CALIFORNIA ISO 2012-2013 TRANSMISSION PLAN

COMMENTS OF THE STAFF OF THE CALIFORNIA PUBLIC UTILITIES COMMISSION ON DRAFT 2012-2013 TRANSMISSION PLAN ISSUED FEBRUARY 1, 2013

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February 25, 2013

Introduction

The Staff of the California Public Utilities Commission ("CPUC Staff") appreciate this opportunity to provide comments on Draft 2012-2013 Transmission Plan ("Draft Plan") distributed by the California Independent System Operator ("CAISO") on February 1, 2013, as part of the Transmission Planning Process ("TPP"). We especially applaud the first realization of the competitive solicitation process, as well as the CAISO's stepping outside of the standard TPP study structure to conduct an integrated study of Central California, as well as studies on the proposed AV Clearview project, and a high out-of-state renewables case. Furthermore, CPUC Staff appreciates the extensive number and depth of improvements to the economic need studies and sensitivity analyses, and the increased, useful detail regarding methodology and assumptions. There are certain areas where CPUC Staff believes that it would be very helpful to have additional clarity and detail in the final 2012-2013 Transmission Plan. Additional analysis in some instances may be possible this Spring, in other cases it may have to await the next planning cycle.

Our comments cover the following topics:

- 1. CPUC Staff is pleased to see the competitive transmission development process being put into action and emphasizes the importance of cost and cost management.
- 2. CPUC Staff appreciates the robustness and documentation of the economic studies that identified an important competitive transmission project, and hopes that the CAISO can provide requested additional information from these studies.
- 3. CPUC Staff requests examination of an earlier in-service date for an SDG&E synchronous condenser project.
- 4. CPUC Staff requests a special study of reliability needs in San Francisco during the 2013-2014 Transmission Plan cycle.
- 5. CPUC Staff appreciates progress on increased consistency of input assumptions regarding Demand Side Management, and requests sufficiently granular assumptions for all cases; CPUC Staff requests a case in the 2013-2014 Transmission Plan cycle that mirrors standard assumptions made in the CPUC's Long Term Procurement Plan base case.
- 6. CPUC Staff commends the CAISO's effort in conducting special studies of the AV Clearview project that may inform future decisions, and looks forward to the CAISO's assessment of the proponent's recently submitted benefits analysis.
- 7. The water availability assessment tools and methodology appear to play an important role in analysis of Fresno area transmission needs, and that role, the assessment methodology, and the tools themselves should be more fully described both in the Final 2012-2013 Transmission Plan and in any stand-alone documentation.
- 8. The proposed schedule for the Sycamore-Penasquitos 230 kV transmission line may be optimistic.
- 9. Understanding of transmission cost drivers will be improved if TAC impact estimates are disaggregated into several requested project categories and if avoided loss of load (dollar value or MW) can be shown for large reliability projects wherever feasible.
- 10. Renewable resource deliverability drives substantial transmission additions even though the modeled RPS is based on *energy* not capacity delivery, and the CAISO should aim to clarify what capacity and energy delivery are expected with and without particular "full deliverability" transmission upgrades, and to what extent a high DG case results in reduction of identified deliverability upgrades.

- 11. The CAISO should clarify the out of state renewables study regarding which California renewables were removed and the additivity of mitigations, and should consider running future studies of this type without removing California renewables since RPS development and procurement are so far advanced.
- 1. CPUC Staff Is Pleased to See the Competitive Transmission Development Process Being Put into Action, and Emphasizes the Importance of Cost and Cost Management.

CPUC Staff is pleased that three transmission projects are identified as eligible for competitive solicitation in the Draft Plan. (One of these, the Sycamore-Penasquitos 230 kV transmission line, is undergoing further assessment.¹) Combined with the renewable energy-supporting Imperial Valley collector substation project recently made available for competitive solicitation on an expedited basis,² this represents the first realization of promising competitive transmission reforms recently included in the CAISO's transmission planning process, after very active stakeholder involvement. This competitive approach will support innovation and efficiency in developing transmission to meet California's ambitious energy goals. We understand that other parts of the country look to California as a model in this regard.

