December 29, 2015

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket No. ER14-2574-___
Informational Report

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its informational report in response to the Commission's directive in its October 16, 2014 Order in the referenced proceeding. The Commission directed the CAISO file this report by December 31, 2015. The report (1) quantifies the documented and projected impact of non-contracted variable energy resources on the CAISO's flexible capacity needs, (2) assesses the feasibility of permitting static import resources to provide flexible resource adequacy capacity, and (3) demonstrates the progress the CAISO has made towards developing a flexible capacity performance incentive mechanism.

Please contact the undersigned with any questions.

Respectfully submitted

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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Corporation	**)**	**Docket No. ER14-2574-000**
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Report of the California Independent System Operator Corporation

The California Independent System Operator Corporation ("CAISO") submits this informational report in response to the directive of the Federal Energy Regulatory Commission in its October 16, 2014 order in this proceeding.[1] Specifically, in this report the CAISO (1) quantifies the documented and projected impact of non-contracted variable energy resources ("VERs")[2] on the CAISO's flexible capacity needs,[3] (2) discusses the feasibility of permitting static import resources to provide flexible resource adequacy capacity, and (3) demonstrates that the CAISO has developed a flexible capacity performance incentive mechanism, approved by the Commission, that will go into effect on March 1, 2017. In addition, the CAISO provides other information requested by the Commission pertaining to these matters.

I. BACKGROUND

On August 1, 2014, the CAISO submitted a tariff amendment to in this docket to establish flexible resource adequacy capacity requirements. The amendment expanded the resource adequacy provisions of the CAISO tariff to include requirements and must offer obligations for flexible resource adequacy capacity needed by the CAISO to address the challenges of reliably operating the grid as the fleet of variable energy resources grows. The amendment also added authority for the CAISO to undertake backstop procurement of flexible capacity in the event of a cumulative deficiency pursuant to the CAISO's capacity procurement mechanism ("CPM").

In it October 16 Order, the Commission conditionally approved the proposed tariff provisions subject to a compliance filing, effective November 1, 2014. In its October 16 Order, the Commission also directed the CAISO to make an informational filing by January 1, 2016 that (1) quantifies the documented and projected impact of non-contracted VERSs on the CAISO's flexible capacity needs,[4] (2) assesses the feasibility of permitting static import resources to provide flexible resource adequacy capacity,[5]

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1 *California Independent System Operator Corporation,* 149 FERC ¶61,042 (2014) ("October 16 Order").

2 These are variable energy resources that do not have contracts with CAISO load serving entities.

3 October 16 Order at P 46.

4 October 16 Order at P 46.

5 *Id.* at P 79.

and (3) demonstrates the progress made towards developing a flexible capacity performance incentive mechanism.[6]

With respect to item (1), the Commission did not require the CAISO to allocate flexible capacity obligations to VERs that do not have contracts with CAISO load serving entities. However, the Commission stated that if such VERs prove, in the future, to be more than a *de minimis* contributor to the CAISO's flexible capacity needs, a methodology that allocates a portion if the obligations and/or costs to these resources (or other appropriate entity) would conform more closely to cost allocation principles. The Commission stated that the informational report should include information on the use of CPM to procure backstop flexible capacity as the result of VERs that do not have contracts with CAISO load serving entities. Also, the report should evaluate options for allocating flexible capacity obligations and backstop costs in a manner that would allocate a share of the flexible capacity burden proportionately to non-contracted VERs or other appropriate entities.

With respect to item (2), the Commission directed the CAISO to indicate in the report whether it is feasible to expand the eligibility to provide flexible capacity to include imports and, if so, when the CAISO will do so. Alternatively, the Commission stated the CAISO could explain why including imports continues to be infeasible.

With respect to item (3), on October 1, 2015, the Commission issued an order approving the CAISO's resource adequacy availability incentive mechanism tariff provisions.[7] These tariff provisions apply the new performance incentive mechanism to flexible resource adequacy capacity. The RAAIM provisions are effective March 1, 2016.

