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COMMENTS OF THE PUBLIC ADVOCATES OFFICE ON PROPOSED LOSS OF LOAD EXPECTATION INPUTS AND ASSUMPTIONS

(PUBLIC VERSION)

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I. INTRODUCTION

Pursuant to the December 18, 2023, *Assigned Commissioner's Scoping Memo and Ruling* (Scoping Memo)[1] and the March 26, 2024, *Email Ruling Extending Deadline for Comments on Inputs and Assumptions in Resource Adequacy Loss of Load Expectation Study*, the Public Advocates Office at the California Public Utilities Commission (Cal Advocates) submits the following comments on the proposed Resource Adequacy (RA) inputs and assumptions (I&A Proposal)[2] to be used in the June 2024 RA Loss of Load Expectation (LOLE) study.[3]

Cal Advocates provides the following comments and recommendations:

- The California Public Utilities Commission (Commission or CPUC) should differentiate between forced outages due to equipment failures and outages due to energy use limitations in developing energy storage Equivalent Forced Outage Rates (EFOR) for the RA LOLE Study;
- The Commission should exclude all non-California Independent System Operator (CAISO) capacity that is contracted to CAISO load-serving entities (LSEs) from the simultaneous import constraints; and
- The Commission should revise the Strategic Energy Risk Valuation Model (SERVM) generator list to exclude Griffith Energy from the list of CAISO-contracted resources.

[1] The Scoping Memo is available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M521/K589/521589385.PDF.

[2] Commission, *Proposed Inputs & Assumptions,* March, 2024. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M527/K361/527361341.PDF.

[3] Energy Division staff's set of proposed inputs and assumptions were provided by the March 18, 2024, *Administrative Law Judge's Ruling on Energy Division's Proposed Inputs & Assumptions*. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M527/K532/527532337.PDF.

II. DISCUSSION

A. The Commission should differentiate between forced outages due to equipment failures and outages due to energy use limitations in developing energy storage EFOR for reliability modeling

Commission staff propose to develop EFOR for energy storage resources for use in SERVM reliability modeling based upon CAISO bidding and curtailment data.[4] EFOR data for other generation resources is drawn from the North American Electric Reliability Corporation (NERC) Generator Availability Data System (GADS) to model unplanned equipment failure.[5] Energy storage resources do not yet report historical outage information to NERC.[6] This requires Commission staff to instead draw from CAISO data. However, differences between CAISO's and NERC's treatment of outage events must be understood to ensure consistency between EFOR data for storage resources and other generation types.[7] The categories of outage types in the CAISO curtailment data and GADS are not necessarily consistent with each other. The use of CAISO curtailment data may overstate energy storage EFOR if equipment failure is not properly differentiated from other outage types in the CAISO curtailment data.[8] The CAISO's Department of Market Monitoring (DMM) indicates that in 2022,[9] up to 20% of

[4] I&A Proposal at 34.

[5] I&A Proposal at 28.

[6] I&A Proposal at 34.

[7] I&A Proposal at 34.

[8] Energy storage is a use-limited resource that can be constrained by battery real-time state of charge (SOC) in its ability to provide scheduled energy and ancillary services, depending on how the resources are dispatched by the CAISO in real-time relative to the day-ahead schedules. SOC limitations can reduce the bid-in availability of storage, which could be included in the estimated forced outage rate that informs the LOLE study. Energy Division staff proposes "to analyze CAISO bidding and curtailment data to calculate approximate…" EFOR rates for storage. The proposed inputs and assumptions document does not make clear if or how SOC or any other market constraints for storage are considered by the LOLE process (I&A Proposal at 34-35). Storage operators can submit outage cards to reflect real-time energy storage limitations, including SOC constraints, that may appear in the curtailment data as forced outages rather than as market-driven use limitation. CAISO, *Special Report on Battery Storage*, July 7, 2023 (CAISO Special Report on Battery Storage) at 20. Available at: https://www.caiso.com/Documents/2022-Special-Report-on-Battery-Storage-Jul-7-2023.pdf.

