**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

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| The Nevada Hydro Company, Inc. | ) | |
| | ) | |
| v. | ) | |
| | ) | Docket No. EL19-81-000 |
| California Independent System Operator Corporation | ) | |
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# ANSWER OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION TO COMPLAINT

Dated: July 22, 2019

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# ANSWER OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION TO COMPLAINT

The California Independent System Operator Corporation (CAISO) submits its answer to the complaint filed in this proceeding by The Nevada Hydro Company, Inc. (Nevada Hydro) on June 17, 2019 (Complaint).[1] The Complaint alleges that the CAISO failed to follow its tariff in studying the Lake Elsinore Advanced Pumped Storage Project (LEAPS) as a transmission facility in the CAISO's 2018-2019 transmission planning process. The Commission should reject the Complaint for the numerous reasons set forth below.

## I. EXECUTIVE SUMMARY

LEAPS is a proposed $2 billion pumped storage hydroelectric facility in southern California developed by Nevada Hydro. Nevada Hydro has a long history of attempting to obtain cost recovery for LEAPS from CAISO transmission

[1] The CAISO files this Answer pursuant to Rule 213 of the Federal Energy Regulatory Commission's (Commission) Rules of Practice and Procedure, 18 C.F.R. § 385.213 (2018). On June 28, 2019, the Commission granted an extension of time until July 22, 2019, to respond to the Complaint.

customers. Most recently, the Commission in 2018 denied Nevada Hydro's attempt to avoid the CAISO's transmission planning process and have the Commission declare, by fiat, that LEAPS should be treated as a needed transmission project and its costs recovered from CAISO ratepayers.[2] The Commission made clear that although LEAPS could potentially be treated as a transmission asset, it, like any other proposed transmission project, would need to be selected as a solution to an identified need through the CAISO's regional transmission planning process.

Consistent with its commitment in that proceeding, and its treatment of other storage projects, the CAISO fully and fairly studied LEAPS as a potential reliability, public policy, and economic project as part of its 2018-2019 transmission planning process. Dissatisfied with the CAISO's conclusions that LEAPS was not a needed transmission solution during this planning cycle, Nevada Hydro is once again attempting to obtain, via Commission mandate, cost recovery from CAISO transmission ratepayers, this time via a complaint alleging flaws in the CAISO's treatment of LEAPS in the 2018-2019 transmission planning cycle. None of Nevada Hydro's allegations have merit.

First, Nevada Hydro objects to the CAISO's findings that LEAPS was not needed for reliability. The CAISO's comprehensive reliability analysis did not identify a need for *any* new transmission projects to address reliability issues because the CAISO determined that they would be mitigated by existing

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[2] *Nevada Hydro Co., Inc.*, 164 FERC ¶ 61,197 at P 2 (2018) (Order Dismissing Declaratory Petition).

solutions, such as previously approved demand response and battery storage (either already in-service or under-development) and operational measures. As such, the 2018-2019 transmission plan indicated that none of the projects proposed for the San Diego area would be necessary. Nevada Hydro's allegation that the CAISO failed to assess whether LEAPS would be more cost effective than these existing measures is spurious, as it relies on the counterintuitive assumption that a new $2 billion project could be more cost effective than solutions that will be in place regardless of the outcome of the transmission planning process. Nevada Hydro also provides no compelling evidence to support its allegation, instead presenting an irrelevant comparison between the costs of LEAPS and capital upgrades the CAISO never identified as being needed.

Nevada Hydro also alleges that the CAISO's evaluation of LEAPS as a potential economic solution was flawed. Utilizing its Transmission Economic Assessment Methodology (TEAM), the CAISO found that LEAPS would not produce economic benefits that would justify its construction. Among other factors, the CAISO analyzed whether LEAPS would produce benefits including "reduction in production costs, congestion costs, transmission losses, capacity, or other electric supply costs resulting from improved access to cost-efficient resources,"[3] and compared LEAPS' cost/benefit ratio to other proposed projects and initially identified solutions. LEAPS' benefit-to-cost ratio in all three configurations the CAISO studied was far below 1:1, even though the CAISO

[3] Section 24.4.6.7 of the CAISO tariff.

included the revenues that the LEAPS pumped storage unit would earn from providing market services.[4]

Nevertheless, Nevada Hydro speculates that the CAISO's economic studies are "suspect" because in prior informational studies regarding the benefits of large-scale storage, the CAISO found that hypothetical bulk storage units studied as market participating resources would provide annual production cost savings. Comparing these purely informational studies to the CAISO's specific economic planning studies is, however, an apples-to-oranges exercise devoid of any probative value. The CAISO has consistently stated that these informational studies are not transmission planning studies, and were performed solely to inform the California Public Utilities Commission's (CPUC) forward capacity procurement processes. Because these informational studies were performed for purposes of informing generation procurement and not transmission planning, the CAISO calculated respective benefits using two different methodologies. In particular, in the case of the informational studies, the CAISO calculated benefits based solely on generators' production cost savings throughout the applicable study region, whereas the CAISO's planning studies determined a benefit-to-cost ratio based on a "CAISO ratepayer benefits"

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[4] 2018-2019 CAISO Transmission Plan, Board Approved-Updated (March 29, 2018) at 359 (2018-2019 Transmission Plan), also attached to the Complaint as Exhibit NHI-1. For ease of reference, the 2018-2019 Transmission Plan is available at http://www.caiso.com/Documents/ISO_BoardApproved-2018-2019_Transmission_Plan.pdf. The CAISO evaluated LEAPS in three configurations, including one not even proposed by Nevada Hydro: the transmission lines only, *i.e.*, Option 1a (not suggested by LEAPS); the pumped storage unit with transmission line connections to Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E) (Option 1b); and the pumped storage unit with a transmission line connection only to SDG&E (Option 2).

approach, which takes into account revenues, profits, and the distribution of benefits across market participants.

Nevada Hydro also identifies purported errors in how the CAISO calculated the benefits attributable to all of the proposed economic projects, including LEAPS. These allegations are incorrect:

- The CAISO properly utilized CPUC default generation supply portfolios in conducting its economic analyses, consistent with Commission precedent and the study assumption process in the CAISO tariff.

- The CAISO reasonably assumed a 2,000 MW export limit in its economic analyses based on actual market dynamics, consistent with TEAM, which actually benefitted LEAPS.

- The CAISO's tariff and TEAM procedures make clear that the CAISO's benefit analysis focuses on CAISO transmission ratepayers, rather than Western Electricity Coordination Council (WECC)-wide societal benefits, because it is CAISO transmission ratepayers that bear the full costs of any selected transmission upgrades.

- The CAISO conducted its economic analyses using the same transmission planning software modeling it has consistently relied on to perform these analyses, and Nevada Hydro's allegation that the CAISO admitted that this software is inferior to other applications is based on a distortion of the CAISO's statements.

- The CAISO reasonably adopted a conservative generation capacity benefit value based on relevant circumstances at the time the CAISO performed its analysis, including existing grid conditions and uncertainty regarding future conditions for gas-fired resources. And even had the CAISO utilized the value suggested by Nevada Hydro, LEAPS' benefit-to-cost ratio would still be well below 1:1.

- The CAISO appropriately calculated market revenues attributable to LEAPS based on a 10-year planning case, consistent with TEAM and prior practice. LEAPS' projected 2025 in-service date is already two years beyond the CAISO's five-year planning period.

- The CAISO properly did not give LEAPS a (1) separate "deliverability" benefit because LEAPS failed the meet the basic

> requirement for such a benefit or (1) an "avoided cost" benefit because LEAPS did not avoid the costs of any otherwise approved reliability or policy project.

Nevada Hydro's claim that the CAISO ignored certain benefits provided by LEAPS in its analysis fares no better. Nevada Hydro fixates on the notion that the CAISO should have credited LEAPS with substantial benefits because it can arguably reduce the need for an "overbuild" of renewable resources. TEAM considers this a "public policy" benefit, and the CAISO assesses it based on the outcome of the CPUC's integrated resource planning process and the renewable resource portfolios the CPUC provides the CAISO. That process did not show a current need for pumped storage. Nevada Hydro essentially wants the CAISO (and the Commission) to override the CPUC's generation procurement decisions through the CAISO's transmission planning process. The Commission should decline to do so.

Finally, Nevada Hydro's claim that the CAISO failed to consider how the CAISO might operate LEAPS as a transmission project is without merit. The CAISO does not deny that energy storage projects such as LEAPS can be selected as transmission solutions in its planning process, and the CAISO has already approved energy storage projects in previous planning cycles. However, as Nevada Hydro itself has acknowledged, the benefits LEAPS would provide through its pumped storage unit result from providing generator and load-type services in the CAISO's markets, not from providing transmission services as a regulated transmission asset. The CAISO has not identified a transmission need for LEAPS. The Commission should not permit LEAPS to bootstrap itself into

being treated as a transmission asset (with associated cost recovery through CAISO transmission rates), when there is no transmission need for it, simply because LEAPS might earn significant energy and ancillary services revenues in the markets.

To the extent that Nevada Hydro's objection is that the CAISO did not go even further and develop formal operating procedures and parameters for LEAPS, or a protocol detailing how the CAISO would interface with Nevada Hydro, such objection is premised on a mischaracterization of the Commission's Order Dismissing Declaratory Petition. The Commission was explicit that the CAISO would have to address more specifically how it would operate LEAPS *only if* the transmission planning process first determined that LEAPS "addresses a transmission need identified through that process."[5] LEAPS did not meet this threshold requirement. There was nothing for the CAISO to evaluate or develop in terms of how it might operate LEAPS because the CAISO found that LEAPS was not needed to meet any transmission needs.

The Commission should dismiss Nevada Hydro's complaint in its entirety.[6]

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[5] Order Dismissing Declaratory Petition at P 22 ("LEAPS has not been studied in the CAISO TPP to determine whether it addresses a transmission need identified through that process, and, *if such a need were met*, how the facility would be operated.") (emphasis added); *Id.* at P 23 ("Given the uncertainty over whether LEAPS will meet identified transmission needs in the CAISO TPP*, and, if so*, how CAISO would require LEAPS to be operated to meet those needs, we can only determine whether or not LEAPS is a transmission facility after it has been studied through the CAISO TPP.") (emphasis added).

[6] As explained below, even if the Commission were to conclude that there is some merit to Nevada Hydro's arguments regarding the CAISO's evaluation of LEAPS, there is no justification for the relief that Nevada Hydro requests beyond requiring the CAISO to re-do its studies. The additional relief that Nevada Hydro requests, particularly the request that the Commission direct the CAISO to include LEAPS in its transmission plan, would require the CAISO to contradict or ignore outright key elements of its transmission planning process such as its competitive

Nevada Hydro fails to show by a preponderance of evidence that the CAISO did not comply with the transmission planning provisions of its tariff in evaluating LEAPS in the 2018-2019 transmission planning cycle. Nevada Hydro has not sustained its burden to "show that any rate, charge, classification, rule, regulation, practice, or contract is unjust, unreasonable, unduly discriminatory, or preferential."[7]

## II. BACKGROUND

### A. The LEAPS Project and Complaint

The $2 billion LEAPS Project consists of two primary components: (1) a 500 MW pumped storage facility to be located on Lake Elsinore in Riverside, California (Pumped Storage Facility); and (2) the Talega-Escondido/Valley-Serrano 500 kV Interconnect (TE/VS Interconnection), a 30-mile transmission line that will interconnect the Pumped Storage Facility to the transmission systems owned by SCE and SDG&E.[8] LEAPS entered the CAISO's generator interconnection queue in 2005 and has Large Generator Interconnection Agreements with the CAISO and SCE and with the CAISO and SDG&E.[9]

Nevada Hydro has been seeking to obtain cost recovery for LEAPS from CAISO transmission customers for many years. Both the TE/VS Interconnection and the pumped storage facility were the subject of a request for transmission

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solicitation process.

[7] 16 U.S.C. § 824e(b).

[8] Order Dismissing Declaratory Petition at P 2.

[9] *Id.* A hydroelectric license application for LEAPS is pending before the Commission in Docket No. P-14227-003. *Id.*

rate incentives under Order No. 679.[10] In 2008, the Commission issued an order approving certain rate incentives for the TE/VS Interconnection but denying incentives requested by Nevada Hydro for the pumped storage facility because it was ineligible for transmission rate incentives under Order No. 679.[11] The Commission also found it was inappropriate for the CAISO to assume control of the LEAPS pumped storage facility, and the costs of the facility should not be included in the CAISO's transmission access charge.[12] The Commission recognized that other existing pumped storage units in the CAISO provide generation services and do not have their costs rolled-into transmission rates.[13]

In 2018, Nevada Hydro filed a petition for declaratory order requesting that the Commission declare that LEAPS is a transmission facility and that it is entitled to cost recovery under the CAISO's transmission access charge (TAC).[14] The Commission dismissed this petition on the basis it would be premature to designate LEAPS as a transmission facility prior to the project being studied in the CAISO's transmission planning process to determine whether it actually addresses a transmission need, and, if such a need were met, how LEAPS would be operated.[15]

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10 *Promoting Transmission Inv. Through Pricing Reform*, Order No. 679, FERC Stats. & Regs. ¶ 31,222, *order on reh'g*, Order No. 679-A, FERC Stats. & Regs. ¶ 31,236 (2006), *order on reh'g*, 119 FERC ¶ 61,062 (2007) (Order No. 679).

11 *Nevada Hydro Co., Inc.*, 122 FERC ¶ 61,272 at PP 22-85 (2008).

12 *Id.* at PP 82-85.

13 *Id.* at P 83.

14 *Petition of the Nevada Hydro Co. for Declaratory Ruling*, Docket No. EL18-131-000 (March 3, 2018) (2018 Petition).

15 Order Dismissing Declaratory Petition at PP 22-25.

Consistent with its representations in the 2018 Petition proceeding, the CAISO fully and fairly evaluated LEAPS in the 2018-2019 transmission planning process cycle under both reliability and economic study criteria. Dissatisfied with the CAISO's conclusions that LEAPS was not a needed transmission solution during this planning cycle for either reliability or economic reasons, Nevada Hydro again attempts to obtain, via Commission mandate, cost recovery from CAISO transmission ratepayers, this time via a complaint alleging flaws in the CAISO's treatment of LEAPS in the 2018-2019 transmission planning process. Nevada Hydro makes several arguments:

- Nevada Hydro alleges that the CAISO failed to abide by a commitment it made, in the proceeding that resulted in the Order Dismissing Declaratory Order Petition, to study LEAPS in the transmission planning process as a transmission proposal to address reliability needs.[16]

- Nevada Hydro alleges that the CAISO failed to abide by its commitment to follow the requirements set forth in section 24 of its tariff for economic studies as applied to LEAPS. Specifically, Nevada Hydro claims that the CAISO failed to give LEAPS proper credit for production cost savings benefits, failed to calculate and include savings required under three mandatory TEAM criteria, and undercounted market revenues for LEAPS.[17]

- Nevada Hydro alleges that the CAISO's purported errors and omissions resulted in unjust and unreasonable benefit estimates for LEAPS in the CAISO's transmission plan.

- Nevada Hydro alleges that the CAISO failed to determine how LEAPS can operate to maximize transmission benefits.[18]

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16 Complaint at 27-29.

17 *Id.* at 29-50.

18 *Id.* at 50-52.

As explained in detail below, these allegations are entirely without merit. The Commission should therefore reject Nevada Hydro's Complaint.

### B. Overview of the CAISO's Transmission Planning Process

The CAISO has consistently demonstrated that its transmission planning process is fair, open, and competitive. Many of Nevada Hydro's allegations are based on misunderstandings or mischaracterizations regarding the CAISO's transmission planning process, tariff, and application of TEAM. The CAISO takes this opportunity to explain its transmission planning process accurately.