II. QUANTIFYING THE DOCUMENTED AND PROJECTED IMPACT OF NON-CONTRACTED VARIABLE ENERGY RESOURCES ON THE CAISO'S FLEXIBLE CAPACITY NEEDS

The CAISO has conducted an assessment of the impact of merchant VERs on flexible capacity requirements to determine their impact on the flexible capacity need and whether such contribution is large enough to warrant redesigning the flexible resource adequacy product to allocate a flexible capacity requirement to merchant VERs. The CAISO notes that currently only load serving entities have resource adequacy forward procurement obligations. Although generators can provide resource adequacy capacity, they are not required to procure any resource adequacy capacity.

As an initial matter, the CAISO began its assessment by reviewing merchant VERs' contribution to the flexible capacity need in its 2016 flexible capacity needs technical study. The CAISO identified 200 MW of merchant wind resources and zero

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6 *Id.* at P 110.

7 *California Independent System Operator Corporation,* 153 FERC ¶61,002 (2015) ("Reliability Services Initiative Order").

MW of merchant solar.[8] This accounts for 4.48 percent of all wind capacity identified in the 2016 flexible capacity needs technical study. The forecasted total three hour net load ramp for non-summer months in 2016 is between 8,850 MW and 11,662 MW. During these months, which are the months in which the CAISO has the greatest flexible capacity need, the study showed that wind resources' forecasted contribution to the three hour net load ramp is approximately 1-2 percent.[9] Table 1 below shows:

1) The forecasted three hour net load ramps
2) The average wind contribution to that ramp as percentage
3) The quantity of MWs that all wind contributes based on the three hour net load ramp and the percent wind contributes
4) The percent of all wind resources that are merchant
5) The estimated contribution of merchant VERs for all months.

To determine the quantity of flexible capacity requirements caused by merchant VERs, the CAISO multiplied the maximum three hour net load ramp times the contribution of all wind resources times the percent of wind resources that are merchant VERs. Given the total three hour net load ramps, and the expected contribution of wind resources to these ramps, the CAISO estimates that the total flexible capacity contribution of merchant VERs in non-summer months would be between -7.93 MW (*i.e.* wind resources are helping with the three hour net load ramp) and 23.3 MW.

Table 1: Results of 2016 flexible capacity technical needs study and estimated contribution of merchant VERs to overall flexible capacity needs

Month	Three hour net load ramp	Average of Wind contribution 2016[10]	Estimated MW of total wind contribution	Percent of all wind MWs that are merchant VERs	Flexible RA contribution (MW)
January	9,974	-1%	99.74	4.48%	4.47
February	9,421	-2%	188.42	4.48%	8.44
March	9,284	-2%	185.68	4.48%	8.32
April	8,850	2%	-177	4.48%	-7.93
May	6,498	-8%	519.84	4.48%	23.30
June	5,876	7%	-411.32	4.48%	-18.44

[8] This is the same amount of merchant VER capacity as was on the CAISO system at the time of the October 16 Order in this proceeding.

[9] The details regarding all calculations and forecasted contributions from load, wind, and solar resources can be found in the 2016 flexible capacity needs technical study at http://www.caiso.com/Documents/FinalFlexibleCapacityNeedsAssessmentFor2016.pdf.

[10] The average wind contribution refers the portion of the three hour net load ramp that is attributable to wind resources as calculated in the 2016 Flexible Capacity Needs Technical study. See http://www.caiso.com/Documents/FinalFlexibleCapacityNeedsAssessmentFor2016.pdf for additional details.