[9] CAISO, *Ensuring Energy and Resource Adequacy with Storage*, January 16, 2024 at 66. Available at:

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battery capacity was not available in the real-time market due to the unique constraints of the technology.[10] The CAISO has since implemented several optional parameters that storage operators can use to control how the battery SOC changes due to market dispatch throughout the day to be better allow storage operators to follow day-ahead schedules.[11] Energy storage unavailability due to SOC limits will likely be mitigated as storage operators gain experience with the SOC biddable parameters, and as the CAISO implements ongoing market enhancements.

In the development of storage EFOR, the Commission should clearly differentiate between energy storage outages due to equipment failure and energy storage unavailability due to market driven SOC limitations. Towards that end, the Commission should clearly explain how SOC use limitations are separated from other outages in the CAISO curtailment data in the Commission's scheduled Track 2 LOLE Study.[12] In addition, the Commission should develop separate energy storage use-limitation outage factors for use in reliability sensitivity modeling to characterize the reliability impacts of SOC limitations.

B. The Commission should exclude all non-CAISO capacity that is contracted to CAISO LSEs from the simultaneous import constraints

1. Background

The I&A Proposal includes the following import operationalization:

- Generally, dynamically scheduled specified imports "have no obligation to sell into CAISO… [and therefore] they are modeled as

https://www.caiso.com/InitiativeDocuments/Presentation-ResourceAdequacyModeling-ProgramDesignWorkingGroup-Jan162024.pdf.

[10] This in part is due to the real-time market multi-interval optimization (MIO) limit of a 65-minute look-ahead period, which may result in sub-optimal real-time energy storage dispatch and subsequent resource unavailability. CAISO Special Report on Battery Storage at 6.

[11] These parameters include upper and lower SOC limits, the expected SOC level at the start of the operating day, and end-of-hour SOC. CAISO Special Report on Battery Storage at 5.

[12] Scoping Memo at 9.

unspecified imports and do not have special priority given to their energy dispatch";[13]

- However, some dynamically scheduled specified imports are "modeled as specified imports (remote generators) in SERVM" because these resources have energy and capacity contracts with CAISO LSEs;[14]
- Dynamically scheduled CAISO imports from renewables are "direct purchases" in SERVM whereby the associated energy and greenhouse gas attributes accrue to the offtaking CAISO LSE;[15]
- Flows between modeled SERVM regions (e.g., between Southern California Edison Company (SCE) and Arizona Public Service Company (APS)) are "derived from the CAISO's PLEXOS model and Import Allocation process, and further supplemented with information from the [California Energy Commission's (CEC)] PLEXOS model";[16]
- Total simultaneous CAISO flows are limited to 5,000 megawatts (MW) in the export direction; 11,040 MW in the import direction in most hours; and 4,000 MW in the import direction between 5pm and 10pm from June through September;[17]
- The simultaneous import constraints do not apply to "the CAISO LSE shares of Hoover, Intermountain Power Plant, Palo Verde, and Sutter[,]" which are specified imports modeled as in-CAISO resources;[18] and
- Staff are developing "shaped simultaneous import and export constraints by analyzing recent CAISO data from OASIS and from LSE RA filings that listed firm RA contracted imports."[19]

[13] I&A Proposal at 15.

[14] I&A Proposal at 15.

[15] I&A Proposal at 17-18.

[16] I&A Proposal at 37.

[17] I&A Proposal at 38-39.

[18] I&A Proposal at 39.

[19] I&A Proposal at 39.