The CAISO follows a "top down" transmission planning approach in which it assesses potential reliability, economic, public policy, and other transmission needs, and then works with stakeholders to identify the best solution to meet any identified transmission needs. The CAISO then conducts a competitive solicitation open to all interested entities to select an approved project sponsor to construct, own, operate, and maintain each solution. The CAISO's transmission planning process reflects a planning horizon covering ten years that considers previously approved transmission upgrades and additions, demand forecasts, demand-side management, capacity forecasts for generation technology types, generation additions and retirements, and other factors the CAISO deems relevant.[19]

The CAISO transmission planning process comprises three distinct

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[19] Business Practice Manual for Transmission Planning Process at 13, available at https://bpmcm.caiso.com/BPM%20Document%20Library/Transmission%20Planning%20Process/Transmission%20Planning%20Process%20BPM%20Version_18.doc.

phases:

### *1. Phase One*

Phase one of the transmission planning process is approximately a four-month effort in which the CAISO develops the unified planning assumptions, which the CAISO documents in a study plan.[20] The unified planning assumptions and study plan include:

- The planning data and assumptions to be used in the transmission planning process cycle, including, but not limited to, those related to demand forecasts and distribution, potential generation capacity additions and retirements, and transmission system modifications;
- A description of the computer models, methodology and other criteria used in each technical study performed in the transmission planning process cycle;
- A list of each technical study to be performed in the transmission planning process cycle and a summary of each technical study's objective or purpose;
- Identification of state or federal, municipal or county requirements or directives that the CAISO will utilize to identify policy-driven transmission solutions.[21]

The study plan articulates the scope and details of technical studies to be conducted as part of the transmission planning process.[22]

The CAISO tariff expressly requires the transmission planning process to

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[20] *See* Section 24.3 of the CAISO tariff.

[21] Section 24.3.2 of the CAISO tariff.

[22] During this time, the CAISO also receives submittals of interregional transmission projects. The CAISO participates in an interregional coordination stakeholder meeting in turn with the other western planning regions to provide for the exchange of planning data and information between themselves and stakeholders.

consider many factors in developing the planning assumptions and study plan for each year's transmission plan, including:

- WECC base cases for the relevant planning horizon;
- Transmission upgrades and additions approved by the CAISO in past planning processes;
- Facilities studied and approved to interconnect new generators;
- Federal, state, and local public policy directives;
- Generation procurement areas identified by local regulatory authorities;
- Demand response programs;
- Generation and non-transmission alternatives proposed for inclusion in long-term planning studies as alternatives to transmission additions or upgrades;
- The most recent interregional Information provided by other planning regions.[23]

Importantly, the CAISO tariff also requires the CAISO to consider "Economic Planning Study requests,"[24] such as the request submitted by Nevada Hydro. Economic Planning Studies are "performed to provide a preliminary assessment of the potential cost effectiveness of mitigating specifically identified Congestion."[25] Based on these and other factors, the CAISO develops the unified planning assumptions and study plan.

In doing so, CAISO staff works closely with local regulatory authorities.

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[23] Section 24.3.1 of the CAISO tariff. There are several other factors the CAISO must consider, enumerated in the tariff.

[24] *Id*.

[25] Appendix A to the CAISO tariff; definition of "Economic Planning Study."

Specifically, the CAISO coordinates with the California Energy Commission (CEC) on the long-term demand forecast resulting from the CEC's biennial Integrated Energy Policy Report (IEPR), and with the CPUC on the generation capacity procurement plans resulting from its biennial Integrated Resource Planning (IRP) proceeding. Consistent with Order No. 1000,[26] the CAISO also coordinates with these agencies and California's municipal entities to identify the public policy requirements that will necessitate transmission upgrades.[27] In the CAISO, the principal public policy requirement driving transmission needs has been California's evolving renewable portfolio standard. California's renewable portfolio standard has resulted in its utilities procuring thousands of megawatts in new renewable generation capacity. The CPUC has regulated the vast majority of this procurement, and therefore plays a critical role in informing the CAISO's transmission planning process. Since the first renewable portfolio standard (RPS) was established, the CAISO's transmission planning process has identified transmission upgrades to enable the delivery of this new generation capacity in the most reliable and cost-efficient way. In the 2018-2019 transmission planning cycle, the CAISO's main public policy focus was the transition from a 33 percent RPS required by 2020 to the 50 percent RPS required by 2030.

The CAISO also seeks input from stakeholders to develop the unified

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[26] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Pub. Util.,* Order No. 1000, 136 FERC ¶ 61,051 (2011); order on *reh'g and clarification*. 139 FERC ¶ 61,132 (Order No. 1000-A) (2012); order on *reh'g and clarification*. 141 FERC ¶ 61,044 (Order No. 1000-B) (2012) (Order No. 1000).

[27] Section 24.3.3 of the CAISO tariff.

planning assumptions and study plan. The CAISO tariff specifically requires the CAISO to issue a market notice requesting input on the assumptions for:

(i) Demand response programs to include in the base case or assumptions;

(i) Generation and other non-transmission alternatives proposed as alternatives to transmission solutions; and

(ii) State, municipal, county or federal policy requirements or directives.[28]

### *2. Phase Two*

Phase two of the transmission planning process is approximately a 12-month activity. Based on the unified planning assumptions and study plan developed in phase one, the CAISO assesses the CAISO controlled grid and determines the need for transmission solutions or alternatives to meet identified needs.[29] This phase includes a request window during which interested parties may submit suggested solutions for needs identified in the technical studies.[30] The CAISO documents the results, conclusions, and recommendations for solutions developed from this technical analysis in a draft transmission plan which, after stakeholder review, CAISO management presents to the CAISO Governing Board for consideration and approval. The comprehensive transmission plan adopted by the CAISO Board plan identifies the transmission solutions needed.

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28 Section 24.3.3(a) of the CAISO tariff.

29 *See* Section 24.4 of the CAISO tariff.

30 *See id.*

In phase two of the transmission planning process, the CAISO evaluates three primary categories of transmission needs:[31]

1. Transmission facilities to ensure system reliability;[32]

2. Transmission facilities to meet public policy requirements;[33] and

3. Transmission facilities to address congestion, local capacity requirements, or the integration of new generators or loads on an aggregated basis. This group is collectively known as the "Economic" category.[34]

The CAISO considers policy and economic solutions after it considers reliability solutions. At each stage of phase two, the CAISO may replace or enhance a solution identified in an earlier stage to better meet the next level of need, or it may adopt a new solution. For example, a public policy need can result in the CAISO modifying the initial solution for a reliability need if a proposed public policy solution meets both needs more efficiently. In such a case, the CAISO would categorize the solution based on the latter group, in this example, a "policy-driven" transmission project. Likewise, an economic study can change or modify the preferred initial solution for a reliability need, a public policy need, or both.[35] Thus, the CAISO's preferred solutions are finalized only

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[31] The transmission planning process also evaluates other facilities not pertinent here, namely, proposed merchant transmission facilities, facilities to maintain the feasibility of long-term congestion revenue rights, and location constrained resource interconnection facilities. *See* Section 24.4 of the CAISO tariff. Additionally, in each stage the CAISO evaluates whether interregional projects could meet any needs better than regional projects.

[32] Section 24.4.6.2 of the CAISO tariff.

[33] Section 24.6.6 of the CAISO tariff.

[34] Section 24.4.6.7 of the CAISO tariff. This provision expressly requires the CAISO to consider "the degree to which, if any, the benefits of the transmission solutions outweigh the costs."

[35] Business Practice Manual for Transmission Planning Process at 50-51.

once all three stages are complete.

### *(a) Stage 1: Reliability Needs*

The first stage of phase two consists of testing the transmission system to meet all North American Electric Reliability Corporation (NERC) reliability standards, WECC regional reliability standards, and CAISO planning standards.[36] The CAISO tabulates initial results and presents them to stakeholders[37] and provides stakeholders an opportunity to submit proposals to address identified reliability issues.[38] The initial results also identify reliability issues addressed by existing solutions that cannot be readily modeled in power flow base cases (such as demand response), but which do not constitute a need for new reliability transmission upgrades.[39] Besides considering new transmission upgrades to address newly identified reliability needs, the CAISO also considers remedial action schemes (RAS),[40] operational solutions, and other alternatives such as accelerating or expanding existing approved transmission solutions, demand-side management, generation, storage facilities, interruptible loads, and reactive support.[41]

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[36] Section 24.4.6.2 of the CAISO tariff.

[37] Section 24.4.1 of the CAISO tariff.

[38] Sections 24.4.2 and 24.4.3 of the CAISO tariff.

[39] The CAISO does this so stakeholders who perform their own analysis are not led to believe that there are additional unmitigated needs that the CAISO failed to report.

[40] Remedial action schemes (or RAS) are also known as special protection systems (SPS). They are designed to automatically disconnect generators or load in the event of a contingency that would otherwise cause system overloads. These schemes generally consist of circuit breakers and telecommunications equipment that can detect grid events and trip generators offline to protect grid equipment.

[41] Section 24.4.6.2 of the CAISO tariff.

The CAISO identifies its initial preferred solutions based on efficiency and cost effectiveness.[42] Specifically, the CAISO will determine the solution that meets the identified need "in the more efficient or cost effective manner."[43] In doing so, the CAISO considers a variety of concrete factors including capital costs, operating costs, and transmission line loss savings. Because the CAISO can "revisit" any new solution in the economic-driven analysis, the CAISO typically identifies an initial preferred solution to meet the reliability needs, and then evaluates other proposed solutions during the later stages of phase two. This allows the CAISO and stakeholders to account for the avoided costs of other initially preferred reliability projects.

### *(b) Stage 2: Public Policy Needs*

After identifying preferred solutions to meet reliability needs, the CAISO evaluates what facilities are needed to meet state, municipal, county, or federal policy directives.[44] In doing so, the CAISO identifies two categories of transmission solutions:

Category One: Transmission solutions the transmission planning process will recommend to the CAISO Board for approval.

Category Two: Transmission solutions that *could* be necessary to

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42 *Id*.

43 *Id.*

44 Section 24.4.6.6 of the CAISO tariff.

> achieve public policy, but which have not been found necessary in the current transmission plan.[45]

The CAISO reevaluates Category Two solutions in the next planning cycle based on updated data on new generation, load, grid topology, and public policy. Future transmission plans are not restricted to studying previously identified Category Two projects; new alternatives to meet public policy needs can be proposed.

In categorizing transmission solutions for public policy needs, the CAISO determines the need for solutions that efficiently meet applicable policies under alternative resource location and integration assumptions and scenarios, while mitigating the risk of stranded investment.[46] The CAISO creates a baseline scenario reflecting the assumptions about likely generation locations and reasonable stress scenarios that the CAISO compares to the baseline scenario. Any transmission solutions identified as critical in a significant percentage of the stress scenarios may be Category One transmission solutions. Transmission solutions identified in the baseline scenario that are not critical in a significant percentage of the stress scenarios generally will be Category Two transmission solutions, unless the CAISO finds that sufficient analytic justification exists to designate them as Category One transmission solutions. In such cases, the CAISO publishes the analysis upon which it based its justification.[47] The results

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45 *Id*.

46 *Id*.

47 *Id*.

and identified generation portfolios of the CPUC and other local regulatory authorities are a key driver in evaluating public policy-driven solutions.

Policy-driven transmission planning in past planning cycles has focused primarily on state policy directives to procure new renewable generation capacity to meet RPS and reduce greenhouse gas emissions (GHG). The CAISO and the CPUC have a memorandum of understanding under which the CPUC provides the CAISO the latest renewable resource portfolios to inform the CAISO's transmission planning process efforts. These data inform the CAISO regarding new generation capacity coming to the grid based on the utilities' procurement efforts, as regulated by the CPUC.[48]

### *(c) Stage 3: Economic Needs*

After the CAISO identifies initially preferred solutions for reliability and public policy needs, the CAISO evaluates whether additional transmission solutions are necessary to address congestion, local capacity requirements, or integrating new generators or loads on an aggregated basis. This group is collectively known as the "Economic" category.[49] The CAISO tariff expressly requires the CAISO to consider "the degree to which, if any, the benefits of the transmission solutions outweigh the costs."[50] The tariff states that potential benefits "may include a calculation of any reduction in production costs,

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48 The CPUC's role in providing generation capacity and resource planning data is explained in detail below.

49 Section 24.4.6.7 of the CAISO tariff.

50 *Id*.

Congestion costs, Transmission Losses, capacity or other electric supply costs resulting from improved access to cost-efficient resources."[51] The CAISO does not perform this evaluation in a project-specific vacuum. The CAISO tariff expressly requires the CAISO to consider "the comparative costs and benefits of viable alternatives to the particular transmission solution," including:

- other potential transmission solutions, including those being considered or proposed during the Transmission Planning Process;
- acceleration or expansion of any transmission solution already approved by the CAISO Governing Board or included in any CAISO comprehensive Transmission Plan, and
- non-transmission solutions, including demand-side management.[52]

The CAISO's economic studies simulate future system conditions and consider historical congestion occurrences, local capacity area resource requirements, other expected grid conditions consistent with the unified planning assumptions, and other data submitted through the request window, such as long-term power supply plans. The studies utilize production cost simulation as the primary tool to identify potential study areas, prioritize study efforts, identify grid congestion, and assess economic benefits created by congestion mitigation measures. The production simulation is a computationally intensive application based on security-constrained unit commitment[53] and security-constrained

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51 *Id*.

52 *Id*.

53 Also known as "SCUC," Appendix A to the CAISO tariff, definition of "SCUC" and "Security Constrained Unit Commitment."

economic dispatch[54] algorithms.[55] The CAISO conducts the production cost simulation for all hours for each study year.

Although the CAISO's initial reliability and policy evaluations consider costs and benefits, their evaluations are based on more conventional financial metrics like capital and operating costs. When the CAISO conducts its economic studies, it considers more comprehensive benefits by using the TEAM.[56] Because transmission ratepayers ultimately fund transmission projects, the principal goal of TEAM is to accurately quantify transmission ratepayer benefits. The CAISO relies on CAISO ratepayer benefits in determining whether to approve a transmission project as an economically-driven solution.[57] These benefits can be grouped into five categories (although some benefits can overlap):

- **Production Benefits:** Changes in the net ratepayer payment based on production cost simulation as a consequence of the proposed transmission upgrade;
- **Capacity Benefits:** Increasing importing capability into the CAISO or a local constrained area. Decreased transmission losses and increased generator deliverability contribute to capacity benefits as

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[54] Also known as "SCED," Appendix A to the CAISO tariff, definition of "SCED" and "Security Constrained Economic Dispatch."

[55] Business Practice Manual for the Transmission Planning Process at 51.

[56] *See id*, citing CAISO Transmission Economic Assessment Methodology (TEAM), November 2, 2017 (TEAM Document), available at http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2_2017.pdf. The TEAM Document is also attached to the Complaint as Exhibit NHI-6. For ease of reference, the CAISO also provides this document as Exhibit CAISO-2.

[57] *See* Exhibit CAISO-2 at 1, 4, 10. CAISO ratepayers are defined as the parties paying the CAISO's transmission access charge. Utility-retained generation is also included in the CAISO ratepayer perspective because the profits (or negative profits) flow into the transmission access charge balancing account. *Id*. at 20. Finally, CAISO participating transmission owners are included in the CAISO ratepayers because their congestion revenues flow into the balance account. *Id.*

well;[58]

- **Public-policy Benefits:** Reducing the cost of reaching renewable energy targets by facilitating the integration of lower cost renewable resources located in remote areas, or by avoiding over-build;

- **Renewable Integration Benefits:** Interregional transmission upgrades help mitigate integration challenges, such as over-supply and curtailment, by allowing sharing energy and ancillary services among multiple balancing authority areas; and

- **Avoided Costs of Other Projects:** If a reliability or policy project can be avoided because of the economic project under study, then the avoided cost contributes to the benefits of the economic project.[59]

TEAM recognizes these five benefits "do not need to be applied in exacting detail for each study"[60] and that for a specific project only some of these benefit types might apply and benefits will be "case by case based" depending on several factors.[61] TEAM also recognizes that

> some data used in the additional benefits calculation may not be from the ISO's transmission planning process such as capacity shortfall, renewable portfolios, etc. Instead, coordination may be needed with state agencies (*e.g.*, the CPUC) and other ISO processes to obtain such data.[62]

Using TEAM, the CAISO identifies its preferred transmission solutions. If a

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58 In a subsequent section of the TEAM Document, "capacity benefits" are enumerated and discussed separately as import capability, transmission loss and deliverability benefits. *Id.* at 21-22.

59 *Id.* at 2.

60 *Id*. at 4. The type of study and initial study result will dictate at what level the principles should be applied. *Id.* For example, if preliminary economic feasibility studies show the proposed upgrade to be strongly economic from CAISO ratepayer perspective and no negative impact to the WECC system, then uncertainty analyses may not be necessary. *Id.* If the economic benefits are marginal, uncertainty analyses may be needed to better understand the distribution of benefits and their root causes. *Id.*

61 *Id.* at 21.