CPUC Staff understand the CAISO's decision to establish a temporal cutoff, such that if the CAISO's Order 1000 filing regarding "intraregional" transmission planning reforms was not approved by that cutoff date, then existing tariff provisions would apply regarding what transmission projects are eligible for competitive solicitation in the present TPP cycle. However, in future planning cycles, we anticipate that a wider range of transmission projects, including 200+ kV reliability projects and inter-service territory projects, can be available for competitive solicitation. Thus, the present cycle will provide an important opportunity to deploy and test competitive solicitations before broader competitive opportunities emerge in the future. Furthermore, we hope that after sufficient experience with competitive development of 200+ kV

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¹ The other two projects are the Gates-Gregg 230 kV transmission line and the Delaney-Colorado River 500 kV transmission line.

² The project does not require CAISO Board approval, because the cost falls below \$50 million.

projects, there might be consideration of making sub-200 kV projects available for non-incumbent development under some circumstances.

A major benefit of competitive solicitations is better control of transmission costs, which have been substantial in recent years. As CPUC Staff have emphasized in connection with the CAISO's Order 1000 intraregional compliance filing, cost and cost management should play an important role when evaluating and selecting competitive solicitation winners. Contractual commitments regarding costs and cost containment provide important means of controlling costs and sharing cost risks between developers and ratepayers, before a project is submitted to FERC, where cost management options are more limited.

2. CPUC Staff Appreciates the Robustness and Documentation of the Economic Studies that Identified an Important Competitive Transmission Project, and Hopes that the CAISO Can Provide Requested Additional Information from These Studies.

CPUC Staff appreciates the Draft Plan's expanded detail regarding the methodology and assumptions for the economic studies. Transmission investments have long economic and physical lives, and future conditions affecting an investment's value are quite uncertain, yet very important. Thus, CPUC Staff welcomes the economic study's sensitivity analyses of transmission project benefits across a range of key uncertainties. An additional key driver of value for the Delaney-Colorado River project that was selected for inclusion in the Draft Plan, as well as for other Southwest-California (SWC) projects studied, is the assumed amount and mix of generation additions east of the Colorado River. Some insight into implications of base case and alternative assumptions regarding these generation additions could be valuable.

The dominant source of computed benefit for the Delaney-Colorado River project is consumer production benefit, i.e., lower Locational Marginal Prices ("LMPs") in the CAISO footprint on an annual aggregate basis. Since this large transmission project recommended for approval is estimated to cost ratepayers approximately \$325 million, it is important to better understand how the estimated benefit arises. Such understanding also aids appreciation of how sensitive or robust benefits might be to changing circumstances. In particular, the economic studies identified little congestion on major facilities in the Desert Southwest-California area before adding the simulated Delaney-Colorado River project (Tables 5.6-1 and 5.7-18), and

addition of this project apparently had limited impact in reducing simulated hours of congestion on Path 26 and other Desert Southwest-California area paths (Tables 5.7-18 and 5.7-19). Thus it is unclear, and should be clarified, *which* CAISO footprint locations were projected to experience significantly reduced LMPs when adding the Delaney-Colorado River project, in order to produce a large consumer benefit, and in which seasons and hours this occurred.

The above information along with information on dispatch changes (with and without the Delaney-Colorado River project) would also indicate *which* low cost east-of-river generation was being made more available to California consumers as a result of the project, to produce the consumer production benefit. Since considerable new solar generation would be expected to already be injecting on the California side of the path from Arizona to Devers during midday hours, we might expect that the additional low-cost east-of-river generation being made available to CAISO area consumers would come largely from underutilized east-of-river fossil (or at least non-solar) generation. However, this is only conjecture, and it would be valuable to have this explicitly clarified in the final Plan, as useful information for understanding not only this particular project but also broader planning issues and options going forward.

The Delaney-Colorado River project was found to provide considerably greater benefit to CAISO footprint market participants than was determined for this same project in last year's study. As described in Chapter 5 of the Draft Plan, this year's economic studies incorporate significant modeling and data changes and enhancements relative to last year's studies, which may account for the increase in assessed benefits. For stakeholder understanding, and also to document the evolving study process and to inform future studies, this year's Plan should include some assessment of which methodology and data changes were most responsible for the significantly increased benefits attributed to the Delaney-Colorado River project, compared to last year's results.

