), the CAISO describes a process in RUC in which the CAISO adjusts IFM bids for VER resources to their forecasted generation values to mitigate the possibility of RUC over-procurement. Given the role that the RUC net short plays in over-committing resources, NRG requests the CAISO to provide information regarding the level of the various RUC adjustments – both those described in Section 6.7.2.5.1 of the BPM for Market Operations as well as the RUC net short process – and how those adjustments interact.

Gas Prices

NRG agrees with the CAISO that gas prices can and do contribute to price performance (*e.g.,* PPR at page 52). Volatile gas prices may not yet contribute enough to CAISO prices because of the gas prices the CAISO uses in capping commitment cost bids and energy bids. The gas prices the CAISO uses may not reflect the actual cost of gas procurement in either the IFM or real-time time frames, a situation that likely will persist at least through the implementation of the proposed CC-DEBE modifications in Fall 2020. NRG encourages the CAISO to commit to using the best available gas price information in all its markets as soon as possible. While using the best gas price information may result in more volatile electric prices under volatile gas supply and price conditions, such prices properly reflect supply fundamentals.

Marginality Graphs

The graphs regarding the frequency by which various types of resources are marginal in the real-time market that the CAISO presents on page 71 share many of the same period labels, and, unlike the IFM marginality graphs, which are presented in distinct annual quarters, it is not clear as to which period they apply. Could the CAISO please correct that in the next version of the report?

Further, it's not intuitive as to how the information in these marginality graphs, while interesting and colorful, relates to price performance. Some different presentation of this information which, in aggregate, ties the technology of the marginal unit to different pricing levels, might be of more use.

Findings and Recommendations

NRG notes that while the report contains analyses of data trends and a few case studies, the initial report makes no findings or recommendations with regards to price performance. While this seems consistent with the CAISO's statement on page 74 of the PPR,[2] the ultimate value of

[2] "The analysis effort will be approached with two deliverables. In the first deliverable, the analysis effort will be focused on measuring the various factors that may play a role in price formation. This will consist of an initial report with a series of metrics, indices and trends of the multiple factors described in previous sections of this report. In the second phase, the analysis objective will be to determine to the extent possible, the correlations, causes, and effect of the areas identified in the first phase on price formation."

the CAISO's significant effort to evaluate the price performance of its markets hinges on what needed changes are implemented. Acknowledging that this is an initial report, NRG recommends that the second iteration of this report not only include the trends and analyses presented in the initial report, but also include (1) findings that flow from the analyses of the trend and case study information as to whether the pricing performance in the CAISO markets is reasonable and meets the reliability needs of the system, and (2) to the extent the pricing performance is not reasonable, recommendations regarding structural modifications to address deficiencies in price performance.

While "price performance" applies to achieving consistent prices across the CAISO's markets, NRG encourages the CAISO, as it considers the need for changes to its markets, to not stop at price *performance,* but examine the reasonableness and efficacy of its current price *formation*, as an ongoing part of this initiative.