62 Exhibit CAISO-2 at 21.

solution identified in the economic study is more efficient than a solution identified in the reliability or public policy evaluations, and can meet the applicable reliability or public policy needs, the CAISO will include the economic solution in the transmission plan, and the solution will be categorized as an economic project.

### *3. Phase Three*

Phase three of the CAISO's transmission planning process takes place if the CAISO Board approves the construction of a needed Regional Transmission Facility identified in the annual transmission plan eligible for competitive solicitation.[63] During phase three, the CAISO conducts a competitive solicitation in which it seeks proposals from potential project sponsors to finance, construct, own, operate, and maintain the new Regional Transmission Facility.[64] Economic solutions that are regional transmission facilities and are not upgrades to existing facilities are eligible for competitive solicitation. Thus, if the CAISO found a transmission solution like LEAPS was a needed economically-driven project, it would be subject to the CAISO's phase three competitive solicitation process.

The CAISO's evaluation of potential project sponsors is a comprehensive, holistic, comparative analysis that considers all of the selection criteria.

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63 Section 24.5.1 of the CAISO tariff. Under the CAISO tariff, Regional Transmission Facilities subject to competitive solicitation are those facilities 200 kV and above or located in the service territories of more than one participating transmission owner, and which do not constitute upgrades or improvements to, additions on, or replacements of, an existing participating transmission owner facility. Section 24.5.1 of the CAISO tariff and Appendix A to the CAISO tariff, definitions of "Regional Transmission Facility" and "Local Transmission Facility."

64 *Id.*

Importantly, the CAISO places no value on whether a potential project sponsor proposed the selected regional transmission facility during the initial phases of the transmission planning process. There is no "ownership" of a particular solution until the competitive solicitation is complete. Instead, the CAISO evaluates each potential project sponsor's qualifications,[65] and then considers a variety of factors in selecting an approved project sponsor.

### C. Coordination with the CPUC

The CAISO and the CPUC coordinate closely to ensure a reliable system that also supports achievement of California's RPS and carbon goals. Consistent with the Federal Power Act (FPA), the CAISO is responsible for conducting studies to identify transmission needs and proposed solutions to meet applicable transmission planning criteria, while the CPUC has planning and procurement control for "facilities used for the generation of electric energy"[66] for load-serving entities in the CAISO footprint. The CPUC's authority extends to resource adequacy, integrated resource planning, and bilateral procurement of generation and other preferred resources.[67] Moreover, the CPUC has siting and permitting authority regarding the construction of planned transmission facilities.[68]

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[65] Section 24.5.3.1 of the CAISO tariff. Qualification criteria include, inter alia, firm size, industry knowledge, financing, credit, and commitment and ability to become a transmission owner.

[66] Fed. Power Act § 824(b)(1).

[67] Preferred resources can include, for example, retail demand response, energy efficiency programs, and energy storage.

[68] Pub. Util. Comm'n of the State of Cal. Gen. Order No. 131-D, pursuant to the provisions of sections 451, 701, 702, 761, 762, 768, 770, and 1001 of the Cal. Pub. Util. Code.

Coordination between the CAISO and the CPUC in transmission planning is mutually beneficial. The CAISO tariff specifically identifies the need for the CPUC and other local regulatory authorities to provide long-term resource plans as inputs into the CAISO's transmission planning process.[69] The CAISO tariff also contemplates that local regulatory authorities such as the CPUC will notify the CAISO of demand response programs and identify energy resource areas and policy programs initiated by the state as assumptions in the transmission planning process.[70] Section 24.4.6.6 of the CAISO tariff also considers that the CPUC and local regulatory authorities will submit resource planning results and identify resources portfolios to enable the CAISO to identify needed transmission upgrades. The CAISO uses these data as critical inputs to identify reliability, policy, and economic transmission needs.

Similarly, the CPUC uses CAISO-developed transmission system information to inform its integrated resource planning process. In developing long-term resource plans, the CPUC considers the existing transmission system capabilities and potential transmission system upgrades in deciding where to site new generation resources.[71]

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[69] Section 24.8.4 of the CAISO tariff. ("The CAISO shall obtain or solicit from…the CPUC…information required by, or anticipated to be useful to, the CAISO in its performance of the Transmission Planning Process, including, but not limited to: (1) long-term transmission system plans; (2) long-term resource plans; (3) generation interconnection process information; (4) Demand Forecasts; and (5) any other data necessary for the development of power flow, short-circuit, and stability cases over the planning horizon of the CAISO Transmission Planning Process.")

[70] Section 24.3.1(g)-(i) of the CAISO tariff.

[71] *Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Plan Requirements,* CPUC Decision D.19-04-040 (issued May 1, 2019) (Preferred System Portfolio and Integrated Resource

In May 2010, the CAISO and the CPUC formalized their resource planning coordination processes by entering into a memorandum of understanding (MOU) that complemented the CAISO's revised transmission planning process.[72] In the MOU, the CAISO and the CPUC agreed to "work together to coordinate the ISO's revised transmission planning process and identification of needed transmission infrastructure with the CPUC's subsequent siting/permitting processes."[73] Specifically, the CAISO agreed to consider and incorporate CPUC-developed generation scenarios into the transmission planning process. Subsequent CPUC siting and permitting processes give "substantial weight" to project applications that are consistent with the CAISO's transmission needs determinations made based on the CPUC-developed portfolios.

This coordinated process provides the CAISO, the CPUC, and project developers with assurances that CAISO-approved transmission solutions can be permitted and ultimately built. The CAISO included the MOU in its tariff amendment filing with the Commission to implement a revised transmission planning process.[74] In approving the CAISO's tariff amendment filing, the Commission expressly noted that the MOU provides for CAISO consideration of

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Plan Decision), available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M287/K437/287437887.PDF.

[72] Memorandum of Understanding Between the California Public Utilities Commission (CPUC) and the California Independent System Operator Corporation (ISO) Regarding the Revised ISO Transmission Planning Process (May 13, 2010) (2010 MOU), available at https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442462040.

[73] *Id*. at 1.

[74] CAISO Tariff Amendment filing, Revised Transmission Planning Process, Docket No. ER10-1401 (June 4, 2010), the 2010 MOU was included as Attachment C to that filing.

study scenarios that reflect the CPUC's long-term procurement process and rejected requests to require the CAISO to amend its tariff to address how it would coordinate with the CPUC's planning process or include all input, assumptions, and study scenarios.[75]

The TEAM and other CAISO tariff and business practice manual provisions also contemplate that the CPUC and other local regulatory authorities will provide resource planning and resource portfolio information and policy directives to the CAISO for use in the transmission planning process.[76] Consistent with these requirements, the 2018-2019 Transmission Planning Process Unified Planning Assumptions and Study Plan recognized that "[t]he ISO has collaboratively worked with the California Public Utilities Commission (CPUC) and the California Energy Commission to align planning assumptions between the ISO's TPP and the CPUC's Integrated Resource Plan process, as well as the demand forecasts assumptions embodied in the 2017 IEPR adopted by the CEC on February 1, 2018."[77]

The CAISO provides an opportunity for stakeholders to comment on this coordination in each annual transmission plan through developing the Unified Planning Assumptions, as discussed above. In the 2018-2019 Unified Planning

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[75] *Cal. Indep. Sys. Operator Corp.,* 133 FERC ¶ 61,224 at P 162 (2010) (Revised Transmission Planning Process Order).

[76] Sections 24.3.1 and 24.4.6 of the CAISO tariff; Business Practice Manual for Transmission Planning at 22, 24, 49; Exhibit CAISO-2.

[77] 2018-2019 Transmission Planning Process Unified Planning Assumptions and Study Plan (March 30, 2018) at 1 (2018-2019 Unified Planning Assumptions), available at http://www.caiso.com/Documents/Final2018-2019StudyPlan.pdf.

Assumptions, the CAISO specifically noted how it intended to use the CPUC's generation portfolios to develop the final transmission plan.[78] Nevada Hydro did not comment on the portfolios outlined in the 2018-2019 Unified Planning Assumptions.

### D. Nevada Hydro's Prior Declaratory Order Filing

In 2018, Nevada Hydro petitioned the Commission to issue a declaratory ruling that: (1) LEAPS is a transmission facility consistent with the Commission's *Western Grid* order and its 2017 policy statement regarding cost recovery for storage resources; and (2) LEAPS is entitled to cost-based rate recovery under the CAISO's TAC.[79]

The Commission dismissed the petition for declaratory order, finding that a request to designate LEAPS as a transmission facility was premature. The Commission explained that "LEAPS has not been studied in the CAISO TPP to determine whether it addresses a transmission need identified through that process, and if such a need is met, how the facility would be operated."[80] Absent such information, the Commission found it "cannot make a reasoned decision on

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[78] *Id.* at 19-20. In prior transmission planning process cycles, the CAISO likewise has utilized the CPUC's resource portfolios. *See, e.g.,* 2017-2018 CAISO Transmission Planning Process Unified Planning Assumptions and Study Plan (March 31, 2017) at 21-22 (2017-2018 Unified Planning Assumptions), available at http://www.caiso.com/Documents/Final2017-2018StudyPlan.pdf; 2016-2017 Transmission Planning Process Unified Planning Assumptions and Study Plan (March 31, 2016) at 17-18 (2016-2017 Unified Planning Assumptions), available at http://www.caiso.com/Documents/Final2016-2017StudyPlan.pdf.

[79] Order Dismissing Petition for Declaratory Order at PP 1, 4-7 (citing *Western Grid Dev., LLC*, 130 FERC ¶ 61,056, *reh'g denied*, 133 FERC ¶ 61,029 (2010) (*Western Grid*); and *Utilization of Elec. Storage Resources for Multiple Servs. When Receiving Cost-Based Rate Recovery*, 158 FERC ¶ 61,051 (2017) (Storage Policy Statement).).

[80] Order Dismissing Petition for Declaratory Order at P 22.

whether LEAPS is a transmission project and thus eligible for cost-recovery under the TAC."[81]

The Commission noted that the CAISO "has committed to study LEAPS as a transmission project, both as a means to address reliability needs (if it is submitted in an appropriate request window of CAISO's TPP and if the proposal specifies the CAISO-identified reliability constraints the project could mitigate), and as an economic planning study request."[82] The Commission stated that it "expect[s] CAISO to adhere to this commitment."[83] However, given the uncertainty over whether LEAPS would ultimately meet an identified transmission need, *and if so*, how CAISO would require LEAPS be operated to meet those needs, the Commission explained that it could only determine whether LEAPS is a transmission facility after it has been studied in the TPP, and agreed with the CAISO that there was no controversy to address.[84]

The Commission also disagreed with Nevada Hydro's assertion that the Commission's Storage Policy Statement[85] provided guidance as to whether LEAPS or any other storage resource is a transmission facility.[86] The

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81 *Id. See also id.* at P 24 ("[W]e find that Nevada Hydro's arguments that LEAPS is a transmission facility are too general to support such a finding in the absence of specific, transmission planning process-identified transmission needs and an explanation of how LEAPS will operate to address those particular transmission needs.").

82 *Id.* at P 23.

83 *Id.*

84 *Id*.

85 *Utilization of Elec. Storage Resources for Multiple Servs. When Receiving Cost-Based Rate Recovery,* 158 FERC ¶ 61,051 (2017) (Storage Policy Statement).

86 Order Dismissing Petition for Declaratory Order at P 24.

Commission explained that "an electric storage resource that seeks a finding from the Commission that it is a transmission facility eligible to recover its costs through transmission rates must demonstrate why it should be considered a transmission facility" and that Nevada Hydro's arguments were "too general to support such a finding in the absence of specific, transmission planning process-identified transmission needs and an explanation of how LEAPS will operate to address those particular transmission needs."[87]

Finally, the Commission stated that "[i]f the CAISO TPP ultimately identifies LEAPS as a more efficient or cost-effective solution to identified transmission needs, and Nevada Hydro wishes to seek cost recovery through the CAISO TAC," then "Nevada Hydro must demonstrate to the Commission how the manner in which LEAPS would operate to address the identified need in the TPP makes it a transmission facility, such as through a filing for cost recovery under FPA section 205 that sets forth the revenue requirement that Nevada Hydro proposes to include in the CAISO TAC."[88]

### E. The CAISO's Evaluation of LEAPS in the 2018-2019 Transmission Planning Process

The CAISO transmission planning process employs a top -down analysis in which the CAISO first establishes transmission system needs, then identifies transmission solutions to meet the identified needs. As part of that process, the CAISO conducts an iterative process that first identifies reliability needs and

87 *Id.*

88 *Id.* at P 25.

potential solutions, and then evaluates public policy and economic solutions. The Commission has noted this comprehensive transmission planning process is "efficient and effective to identify the needed transmission projects and elements, while limiting overbuilding and stranded investment."[89]

Nevada Hydro submitted LEAPS as a potential reliability, public policy, and economic project. The CAISO's 2018-2019 Unified Planning Assumptions described its inclusion:

> The Nevada Hydro Company, proposing a specific pumped storage project that the proponent believes would provide reliability, policy and economic benefits. The ISO suggests the proponent considers submitting the project in the 2018 Request Window specifying the ISO-identified reliability constraints the project could mitigate. The submission will also be considered as an economic study request.[90]

As explained in in Section III, the CAISO followed its iterative process in considering LEAPS. The CAISO posted its 2018-2019 Preliminary Reliability Assessment Results on August 15, 2018.[91] The Preliminary Reliability Assessment listed eight potential reliability issues on the SDG&E "main" system identified by the CAISO. The assessment also indicated that such needs were addressed by 30-minute emergency line ratings and existing operational mitigations. In one area, the Preliminary Reliability Assessment indicated the

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89 Revised Transmission Planning Process Order at P 165.

90 2018-2019 Unified Planning Assumptions at 26. Nevada Hydro's submission was actually made in response to a market notice requesting input on assumptions regarding projects already approved that could be considered mitigations without requiring further approval, rather than during the applicable new solution request window, but the CAISO nevertheless accommodated Nevada Hydro's submission at that time.

91 2018-2019 Preliminary Reliability Assessment Results, San Diego Main (Preliminary Reliability Assessment), included as Appendix C to the CAISO Board-approved 2018-2019 Transmission Plan, available at http://www.caiso.com/Documents/AppendixC-BoardApproved2018-2019TransmissionPlan.pdf.

CAISO would perform additional assessment to determine whether the preferred resources and operational actions were adequate to mitigate overload concerns identified in summer peak sensitivity scenarios.

Nevada Hydro's October 1, 2018 reliability request window submission stated that LEAPS could meet P6/N-1-1 potential San Diego area needs associated with thermal overloads on six CAISO transmission facilities, of the thermal and voltage contingencies the Preliminary Reliability Assessment identified on the "main" SDG&E system.[92] As noted in the 2018-2019 Transmission Plan, several other entities also submitted projects as possible mitigation solutions to the San Diego Main needs identified in the Preliminary Reliability Assessment.[93]

The CAISO's comprehensive reliability analysis, however, identified *no* need for new reliability transmission projects in the San Diego area. Existing and under-development solutions mitigated the initially identified reliability needs, specifically: (1) demand response and battery storage approved by the CPUC and either already in operation or under construction; and (2) existing operational mitigation procedures, including RAS.[94] These were assumptions in the 2018-2019 transmission planning cycle.[95]

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92 Exhibit NHI-7 at 8-9; s*ee also* Exhibit NHI-2 at 18.

93 2018-2019 Transmission Plan at 189-190.

94 *Id.* at 184, 188-190.

95 *See* sections 24.3.1 and 24.3.2 of the CAISO tariff; 2018-2019 Unified Planning Assumptions and Final Study Plan at sections 3.5.3,3.8.2, 3.8.3; 2018-2019 Transmission Plan at 183, Table 2.9-1 (the table shows all storage in the San Diego area, totaling 201 MW, not just 161 MW of battery storage); Preliminary Reliability Assessment at San Diego Main.

The CAISO notes that its initial base case power flow cases do not generally reflect the demand response, system redispatch, and operational solutions—those are only dispatched in each specific area when there is a need to include them to confirm their effectiveness.[96] Once the CAISO accounted for these and considered CPUC-approved storage projects that were either operational or under construction, and validated their effectiveness in subsequent system tests, there were no reliability needs requiring new transmission solutions.[97] As the CAISO recognized in the 2018-2019 Transmission Plan "no new corrective action plan" was necessary to meet NERC Reliability Standard TPL-001-4.[98] Accordingly, in describing each of the San Diego area request window suggested reliability solutions, the CAISO indicated that "it has not identified a reliability need for this project."[99]

The CAISO also noted that for each such project the economic analysis regarding the project (and other similarly situated projects whose proponents cited both reliability and economic benefits) was set forth in Section 4 of the Transmission Plan.[100] As noted above, at the reliability stage the CAISO primarily focuses on the incremental capital costs (and potentially operations and maintenance costs) of alternative solutions.[101] Because the existing and under-

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96 Declaration of Neil Millar (Millar Declaration), attached hereto as Exhibit CAISO-1 at 10.