Two favorably evaluated economic projects, the Delaney-Colorado River project recommended for approval and the Harry Allen-Eldorado project recommended for continuing study, cross the interface between the CAISO area and adjoining planning areas. These projects could potentially benefit consumers and producers not only in the CAISO area but also in adjoining areas, and thus conceivably could be jointly funded by multiple planning areas. In fact,

it appears that these projects would be assessed for joint funding based on principles being developed for FERC Order 1000 compliance filings by western transmission providers. Thus, CPUC Staff recommend that the CAISO and other parties studying these two transmission projects explicitly consider consumer and producer benefits outside of the CAISO footprint.

3. CPUC Staff Requests Examination of an Earlier In-Service Date for a SDG&E Synchronous Condenser Project.

CPUC Staff appreciates CAISO's attention to reactive power needs for voltage support in southern Orange County and San Diego, given the uncertain duration of the outage of the San Onofre Nuclear Generation Station ("SONGS"). CAISO had previously approved capacitors at three Southern California Edison ("SCE") substations (Santiago, Johanna, and Viejo), synchronous condensers at Huntington Beach units 3 and 4, and reconfiguration of the Barre-Ellis 230 kV transmission line.³ The Draft Plan indicates that CAISO is still considering approval of two additional reactive power projects. SCE has proposed Static Var Compensators near SONGS, to be on-line by the summer of 2014 (the Orange County SVC project). CAISO is still considering a San Diego Gas and Electric Co. ("SDG&E") synchronous condenser project at either the San Luis Rey or Talega substation, also relatively near SONGS.⁴

Given the possibility of an extended SONGS outage, in considering the SDG&E synchronous condenser project CAISO, should investigate bringing forward the in-service date⁵ from June 1, 2018 to June 1, 2015. CPUC Staff's understanding is that permitting and construction could occur by the summer of 2015. Assuming SDG&E could build the synchronous condenser project at a reasonable cost, CPUC Staff supports the idea of a reasonable amount of additional reactive power supply. We request consideration of a 2015 inservice date in the Final Plan.

³ Draft Plan, p. 153.

⁴ Draft Plan, p. 166.

⁵ Draft Plan, p. 375, Table 7.2-1 (indicating an expected in-service date of 6/1/2018).

4. CPUC Staff Requests Special Study of Reliability Needs in San Francisco during the 2013-2014 Transmission Plan cycle.

The Draft Plan approves the Trans Bay Cable Dead Bus Energization Project, which is a relatively low-cost reliability improvement. The Draft Plan also states that CAISO is continuing to study reliability needs in downtown San Francisco under Extreme Event conditions. If CAISO is concerned about reliability in downtown San Francisco, CPUC Staff would like to see a comprehensive, special study of reliability for San Francisco and the San Francisco Peninsula as part of the 2013-2014 Transmission Plan. In this vein, CPUC Staff would encourage CAISO staff to not add a new (i.e., not in the Draft Plan), major, San Francisco reliability project in this year's Final Plan; rather, studying the issue in greater detail during the next cycle would be better.

5. Staff Appreciates Progress on Increased Consistency of Input Assumptions regarding Demand Side Management, and Requests Sufficiently Granular Assumptions for All Cases; CPUC Staff Requests a Case in the 2013-2014 Transmission Plan Cycle that Mirrors Standard Assumptions Made in the CPUC's Long Term Procurement Plan Base Case.

CPUC Staff appreciates progress on increased consistency of input assumptions between CAISO, CPUC, and the California Energy Commission ("CEC") regarding Demand Side Management results. For example, CPUC Staff appreciates CAISO planning to run the sensitivity analysis for the High Distributed Generation ("DG") case, using incremental uncommitted energy efficiency beyond the committed portion that was included in the CEC adopted demand forecast and potential incremental combined heat and power ("CHP").

CPUC Staff also appreciates CAISO's promise for proposed cooperation with CEC and CPUC on energy efficiency ("EE") and demand response ("DR") assumptions⁸ (generally, to result in more DR and incremental, uncommitted EE being assumed under all TPP cases). The

⁶ Draft Plan, p. 73.

⁷ Draft Plan, p. 192.

⁸ Draft Plan, pp. 21, 27.

combined expertise of the three agencies to develop common assumptions has, and will, help to improve the accuracy of assumptions.

During the 2013-2014 Transmission Plan cycle, we suggest that TPP documentation should provide increased granularity of EE, DR, and CHP assumptions for all of the TPP cases. In addition, CPUC Staff requests a case in the 2013-2014 Transmission Plan cycle that mirrors standard assumptions made in the CPUC's Long Term Procurement Plan base case.

