BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements.	Rulemaking 16-02-007 (Filed February 11, 2016)

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

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I. Introduction

On September 24, 2018, Administrative Law Judge Fitch issued a Ruling Seeking Comments on Production Cost Modeling (September 24 Ruling). The September 24 Ruling includes an updated description of the role of production cost modeling in the Integrated Resource Planning (IRP) process (Attachment A) and a PowerPoint slide deck detailing the production cost modeling and analysis Energy Division staff conducted on the Reference System Plan (Attachment B). The September 24 Ruling invited parties to comment on any aspect of the attachments. The California Independent System Operator Corporation (CAISO) appreciates the Commission's continuing efforts to improve its production cost modeling capabilities. The CAISO's comments address two general issues: (1) process improvements to increase stakeholder engagement and feedback; and (2) and corrections to the loss of load expectation (LOLE) methodology and the strategic energy and risk valuation model (SERVM) modeling. The CAISO looks forward to providing its own reliability analyses for the benefit of all parties as this proceeding progresses.

II. Discussion

The CAISO appreciates the steady progress Energy Division staff has made in developing and improving its production cost modeling in the IRP. The efforts to date reflect significant staff commitment and a necessary investment to ensure that the IRP will inform and meet electric reliability needs. To that end, the CAISO urges the Commission to provide sufficient and realistic opportunities for stakeholder engagement in the IRP modeling process and to continue to make significant reliability-focused production cost modeling improvements before using the modeling results to direct procurement.

A. The Commission Should Improve the IRP Production Cost Modeling and Feedback Process.

At the Commission's August 7, 2018 IRP workshop, CAISO staff presented two process-related observations about the IRP process, neither of which has been adequately addressed to date.[1] The CAISO's first observation noted that the Commission had deviated from the schedule outlined in its February 8, 2018 Decision.[2] The proposed schedule provided modeling parties an opportunity to both conduct production cost modeling and to share modeling results based on Energy Division staff's SERVM results. The schedule also provided for a formal comment period subsequent to the modeling parties submission of production cost modeling results.[3] The CAISO's second observation identified a lack of specific guidance regarding how load serving entity (LSE) IRP plans would be aggregated for production cost modeling. Since that time, there has been limited progress addressed these issues, as the CAISO explains in further detail below.

1. The Commission Should Provide Modeling Parties an Opportunity to Provide Meaningful Feedback on Production Cost Modeling.

Production cost modeling should provide a critical reliability check on both (1) the Reference System Plan produced by the simplified RESOLVE model; and (2) the Preferred System Plan aggregated from the IRP plans filed by the LSEs. To date, however, the IRP process has afforded only limited opportunity for feedback on the Energy Division staff's production cost modeling of the Reference System Plan. For example, the Modeling Advisory Group (MAG) held only a single webinar to present preliminary production cost modeling results on July 13, 2018.[4] A subsequent in-person MAG meeting on August 10, 2018, was

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[1] CAISO staff presentation, "IRP process observations," August 7, 2018. *Recording available at:* http://www.cpuc.ca.gov/General.aspx?id=6442451195

[2] California Public Utilities Commission, D.18-02-018 Setting Requirements for Load Serving Entities Filing Integrated Resource Plans, Attachment B, "Guide to Production Cost Modeling in the Integrated Resource Plan Proceeding," February 8, 2018, p. 4 (February 8 Decision).

[3] February 8 Decision, Attachment B, p. 4.

[4] *See*: http://www.cpuc.ca.gov/General.aspx?id=6442451195

converted to a brief webinar on greenhouse gas (GHG) modeling.

The September 24 Ruling provided an 83-page PowerPoint slide deck (Attachment B) with additional details regarding Energy Division staff's modeling methodology.[5] Based on the CAISO's understanding of Attachment B, some of the modeling changes and enhancements are significant and potentially flawed, as the CAISO discusses below, but the details have not been presented or vetted through the MAG or any other public forum. While the CAISO appreciates this opportunity to submit formal comments, it cannot replace a robust production cost modeling discussion amongst parties and Energy Division staff.