97 *Id.*

98 2018-2019 Transmission Plan at 184. The CAISO also noted there was no need for additional preferred generation resources and energy storage beyond that already approved to meet reliability needs in the San Diego area. *Id.* at 189.

99 *Id.* at 184-188.

100 *Id.*

101 The CAISO considers other economic factors in the subsequent studies.

development demand response and battery storage and existing operational solutions presented no additional future capital costs to transmission ratepayers (compared to LEAPS' $2 billion in capital costs), these solutions constituted the more efficient or cost-effective means of reliability mitigation.

Second, the CAISO identified no policy-driven transmission needs for LEAPS nor any other project in the 2018-2019 transmission planning process.[102] The CAISO's policy-driven needs assessment has focused primarily on transmission needs to support California policy objectives for developing renewable generation. The CAISO uses CPUC-developed portfolios to identify needs and solutions to meet the state's renewable energy targets. In the 2018-2019 Transmission Plan, the CPUC submitted no base portfolio to the CAISO for consideration in the 2018-2019 public policy assessment. However, the CPUC provided a 42 million metric tons (MMT) of Carbon Dioxide scenario portfolio to be used as a sensitivity in the 2018-2019 transmission planning process.[103] The CAISO's evaluation showed that no new transmission upgrades were needed to support the 42 MMT portfolio resources.[104]

Third, as described in detail in section 4.9.11.5 of the 2018-2019 Transmission Plan, the CAISO, utilizing TEAM, found that LEAPS would not produce economic benefits that would justify its $2 billion construction costs to transmission ratepayers. The CAISO's TEAM relies on detailed production

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102 2018-2019 Transmission Plan at 191-224.

103 *Id*. at 191-193. The CPUC noted that once it adopted a preferred system resource plan through the 2018 IRP cycle, it would provide a preferred resource plan for use in future transmission planning cycles. *Id.* at 191.

104 *Id*. at 222-223.

modeling that captures both ratepayer benefits and potential market revenues associated with each proposed project and initially identified solution. Among other factors, the CAISO analyzed whether LEAPS would produce benefits including "reduction in production costs, congestion costs, transmission losses, capacity, or other electric supply costs resulting from improved access to cost-efficient resources,"[105] and compared LEAPS' cost/benefit ratio to other proposed projects and initially identified solutions. The CAISO evaluated LEAPS in three configurations, including one not even proposed by Nevada Hydro: the transmission lines only, (Option 1a, which was not suggested by LEAPS); the pumped storage unit with transmission line connections to SCE and SDG&E (Option 1b); and the pumped storage unit with a transmission line connection only to SDG&E (Option 2). Thus, the CAISO studied LEAPS in more configurations than Nevada Hydro even asked that it be studied.[106]

LEAPS' benefit-to-cost ratio in all configurations was well below 1:1. The Option 1a benefits ranged from 0.1 to 0.13. Option 1b benefits ranged from 0.27 to 0.29. Option 3 benefits ranged from 0.3 to 0.32.[107] None of these ratios would justify LEAPS' $2 billion cost to ratepayers. The CAISO's analysis also showed that most of the benefits of LEAPS resulted from generator-type market services rather than transmission services.[108] However, the TEAM analysis included all of these benefits in calculating LEAPS' benefit-to-cost ratio, and LEAPS benefit-to-

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105 Section 24.4.6.7 of the CAISO tariff.

106 2018-2019 Transmission Plan at 249-253, 344-361.

107 *Id.* at 359.

108 *Id.* at 347-358.

cost ratios were still well below 1.0. Because LEAPS' benefits to ratepayers were far below its costs, the CAISO did not identify LEAPS in any of its possible configurations as a needed economic-based project, nor as a more efficient or cost effective solution for any other transmission need.

## III. ANSWER TO COMPLAINT

### A. Nevada Hydro Fails to Carry Its Burden of Proof Under FPA Section 206, Fails to Demonstrate that the CAISO Violated its Tariff, and Fails to Show that LEAPS Satisfies the Applicable Standards for Being Approved as a Reliability or Economically-Driven Transmission Project

- Section 206 of the FPA provides that "the burden of proof to show that any rate, charge, classification, rule, regulation, practice, or contract is unjust, unreasonable, unduly discriminatory, or preferential shall be upon . . . the complainant."[109] The Courts and the Commission have long recognized that a complainant "carries the heavy burden of making a convincing showing that [a rate order] is invalid because it is unjust and unreasonable in its consequences."[110] Both the demonstration that the current rules are unjust and unreasonable and the showing that the proposed modification is just and reasonable must be supported by substantial evidence.[111] This substantial

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[109] 16 U.S.C. § 824e(b).

[110] *FPC v. Hope Natural Gas Co.*, 320 U.S. 591, 602 (1944). Although *Hope* addressed section 5 of the Natural Gas Act, the Commission properly applies these bedrock principles to the analogous provisions of the FPA. *See Cal. Mun. Utils. Ass'n v. Cal. Indep. Sys. Operator Corp.*, 126 FERC ¶ 61,315 at P 70 (2009), *order on reh'g*, 143 FERC ¶ 61,174 (2013).

[111] *Ameren Servs. Co. v. Midwest Indep. Transmission Sys. Operator, Inc.*, 124 FERC ¶ 61,173 at P 9 (2008), *order on reh'g*, 131 FERC ¶ 61,214 (2010).

evidence must be specific and include more than just general allegations.[112] Even if a complainant meets this initial burden of production, the complainant may prevail only if the evidence shows it is more probable than not *(i.e.,* by a "preponderance of evidence") that the challenged existing rate, charge, classification, etc. is unjust and unreasonable.[113]

- Nevada Hydro does not meet this burden. First, Nevada Hydro fails to make even a *prima facie* case to support its assertions that the CAISO violated the Commission's directives in its Order Dismissing Declaratory Petition.[114] In that order, the Commission noted the CAISO's commitment to study LEAPS both as a means to address reliability needs and as an economic planning study. It is evident on the face of the CAISO's 2018-2019 transmission planning process that the CAISO considered LEAPS both as a potential solution to reliability needs and as a potential economic transmission project. Regarding

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112 *See Wis. Pub. Serv. Corp. v. Midwest Indep. Sys. Operator, Inc. and PJM Interconnection, LLC*, 120 FERC ¶ 61,269 at PP 45-46 (2007) (noting that WPS Companies failed to meet their burden under section 206 of the FPA to demonstrate that the PJM Interconnection, L.L.C. (PJM) and Midwest Independent Transmission System Operator tariffs are unjust and unreasonable and that their proposal replacement was a just and reasonable replacement, in part because "WPS Companies did not identify any specific transmission or electricity rate that they consider unjust and unreasonable.").

113 *See, e.g., City of Oakland v. Pac. Gas and Elec. Co.*, 165 FERC ¶ 61,249 (2018) at P 24 (explaining that "the ultimate burden of persuasion remains with the complainant and a complainant prevails only if a preponderance of evidence supports its position"); *San Diego Gas & Elec. Co. v. Sellers of Energy and Ancillary Servs.*, 149 FERC ¶ 61,116 at P 45 (citing *Dir., Office of Workers' Compensation Programs v. Greenwich Collieries*, 512 U.S. 267 (1994)); *see also BP Pipelines (Alaska) Inc.*, 149 FERC ¶ 61,149, at P 50 (2014) ("Flint Hills confuses the standard applicable to a Commission order at the Courts of Appeal (substantial evidence) with the standard a proponent faces when seeking to prove that an existing rate is unjust and unreasonable. . . . Clearly the preponderance of evidence standard requires 'substantial' evidence, but the evidence must not be just substantial, but more probable than not.").

114 *See* Complaint at 3 (arguing that "CAISO's 2018-2019 transmission plan did not adhere to its commitment.").

the reliability assessment, the CAISO concluded there was no need for *any* additional projects in the 2018-2019 transmission planning cycle to address reliability issues in the region (San Diego) for which Nevada Hydro was proposed.[115] Nevertheless, as with other potential projects proposed for this region, the CAISO specifically discussed LEAPS and concluded there was no need for it or any other proposed projects.[116] The CAISO also conducted an extensive and detailed evaluation of LEAPS as a potential economic solution to reduce congestion and local capacity requirements for gas-fired generation in the San Diego sub-area and Imperial Valley/San Diego/Los Angeles Basin area.[117] There is no evidentiary basis whatsoever for Nevada Hydro's claim that the CAISO failed to adhere to its commitment to evaluate LEAPS as a potential reliability and economic solution in the 2018-2019 transmission planning process.

- Nevada Hydro's allegation that the CAISO violated the Order Dismissing Declaratory Petition regarding how the CAISO might operate LEAPS similarly rings hollow. The CAISO acknowledges that the LEAPS' pumped storage unit can provide voltage support and relieve flows on transmission lines. However, the CAISO found LEAPS was not needed to meet any specific reliability needs once the CAISO accounted for existing RAS and existing and under-construction demand response and storage. Nevada Hydro's Request

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115 2018-2019 Transmission Plan at 184.

116 *Id*. at 187.

117 *Id*. at 253 ("Based on this and the economic study request as stated in the draft and final Unified Planning Assumptions and Study Plan, the project has therefore been included in the detailed analysis of those local capacity areas."); *see also id*. at 344-361 (providing extensive discussion regarding the conduct and findings of the CAISO's economic evaluation of LEAPS).

Window Submission Form (Exhibit NHI-7) showed LEAPS meeting preliminary thermal overload needs on six of the identified transmission facilities[118] (where the CAISO had preliminarily identified eight potential issues in its Preliminary Reliability Assessment). The CAISO's economic planning assessment and production cost simulation reflected LEAPS' intrinsic functions and operations in addressing congestion and local capacity requirements when calculating economic benefits.[119]

- But if Nevada Hydro's objection is that the CAISO did not go even further and develop formal operating procedures and parameters for operating LEAPS or a protocol detailing how it would interface with Nevada Hydro, such objection is premised on a mischaracterization of the Commission's order. Developing more formal and detailed operating protocols was unnecessary given the CAISO found that LEAPS was not needed for reliability, did not provide net economic benefits, and did not qualify as an economically-driven transmission project under the CAISO tariff. Contrary to Nevada Hydro's assertion, the Commission was explicit that the CAISO would have to address more specifically how it would operate LEAPS *only if* the transmission planning process first determined that LEAPS "addresses a transmission need identified through that process."[120] LEAPS did not meet this threshold requirement. Nowhere in the

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118 Exhibit NHI-7 at 8-11. *See also* Exhibit NHI-2 at 23.

119 2018-2019 Transmission Plan at 228-238, 249-253, 344-361.

120 Order Dismissing Declaratory Petition at P 22 ("LEAPS has not been studied in the CAISO TPP to determine whether it addresses a transmission need identified through that process, and, *if such a need were met*, how the facility would be operated.") (emphasis added); *Id.* at P 23 ("Given the uncertainty over whether LEAPS will meet identified transmission needs in

Order Dismissing Declaratory Petition did the Commission state or suggest that the CAISO would be required to specify in detail how it would operate LEAPS to meet transmission needs, even if the CAISO determined that LEAPS was not actually needed in the first place. Such an assessment would be unnecessary.

- As discussed and demonstrated below, Nevada Hydro's claims regarding the conduct of the CAISO's reliability and economic studies and application of those studies to LEAPS rely on mischaracterizations of the relevant tariff processes, lack sufficient evidentiary support, and are factually incorrect. Nevada Hydro has failed to show by a preponderance of evidence that the CAISO violated the transmission planning provisions of its tariff in evaluating LEAPS in the 2018-2019 transmission planning cycle.

### B. The CAISO Properly Concluded that LEAPS Was not Needed as a Potential Reliability Solution, and Nevada Hydro Fails to Show Otherwise

Nevada Hydro argues that the CAISO failed to study LEAPS as a reliability solution.[121] Specifically, Nevada Hydro argues that the CAISO "did not study whether LEAPS can solve any of the eight thermal reliability violations that

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the CAISO TPP*, and, if so*, how CAISO would require LEAPS to be operated to meet those needs, we can only determine whether or not LEAPS is a transmission facility after it has been studied through the CAISO TPP.") (emphasis added). The Commission also stated that an electric storage resource that seeks a finding it is a transmission facility must demonstrate why it should be considered a transmission facility. *Id.* at P 24. The Commission found Nevada Hydro's arguments in this regard too general to support a finding absent a specific planning process identified transmission need and an explanation of how LEAPS will operate to address those particular transmission needs. *Id.* The Commission concluded that because this threshold demonstration of whether LEAPS will address transmission needs identified through the CAISO transmission planning process, the Commission dismissed Nevada Hydro's request as premature. *Id.* at P 25. As discussed herein, Nevada Hydro fails to satisfy the threshold demonstration that LEAPS is required to meet CAISO reliability or economic needs.

[121] Complaint at 27, *et seq.*

CAISO forecasts on the SDG&E system during the ten-year planning horizon," and instead "had its mind made up that it would rely on short-term 'operational measures.'"[122] Nevada Hydro alleges that the CAISO thus "never even studied whether LEAPS could solve those serious problems more effectively" and never performed a comparative analysis of LEAPS to the other reliability solutions the CAISO adopted.[123]

The CAISO properly performed its reliability analysis. Nevada Hydro's claim that the CAISO failed to compare LEAPS to other potential "options" incorrectly conflates reliability study *assumptions* with reliability study proposals to address identified transmission needs. The existing RAS and existing under-development demand response and storage facilities were not proposed reliability projects; rather, they were planning assumptions[124] for the 2018-2019 transmission planning cycle because they were already in-place or under construction.[125] Assumptions are the basis for the CAISO's approval of any

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122 *Id*. The Complaint is contradicted by Mr. Alaywan's testimony that states that the CAISO did not "study LEAPS as a solution to six of the eight reliability violations on the SDG&E transmission system as NHI proposed." Exhibit NHI-2 at 18. As discussed above, Nevada Hydro's Request Window Submission Form (Exhibit NHI-7 at 11) also stated that LEAPS could resolve reliability contingencies on six transmission facilities (as opposed to eight).

123 Complaint at 27-28.

124 *See* sections 24.3.1 and 24.3.2 of the CAISO tariff; 2018-2019 Unified Planning Assumptions at sections 3.5.3, 3.8.2, 3.8.3; 2018-2019 Transmission Plan at 183, Table 2.9-1 (the table shows all storage in the San Diego area – 201 MW – not just 161 MW of battery storage); Preliminary Reliability Assessment.

125 The CAISO included in its assumptions battery storage that was already in place, battery storage that had already been procured under CPUC Decision D.13-10-040, and fast-tracked storage procured under CPUC Resolution E-4791 are *assumptions*. *See* 2018-2019 Unified Planning Assumptions at 29. The CAISO did not include unproduced, residual capacity from Decision D. 13-10-040. *Id.* at 31, nor any other storage not identified in the 2018-2019 Unified Planning Assumptions. Further, the CPUC's default portfolio included potential additional battery storage, but the CAISO relied on the default portfolio solely for renewable generation volumes.

specific transmission solutions in the transmission planning process.[126] Because no reliability needs existed after the CAISO fully applied its adopted planning assumptions (nor were there any other residual reliability needs), there was no basis to approve any new reliability transmission project.

Page 184 of the 2018-2019 Transmission Plan generally describes the eight thermal overload and voltage concerns in the SDG&E area.[127] The 2018-2019 Transmission Plan then has a section entitled "Request Window Project Submissions," which states that the CAISO received thirteen project submissions for SDG&E system needs. The Transmission Plan describes each proposal followed by the CAISO's findings. The Transmission Plan includes an underlined sub-heading: "Lake Elsinore Advanced Pump Storage Project"[128] and states:

> ZGlobal, on behalf of the Nevada Hydro Company, proposed the Lake Elsinore Advanced Pump Storage (LEAPS) project as a reliability need to resolve the overloads concerns identified in the San Diego main system. The Project was also proposed as an economic-driven project to reduce the LCR[129] requirement for the San Diego sub-area. The LEAPS project consists of a 500/600 MW advanced pumped storage facility, two new 500 kV interconnecting transmission lines, two new 500 kV substations, three new 500/230 kV transformers, and three new phase shifting transformers. The project has an estimated cost of $1.76-2.04 billion and an expected in-service year of 2025.