6. CPUC Staff Commends the CAISO's Effort in Conducting Special Studies of the AV Clearview Project that May Inform Future Decisions, and Looks Forward to the CAISO's Assessment of the Proponent's Recently Submitted Benefits Analysis.

CPUC Staff appreciate the CAISO's special study of the AV Clearview transmission project proposal as a possible alternative to the South of Kramer (i.e., the former Coolwater-Lugo) project for interconnecting and delivering renewable generation in the Kramer area. We understand that the CAISO's assessments of both projects, to date and going forward, may inform future permitting processes for transmission to meet objectives of the Coolwater-Lugo project. The CAISO's tariff provisions regarding policy-driven transmission approvals (for selection of "Category 1" elements) provide for consideration of publicly-available information regarding environmental factors. However, in practice it may be difficult to sufficiently assess and vet environmental information on large transmission projects within the confines and timeline of the CAISO's Transmission Planning Process, so that we anticipate that the relative environmental attributes of South of Kramer (Coolwater-Lugo) versus AV Clearview will be addressed during siting and permitting.

We note that the proponents of the AV Clearview project have entered into the comment record of the 2012-2013 TPP an analysis by ZGlobal of the benefits of the AV Clearview and Coolwater-Lugo projects, including technical, reliability, economic and societal benefits indicating substantial advantages for the AV Clearview project. We look forward to the CAISO's evaluation of the ZGlobal study; however, we are concerned that a major change in the Draft Plan could occur without a full stakeholder vetting. If necessary, CAISO should take additional time to review the ZGlobal study, even after the 2012-2013 Plan is finalized.

Finally, we note that the Coolwater-Lugo project was originally included in the 2010-2011 Transmission Plan as an LGIA-driven project. Under today's FERC-approved CAISO generator interconnection paradigm (Generator Interconnection and Deliverability Allocation – "GIDAP") plus the CAISO's Order 1000 compliance filing, such transmission needs are to be addressed in a more holistic (less LGIA-driven) and competitive manner with costs and cost containment playing significant roles. We hope that such eventual efficiencies can still be brought to bear in the *current* Kramer area situation involving prior interconnection agreements, through a combination of the CAISO's studies plus subsequent siting and permitting processes informed by those studies.

7. The Water Availability Assessment Tools and Methodology Appear to Play an Important Role in Analysis of Fresno Area Transmission Needs, and That Role, the Assessment Methodology and the Tools Themselves Should be More Fully Described Both in the Final 2012-2013 Transmission Plan and in Any Standalone Documentation.

The Helms water availability assessment appears to play a critical role in identification of Fresno area transmission needs in the 2012-2013 transmission planning process. Furthermore, as suggested in the Draft Plan, future needs for ancillary services and operating flexibility to integrate variable generation may increase the importance of pumping to fill Helms storage.

Thus, CPUC Staff look forward to more complete and clear documentation of the Water Analysis Model and its application in the near future. Even before such full documentation may be available, the CAISO's final 2012-2013 Transmission Plan should provide greater clarity than the Draft Plan regarding several aspects of the Water Analysis Model and the water availability assessment.

First, there should be clarification of the respective roles and interrelationship, in assessing Central California transmission needs, of: (a) conventional power flow and stability analysis addressing reliability standards⁹ for snapshot scenarios summarized in Table 3.3-1 and 3.3.2 versus (b) the Helms water availability assessment covering a broader, more continuous range of hours and conditions. The Final Plan should explain what transmission solution is

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⁹ Staff refers to "consistent with the approach noted in section 2.3.2.4."

found adequate to meet reliability standards under the most stressful snapshot powerflow conditions without considering the water availability analysis, such as the 2022 summer partial peak case, which apparently assumes Helms to be off-line (Table 3.3-2). Our understanding from the Draft Plan is that a more robust mitigation solution was required beyond what was needed to meet reliability standards under selected snapshot stress conditions, because while Helms pumping could be avoided under such stress (contingency) conditions it could *not* be avoided over a longer period of time (hours) if sufficient water is to be maintained in Helms storage for overall reliability. This explanation, if correct, should be more clearly explained in the Final Plan.