In addition to providing feedback on Energy Division staff's production cost modeling methodology, the CAISO aims to provide its own reliability-based modeling results in the IRP proceeding to benefit all parties. The February 8 Decision contemplated an opportunity for parties to present such results, but the September 24 Ruling removed this opportunity from the procedural schedule. Instead, the new timeline omits any opportunity for parties to provide their own modeling results on the Reference System Plan and, instead, now provides a separate, later opportunity to provide modeling results on the Preferred System Plan.[6]

2. The Commission Should Articulate a Detailed Process for Aggregating LSE IRPs and Provide Necessary Data for Aggregating LSE plans.

At the August 7, 2018 workshop, Energy Division staff noted that it would provide guidance regarding how to aggregate LSE-submitted IRPs by end of August 2018. Energy Division staff provided a general form of this guidance in Attachment A, but the Commission now anticipates another ruling in mid-October to revise production cost guidelines for studying aggregated LSE portfolios.[7] A September 28, 2018 MAG webinar, which was intended to discuss aggregated LSE filings, was postponed to an as-yet unannounced October date.[8] Moreover, Energy Division staff indicated that it would provide the underlying data needed for

[5] September 24 Ruling, p. A-1.

[6] *Id.*, Attachment B "IRP Production Cost Modeling with the Reference System Plan and the 2017 IEPR: SERVM model results," p. 12.

[7] *Id.*

[8] Email communication from Patrick Young, "R.16-02-007: Changes to IRP Modeling Advisory Group Meeting Schedule," September 19, 2018.

parties to conduct the production cost modeling by end of September, but it had not yet been provided at filing.[9]

To perform production cost modeling on the aggregated LSE portfolios or a Preferred System Plan, the CAISO needs the required data (such as the aggregated data promised at the end of September) and guidance at least a month prior to date that results are due. The CAISO urges the Commission and Energy Division staff to provide both no later than mid-October so that modeling parties can conduct meaningful analysis and adhere to the remainder of the schedule provided in the September 24 Ruling.[10] In addition, the CAISO recommends that the Commission schedule two additional MAG meetings after Energy Division staff completes its SERVM modeling of the Proposed Preferred System Plan (currently scheduled for the end of November) and before party comments on production cost modeling results are presented to the Commission (currently scheduled for the end of December).[11] The first MAG meeting should be used to review the results of Energy Division staff's Proposed Preferred System Plan SERVM results. The second MAG meeting should be used to review party modeling results. Lastly, the CAISO requests that party production cost modeling be provided to the Commission at the end of December as formal comments.

3. The Commission Should Continue to Coordinate with the CAISO to Produce Timely Portfolios for the Transmission Planning Process.

The CAISO intends to publish its Reference System Plan production cost modeling results as a special study in the CAISO's 2018-19 Transmission Planning Process. For the 2019-20 Transmission Planning Process, the Commission should officially communicate the reliability and policy-driven portfolios to the CAISO by February 2019 the latest. The CAISO cannot accept portfolios any later because it would delay the transmission planning process such that the CAISO would not be able to meet its tariff-driven deadlines for completing the transmission plan. In addition, the CAISO requests the Commission recognize and agree that the portfolios it will provide to the CAISO will use an earlier vintage of the integrated energy policy report (IEPR) than will be used in the CAISO's 2019-2020 transmission plan. This is a known mismatch between IEPR vintages, but the Commission should acknowledge that the portfolios it

[9] September 24 Ruling, Attachment B, p. 12. "Post aggregated LSE portfolios' physical unit data for PCM."
[10] *Id.*, p. 12.
[11] *Id.*, p. 12.

sends to the CAISO will provide sufficient basis for the CAISO to identify necessary transmission infrastructure upgrades in the transmission planning process.

B. The Commission Should Make Significant Reliability-Focused Improvements to the Production Cost Modeling Assumptions Before Using the Results for Procurement.

1. Energy Division Staff's Conclusions that the Reference System Plan is Reliable and that the System is Long on Capacity in 2030 Are Misleading.