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*Id.* at 19.

126 *Id.* at 1.

127 Appendix B to the 2018-2019 Transmission Plan provides a more detailed discussion beginning on page B-128. Appendix B is available on the CAISO's Market Participant portal and an executed Non-Disclosure Agreement is required to access this material. The Preliminary Reliability Assessment at San Diego Main (Appendix C to the 2018-2019 Transmission Plan) shows the Study Results of the CAISO's reliability assessment.

128 2018-2019 Transmission Plan at 187.

129 Internal footnotes omitted.

> *The ISO has not identified a reliability need for this project*. As discussed above, the power flow concerns identified in the SDG&E main system can be eliminated by the operational measures. For this reason, the project was not found to be needed for reliability. The economic analysis on the project can be found in Chapter 4.[130]

As the CAISO's 2018-2019 Transmission Plan and Nevada Hydro's subsequent allegations indicate, the CAISO found there was no *reliability need* that warranted LEAPS' or any other proposed project's selection, because all the concerns identified in the SDG&E area "can be mitigated by previously approved projects and operational mitigations including remedial action scheme (RAS)."[131] Specifically, the transmission plan stated:

> The 30-minute emergency ratings of transmission facilities along with demand response and energy storage resources in the area can be relied upon under contingency in allowing operation actions including re-configuring the system, redispatching resources, reducing battery storage char[g]ing, and adjusting the phase shifting transformers at Imperial Valley substation. The stability analysis performed did not identify transient issues that require mitigation. Please refer to Appendix B for details on these concerns and associated mitigations. As a result, no new corrective action plan except operational mitigation has been found to be needed for the San Diego main and subtransmi[s]sion systems to meet TPL 001-4 requirements.[132]

- This outcome is entirely consistent with Section 24.4.6.2 of the CAISO tariff, which states that in determining whether any transmission solutions are needed to ensure system reliability consistent with applicable reliability criteria, the CAISO will consider "lower cost solutions" including RAS and

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130 *Id*. (emphasis added).

131 *Id.* at 184.

132 *Id*.

appropriate generation. There were no reliability needs after taking into account existing operational/RAS solutions and CPUC-approved, existing and under-development demand response and storage.[133]

- Nevada Hydro's allegation that the CAISO dismissed LEAPS because it "had its mind made up" that it would rely on "short term 'operational measures'"[134] fares no better. The CAISO tariff requires the CAISO to "determine the solution that meets the identified reliability need in the more efficient or cost effective manner."[135] Consistent with this approach, the CAISO tariff specifically requires the CAISO, in determining whether there is a need for any transmission solutions, to "consider lower cost solutions, such as acceleration or expansion of existing transmission solutions, Demand-side management, Remedial Action Schemes, appropriate Generation, interruptible Loads, storage facilities or reactive support" for the good reason that doing so can potentially avoid the need for costly new facilities.[136]

- Nevada Hydro argues that the CAISO inappropriately failed to "attribute any cost to the batteries or demand response,"[137] and "compare the costs of the RAS to LEAPS."[138] In the reliability needs stage of phase two of the CAISO's transmission planning process, the CAISO primarily examines new

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133 *Id*.

134 Complaint at 27-28.

135 Section 24.4.6.2 of the CAISO tariff.

136 *Id*.

137 Complaint at 28.

138 *Id.* at 29.

capital costs (and potentially O&M costs) to transmission ratepayers, evaluating other factors in the economic study process. But the RAS, demand response resources, and energy storage all were in operation or under construction so they would be present on the grid *regardless* of any CAISO finding in the transmission planning process. The CAISO's simulations simply showed that it could adjust its operating procedures when approaching or in contingency conditions such that it would need *no* new transmission facilities, including LEAPS.[139] It strains credibility to suggest that a $2 billion facility would be more cost-effective than facilities and RAS already in place (and facilities already under construction) that presented *no* new additional capital costs to transmission ratepayers.

- Nevada Hydro presents no convincing evidence that the CAISO's identified operational solutions would be inadequate to meet applicable reliability and planning criteria during the relevant planning window.[140] The CAISO's baseline studies of the San Diego main transmission system reliability showed that the reliability issues Nevada Hydro claimed that LEAPS could address were P6, N-1-1 contingencies.[141] NERC reliability standards permit such

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[139] Nevada Hydro's witness, Mr. Alaywan, makes no attempt to show that LEAPS would be cost competitive with the operational and other existing solutions identified in the transmission plan. Rather, Mr. Alaywan focuses his analysis solely on a comparison between LEAPS and what he claims to be the $459 million in capital costs necessary to physically upgrade all six transmission lines on which reliability needs were preliminarily identified. Exhibit NHI-2 at 23. The CAISO discusses this particular claim in Section III.C.3.c., *infra*.

[140] The only such "evidence" presented by Nevada Hydro is a single conclusory statement by Mr. Alaywan that "[r]outinely operating transmission lines up to their 30-minute operating limit is a risky practice..." Exhibit NHI-2 at 23.

[141] Preliminary Reliability Assessment at San Diego Main. Sensitivity studies showed more severe contingencies in a couple of instances, and the CAISO showed how all contingencies would be resolved by the solutions described herein and in the transmission plan.

contingencies to be addressed by measures including non-consequential load shedding.[142] NERC standards do not require a $2 billion transmission project (or any other transmission project) to address these contingencies.[143]

- As discussed in Mr. Millar's Declaration, LEAPS would not mitigate all the potential reliability issues in the SDG&E area and would not eliminate the need for the RAS.[144] Nevada Hydro's own exhibits confirm that even with LEAPS, the RAS would need to remain in place.[145]

- Mr. Alaywan also states the CAISO does not identify what the solutions will be when gas-fired resources retire in the area.[146] The CAISO modeled all known and expected retirements in the region within the 10-year planning horizon assessed in the 2018-2019 planning cycle. There was no evidence of additional units retiring within the studied planning horizon in the region.

- Finally, contrary to Nevada Hydro's assertion that the CAISO "did not discuss the pros and cons of selecting a short-term operational fix to

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142 NERC Transmission Planning Standard TPL-001-4 at Table 1 – Steady State & Reliability Performance Planning Events, available at https://www.nerc.com/files/TPL-001-4.pdf.

143 Nevada Hydro also ignores that the CAISO's reliability assessment indicated that these P6 contingencies occur in in the 2023 Summer Peak (and in some instances in the 2020 Summer Peak). Preliminary Reliability Assessment, at San Diego Main. As Nevada Hydro indicated in its Request Window Submission, LEAPS' anticipated in-service date was 2025. Exhibit NHI-7 at 8. Thus, LEAPS would not be in-service in a timely manner to address the identified reliability needs.

144 Exhibit CAISO-1 at 15.

145 Exhibit NHI-7 at 11, figure 3-2; Exhibit NHI-2 at 22.

146 Exhibit NHI-2 at 19-21.

selecting a long-term physical solution,"[147] the CAISO found that LEAPS, in fact, was *not* a superior long-term solution. The CAISO tariff expressly contemplates that the CAISO can adopt "lower cost" solutions such as RAS to address reliability needs. Nevada Hydro's assertion that a RAS is necessarily a "short-term solution" is unfounded. The CAISO has several RAS in place to address ongoing reliability needs that constitute more than merely "short-term" solutions.[148] Nevada Hydro cites to no regulations, orders, or tariff requirements that preclude this practice, nor can it.

### C. The CAISO Properly Studied LEAPS as an Economic Project, and Nevada Hydro Fails to Demonstrate Otherwise

- Nevada Hydro states that the CAISO tariff contemplates that evaluating a project as an economic study request involves (1) determining whether there is a need for transmission to meet congestion or local capacity needs or to integrate new generating resources on an aggregated basis; (2) determining whether the benefits of the transmission solutions outweigh the costs; and (3) comparatively analyzing the costs and benefits of the potential solutions. Nevada Hydro claims that the CAISO failed to apply the tariff or TEAM Document guidelines to con

- duct a reasonable, open, and transparent assessment of LEAPS.[149]

- This argument is spurious. The CAISO's discussion of its

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147 Complaint at 28.

148 Exhibit CAISO-1 at 16.

149 Complaint at 29-30.

economic planning study and congestion and economic benefit analysis spans almost 175 pages (Section 4) of the 2018-2019 Transmission Plan.[150] It includes the CAISO's production cost simulation (including congestion) results, a local capacity reduction benefit evaluation, evaluating potential reliability solutions with potential material economic benefits, six economic planning study requests (including LEAPS), and a detailed investigation of congestion and economic benefits in 12 areas of the CAISO grid and an examination of costs and benefits of potential solutions to address any needs in those areas (section 4.9, *et seq*.). The latter discussion includes an assessment of 23 transmission solutions, nine of which (including LEAPS) were in the San Diego/Imperial Valley Area and San Diego Sub-Area, which the CAISO studied with the Los Angeles Basin. The assessment evaluated the costs and benefits of all these projects, including LEAPS, and calculated a benefit-to-cost ratio for each. The CAISO studied LEAPS in three configurations, including one that Nevada Hydro did not even propose. Of the nine projects in the San Diego/Imperial Valley/Los Angeles Basin area, only one project showed a positive benefit-to-cost ratio. The CAISO considered five storage solutions, none of which showed a benefit-to-cost ratio higher than 0.5. Two battery storage projects that would compete with LEAPS showed potentially higher benefit-to-cost ratios than LEAPS based on the same assumptions and study methodology the CAISO applied to LEAPS.[151] The CAISO's analysis allows easy comparison of the costs and benefits of each

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150 *See* 2018-2019 Transmission Plan at 225-398.

151 *Id*. at 383, 391.

project and their resulting benefit-to-cost ratios. No further "comparative analysis" was required because the remaining projects all had benefit-to-cost ratios far below 1.0.

- Nevertheless, Nevada Hydro asserts that the CAISO failed to properly apply its TEAM guidelines by miscounting three of the seven benefits categories in TEAM and making no assessment of the other four.[152] Nevada Hydro claims that the CAISO's finding that LEAPS will provide less than 25 percent of the benefits the CAISO identified in a 2018 large scale-bulk storage sensitivity study casts "serious doubt" on the CAISO's decision to reject LEAPS as an economic solution.[153] Nevada Hydro also claims that the Benefits Analysis of Large Energy Storage in Chapter 7 of the 2018-2019 Transmission Plan shows that LEAPS will provide $85 million more in "production cost savings to California" than the CAISO credited to LEAPS in its TEAM analysis.[154]

- The CAISO addresses below each of Nevada Hydro's claims regarding the CAISO's applying the TEAM to LEAPS. The discussion demonstrates that the CAISO properly, reasonably, and objectively applied TEAM and the CAISO tariff and did not unduly discriminate against LEAPS. The CAISO applied the same assumptions and methodologies to all of the projects it studied, including the five storage projects in the San Diego area.

- Moreover, Nevada Hydro presents no compelling evidence to

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152 Complaint at 30.

153 *Id.*

154 *Id.*

substantiate its claims of deficiencies in the CAISO's transmission planning study process. In particular, Nevada Hydro's attempt to imply the existence of flaws in the CAISO's assessment of LEAPS based on the results of separate, informational studies regarding the potential system-wide benefits of large-scale storage are misplaced. These studies were not transmission planning studies. Unlike the CAISO's economic planning studies, they evaluated the general benefits of hypothetical bulk pumped storage resources as generation resources, did not assess individual pumped storage projects like LEAPS for locational benefits. More importantly, the informational studies calculated production cost savings, rather than CAISO ratepayer benefits, and they did not calculate benefit-to-cost ratios for CAISO ratepayers, both of which are the basis for approving economically-driven transmission project under TEAM. The informational studies were intended to inform the CPUC's IRP process and resource procurement, not transmission planning decisions. Thus, Nevada Hydro is comparing apples to oranges, and these studies provide no justification for approving LEAPS as an economically-driven transmission project, or finding any flaw in the CAISO's assessment of LEAPS or any other project.

#### *1. CAISO Gave LEAPs Appropriate Credit for Production Cost Savings Benefits*

Nevada Hydro argues that the CAISO's 2018-2019 analysis of LEAPS (1) improperly included generation identified in the CPUC's integrated resource plan portfolio and (2) incorrectly applied a 2,000 MW net export limit from the

CAISO balancing authority area.[155] Nevada Hydro claims these assumptions depressed prices in California for modeling purposes by artificially increasing supply. The CPUC-developed generation portfolios and the 2,000 MW net export limit represent scenarios that are "reasonably likely to occur based on existing policy."[156] Therefore, contrary to Nevada Hydro's assertions, these assumptions are critical to appropriately identifying realistic system transmission needs and conditions in the transmission planning process, while reducing the potential for stranded investment.

#### *(a) Utilizing the CPUC's Default Generation Supply Portfolio Was Reasonable and Consistent with the CAISO's Tariff, Commission Precedent, and Documented Practice*

The Commission has acknowledged the important role that the CPUC-CAISO MOU, and, in particular, the CPUC's long term procurement process, plays in the CAISO's transmission planning process.[157] As discussed above in Sections II.B and II.C, the CAISO's tariff and other transmission planning documents also recognize the importance of CAISO-CPUC coordination and CPUC resource planning inputs in the transmission planning process. In the 2010 MOU, the CAISO agreed to consider and incorporate CPUC-developed generation scenarios into the transmission planning process. The CPUC siting

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155 Complaint at 32-35.

156 *Order Instituting Rulemaking to Develop an Electricity. Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Plan Requirements,* CPUC Decision D.18-02-018 (issued February 13, 2018) at 104 (IRP Proceeding Decision), available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K771/209771632.PDF.

157 Revised Transmission Planning Process Order at P 162. ("The CPUC-CAISO MOU provides, among other things, for CAISO consideration of study scenarios that reflect CPUC's long term procurement process.")

and permitting processes then give "substantial weight" to project applications that are consistent with the CAISO's needs determinations made based on the CPUC-developed generation portfolios. Using CPUC-developed generation portfolios minimizes the risk of stranded investment by ensuring that any transmission solutions approved by the CAISO can be permitted and ultimately built by CAISO-selected project sponsors. The Commission has recognized that consideration of local regulatory authorities' resource planning directives helps ensure the right infrastructure solutions, with the least risk of stranded investment, are approved and developed.[158]

Notwithstanding the above, the CAISO maintains ultimate discretion regarding how to use the CPUC-developed portfolios in the transmission planning process. In discussing the CPUC-CAISO MOU, the Commission recognized that

> the tariff requires, and the CAISO has an obligation to ensure, that the transmission planning process is open and transparent. Therefore…stakeholders will be informed of how CAISO is taking CPUC's procurement decision into account in the CAISO's study scenarios.[159]

The CAISO met this obligation in the 2018-2019 transmission planning cycle by thoroughly describing in its 2018-2019 Unified Planning Assumptions, established during phase one of the transmission planning process, how it planned to use the CPUC-developed "Default Scenario." In the Unified Planning

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158 *Id.* at P 196.

159 *Id.* at P 162.

Assumptions, the CAISO explained that it would use the "Default Scenario" to develop its base case.[160] All stakeholders, including Nevada Hydro, had an opportunity to comment on this assumption during the phase one process. Nevada Hydro provided comments on the Unified Planning Assumptions, but raised no concerns regarding the CAISO's proposed use of the CPUC-developed generation portfolios.[161]

Nevada Hydro's argument here boils down to nothing more than an assertion that the CAISO should have discounted or rejected the CPUC's generation procurement and integrated resource planning process because Nevada Hydro believes LEAPS is a more cost-effective resource than those selected in the CPUC's modeling.[162] Nevada Hydro would apparently have the CAISO disregard the CPUC's authority over procuring new generation resources, and substitute its own judgment regarding the appropriate generation resources

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160 2018-2019 Unified Planning Assumptions at 19.

161 *See* Nevada Hydro Comments on Draft Study Plan (March 14, 2018), available at http://www.caiso.com/Documents/NevadaHydroComments-Draft2018-2019StudyPlan.pdf.