2. Discussion

The I&A Proposal lists four non-CAISO generators (the CAISO LSE shares of Hoover, Intermountain, Palo Verde, and Sutter) that are modeled as in-CAISO resources not subject to the simultaneous import constraint.[20] The I&A Proposal further states that non-CAISO renewables are modeled as external generators with "direct purchases" of energy and greenhouse gas attributes by CAISO offtaking LSEs.[21] However, these non-CAISO renewables and any other dynamically scheduled resources remain subject to the 11,040 MW non-summer-peak and 4,000 MW summer-peak simultaneous import constraints.[22]

The Commission should not move forward with the I&A Proposal's approach of including dynamically scheduled imports (besides the CAISO LSE shares of Hoover, Intermountain, Palo Verde, and Sutter) within the simultaneous import constraints. Instead, the Commission should exclude all non-CAISO specified imports that are contracted to CAISO LSEs from the simultaneous import constraints for two reasons.[23] First, an external resource that is contracted to deliver energy to a CAISO LSE is, in fact, obligated to serve CAISO load and does so by delivering physical energy to the contracted intertie[24] – even if the contract is energy-only (i.e., lacking an explicit capacity transaction element). The contracted energy deliveries obligate the non-CAISO resource to reserve sufficient generation capacity to provide the contracted quantities; the generator cannot contract this capacity out to non-CAISO LSEs without jeopardizing its ability to fulfill its contractual obligations to deliver energy.[25]

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[20] I&A Proposal at 39.

[21] I&A Proposal at 17-18.

[22] This treatment is based on the argument that these resources resemble unspecified imports because they are not obligated to serve CAISO load. I&A Proposal at 15.

[23] While the I&A Proposal states that staff are creating new shaped constraints (I&A Proposal at 39), in the event that the Commission ultimately maintains the 11,040 MW non-summer-peak constraint, this constraint should be reduced by the hourly shape of the aggregated specified imports.

[24] See CAISO Tariff at 40.6.5 and 40.8.1.1.12 for the treatment of dynamically scheduled imports obligations.

[25] Failing to deliver contracted energy or capacity to a counterparty typically results in incurring

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Secondly, multiple CPUC-jurisdictional CAISO LSEs show RA capacity from specified external resources other than Hoover, Intermountain, Palo Verde, and Sutter, including significant levels of capacity from dynamically scheduled renewables. Such resources provide CAISO capacity in much the same way as Hoover, Intermountain, Palo Verde, and Sutter, yet this would be treated as unspecified imports and subjected to the simultaneous import constraint. In aggregate, CPUC-jurisdictional LSEs have recently shown capacity from the resources whose resource IDs are included in Appendix A (hereafter, the "Additional Specified Imports").[26] Whereas the I&A Proposal argues that such dynamically scheduled non-CAISO resources "have no obligation to sell into CAISO,"[27] the Additional Specified Imports indeed have been contracted to serve CAISO load.

The amounts of capacity and energy associated with the Additional Specified Imports are not small.[28] As shown in Figure 1 below, because the Additional Specified Imports are predominantly variable energy resources, the actual generation from this capacity can be much higher in certain hours,[29] including midday hours with respect to

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contractual costs and/or having to procure replacement energy. The latter is also a typical solution to maintain RA obligations; dynamic resources are not subject to the RA Availability Incentive Mechanism (RAAIM, CAISO Tariff 40.9.2), but are still subject to enforcement actions such as bid insertion (CAISO Tariff 40.6.8) and other actions the CAISO may take if its Tariff is violated (CAISO Tariff 40.7.2).

[26] The resources listed in Appendix A appear in the aggregated 2023 September month-ahead and 2024 year-ahead RA showings of the CPUC-jurisdictional LSEs.