Energy Division concludes that the Reference System Plan creates no reliability issues and provides a 19 percent planning reserve margin in 2030.[12] Energy Division staff further notes that "[a]s more GHG free capacity is installed, it may be possible for other capacity to be removed (at least in certain months) without significant reliability consequences" subject to further study.[13] The production cost modeling does not adequately validate these conclusions because it relies heavily on simplifying assumptions—especially the assumption that no gas-fired generation units will economically retire—and does not consider local capacity area needs, which are both substantial and unique. As explained in greater detail below, the methodology used erodes the one event in 10 year loss of load expectation target. Given these significant caveats, the CAISO strongly urges the Commission to reconsider how the current IRP results are portrayed. It is important that additional improvements are made to appropriately reflect reliability.

2. Energy Division's Loss of Load Expectation Analysis Improperly Reduces Reliability to a 3-in-10 Loss of Load Expectation.

The CAISO is deeply concerned that Energy Division staff's methodology decreases the system reliability target from a 1-day-in-10 years loss of load expectation (*i.e.*, 0.1 LOLE) to a 3 days-in-10 years LOLE (*i.e.*,0.3 LOLE) based on flawed reasoning. In addition, this approach presupposes the outcome of the resource adequacy proceeding by using an LOLE standard that the Commission discussed, but did not adopt, in that forum. As such, the resulting effective load carrying capability (ELCC) values should not be used in procurement.

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[12] *Id.*, p. 6, p. 64, p. 78.
[13] *Id.*, p. 64.

The September 24 Ruling describes in a footnote (emphasis added):

> Specifically, the monthly LOLE target was created by first taking the industry standard 0.1 LOLE annual target and assuming that most of those events map to the four peak months of June through September, or one third of the year. *Assuming a similar target reliability for the rest of the year would mean that total LOLE over the entire year should have a target of 0.1x3=0.3* [emphasis added]. Thus, monthly LOLE studies would have a monthly target LOLE of 0.3/12=0.025, i.e. a target range of 0.02 to 0.03.[14]

Using such criteria to determine the ELCC and resource adequacy procurement, the system would be expected to have 3 days of loss of load in 10 years. The CAISO opposes decreasing the generally accepted 1 day-in-10 years industry LOLE target.[15] There has been no analysis presented to support a 3 days-in-10 years (0.3) LOLE.

Energy Division staff argues that the 1 day-in-10 years LOLE target may no longer be appropriate because "[t]oday's computers perform simulations, not simple calculations, and perform simulations of each hour of the year thousands of times with multiple stochastic variables" whereas in the past, planners could only focus on weekday peak hours because they lacked sufficient computing power.[16] This is not a proper logical conclusion. The North American Reliability Corporation (NERC) explains the methodological focus on peak hours as follows:

> The general principle is to start with a full year (or more) of data and calculate LOLE for each time period. During off-peak periods and times when there is excess generating capacity available, LOLE values will usually be zero. Non-zero LOLE values occur during peak periods and near-peak periods, and possibly during times that large amounts of capacity are undergoing scheduled maintenance and is therefore unable to provide capacity.[17]

In other words, the eight off-peak months, as defined in the September 24 Ruling, should have no contribution to LOLE (0.0 LOLE), to produce a 0.1 LOLE over the entire study year. Energy Division staff implies that the LOLE risk in the non-peak months existed prior to the advent of newer computing technologies, but that in prior studies this risk was ignored. Based

[14] *Id.*, p. A-7.

[15] https://www.nerc.com/files/IVGTF1-2.pdf, p. 9.

[16] California Public Utilities Commission Energy Division, "Proposal for Monthly Loss of Load and Solar and Wind Effective Load Carrying Capability Values for 2018 Resource Adequacy Compliance Year," February 24, 2017, p. 6.