162 Mr. Alaywan claims that the Policy-Driven Need Assessment section of the 2018-2019 Transmission Plan "acknowledged" that the use of "generic" resources contained in the CPUC's "default" generation portfolio provided to the CAISO constituted a change from past practice and infers that such an approach is inconsistent with the Unified Planning Assumptions. Exhibit NHI-2 at 44. This mischaracterizes the CAISO's 2018-2019 Transmission Plan because the comment Mr. Alaywan refers to does not describe any change in the CAISO's treatment of generic resources identified in the CPUC's portfolios. Instead, the statement that Mr. Alaywan refers to indicated that "the portfolio now includes the new generic (non-contracted) resources. In the past, portfolios were comprised of contracted and generic resources." 2018-2019 Transmission Plan at 193. In previous cycles, the CPUC treated only generation that was actually online as pre-existing, and the CPUC portfolios included both contracted for and generic resources. Thus, the only difference in the 2018-2019 planning cycle was to include the "contracted for but not in service" resources in the baseline rather than in the CPUC's portfolios. This has nothing to do with the CPUC's continued use of "generic" resources in developing renewable generation portfolios, Instead, the change was merely an accounting change regarding contracted for resources, and it had no material impact on the CAISO's transmission planning analysis. Exhibit CAISO-1 at 42-43.

that should be procured to "achieve the [the state's] intended GHG targets and ensure a safe, reliable and cost-effective electricity supply in California."[163] This is clear from Nevada Hydro's assertion that the CAISO should examine in its transmission planning process whether projects such as Nevada Hydro can "economically displace" generation that the CPUC has identified through its resource planning function.[164]

The CAISO's role, however, is transmission planning; not generation procurement. The CAISO does not conduct a forward capacity auction or other process to procure new generation. The approach advocated by Nevada Hydro would contravene the FPA's requirement that the state maintain planning and procurement authority over "facilities used for the generation of electric energy." As discussed above, one of the main reasons the CAISO agreed to incorporate CPUC resource portfolios in its transmission planning process is to ensure that CAISO-approved transmission solutions can actually be permitted and constructed and thereby avoid stranded costs. Abandoning this approach—as Nevada Hydro would have the CAISO do—would undermine the CAISO's ability to efficiently and cost-effectively plan the system in a realistic and integrated

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[163] IRP Proceeding Decision at 26, citing Peninsula Clean Energy's comments on the proposed decision.

[164] Complaint at 42. Mr. Alaywan also wrongly claims that the "CAISO also included 807 MW of generic lithium ion battery storage, although it does not specifically mention that in the TPP report." Exhibit NHI-2 at 43. The CAISO did not include such storage. As discussed above, the CAISO included existing and under construction battery storage. It did not include any residual storage, as indicated in the 2018-2019 Unified Planning Assumptions at 31. Further, the CPUC's default portfolio included potential additional battery storage, but the CAISO relied on the default portfolio solely for renewable generation volumes. *See* 2018-2019 Unified Planning Assumptions at 19.

fashion.

The CAISO notes that in developing the generation portfolios for the 2018-2019 transmission plan, the CPUC specifically considered whether large-scale pumped storage could help the state achieve its environmental, economic, and reliability goals.[165] The CPUC conducted three special analyses for pumped storage, geothermal, and out-of-state wind resources to determine whether such resources could cost-effectively diversify the portfolio.[166] The CPUC staff found that out-of-state wind resources could be cost-effective and warranted additional study, but that pumped storage and geothermal did not warrant "immediate activity to support . . . pumped hydro development."[167] Nevada Hydro may raise any concerns or disputes it has with the CPUC's procurement decisions in the appropriate state proceeding. However, the Commission should not entertain Nevada Hydro's attempt to use the CAISO's transmission planning process as an alternative venue to argue the merits of its project relative to other generation.

#### *(b) The CAISO Reasonably Assumed a 2,000 MW Export Limit in Its Economic Planning Study*

Nevada Hydro separately argues that the CAISO's "assumption of a 2,000 MW limit on exports from California was unreasonable and materially prejudicial to the evaluation of LEAPS."[168] Nevada Hydro alleges that the export limit is not included in the WECC full network model and that the CAISO failed to explain

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165 IRP Proceeding Decision at 78.

166 *Id* at 71.

167 *Id*. at 78.

168 Complaint at 33.

material changes from WECC's model. Nevada Hydro argues that the export limit is not properly applied in transmission planning, which assumes actual flows and seeks to identify transmission needs. Nevada Hydro further argues that the CAISO violated its tariff by failing to disclose and explain the 2,000 MW export limit in its 2018-2019 Unified Planning Assumptions. Last, Nevada Hydro claims that CAISO should not impose a transmission limit merely because the CPUC uses it in resource planning.

Nevada Hydro's claims are incorrect on multiple levels. First, Nevada Hydro mischaracterizes the 2,000 MW export constraint as a "transmission export limit," and erroneously claims that the CAISO is significantly changing the transfer and export capability on major transmission lines between the CAISO and its neighbors.[169] The 2,000 MW net export limit is based on CAISO market realities; the CAISO did not modify the actual physical transfer/export capabilities of any transmission lines in its transmission planning studies.[170]

Second, regarding Nevada Hydro's argument that the CAISO blindly adopted this limit from the CPUC, the CAISO consistently has noted that production cost modeling should impose net export limits to "provide a more accurate assessment" of actual market outcomes.[171] Nevada Hydro ignores that the CAISO has used this export limit in informational studies regarding the benefits of large-scale storage conducted before the 2018-2019 transmission

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169 *Id.* at 34.

170 Exhibit CAISO-1 at 26.

171 2018-2019 Transmission Plan at 293.

planning process.[172]

Third, there is no merit to Nevada Hydro's assertion that the CAISO's use of a 2,000 MW net export limit "fails to depict reality."[173] As Mr. Millar states in his Declaration, "[t]he net export limit reflects market realities and the existing hurdles to interregional transactions. . . ."[174]

Western Interconnection market dynamics limit net exports from the CAISO.[175] In presenting production cost modeling results in the CPUC's long-term procurement plan proceeding in 2014, the CAISO explained that it imposed an even stricter *zero* net export limit because

> [i]n the CAISO market, imports and exports schedules are mostly established in the day-ahead market. Moving into the real-time market, forecasts become more accurate, but the CAISO observes limited movement of import and export schedules from the day-ahead level, even when the CAISO energy prices go to negative. In other words, imports and exports do not always respond to real-time prices, and this often results in excessive imports.[176]

In subsequent years, with the expansion of the Energy Imbalance Market, the CAISO updated its production cost modeling to allow net exports up to 2,000 MW. The CAISO has, however, consistently opposed raising the net export limit

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172 Exhibit CAISO-1 at 26. *See also* CAISO 2016-2017 Transmission Planning Process Supplemental Sensitivity Analysis of Large Energy Storage (January 4, 2018) at 2 (2018 Sensitivity Studies), available at http://www.caiso.com/Documents/SupplementalSensitivityAnalysis-BenefitsAnalysisofLargeEnergyStorage.pdf, also attached to the Complaint as Exhibit NHI-4.

173 Complaint at 34.

174 Exhibit CAISO-1 at 26.

175 *Id.*

176 *See* CPUC Rulemaking R.13-12-010, Phase 1.A Direct Testimony of Dr. Shucheng Liu on Behalf of the California Independent System Operator, at 14-15 (August 13, 2014) (Dr. Liu Testimony), available at http://www.caiso.com/Documents/Aug13_2014_InitialTestimony_ShuchengLiu_Phase1A_LTPP_R13-12-010.pdf.

over 2,000 MW until there is "a west-wide jointly cleared market with both day-ahead and real-time scheduling processes."[177] Historical net exports from the CAISO supported the CAISO's use of the 2,000 MW net export limitation in the 2018-2019 transmission planning process economic studies. The CAISO has historically been a large net importer, even during periods with negative energy prices in the CAISO.[178] This is partially due to the fact that CAISO load-serving entities have dedicated or must-take imports from resources outside of the state such as the Palo Verde Nuclear Generating Station, Hoover Dam, and other out of state renewable resources.[179] In any event, if experience shows that a 2,000 MW export limit is unreasonable, the CAISO can revisit the limit in future planning cycles, but using a 2,000 MW export limit was reasonable based on the circumstances at the time the CAISO developed the 2018-2019 Transmission Plan.

Fourth, Nevada Hydro's allegation that the CAISO violated its tariff by failing to describe the net export limit in its 2018-2019 Unified Planning Assumptions document is incorrect. The CAISO respected all physical limits on the interties [180] and simply used the 2,000 MW net export limit to reflect realistic

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177 Dr. Liu Testimony at 15.

178 See CPUC Rulemaking R.13-12-010, Phase 1.A Reply Testimony of Dr. Shucheng Liu on Behalf of the California Independent System Operator(October 22, 2014) at 10-12 (Dr. Liu Reply Testimony), available at http://www.caiso.com/Documents/Oct22_2014_ReplyTestimony_ShuchengLiu_Phase1ALong-TermProcurementPlans_R13-12-010.pdf.

179 *Id.* at 12; Exhibit CAISO-1 at 27.

180 Exhibit CAISO-1 at 26. The 2018-2019 Transmission Plan expressly recognizes that the CAISO used the WECC anchor data production cost model set as a starting data, and incorporated validated changes in consequent versions of the anchor data set from WECC, in performing its economic assessment. 2018-2019 Transmission Plan at 236. WECC's anchor data set production cost model "uses a nodal model to represent the entire WECC transmission

market dynamics, not physical transmission limitations. The 2018-2019 Unified Planning Assumptions stated the economic analysis will be conducted based on TEAM.[181] The TEAM document states the CAISO can make modeling adjustments "to mimic the actual transaction hurdles between Balancing Authority Areas."[182] The net export constraint did not modify the WECC full network model; it reflected a reasonable market hurdle regarding exports and therefore more realistically reflects actual market outcomes.

Also, the 2018-2019 Unified Planning Assumptions stated that the CAISO would utilize the "Default Scenario" that the CPUC approved for submission to the CAISO for use in the 2018-2019 transmission planning process and provided a link to the CPUC's decision.[183] That decision recognized that the modeling for the portfolio reflected a 2,000 MW export limit because of the absence of broader regional coordination and because the CAISO has never been a net exporter.[184] Further, stakeholders were aware of the 2,000 MW net export limit during the development of the 2018-19 Unified Planning Assumptions. One party submitted comments on the draft assumptions that supported the net export limit and requested the CAISO to run additional sensitivities, which the CAISO did, as discussed below.[185]

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network." *Id.*

181 2018-2019 Unified Planning Assumptions at 49.

182 Exhibit CAISO-2 at 30.

183 2018-2019 Unified Planning Assumptions at 19.

184 IRP Proceeding Decision at 50-52.

185 See ITC Holdings Corp. on behalf of ITC Grid Development, LLC, Comments on the Draft Assumptions and Study Plan for the 2018-2019 Transmission Planning Process (March 15, 2018)

Finally, even if the 2,000 MW export limit was considered to be a modification to the WECC model, the CAISO did not receive the actual production model base case for the 2019-220 transmission planning process from WECC until June 2018,[186] approximately two-and-one-half months after the CAISO posted its 2018-2019 Unified Planning Assumptions. Thus, even if applicable, the CAISO would have been unable to describe any "significant modifications" to the WECC base cases in its 2018-2019 Unified Planning Assumptions, which the CAISO posted on March 31, 2018, consistent with the requirements of its Business Practice Manual for Transmission Planning.[187] The CAISO did, however, discuss the application of the 2,000 MW export limit with stakeholders in two transmission planning process stakeholder meetings held on September 21-22, 2018 and November 16, 2018.[188] At both of these stakeholder meetings, the CAISO also stated that in addition to studies with the 2,000 MW export limit, it would also run a general sensitivity study with no export limit.[189]

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(ITC Holdings Comments), available at http://www.caiso.com/Documents/ITCGDComments-Draft2018-2019StudyPlan.pdf.

186 Exhibit CAISO-1 at 22.

187 Business Practice Manual for Transmission Planning at Table 2-1 and Figure 2-1 (providing that the CAISO finalizes the study plan and posts it on the public website at the end of March.

188 2018-2019 Transmission Planning Process Stakeholder Meeting, Slides of Yi Zhang at 5, September 21-22, 2018 (2018-2018 Production Cost Modeling Slides) (also noting that the WECC anchor data set Production Cost Modeling case was not released until the end of June), available at http://www.caiso.com/Documents/Day2-Presentations_2018-2019TPPMtg-Sep20-21-2018.pdf.

189 *Id.* At the February 14, 2019 stakeholder meeting on the draft transmission plan, the CAISO discussed some of the congestion impacts of the sensitivity study it conducted with no export limit. *See* 2018-2019-Trasnmisison Planning Process Stakeholder Meeting, February 14, 2019, Slides of Yi Zhang, Economic Assessment (Economic Assessment Slides), available at http://www.caiso.com/Documents/Presentation-2018-2019TransmissionPlanningProcessMeeting-Feb14-2019.pdf.

Although Nevada Hydro attempts to argue that the CAISO's use of a 2,000 MW export limit constitutes a modification to the WECC physical transmission system base case, Nevada Hydro never presents any analysis of its impact on LEAPS, but rather just claims that such an export limit denies LEAPS $51 million in annual value.[190] There is good reason Nevada Hydro does not discuss matter this further: a higher export limit would decrease the value of the LEAPS pumped storage unit. As indicated above, the CAISO also conducted a sensitivity economic planning study with no export limit. The sensitivity study with no export limit showed the present value of LEAPS' Total Production Cost Modeling Benefits—CAISO ratepayer benefits including LEAPS net revenues—declined from $39 million to $34 million.[191] In calculating LEAPS' benefit-to-cost ratio in the transmission planning process, the CAISO used the higher $39 million value rather than the lower value from the no-export-limit sensitivity study, which benefitted LEAPS. Thus, LEAPS was not harmed by the CAISO's use of the 2,000 MW export limit.

These results are what one reasonably would expect: increasing the export limit diminishes the value of a pumped storage facility because the additional exports may compete for the low-cost surplus renewable generation output that the pumped storage would otherwise access.[192] Most of the value of a pumped storage facility comes from pumping at low cost, especially when the

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190 Complaint at 36.

191 Exhibit CAISO-1 at 28-29.

192 *Id*. at 29-30.

CAISO has solar curtailment, and generating at higher prices during evening peak load. However, when the export limit is increased, more solar energy can be exported to outside balancing authority areas. The price in the CAISO will be higher than with a lower export limit, reducing the value provided by the pumped storage.

### *(c) The CAISO Is not Required to Credit LEAPS with WECC-wide Production Cost Savings*

- Nevada Hydro claims that under TEAM, the CAISO was required to credit LEAPs with WECC-wide production cost savings, not just California savings.[193] Nevada Hydro alleges that the WECC-wide perspective takes precedence over the California-only production cost perspective for "projects with obvious interregional impacts."[194] Nevada Hydro argues that LEAPS has obvious interregional impacts because it claims to produce $50 million a year in

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193 Complaint at 36. The Complaint's statement that the CAISO's "TEAM" or "Ratepayer Benefits per TEAM" analysis led to calculating "the production cost impact on California alone" is incorrect. Consistent with TEAM, the CAISO calculated benefits based on "CAISO net ratepayer benefits." There are two significant differences between the two. First, not all of California is in the CAISO footprint: Los Angeles Department of Water and Power (LADWP), Sacramento Municipal Utility District (SMUD), Imperial Irrigation District (IID), and others are in California but not the CAISO. (2018 Sensitivity Studies calculated California production cost savings, Chapter 7 Informational Studies calculated CAISO production cost savings. Second, CAISO net ratepayer benefits represent a different measure altogether than the impacts of the total CAISO production costs. Merchant generation in the CAISO footprint impacts total CAISO production costs, but do not accrue to CAISO ratepayers to impact net ratepayer benefits, and therefore are not considered as part of net ratepayer benefits. This error permeates the Complaint, where Nevada Hydro confuses CAISO net ratepayer benefits with or compares them to either CAISO or California total production cost values calculated in the informational studies. The CAISO calculated CAISO or California total production cost values only in the informational studies because the results were intended to inform supply side resource planning, rather than serve as the basis for approving individual transmission projects whose costs would be recovered solely from CAISO ratepayers. The CAISO notes that Table 1: "CAISO TPP Analysis" of the Complaint, refers to "CAISO Net Production Cost Payments." Actually this refers to CAISO net ratepayer benefits. *Id.* at 24.