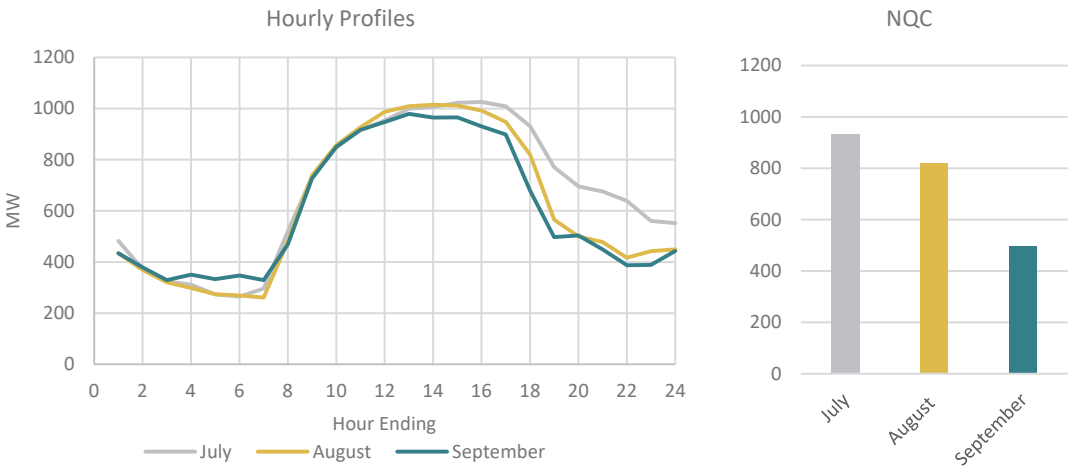
[27] I&A Proposal at 15.

[28] If LSEs were to contract with the entire capacity of the Additional Specified Imports, the collective volume would be nearly 500 MW of September 2024 net qualifying capacity (NQC). CPUC Master Resource Database, February 16, 2024. Available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/resource-adequacy-homepage/resource-adequacy-compliance-materials.

[29] The variable energy resources within the Additional Specified Imports provide hourly Qualifying Capacity values in September that range from approximately 125 MW in nighttime hours in September to midday values that exceed 770 MW. *CPUC Master Resource Database*, February 16, 2024. Available at: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/resource-adequacy-homepage/resource-adequacy-compliance-materials.

those resources that are solar.[30] The Additional Specified Imports also include over 200 MW from three geothermal resource IDs and one gas resource ID.

Figure 1: Hourly Profiles and NQCs by Month of the Additional Specified Imports[31]



The Additional Specified Imports are more similar to Hoover, Intermountain, Palo Verde, and Sutter than to unspecified imports. Instead of treating the Additional Specified Imports similarly to Hoover, Intermountain, Palo Verde, and Sutter, the I&A Proposal applies the simultaneous import constraints to the Additional Specified Imports, as if they were unspecified imports. Applying that constraint to the Additional Specified Imports effectively reduces the amount of the simultaneous import constraints available for unspecified imports, because the simultaneous import constraint covers all imports other than the dispatch of Hoover, Intermountain, Palo Verde, and Sutter. Therefore, the I&A Proposal would result in a LOLE study that misrepresents energy deliveries from unspecified imports, particularly during June through September from 5pm to 10pm, when the simultaneous import constraint is set to 4,000 MW.

[30] There may be more potential CAISO-contracted capacity from specified resources to the extent that non-CPUC-jurisdictional LSEs – i.e., CAISO publicly-owned utilities (POUs) – have contracted with such resources. The Commission should work with the California Energy Commission, which has jurisdiction over POU resource planning, to determine if any CAISO POUs have similar contracts with specified imports.

[31] Figure 1 uses data from the CPUC Master Resource Database to illustrate the hourly profiles of the Additional Specified Imports by month, along with their NQCs.

The difference of the 4,000 MW summer peak simultaneous import constraint and the shaped hourly levels of energy from the set of specified imports list above will also have a shape that varies hour by hour on a one-for-one basis. For example, the simultaneous import constraint leaves room for only 3,070 MW of energy from unspecified RA import contracts in Hour Ending 18 in July (4,000 MW – 930 MW = 3,070 MW).[32] These hourly values for remnant energy from unspecified RA imports within the summer peak simultaneous import constraint misrepresent energy deliveries from unspecified RA imports, because unspecified imports are often contracted with flat 24-hour or 16-hour shapes.