Month	Three hour net load ramp	Average of Wind contribution 2016[10]	Estimated MW of total wind contribution	Percent of all wind MWs that are merchant VERs	Flexible RA contribution (MW)
July	6,392	6%	-383.52	4.48%	-17.19
August	6,412	6%	-384.72	4.48%	-17.24
September	7,784	1%	-77.84	4.48%	-3.49
October	9,066	-2%	181.32	4.48%	8.13
November	10,858	-1%	108.58	4.48%	4.87
December	11,662	-2%	233.24	4.48%	10.45

As noted above, allocating a resource adequacy requirement to a generating resource constitutes a significant departure from the existing resource adequacy construct. Further, the CAISO has not had to engage in any backstop procurement under its capacity procurement mechanism as the result of VERs that do not have contracts with CAISO load serving entities. Given merchant VERs' *de minmis* contribution to the three hour ramp needs (and the fact that in some months merchant VERs actually reduce the need for flexible resource adequacy capacity) and the fact that the CAISO has not issued any flexible capacity CPMs designations,[11] the CAISO does not believe there is sufficient evidence or need at this time to change the existing resource adequacy construct. Accordingly, the CAISO does not intend to pursue any additional requirements for merchant VERs at this time. Based on the annual data submitted by load serving entities, which the CAISO uses in its flexible capacity needs technical assessment, the number of merchant VERs may increase over time as existing contracts expire. However, increased state RPS targets (50 percent) may reduce the likelihood that resources under expiring contracts remain merchant VERs (*i.e*. these resources may receive new contracts to help meet higher RPS targets). The CAISO will continue to monitor the impact of these changes in the future to determine whether expiring contracts remain merchant and whether there are sufficient quantities of merchant VERs to warrant a change in the methodology for allocating the flexible capacity need.

III. FEASIBILITY OF PERMITTING STATIC IMPORT RESOURCES TO PROVIDE FLEXIBLE RESOURCE ADEQUACY CAPACITY

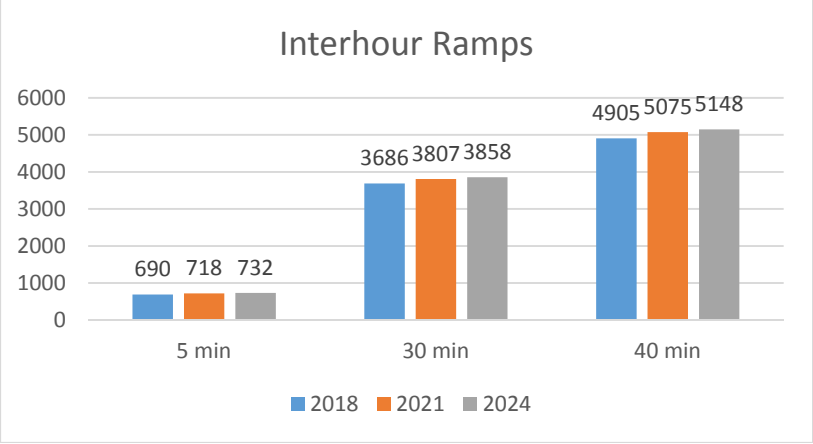
The CAISO is currently considering refinements to its existing flexible capacity program as part of its ongoing Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 (FRACMOO2) stakeholder initiative, and is seeking input from stakeholders at this time. In connection with this initiative, the CAISO has completed a preliminary assessment of flexible ramping needs and the differences between five minute dispatch and 15-minute dispatch resources for purposes of meeting flexible capacity needs to determine how much of the three hour net load ramp and CAISO

[11] For example, a local regulatory authority's ("LRA") net load profile could be decreasing while the CAISO net load is increasing. Thus, the three hour net load ramp would be smaller than it would otherwise be without that LRA's contribution.

flexible capacity needs must be addressed by resources internal to the CAISO. Based on the CAISO's initial assessment, the CAISO is proposing, in the FRACMOO2 stakeholder initiative to allow qualified 15-minute intertie resources[12] to provide flexible resource adequacy capacity. The CAISO anticipates concluding FRACMOO2 policy development in time for consideration at the CAISO's June 2016 Board of Governors meeting. Following Board approval of any policy changes, the CAISO will file a tariff amendment with the Commission.

Because flexible capacity needs are forward looking, the CAISO's assessment relied on the forecasted load, wind, and solar profiles used in the 2016 Flexible Capacity Needs Technical study. As shown in Figure 1, the largest changes between real-time dispatch and the time at which the CAISO dispatches 15 minute intertie resources is almost 5,000 MW. This does not account for five-minute variability, which can be approximately 700 MW from interval to interval. The CAISO must manage all five minute variability between dispatch intervals using internal CAISO resources. Further, internal CAISO resources must handle all variation between the 15-minute intertie dispatch intervals and real-time.