194 *Id.*

production cost savings across the West. Nevada Hydro argues that the CAISO "had no good reason" to prefer the negative $34 million production cost result for California ratepayers to the WECC production cost savings of $50 million.[195] Nevada Hydro also claims that the CAISO tariff requires the CAISO to use "WECC base cases, as may be modified for the relevant planning regions" with a "description of significant modifications to the planning data and assumptions."[196] Nevada Hydro alleges that the CAISO disclosed no changes to the WECC base cases that could lead to such a large disparity between California-only and WECC-wide production costs.[197]

- The CAISO did not act contrary to the TEAM methodology, the CAISO tariff, or the CAISO's longstanding practice in "counting" only CAISO ratepayer benefits,[198] and not WECC societal benefits[199] in evaluating the benefit-to-cost ratio of proposed economic projects, including LEAPS. The TEAM methodology makes clear that the "CAISO will primarily rely on CAISO ratepayer perspective when evaluating the economic viability of a potential transmission upgrade since cost covering of transmission upgrades is collected

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195 *Id.* at 36. Nevada Hydro mischaracterizes the negative $34 million value. It is not a production cost value. Rather, it reflects CAISO ratepayer benefits from LEAPS resulting from the production cost modeling before taking into account LEAPS' market revenues that would be credited to CAISO ratepayers. Once LEAPS' $73 million in annual revenues are accounted for, LEAPS has a net annual ratepayer benefit of $39 million.

196 *Id.* at 36-37.

197 *Id.* at 37.

198 The CAISO ratepayer test focuses on the benefits that would accrue to those entities funding the upgrade. Exhibit CAISO-2 at 20.

199 WECC-societal benefits from a transmission project can be measured as the reduction in total WECC variable production cost of energy. *Id*. at 19.

from ratepayers by the [CAISO's transmission access charge]."[200] Although the original TEAM methodology explored a range of perspectives, the "'ratepayer' perspective has been relied upon consistently since the methodology was introduced" because the costs of transmission upgrades are collected from CAISO ratepayers, and thus, "the ratepayer perspective best reflects the regulatory framework."[201]

- The CAISO has consistently applied this approach in its annual transmission plans. For example, the 2018-2019 Transmission Plan indicated that "to justify a proposed transmission solution, the ISO ratepayer benefit needs to be greater than the cost of the network upgrade" and "the justification if successful, the proposed transmission solution may qualify as an economic transmission solution."[202] Prior transmission plans specified this same requirement.[203] Similarly, in approving other transmission solutions as economically-driven projects, the CAISO has stated that "to justify a proposed network upgrade, the required criterion is that the ISO ratepayer benefit needs to be greater than the cost of the network upgrade."[204]

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200 *Id.* at 4.

201 *Id.* at 10.

202 2018-2019 CAISO Transmission Plan at 228.

203 *See, e.g.,* 2017-2018 CAISO Transmission Plan (March 31, 2017) at 220 (2017-2018 Transmission Plan), available at http://www.caiso.com/Documents/Final2017-2018StudyPlan.pdf; 2016-2017 CAISO Transmission Plan (March 31, 2016) at 167 (2016-2017 Transmission Plan), available at http://www.caiso.com/Documents/Final2016-2017StudyPlan.pdf.

204 2013-2014 CAISO Transmission Plan (July 16, 2014) at 211 (2013-2014 Transmission Plan) at http://www.caiso.com/Documents/Board-Approved2013-2014TransmissionPlan_July162014.pdf. *See also* CAISO 2013-2014 Transmission Planning Process Supplemental Assessment: Harry Allen-El Dorado 500 kV Transmission Project Economic Need (December 4, 2014) at 4 (Harry Allen-El Dorado Supplemental Analysis), available at http://www.caiso.com/

- Nevada Hydro's claim that the TEAM document *required* the

CAISO to credit LEAPS with WECC-wide production cost savings conflicts with the clear wording of the TEAM document and the manner in which the LEAPS project was proposed to the CAISO. Under TEAM, the CAISO considers WECC-wide benefits, but they do not drive economic project decisions. TEAM says nothing about WECC-wide costs taking precedence over CAISO ratepayer costs. WECC-wide benefits are primarily used for informational purposes;[205] although they can inform the economic assessment of *interregional* transmission projects insofar as "other perspectives may be evaluated to determine if other parties benefit from the potential upgrade and can contribute to the capital cost of the upgrade."[206] However, Nevada Hydro did not submit LEAPS as an interregional project, either to the CAISO or any other planning region in WECC, and has not sought to allocate any costs of LEAPS to entities in other WECC planning regions. Nevada Hydro only submitted LEAPS to the CAISO as a potential CAISO regional transmission project, the costs of which would be allocated to CAISO ratepayers alone. And even if LEAPS was a potential "interregional solution," the CAISO tariff provides that such projects will be evaluated "on the basis of the need for the entire proposed facility *as a CAISO regional solution*, the costs of which would be recovered through the Transmission Access Charge

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Documents/HarryAllen-EldoradoProjectAnalysisReport_AppendixA.pdf.

[205] For example, the CAISO has provided "information only" WECC-wide benefits in its general studies on large-scale bulk storage. *See* Exhibit NHI-4 at 1.

[206] Exhibit CAISO-2 at 5.

if approved as part of the comprehensive Transmission Plan."[207] Thus, even if LEAPS had "obvious interregional impacts," it still fails to meet the cost-to-benefit criteria for selection as a CAISO regional solution.

- Nevada Hydro's assertion that the CAISO had "no good reason" for focusing on CAISO ratepayer impacts is spurious. The reason the CAISO requires demonstrable CAISO-ratepayer benefits for a project to even qualify as an economically-driven project is both obvious and inherently reasonable: CAISO ratepayers will bear all the costs of regional projects selected in the CAISO planning process. Utilizing WECC-wide production cost savings[208] instead of CAISO ratepayer benefits could result in the selection of projects with a benefit-to-cost ratio of less than 1:1 for CAISO ratepayers, unfairly and unreasonably burdening CAISO ratepayers for the benefits received by merchant generation and non-CAISO entities both inside California and across the west. This outcome would violate basic cost allocation principles, *i.e*., cost allocation should track benefits.

- The CAISO notes the entire Harry Allen-El Dorado transmission line project and most of the Delaney-Colorado transmission line project are located outside of California. Consistent with the CAISO tariff and TEAM, the CAISO approved these two transmission projects as economically-driven

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207 Section 24.13 of the CAISO tariff (emphasis added).

208 The CAISO notes there is a typographical error on page 359 of the 2018-2019 Transmission Plan. The information-only calculations mistakenly refer to CAISO Production Costs instead of the WECC Production costs that the CAISO actually used and which are correctly labeled in the calculation tables.

projects based on the net economic benefits to CAISO ratepayers,[209] not their WECC-wide benefits, because the project costs were allocated entirely to CAISO ratepayers. If there was no basis for the CAISO to rely on WECC-wide societal benefits to approve these two interstate transmission lines that traverse and directly access generation in other planning regions, there is no basis to rely on WECC-wide benefits to approve LEAPS, which is located in a small area of southern California.

- Nevada Hydro also insinuates that the CAISO must have violated Section 24.3.2 of the CAISO tariff[210] because it believes that the disparity between WECC societal benefits and CAISO ratepayer benefits calculated for LEAPS could only have arisen if the CAISO changed the WECC base cases and did not disclose them. Nevada Hydro conflates WECC societal benefits with CAISO ratepayer benefits and provides no support for its baseless and conclusory allegation, and the Commission should therefore disregard it.[211]

- As indicated in the 2018-2019 Transmission Plan, the CAISO (1) used the WECC Anchor Data Set as the starting data base and incorporated validated changes, and (2) developed base cases using these data, which "included in the modeling updates and additions which followed the ISO unified

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[209] 2013-2014 Transmission Plan at 211, 248, 257, 264, 267; *see also* Harry Allen-El Dorado Supplemental Analysis at 2, 4, 15.

[210] Section 24.3.2 of the CAISO tariff provides that in the Unified Planning Assumptions the CAISO shall provide a description of any significant modifications to the WECC base cases.

[211] General allegations lacking support cannot serve as the basis for a complaint. *See supra,* fn. 112.

planning assumptions and are described in this section."[212] Thus, in its economic analysis, the CAISO followed its Unified Planning Assumptions, which included identified updates and additions to the WECC base cases.[213] Contrary to Nevada Hydro's speculation, the "disparity" between CAISO and WECC-wide benefits was not the result of undocumented changes to the base cases.

- Moreover, it is unreasonable simply to assume that the operation of a pumped storage facility in southern California to reduce WECC-wide production costs (which is the objective function of the production simulation software) will necessarily also produce equal net CAISO ratepayer benefits. To do so ignores the fact that a project can result in benefits to entities captured in a WECC-wide analysis, but not to CAISO ratepayers, such as parties outside of the CAISO footprint (*e.g.*, LADWP, SMUD) and market participants (*e.g.*, merchant generators) inside the CAISO footprint who may see revenue increases that do not accrue to the benefit of CAISO ratepayers.[214] Moreover, the WECC-wide information-only analysis was based on a calculation of generator production cost savings, which as discussed below considers a different set of factors than the CAISO ratepayer benefit approach dictated by TEAM. Nevada Hydro again inappropriately conflates WECC production cost benefits with CAISO ratepayer benefits. As discussed *infra*, they are completely different concepts.

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212 2018-2019 Transmission Plan at 235.

213 2018-2019 Unified Planning Assumptions at 38.

214 Exhibit CAISO-1 at 31, 34.

### *(d) The CAISO Did Not Evaluate LEAPS Using a "Less Reliable" Computer Model*

- Nevada Hydro claims that the CAISO analyzed the economic impact of LEAPS utilizing transmission modeling software, known as GridView, that was "less reliable" than the software the CAISO used to conduct its informational assessments of the benefits of large-scale storage, known as PLEXOS.[215] Nevada Hydro suggests that the CAISO should have explained why it relied on the GridView model to analyze LEAPS, given what it asserts is an $85 million/year "difference in the results . . . between the two models."[216] These arguments are without merit.

- The CAISO uses GridView for transmission planning studies and uses PLEXOS when undertaking studies to inform generation planning and procurement, particularly because of GridView's superior capability in dealing with transmission constraints and contingences, which is especially important in the transmission planning context.[217] As discussed below, WECC also uses GridView.

- Nevada Hydro makes much of the CAISO's statement that PLEXOS "provides better results for assessing system and flexible capacity

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215 Complaint at 37.

216 *Id.* In that regard, Nevada Hydro claims that the GridView transmission planning model showed a negative $34 million production cost benefit; whereas, the PLEXOS studies regarding the benefits of large storage included in Section 7 of the 2018-2019 CAISO Transmission Plan showed a production cost benefit of $51 million. *Id.* at 35-36. The CAISO notes that the total CAISO ratepayer benefit from production simulation analysis for the scenario referred to is positive $39 million, when LEAPS net revenue is taken into account.

217 Exhibit CAISO-1 at 24-25.

benefits."[218] However, Nevada Hydro ignores the remainder of the discussion that included this language. Before the statement to which Nevada Hydro refers, the CAISO noted that with "higher levels of renewable resource development and with the decline in the size of the gas-fired generation fleet, increased value is emerging for *preferred resources, including storage, on a system basis regardless of local capacity and transmission congestion needs*."[219] In other words, the CAISO was discussing the role of preferred resources—which are generation resources, not transmission facilities—to provide system and flexible capacity benefits[220] even if there are no local capacity or transmission congestion needs, which are the two primary reasons for approving economically-driven transmission projects. The CAISO then noted that considering these additional benefits led it to "supplementing transmission congestion analysis conducted in the GridView platform with additional platforms such as PLEXOS."[221]

- Nevada Hydro also ignores the subsequent discussion at page 235 of the 2018-2019 Transmission Plan which states: "[a]s discussed in chapter 7, the CAISO also relies on PLEXOS analysis is [sic] considering system-wide resource issues outside of the CAISO's tariff-based transmission planning process, in particular in support of the CPUC's integrated resource planning

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218 Exhibit NHI-2 at 35 (quoting 2018-2019 Transmission Plan at 227).

219 2018-2019 CAISO Transmission Plan at 227 (emphasis added).

220 Flexible capacity is provided by generating resources. The CAISO's resource adequacy program requires load serving entities to procure flexible capacity to meet the CAISO's flexible capacity needs (section 40.10 of the CAISO tariff), and the CAISO procures flexible ramping products from resources with economic bids (section 44 of the CAISO tariff).

221 2018-2019 Transmission Plan at 227.

proceedings."[222] The discussion further explains that although the PLEXOS analysis "is often based on different forecast parameters and does not address intra-ISO transmission limits to the extent that the GridView analysis does, it can provide helpful comparisons of overall GridView results in some cases."[223] The CAISO recognizes the value of PLEXOS for resource planning and procurement studies, but has not suggested that it in any way should serve as a substitute for GridView for purposes conducting economic transmission planning studies.

- The CAISO has consistently used GridView in its annual transmission planning process to conduct economic planning studies, evaluate the need for new economic transmission projects, and compare alternative transmission solutions.[224] WECC also uses GridView for transmission planning purposes in developing its base cases, and, as Nevada Hydro acknowledges, the CAISO uses the WECC base cases as the starting point for its transmission planning process.[225] In particular, WECC uses GridView for its anchor data set production cost model as well as production cost modeling.[226] Under these

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222 *Id.* at 235.

223 *Id.*

224 *See, e.g.,* 2017-2018 Transmission Plan at 224; 2016-2017 Transmission Plan at 169; 2015-2016 CAISO Transmission Plan (March 28, 2016) at 287 (2015-2016 Transmission Plan), available at http://www.caiso.com/Documents/Board-Approved2015-2016TransmissionPlan.pdf.

225 Given Nevada Hydro's repeated hand-wringing throughout the complaint regarding any perceived deviation from the WECC base cases, it is rather ironic that Nevada Hydro expresses no reservations with advocating that the CAISO conduct its transmission studies using a model entirely different than the one used to develop the WECC cases.

226 *See* WECC ADS Data Development and Validation Manual (July 17, 2018) (stating the WECC uses GridView as its production cost modeling tool, which is the foundation for its study cases, which are used throughout the Western Interconnection for several purposes including FERC Order 890 and 1000 planning studies by Western Planning Regions, independent transmission developer's studies, market studies (*e.g.*, the CAISO's Energy Imbalance Market) and integration studies) available at https://www.wecc.org/_layouts/15/WopiFrame.aspx?source

circumstances, the CAISO acted reasonably, and did not unduly discriminated against LEAPS or singled-out LEAPS by using the GridView model in the CAISO's economic planning study analysis. The CAISO has consistently used GridView to assess proposed economically-driven projects.[227]

### *(e) CAISO Studies Regarding the Benefits of Large-Scale Pumped Storage Do not Support Approving LEAPS as a Needed, Economically-Driven Transmission Project*

- Nevada Hydro alleges that the CAISO's economic planning study of LEAPS is "suspect" because in prior informational studies of the benefits of large-scale storage that used the PLEXOS model, the CAISO found that hypothetical bulk storage units would provide average annual production cost savings of $40 million.[228] Nevada Hydro also points to the benefits of the informational large bulk storage study in Section 7 of the 2018-2019 CAISO Transmission Plan that shows $51 million of production cost benefits.[229] Nevada Hydro claims that the CAISO offered no explanation for these results, or why it used the purportedly

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doc=/Reliability/ADS%20DDVM%20V1.0.docx&action=default&DefaultItemOpen=1.

[227] 2013-2014 Transmission Plan at 212 (approving the Delaney-Colorado River project and rejecting other economically-driven projects); *see also* Harry Allen-El Dorado Supplemental Analysis at 5.

[228] Complaint at 38. Nevada Hydro cites a January 4, 2018 report updating earlier informational studies and refers to it as the "2018 Sensitivity Studies." The 2018 Sensitivity Studies sere sensitivities to prior bulk storage studies the CAISO had conducted going back to 2015. As reflected in Exhibit NHI-4, the 2018 Sensitivity Study was a "Supplemental Sensitivity Analysis."

[229] *Id.* at 37 (referred to hereinafter as the "Chapter 7 Informational Study"). The Complaint notes that the Chapter 7 Informational Study shows a CAISO production cost reduction of $51 million and seeks to compare that reduction to the -$34 million CAISO ratepayer benefit for LEAPS set forth in Table 4.9-44 (page 359) of the 2018-2019 CAISO Transmission Plan. The Complaint argues that this supports an $85 million cost swing that should be credited to LEAPS. *Id.*

inferior GridView model in analyzing LEAPS and other proposed economic projects.[230]

- Nevada Hydro's claims are baseless. Nevada Hydro provides no evidence of a flaw in the CAISO's analysis of LEAPS, instead relying on mere speculation based on the unsurprising fact that studies conducted for entirely different purposes with different parameters, examining different potential benefits,[231] arrived at different results. Such speculation fails to meet the evidentiary standard to sustain even a prima facie case against the CAISO. Regardless, the CAISO's special informational studies regarding the benefits of large-scale pumped storage provide no basis to support a finding that the LEAPS is needed as an economically-driven transmission project or that the CAISO analysis of LEAPS was in any way flawed.