The summer peak simultaneous import constraint also misrepresents the magnitude of unspecified imports. Actual CAISO data show that unspecified RA imports were approximately 4,000 MW in the 2021, 2022, and 2023 month-ahead showings for September and almost twice as high in 2019 and 2020.[33] At these historical levels, unspecified RA imports alone would be sufficient to occupy the entirety of the 4,000 MW summer peak simultaneous import constraint. Instead, the I&A Proposal would have unspecified RA imports share the summer peak simultaneous import constraint with the Additional Specified Imports.

Because the simultaneous import constraints in the I&A Proposal do not reasonably represent the combination of imported energy from unspecified RA imports and from the Additional Specified Imports, Cal Advocates recommends that the Commission amend the I&A Proposal and the corresponding SERVM datasets to exclude all non-CAISO capacity that is contracted to CAISO LSEs from the simultaneous import constraints, not just the CAISO shares of Hoover, Intermountain, Palo Verde, and Sutter. Specifically, the Commission should model the Additional Specified Imports as in-

[32] The amount of energy associated with the Additional Specified Imports will vary hour by hour, due to the high volume of variable energy resources. In the first hour of the 5-10pm period, the RA Master Resource Database values the Additional Specified Imports at approximately 680 MW in September and over 930 MW in July. CPUC Master Resource Database, February 16, 2024.

[33] CAISO, *Historical Resource Adequacy Aggregate Data* (spreadsheet), January 12, 2024. Available at: https://www.caiso.com/planning/Pages/ReliabilityRequirements/Default.aspx.

CAISO resources.[34] This approach will result in the Additional Specified Imports receiving the same modeling treatment as Hoover, Intermountain, Palo Verde, and Sutter.

Cal Advocates' primary recommendation, above, is to treat the Additional Specified Imports similarly to the other four specified imports in SERVM. In this way, the normalized production profiles of the variable energy resources of the Additional Specified Imports will be credited within the appropriate CAISO region and will not be inappropriately subjected to the simultaneous import constraints. However, the I&A Proposal already states that Energy Division is creating two alternatives of shaped import constraints that account for "listed firm RA contracted imports."[35] The I&A Proposal does not describe these two alternatives or provide any operationalization details for these as-yet-unpublished shapes.

If the Commission does implement shaped constraints, Cal Advocates offers the alternative recommendation that the shaped constraints should reflect the entire pool of specified imports rather than just the "listed firm" specified imports. This includes the shaped energy generation of the Additional Specified Imports, which are primarily non-firm, and a shape to represent unspecified RA imports. As a starting suggestion, the unspecified import shape for September could reach 4,000 MW from 6am through 10pm, delivery hours for either a 24-hours-a-day delivery or an on-peak unspecified import contract. In total, Cal Advocates' alternative recommendation for a shaped import constraint would include firm and non-firm RA contracted specified as well as a 4,000 MW allowance for unspecified RA imports.

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[34] In SERVM, each of these "remote generators" should be modeled as internal to its currently assigned "remote region," i.e., its CAISO offtaking region.

[35] I&A Proposal at 39:

> Staff are also creating two scenarios of shaped simultaneous import and export constraints by analyzing recent CAISO data from OASIS and from LSE RA filings that listed firm RA contracted imports. The final version of this document will fully describe the revised constraints to be used in 2024 RA studies.

Finally, the Commission should exclude economic imports from the shaped simultaneous import constraints that staff are creating.[36] Economic imports are otherwise explicitly covered by the proposed 11,040 MW non-summer-peak and 4,000 MW summer peak simultaneous import constraints.[37] Including any economic imports in the final simultaneous import shapes would reduce the ability of the model to inform the Commission as to the sufficiency of the RA fleet in and of itself to meet reliability standards. This is because economic imports are supported by uncontracted resources, yet the SERVM results will still reflect the reliability attributes of the economic import energy. As a result, including economic imports in the final import shapes could risk improper portfolio calibration[38] or even inappropriate Planning Reserve Margin identification.[39] This is because the calibrated portfolio and the modeling results will reflect reliability attributes that are not the result of generation and storage resources' contracts with CAISO LSEs.[40]

In summary, Cal Advocates recommends:

- The Commission should exclude all non-CAISO specified imports that are contracted to CAISO LSEs (listed in Appendix A) from the simultaneous import constraints.
- If the Commission implements either of the alternative shaped import constraints, the shaped constraints should reflect not only the "listed firm" specified imports but also the shaped energy generation of the Additional Specified Imports, which are primarily non-firm, and a shape to represent unspecified RA imports; and,

[36] I&A Proposal at 39.