For the water availability assessment, key results appear to be reflected in Figures 3.3-4, 3.3-6, and 3.3-8. For these figures it should be clarified what "Minimum Reservoir Storage" represents. For example, for what period of time or set of hours does this amount of storage apply? In what way is it a "minimum?" The amount of storage MWh over the applicable period is apparently based on the number of hours during that period when Helms is calculated to be able to operate with 0, 1, 2 or 3 pumps, given the load forecast and the assumed transmission configuration (e.g., "configuration 3" or "configuration 4"). The CAISO should clarify in the Final 2012-2013 Transmission Plan which (and how many) hours of potential pumping (season, time of day) are reflected in Figures such as 3.3-6 and 3.3-7, and how the transmission constraints limiting such pumping were calculated or interpolated across the different varied hours and conditions considered, given that power flow and stability studies typically examine only selected snapshot conditions. It should also be clarified what frequency and impact of outage contingencies was assumed when determining the 0, 1-, 2- and 3-pump operating windows over the applicable time period represented in Figures such as 3.3-6 and 3.3-7. Were N-0 conditions assumed for these energy calculations? The above questions reflect the more general need for greater clarity regarding the design and application of the Water Analysis Model.

8. The proposed in-service date for the Sycamore-Penasquitos 230 kV transmission line may be optimistic.

CPUC Staff appreciates the detailed study of nuclear plant outage scenarios. CAISO concluded that the Sycamore-Penasquitos 230 kV transmission line might both meet mid-term

reliability needs under certain nuclear outage scenarios, and also have policy-driven benefits.¹⁰ CAISO recognizes there may be a long lead time to build the Sycamore - Penasquitos 230 kV transmission line,¹¹ but CAISO and SDG&E assert a 2017 on-line date.¹²

CPUC Staff understands that CAISO's process does not include the analysis of environmental constraints and permitting. The Sycamore-Penasquitos line was part of the original Sunrise Powerlink proposal, and was not approved by the CPUC in the certification proceedings for Sunrise. CPUC Staff is concerned about the proposed 2017 on-line date for the Sycamore-Penasquitos project, in light of potential environmental review and permitting timeframes and potential obstacles. In CAISO's deliberations leading to the Final Plan, we suggest further consideration of these potential difficulties for the Sycamore-Penasquitos line versus the alternative projects (reconductoring and SPS projects) identified by CAISO to meet certain needs. ¹³

9. Understanding of Transmission Cost Drivers Will Be Improved if TAC Impact Estimates Are Disaggregated into Several Requested Project Categories and if Avoided Loss of Load (Dollar Value or MW) Can Be Shown for Large Reliability Projects Wherever Feasible.

CPUC Staff welcome the CAISO's development of a tool to estimate future trends in the High Voltage Transmission Access Charge ("TAC") to provide an "estimation of the impact of the capital projects identified in the 10-Year Transmission Plan" and to provide a "high level understanding of the relative impacts of the different cost drivers." CPUC Staff understand that the CAISO is concerned that breaking transmission costs into discrete categories such as "policy driven" could create misunderstanding because transmission projects often address multiple objectives. Nevertheless, CPUC Staff ask that when the TAC impact results and the associated

¹⁰ Draft Plan, p. 290.

¹¹ Draft Plan, p. 189.

¹² *Id.*, p. 8.

¹³ Draft Plan, p. 290.

¹⁴ Draft Plan, p. 380.

¹⁵ Ibid.

tool and data are posted, that there be some breakdown into categories of transmission, so that stakeholders may achieve understanding of the relative impact of the different cost drivers. In particular, we request that the transmission costs and TAC impact be broken down by timing (historical in-service year, and year of approval and of estimated completion for transmission not yet in service) and by PTO. Furthermore we strongly support at a minimum breaking out (separately identifying) costs for LGIA-driven transmission projects and for transmission projects identified *solely* for reliability purposes.

Furthermore, the reliability-driven component of transmission costs is high in the aggregate, reliability study methods are complex, and controlled load dropping is allowed under certain conditions under NERC, WECC and CAISO standards. In this context, we have found the occasional inclusion of benefit/cost analysis for reliability projects, and even the simple reporting of the MW of load at risk of being dropped absent a mitigation measure, to be very helpful, especially for large reliability projects. We request that such information be included where possible for the larger (perhaps over \$20-30 million) reliability projects, and request clarification of when it is (and is not) feasible to reasonably develop and post such useful information. Please explain the appropriate role and limitations of benefit/cost analysis, and of explicit identification of MW of load drop avoided (and associated probability), for large reliability projects.