[17] https://www.nerc.com/files/IVGTF1-2.pdf, p. 10.

on this assumption, Energy Division staff erroneously calculated a "monthly LOLE target by taking the 0.1 LOLE target over the four peak months of June through September (equal to one third) of the year and spreading that level of LOLE across the year (translating to three times that level over the year)."[18] This leads to a lower overall 3 days-in-10 years reliability target and is not appropriate. It is critical to note that the industry developed the 1 day-in-10 years target based on legacy power systems that were dominated by conventional resources with high availability factors. [19] Any change in the LOLE target must consider variable energy resource integration needs, energy limited resources, the impact of conventional generation retirements, and conventional generation outage patterns.[20]

Energy Division staff's methodology is also inconsistent as it applies a day or event-based reliability metric to an hourly model.[21] The "day" in the LOLE metric is not equivalent to 24 hours. In fact, the reliability metric assumes that the loss of only one peak load hour is equivalent to a single day of loss of load. Energy Division staff's current methodology ignores the fact that the system and economic impacts of multiple hours of loss of load in the same day are much more severe than a single hour. Much more analysis and discussion is needed to consider how to align a day or event-based metric with hourly modeling.

Much of the work in developing an LOLE analysis cited by the September 24 Ruling and Energy Division staff in this IRP proceeding refers back to the resource adequacy proceeding where LOLE and the resultant ELCC values are still being discussed.[22] In the Commission's resource adequacy decision on ELCC values, it did not adopt a specific calculation methodology but rather interim ELCC values.[23] Until an ELCC methodology is adopted in the resource

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[18] California Public Utilities Commission Energy Division, "Proposal for Monthly Loss of Load and Solar and Wind Effective Load Carrying Capability Values for 2018 Resource Adequacy Compliance Year," February 24, 2017, p. 7.

[19] https://www.nerc.com/files/IVGTF1-2.pdf, p. 9.

[20] https://www.nerc.com/files/IVGTF1-2.pdf and http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2018-10-09/09242018%20Capacity%20Value%20of%20Resources%20with%20Energy%20Limitations.pdf.

[21] There have been studies conducted about the conversion of LOLE targets using only peak load to LOLE targets using hourly load. *See* R. Billinton, R. N. Allan, *Reliability Evaluation of Power Systems*, Plenum Press, New York and London (second edition, 1996).

[22] Email from Administrative Law Judge Peter Allen, "RE: R.17-09-020 RA – ELCC," on September 28, 2018 requesting party feedback on whether a workshop is needed to discuss the forthcoming Energy Division proposal on ELCC.

[23] Decision 17-06-027, June 29, 2017, p. 20.

adequacy proceeding, any resulting ELCC values in the IRP proceeding presupposes the outcome of the resource adequacy proceeding.

3. Energy Division Staff's ELCC Is Preliminary and Should Not Lead to Procurement.

The ELCC analysis described by Energy Division staff should be considered preliminary and subject to further methodology refinements and coordination in the resource adequacy proceeding. It should not be used for any purpose outside of this IRP cycle. Energy Division staff's conclusion that significant amounts of storage may increase the ELCC of wind and solar are speculative, especially given staff's caveats. Energy Division staff notes the ELCC analysis presented in Attachment B "does not represent an adequate reliability assessment, as CPUC staff did not explicitly evaluate sub-hourly flexibility (ramping) needs nor Local Resource Adequacy (RA) needs."[24] The CAISO agrees and emphasizes that the system ELCC values derived from Energy Division staff's analysis are portfolio-dependent and that the IRP resource portfolio include includes the entire existing thermal generation fleet net of announced retirements. In addition, Energy Division staff's observed increases in wind and solar ELCC values with the addition of storage assume that the solar and storage resources work in tandem to lower LOLE. However, storage resources procured in local capacity areas may be reserved for contingency use and, therefore, will not be optimized with solar or wind at the system level. Furthermore, ELCC values will not be equivalent in each local area because each area has unique load shape and resource portfolio. As currently modeled, the IRP approach reduces reliability while overestimating ELCC values.

4. Energy Division Staff Must Refine the SERVM Methodologies and Assumptions.

The CAISO supports the modeling improvements noted by Energy Division staff prior to modeling the aggregation of LSE portfolios. As acknowledged in Attachment B, there are several SERVM results that are inconsistent with that of the RESOLVE model. Some of these results are driven by SERVM assumptions that differ from the California Energy Commission's (CEC) IEPR forecast[25] or are otherwise incorrect. The CAISO recommends that the

[24] September 24 Ruling, Attachment B, p. 64.