[37] I&A Proposal at 39.

[38] "Calibration" refers to establishing the initial loss-of-load results of the baseline portfolio and the subsequent addition or removal of capacity to achieve the 0.1 LOLE standard.

[39] "Identification" refers to calculating the Planning Reserve Margin that the calibrated portfolio can sustain during the worst hour of the "worst day" under the ongoing Slice of Day reform work.

[40] Alternatively, the Commission could consider that the calibrated portfolio will have energy from uncontracted economic imports that LSEs would ultimately need to contract in order to achieve the modeled level of reliability. Depending on the hourly magnitude of any economic imports, it may or may not be reasonable to assume that LSEs could obtain the same shape of economic import energy through additional contracting.

- The Commission should exclude economic imports from the shaped simultaneous import constraints that staff are creating.

C. The Commission should revise the SERVM generator list to exclude Griffith Energy from the list of CAISO-contracted resources

The most recent vintages of the SERVM generator list include Griffith Energy as a CAISO-contracted resource with offtaking in the SCE SERVM region.[41] No party has provided, and Cal Advocates has been unable to locate, any evidence indicating contracted CAISO offtaking from this resource. Instead, APS's 2023 Integrated Resource Plan suggests that APS may have a long-term summer contract with this resource.[42] As a large, firm resource, the improper inclusion of Griffith Energy in the SERVM generator list could lead to improper model operationalization, including initial miscalibration of the portfolio.[43] Therefore, the Commission should revise the SERVM generator list to exclude Griffith Energy from the list of CAISO-contracted resources.

III. CONCLUSION

The Commission should modify the I&A Proposal to differentiate between forced outages due to equipment failures and outages due to energy use limitations for energy storage forced outage assumptions. In addition, the Commission should modify the I&A Proposal's simultaneous import constraint assumption to exclude all non-CAISO specified imports that are contracted to CAISO LSEs. If the Commission adopts alternative shaped import constraints, the shaped constraints should reflect both "listed

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[41] See "SERVM Generator List," October 2023, and "SERVM Modeled Unit List for 2023 Proposed PSP 25 MMT Core Scenario," January 2024. Available at: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2022-irp-cycle-events-and-materials/system-reliability-modeling-datasets-2023.

[42] Available at: https://www.aps.com/-/media/APS/APSCOM-PDFs/About/Our-Company/Doing-business-with-us/Resource-Planning-and-Management/APS_IRP_2023_PUBLIC.pdf?la=en&sc_lang=en&hash=DF34B49033ED43FF0217FC2F93A0BBE6. APS's 2023 Integrated Resource Plan includes three large combined cycle tolls on pages 30 and 177, including one toll with a resource listed at the same capacity, 570 MW, associated with Griffith Energy in the Commission's NQC list. APS further references firm gas contracts for its "Griffith PPA" at 227-230.

[43] "Calibration" refers to establishing the initial loss-of-load results of the baseline portfolio and the subsequent addition or removal of capacity to achieve the 0.1 LOLE standard.

firm" specified imports and the shaped energy generation of Additional Specified Imports. The Commission should exclude economic imports from shaped simultaneous import constraints. Lastly, the Commission should exclude Griffith Energy from the list of assumed CAISO-contracted resources.

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Appendix A

Additional specified imports contracted by CPUC-jurisdictional LSE as reported in LSE's September 2023 month-ahead and 2024 year-ahead Commission RA showings:[1]

[1] September 2023 month-ahead and 2024 year-ahead RA showings are confidential.