Figure 1: Largest net load ramps between dispatch intervals (in MWs)



This implies that 15-minute intertie resources can provide reliability benefits; however, because there is still significant variability after the CAISO issues dispatch instructions to 15-minute intertie resources (and which 15-minute intertie resources cannot resolve), these benefits are not equal to the benefits provided by 5-minute dispatchable capacity.

As a demonstration of the CAISO's progress, the CAISO describes the aspects of its initial proposal to allow 15-minute intertie resources to provide flexible resource adequacy capacity. The CAISO notes, however, that it is still developing its policy through the FRACMOO2 stakeholder process.

[12] The CAISO describes the qualifications it has preliminarily identified below, but notes that is still in the process of developing the policy as part of the FRACMOO2 stakeholder initiative.

Given the differences in the flexibility need between the 15-minute market dispatch and real-time, the CAISO believes a measured approach to allowing 15-minute import resources to provide flexible resource adequacy is warranted at this the time. Accordingly, the ISO proposes initially to cap the allowable flexible resource adequacy capacity from qualified 15-minute intertie resources to no more than 50 percent of the total flexible capacity showing. The CAISO will monitor the actual effectiveness of 15-minute intertie resources in meeting flexible capacity needs and will reassess the feasibility and benefits of raising this limit in the future.

Based on the CAISO's assessment thus far, the CAISO believes that, 15-minute intertie resources providing flexible resource adequacy capacity must meet following basic criteria:

1) Must be resource specific
2) Load serving entity must have sufficient Maximum Import Capability ("MIC") allocation for the resource
3) Firm energy schedule

The CAISO provides the basis for each of these initial criteria below and notes that it is still examining these criteria and assessing the need for any further criteria.

The CAISO assessed the possibility of allowing non-resource specific resources to provide flexible capacity, but identified two primary shortcomings with such an approach. First, the goal of forward procurement is to ensure that the CAISO has sufficient resources committed to the CAISO market. Further, in connection with the Energy Imbalance Market ("EIM"), the CAISO conducts a ramp sufficiency test to ensure that one EIM entity is not leaning on the flexible capacity of another EIM entity. If the CAISO allows non-resource specific imports to provide flexible capacity, it is possible such imports could count towards meeting the flexible capacity requirement of two balancing authority areas: once as a resource specific flexible capacity resource; and then as the resource backing-up a non-resource specific flexible capacity resource. This would result in a double counting of the same resource. The CAISO is still assessing whether this resource specific criteria is necessary for non-EIM capacity. The second shortcoming is associated with determining the quality of the flexible capacity and the amount of capacity the resource can provide. As the resources backing a non-resource specific flexible capacity resource change, the "operational attributes" of the import might also change day-to-day or even hour-to-hour. Thus, an import that was capable of providing flexible capacity during one time period might be unable to provide it in a different period. Therefore, the CAISO is proposing that import flexible capacity resources be resource specific.

Any load serving entity using an import resource for flexible capacity must demonstrate that it has sufficient MIC capacity. The MIC allocation process is described in section 40.4.6.2 of the CAISO tariff. Load serving entities demonstrate that a resource's output, and therefore its flexibility, is deliverable to the CAISO through the MIC process. The CAISO is not proposing changes to the MIC process. However,

under the CAISO tariff, having sufficient MIC is a requirement for any import resources to provide resource adequacy capacity. It is equally important that flexible capacity be deliverable into the CAISO and, therefore. It is appropriate to maintain this requirement for flexible resource adequacy capacity.

A flexible capacity resource must commit to providing firm energy to the CAISO because the CAISO is relying on the output of the resource to meet flexibility needs. Allowing other balancing authority areas or even the scheduling coordinator for the resource to adjust the output from the resource for external reasons could comprise the CAISO's ability to meet a ramping need. For example, if the CAISO is relying on a resource to meet a ramp, but a third party "pulls the resource away from the CAISO" to provide energy to an external balancing authority area, the CAISO would be "stuck" having to deal with the reliability implications at the last minute.