10. Renewable Resource Deliverability Drives Substantial Transmission Additions Even Though the Modeled RPS Portfolios are Based on <u>Energy</u> not Capacity Delivery, and the CAISO Should Aim to Clarify What Capacity and Energy Delivery Are Expected with and without Particular "Full Deliverability" Transmission Upgrades, and to What Extent a High DG Case Results in Reduction of Identified Deliverability Upgrades.

CPUC Staff appreciates CAISO's use of CPUC-generated RPS portfolios in the transmission planning process. Policy-driven transmission needs identified in the Draft Plan appear to arise from deliverability assessment of the base case (Commercial Interest portfolio) assuming that all of the renewable generation will have RA deliverability. Since the RPS portfolios are intended to meet the 33% energy target without any specified RA capacity target, it would be helpful to understand what would be the renewable resources deliverability if each identified policy-driven transmission upgrade were *not* built.

Determining transmission needs related to deliverability of renewable or other resources' output appears to depend strongly on three separate but interacting questions:

- 1. What overall level of RA capacity is needed systemwide and locally?
- 2. What transmission is needed to support that RA capacity?
- 3. What amount of transmission is needed to provide a high level of annual (8,760 hour) *energy* deliverability?

Question (1) is a broad energy policy matter of concern to all energy agencies and stakeholders. Question (2) directly focuses on the CAISO's deliverability assessment methodology and its level of conservatism. CPUC Staff hope and understand that CAISO plans to clarify and discuss its deliverability assessment methodology in the near future, since that methodology drives identification of substantial transmission needs and appears to many stakeholders to be overly conservative. A better mutual understanding of this methodology and the rationale for its statistical level of conservatism is needed.

Question (3) requires other kinds of analyses addressing 8,760-hour conditions and uncertainties affecting delivery of resources' energy over a range of conditions, but not under the extreme (and rare) stress snapshot conditions assumed to test RA deliverability. This question was at least partly addressed in past TPP cycles via 8,760-hour production simulations for the RPS portfolios, but was apparently not addressed in the present cycle. Given that full RA deliverability of 100% of renewable resources may not be necessary or economically desirable, it is important to have an assessment of not only what RA deliverability is achievable without certain incremental "policy driven" deliverability upgrades (as noted above) but also whether a high percentage of energy output would be deliverable without those upgrades. These are important questions for coordinating resource and transmission planning.

As noted above, not all renewable resources may ultimately need to have full RA deliverability. In addition, identification of Category 1 (for approval) policy-driven transmission entails considering conditions beyond a single base case. Therefore, we would like to understand which identified deliverability upgrades would, or would not, be needed under the high-DG case.

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11. The CAISO Should Clarify the Out of State Renewables Study Regarding which California Renewables were Removed and the Additivity of Mitigations, and Should Consider Running Future Studies of This Type without Removing California Renewables Since RPS Development and Procurement Are so Far Advanced.

CPUC Staff understand that the high out of state sensitivity study was conducted within the Policy Driven Need Assessment for informational purposes only, and that the 3000 MW of imports assumed to inject at Eldorado do not correspond to actual California resource planning scenarios. The CAISO should clarify: (1) if the "potential mitigations" summarized under "Option 1" would be required all together in combination (not substituting for each other), (2) whether potential mitigations summarized under "Option 2" would substitute for Option 1 or would need to be combined (wholly or in part) with Option 1, and (3) whether resolution of the Pacific Northwest voltage instability issue would require additional measures beyond Options 1 and 2 and thus would be additive with Options 1 and/or 2. Also, CPUC Staff request that the CAISO list by technology, resource area and MW (not by individual resources) of the Commercial Interest portfolio resources that were removed for the sensitivity studies in which 3,000 MW of out-of-state renewable generation was assumed to be injected at Eldorado. Finally, CPUC Staff note that the status of renewable resource development and procurement for the 33% RPS goal is so far along at this point that it would be relevant and informative to study the impact of importing 3,000 MW of out of state renewable generation at Eldorado substation or elsewhere without removing California renewables from the Commercial Interest (or any other) resource portfolio.

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