[25] *Id.*, p. 35, p. 40, p. 44.

Commission modify the SERVM input assumptions discussed in more detail in the following sections. The CAISO urges the Commission address these issues before it models aggregated LSE portfolios and not to draw conclusions based on the current results.

i. Behind-the-Meter Photovoltaic and Utility Scale Solar Assumptions

SERVM behind-the-meter photovoltaic (BTM PV) generation is 6,326 GWh—17.4%, higher than in RESOLVE and the IEPR forecast. This differences is primarily because SERVM uses 35 historical weather data years to create its BTM PV profiles. As a result, the BTM PV profiles are inconsistent with the CEC's hourly BTM PV shape provided in the 2017 IEPR forecast. SERVM's utility-scale solar generation suffers from a similar discrepancy. The CAISO believes these incorrect inputs lead to significantly increased renewable curtailment in SERVM (11,055 GWh) compared to RESOLVE (2,923 GWh). If Energy Division staff modifies the RESOLVE model to match with the curtailment in SERVM, solar may have been much less effective and more costly compared to other resources. RESOLVE would then have chosen other types of clean resources to serve the load and to meet the GHG targets resulting in a completely different Reference System Plan portfolio. For comparison the CAISO's actual 2017 renewable curtailment was 404 GWh.[26]

The CAISO also strongly supports improving the solar profiles to include more longitudinal resolution and increase accuracy.[27]

ii. Net Export Limit

As the CAISO explained extensively in previous comments, a 5,000 MW net export limit is inappropriate because there is no technical analysis supporting this number and no historical precedent.[28] A 2,000 MW net export limit is the most appropriate and defensible number. The IRP's current 5,000 MW net export limit implies that there is more regional coordination than the current operation of the CAISO market.

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[26] http://www.caiso.com/informed/Pages/ManagingOversupply.aspx.

[27] September 24 Ruling, Attachment B, p. 82.

[28] California Independent System Operator, Comments of the California Independent System Operator, June 28, 2017, p. 9; and California Independent System Operator, Reply Comments of the California Independent System Operator, July 12, 2017, pp. 3-4.

As a secondary point, the Commission should investigate why net exports rarely reached the 5,000 MW net export limit in SERVM, even during hours with significant renewable curtailment and energy prices at negative $300/MWh. This outcome is unexpected and inconsistent with what CAISO has observed from its market operation. The Commission should correct for any underlying assumption that is leading to this contradictory outcome.

iii. Import GHG assumptions

As the CAISO has described in previous comments, the use of the California Air Resources Board (CARB) deemed rate of 0.428 MT/MWh for all out of state resources, including renewable resources, skews results.[29] The production cost modeling should reflect the much lower import emissions rates of specific importers, such as the Asset-Controlling Suppliers (ACSs) approved and registered with CARB. For example, ACS Bonneville Power Administration has a CARB-assigned emission factor of only 0.0120 MT/MWh.[30]

III. Conclusion

The CAISO appreciates this opportunity to submit comments regarding the production cost modeling framework and results. As the CAISO outlined above, it is imperative that the Commission establish a process that allows parties to model and present their own production cost modeling results on the Preferred System Plan. To accomplish this, the Commission and Energy Division staff must provide guidance to parties regarding how the LSE IRPs will be aggregated. This guidance must be provided in the near future to have meaningful impact in the Commission's IRP and the CAISO's transmission planning process. The CAISO looks forward to presenting the results of its future production cost modeling analysis for the Commission's

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[29] California Independent System Operator, Comments of the California Independent System Operator Corporation on Administrative Law Judge's Ruling Seeking Comment on Proposed System Reference Plan and Related Commission Policy Actions, October 26, 2017, p. 4.

[30] *See* https://ww2.arb.ca.gov/mrr-acs.

consideration in this proceeding.

Respectfully submitted,

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