Because the import resource must be resource specific, the CAISO will calculate effective flexible capacity ("EFC") the same way it calculates EFC for an internal resource. Specifically the CAISO would apply the following formula to determine EFC for an import flexible capacity resource:

<u>If start-up time of a resource is greater than 90 minutes:</u>

EFC is limited to the MW range between Pmin and Net Qualifying Capacity (NQC) as limited by ramp rate
EFC = minimum of (NQC-Pmin) or (180 min * RRavg)

<u>If start-up time of a resource is less than or equal to 90 minutes:</u>

EFC is limited to the MW range between zero and NQC as limited by start-up time and ramp rate
EFC = minimum of (NQC) or (Pmin + (180 min – SUT) * RRavg)
Where: SUT = Longest (cold) RDT start-up time in minutes
RRavg = average MW/min ramp rate between Pmin and NQC

The CAISO will hold all import flexible capacity resources to the same must-offer obligation applicable to internal resources providing the same category of flexible capacity. Specifically, the resource must submit economic bids into both the day-ahead and real-time markets for the total amount of flexible capacity that has been provided. The only difference is that the import resource must submit economic bids into both the day-ahead and 15-minute markets (which is the shortest time interval on which they can be dispatched).

The CAISO will also apply its resource adequacy availability incentive mechanism ("RAAIM") to all import flexible capacity resources in a manner comparable to how the CAISO applies RAAIM to internal flexible capacity resources. More specifically, the CAISO will hold an import flexible capacity resource to the must offer obligation of the highest quality of flexible capacity for which it is shown. For example, if an import

flexible capacity resource is shown as both a category one and category two flexible capacity resource, the CAISO will assess the entire resource as a category one flexible capacity resource. If an intertie flexible capacity resource goes on outage, then the resource must provide substitute capacity from either an internal flexible capacity resource or another qualified import resource that is able to provide the same level of flexible capacity for the duration of the outage. Internal resources must still meet bidding requirements for other internal resources (*i.e*. economic bids for five minute dispatches).

A unique challenge with imports providing flexible capacity is ensuring that the resource is, in fact, providing flexible capacity and is not simply wheeling through the CAISO. The CAISO is considering in the FRACMOO2 stakeholder process how to ensure that the flexible capacity sold by 15-minute intertie resource is actually made available for use by the CAISO. Therefore, the CAISO is still attempting to determine whether there are any other special considerations that it must account for to apply RAAIM to import resources.

As a final matter, the CAISO notes again that it is addressing the matter (and the mechanics/requirements) of 15-minute intertie resources providing flexible resource adequacy capacity in the ongoing FRACMOO2 stakeholder process that is expected to culminate with a CAISO Board decision in June of 2016. The CAISO is seeking stakeholder input regarding all aspects of allowing 15-minute intertie resources to provide flexible resource adequacy capacity.

IV. AVAILABILITY INCENTIVE MECHANISM FOR FLEXIBLE RESOURCE ADEQUACY CAPACITY

In the October 16 Order, the Commission directed the CAISO to demonstrate in this report the progress made towards developing a flexible capacity performance incentive mechanism.[13] On October 1, 2015, the Commission issued an order approving the CAISO's new resource adequacy availability incentive mechanism tariff provisions.[14] These tariff provisions, *inter alia,* apply an incentive performance incentive mechanism to flexible resource adequacy capacity. The RAAIM provisions will become effective March 1, 2016. As discussed in the preceding section, the CAISO is proposing at this time to apply these provisions to 15-minute intertie resources that provide flexible resource adequacy capacity.

[13] October 16 Order at P 110.

[14] *California Independent System Operator Corporation,* 153 FERC ¶61,002 (2015) ("Reliability Services Initiative Order").

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Washington, DC this 29th day of December, 2015.

/s/ Anna Pascuzzo

Anna Pascuzzo