- Unlike the economic study of LEAPS, the 2018 Sensitivity Studies and the Chapter 7 Informational Study were not conducted to determine specific transmission planning needs. Rather, they were conducted on an "information-only" basis to inform resource planning decisions, particularly the CPUC's integrated resource planning process, on a system-wide basis. As such, these informational studies assumed that the storage resources under consideration would be added to the system as generation resources, not transmission assets.

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230 *Id.* As discussed in Section III.C.d above, Nevada Hydro's allegation that GridView constitutes an "inferior" model is incorrect.

231 *I.e.*, production cost savings versus CAISO ratepayer benefits.

- The CAISO has consistently clarified the nature, parameters, and purpose of these studies. The CAISO's 2018 Sensitivity Studies and Chapter 7 Informational Study were *informational* bulk storage studies that were hypothetical in nature because the zonal PLEXOS model used in those studies did not model specific locations on the CAISO system.[232] The CAISO conducted the 2018 Sensitivity Studies and its predecessor studies to inform the CPUC's integrated resource planning process (formerly the long-term procurement plan process) and resource procurement. Nevada Hydro's Exhibit NHI-5 confirms this.[233] Exhibit NHI-5 is a letter from CAISO President and Chief Executive Officer Steve Berberich to the CPUC indicating that the intent of the storage studies was to "provide a solid, empirical basis to review the benefits of large-scale pumped storage to meet over-generation, ramping, and other system needs in the 2016 LTPP" and that the CAISO would share the studies so they might "inform potential procurement in the 2016 LTPP." The CAISO also stressed that the study results depended on the specific assumptions made in the studies.[234]

- Similarly, the CAISO expressly stated its PLEXOS modeling for the Chapter 7 Informational Study was "primarily conducted for supporting the CPUC's integrated resource planning (IRP) process focusing on a system-wide

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232 Exhibit CAISO-1 at 31.

233 *See also* 2015-2016 Transmission Plan at 248; 2016-2017 Transmission Plan at 308.

234 2016-2017 Transmission Plan at 308; 2015-2016 Transmission Plan at 248; Exhibit NHI-4 at 1.

basis" and could continue to "provide useful background and context to supplement the transmission planning studies and provide a broader perspective to stakeholders by being included in the transmission plan.[235] The CAISO noted that it also "continues to [sic] useful platform for sensitivities such as assessing the benefits of large storage from a system perspective."[236]

- Because the purpose of these informational studies was to inform resource procurement, not transmission planning, the methodology used in those studies to assess the potential benefits of hypothetical large-scale storage resources was different in several key respects than the methodology set forth in TEAM and used for purposes of the study of LEAPS and other discrete economic transmission project proposals.

- First, both the 2018 Sensitivity Studies and the Chapter 7 Informational Study assumed that the new pumped storage units would be unconstrained market resources, not transmission facilities as LEAPS seeks to be.[237] The Chapter 7 Informational Study specifically recognized that pumped storage could "provide ancillary services and load-following in both pumping and generation modes." [238] Thus, Nevada Hydro is relying on studies that assessed pumped storage as a market resource to support treating LEAPS as a

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235 2018-2019 Transmission Plan at 453.

236 *Id.*

237 2015-2016 Transmission Plan at 249-251; 2016-2017 CAISO Transmission Plan at 313; Exhibit NHI-4 at 1-3 (no changes regarding the function of the pumped storage units as generation resources); 2018-2019 Transmission Plan at 453 (noting that in prior chapters the CAISO was studying storage projects as possible reliability and economic transmission solutions).

238 2018-2019 Transmission Plan at 465.

transmission asset.

- Second, because the 2018 Sensitivity Studies and Chapter 7 Informational Study were conducted using a PLEXOS zonal model, they only reflected the impact of renewable curtailment on a zonal basis, for California and the CAISO, respectively.[239] PLEXOS does not model specific locations on the CAISO system.[240] GridView, on the other hand, assesses LMP-based transmission constraints, thus resulting in a different pattern of load payment and generation revenue that may or may not accrue to ratepayers. As merchant and utility-owned generation is not distributed homogenously across the CAISO footprint, congestion and curtailment will have unequal impacts compared to a zonal model that does not fully capture transmission constraints across the CAISO footprint.

- Third, the findings in the 2018 Sensitivity Studies and the Chapter 7 Informational Study were based on "production cost savings,"[241] whereas the CAISO's economic planning studies were based on as assessment of "CAISO

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239 Exhibit CAISO-1 (Millar Declaration) at 31. The 2018 Sensitivity Studies used a 2,000 MW net export limit (*Id*. and Exhibit NHI-4 at 2), and the Chapter 7 Informational Study used a 5,000 MW export limit (Exhibit CAISO-1 (Millar Declaration) at 32. As discussed, *supra*, increasing the export limit reduces the value and benefits of LEAPS.

240 *Id.* at 31.

241 The 2018 Sensitivity Studies and predecessor studies calculated production cost savings for WECC and California (not just the CAISO). *See* 2015-2016 Transmission Plan at 254; 2016-2017 Transmission Plan at 316; Exhibit NHI-4 at 22, 24, 30, 33, 39, 42. While The Chapter 7 Informational Study calculated production cost savings for WECC and the CAISO. *See* 2018-2019 Transmission Plan at 467. California is not the same as CAISO and includes other balancing authority areas such as SMUD, LADWP and IID. California benefits also include benefits to merchant generators as opposed to utility owned generation and generation under purchased power agreements with California load serving entities, and which the CAISO refers to as "ISO-owned generation." Exhibit CAISO-1 at 34.

ratepayer benefits," which is the basis for approving a transmission project under TEAM. As discussed in Mr. Millar's Declaration, production cost savings and CAISO ratepayer benefits are significantly different concepts and have different components.[242]

The CAISO determines CAISO ratepayer benefits based on the impact to CAISO ratepayers of three separate categories: (1) CAISO gross load payment, (2) CAISO generator profit (*i.e.*, generator net revenues benefiting CAISO ratepayers), and (3) CAISO transmission revenue (*i.e.*, transmission revenue benefiting CAISO ratepayers).[243] The CAISO calculates ratepayer benefits (referred to in TEAM as the "net load payment") using the following formula:

***Net load payment = CAISO Gross load payment – CAISO Generator profit – CAISO Transmission revenue***

The CAISO also tracked LEAPS' potential market revenues separately, but ultimately included all potential market revenues as a benefit to ratepayers in its benefit-to-cost ratio calculations. This fully captured the potential benefits of LEAPS and other storage projects.

On the other hand, neither the 2018 Sensitivity Studies nor the Chapter 7 Informational Study calculated CAISO ratepayer benefits as required under

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[242] Mr. Alaywan questions why the storage studies would show a significant difference between the production cost impact on "California" ratepayers. Exhibit NHI-2 at 34-36. He ignores that the storage studies measured production cost savings, not CAISO ratepayer benefits. They are not the same thing. As stated above, the PLEXOS models used for purposes of the informational storage studies measure production cost impacts on all market participants, but the GridView studies measure only benefits for CAISO ratepayers, which is required by TEAM. The difference between the two is further exacerbated given that the GridView nodal model reflects internal CAISO constraints that are not reflected in the PLEXOS model.

[243] Exhibit CAISO-1 at 31-34.

TEAM; instead they calculated California/WECC production cost benefits and CAISO/WECC production cost benefits, respectively. These differ vastly from CAISO (alone) ratepayer benefits.[244] As explained above, the CAISO ratepayer benefits calculation considers both the production costs of resources serving load, but also the payments, revenues and profits—and their distribution—across market participants. Benefits that accrue to CAISO ratepayers are tracked and may or may not reflect benefits to other market participants inside or outside of the CAISO. In contrast, the production cost savings calculation used in the informational studies considers only the actual cost of production from the generation resources in an area, and does not consider the distribution of benefits among market participants. The figure below, from Mr. Millar's declaration, illustrates the different costs and revenues included in the calculation of CAISO ratepayer benefits in the GridView transmission planning studies versus the calculation of CAISO production cost savings in the Chapter 7 Informational Study.

244 *Id.* at 31-36.

## Ratepayer Benefits versus Production Cost Benefits

| CAISO Net Ratepayer Benefits from Production Cost Simulations are the sum of: | Types of Revenues and Costs calculated in Production Cost Studies | CAISO "Production Cost" Savings are the sum of: |
|---|---|---|
| | **Load Payments at Market Prices for Energy** | |
| Yes ⇐ | Reductions in ISO Ratepayer Gross Load Payments | |
| | **Generation Revenues and Costs** | |
| Yes ⇐ (CAISO tabulated LEAPS net revenue benefits separately for tracking purposes) | Increases in generator profits inside CAISO for generators owned by or under contract with utilities or load serving entities, being the sum of: | |
| | Increases in these generators' revenues | |
| | Decreases in these generators' costs | ⇒ Yes |
| | Increases in merchant (benefits do not accrue to ratepayers) generator profits inside CAISO, being the sum of: | |
| | Increases in these generators' revenues | |
| | Decreases in these generators' costs | ⇒ Yes |
| Yes ⇐ | Increases in profits of dynamic scheduled resources under contract with or owned by utilities or load serving entities, being the sum of: | |
| | Increases in these dynamic scheduled resource revenues | |
| | Decreases in these dynamic scheduled resource costs | |
| | **Transmission-related Revenues** | |
| Yes ⇐ | Increases in transmission revenues that accrue to ISO ratepayers | |
| | Increases in transmission revenue for merchant (e.g. non-utility owned but under ISO operational control) transmission | |

In addition to the CAISO ratepayer benefit calculation conducted pursuant to TEAM, the CAISO also calculated for informational purposes a benefit-to-cost ratio for LEAPS based on WECC-wide production cost savings using the GridView model.[245] The results of this calculation ($50 million in savings) are relatively similar to the WECC-wide production cost savings that the Chapter 7 Informational Study, utilizing the PLEXOS model, determined for a 500 MW hypothetical pumped storage facility ($46 million in savings).[246] This similarity is not surprising, because both of these analyses were based on a calculation of

245 *See* 2018-2019 Transmission Plan at 360, Table 4.9-45.

246 *See id*. at 467, Table 7.2-7.

WECC-wide production cost savings. However, given the significant differences in how those production cost savings are distributed, as shown in the figure above, it is unreasonable to assume, as Nevada Hydro does, that the production cost savings calculated for a hypothetical 500 MW storage unit would mirror the CAISO ratepayer benefits calculated for LEAPS. To do so ignores the potential benefits that accrue to parties outside of the CAISO footprint, as well as the potential benefits enjoyed by participants (*e.g.*, merchant generators) inside the CAISO footprint who may see revenue increases that do not accrue to the benefit of CAISO ratepayers. Unlike the production cost savings analysis used for the informational studies, the CAISO ratepayer benefit calculation includes both production cost results and more detailed information that attributes production cost benefits and market operation results to the entities that will realize those benefits. This is important because, as discussed above, in order for a project to be selected as an economic transmission solution, the project must result in positive economic benefits to CAISO ratepayers because CAISO ratepayers will bear the full costs of the project.

That said, Nevada Hydro understates the CAISO ratepayer benefits determined by the economic planning study of LEAPS. Mr. Alaywan alleges that the CAISO's calculation of ratepayer benefits is "suspect" because it shows a "34 million a year production cost impact on California."[247] This statement is incorrect because the negative $34 million cost figure cited by Mr. Alaywan fails

[247] Exhibit NHI-2 at 34, 36.

to consider LEAPS market revenues. The CAISO considered potential market revenues of storage projects as a CAISO net ratepayer benefit,[248] but the CAISO calculated and tracked these benefits separately[249] and then added them to the other CAISO net ratepayer benefits before calculating total CAISO ratepayer benefit-to-cost ratios. The annual CAISO ratepayer production cost benefit is the sum of CAISO ratepayer net load payment (*i.e.*, the negative $34 million cited by Mr. Alaywan) and the CAISO ratepayer benefit of the LEAPS market revenues (*i.e.*, $73 million). This results in an annual CAISO ratepayer benefit of $39 million through the market operation simulated in the production cost model.

Not surprisingly, the market-based CAISO ratepayer benefits of LEAPS seem low if one omits the revenue earned by the resource itself. Consider an example of a storage facility operated so it effectively displaces the operation of a similar but slightly less efficient generator—with the benefits of both accruing to ratepayers. The efficiency savings would cause the newer more efficient unit displacing the operation of the older unit, thus resulting in marginal overall benefit increases to total production costs, and decreased revenues for the existing facility. This would represent an increase in ratepayer production costs until the revenue generated by the new storage facility is also considered.

Overall, the GridView model provided relatively consistent results for WECC-wide production cost savings with the PLEXOS results, which is the

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248 All LEAPS revenues were considered ratepayer benefits because LEAPS' costs would be recovered from ratepayers if it were selected as a needed transmission solution.

249 2018-2019 CAISO Transmission Plan, footnote to Table 4.9-40, at 347.

objective function of the program. However, it is unreasonable to assume that operating a pumped storage facility to reduce WECC-wide production costs will necessarily equal net CAISO ratepayer benefits. To do so ignores the potential benefits that accrue to parties outside of the CAISO footprint, and also, the potential benefits enjoyed by participants (*e.g.*, merchant generators) inside the CAISO footprint who may see revenue increases that do not accrue to the benefit of the CAISO ratepayer. The PLEXOS studies did not take this step necessary for transmission planning studies.

Nevada Hydro's reliance on the Chapter 7 Informational Study is misplaced for another important reason: the study used the CPUC's 2017-2018 Hybrid Conforming Plan (HCP) portfolio to evaluate its contribution to reducing renewable curtailment, CO2 emission, and production costs.[250]

The CAISO did not use the HCP in its transmission planning base case, and it was not reflected in the 2018 Unified Planning Assumptions. The CAISO used the CPUC's "Default Scenario" portfolio in both instances.[251] The CAISO previously raised concerns regarding the HCP portfolio from a reliability perspective based on the results of its PLEXOS modeling. Nevada Hydro recognizes this fact, noting the CAISO's prior statements that such portfolio "does not have sufficient capacity to serve load and meet reserve requirements during critical net load hours." [252] The CPUC subsequently rejected using the

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250 20180-2019 Transmission Plan at 463.

251 2018-2019 Unified Assumptions Plan at 19.

252 Complaint at 41. The CAISO discusses *infra* Nevada Hydro's incorrect claim that the CAISO inappropriately used the HCP portfolio in the transmission process because it reflects

HCP portfolio and found it should not be the "preferred portfolio for future planning" because its "does not come close to achieving the 60 percent RPS requirements in 2030" and "not result in emissions reductions consistent with the electricity sector GHG goals established by this Commission."[253] The CAISO used the Section 7 Informational Study only to inform the IRP process, and not the transmission planning process. The Chapter 7 Informational Study used the HCP portfolio because the CPUC was still considering using the HCP portfolio. Regardless, it is ironic that Nevada Hydro seeks to rely on the results of a study based on a renewable resource portfolio that it disparages elsewhere in the Complaint.[254] This is yet another reason why Nevada Hydro's reliance on the Chapter 7 Informational Study to dictate transmission planning results is misplaced.

Finally, Nevada Hydro claims that the CAISO's informational storage studies showed that pumped storage units like LEAPS show benefits well above a 1:1 benefit-to-cost ratio.[255] But none of these studies calculated a benefit-to-cost ratio for pumped storage or followed the TEAM methodology, and they certainly did not calculate a benefit-to-cost ratio for CAISO ratepayers, as required by TEAM. Thus, Nevada Hydro is comparing apples to oranges, and the informational storage study results in no way indicate a need for LEAPS as a

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insufficient generation. As discussed above, the CAISO used the CPUC Default Portfolio in the planning process not the CPUC's HCP portfolio.

253 Preferred System Portfolio and Integrated Resource Plan Decision at 106-07.

254 *See* Complaint at 41.

255 *Id.* at 32.

transmission facility, demonstrate that LEAPS benefit-to-cost ration exceeds 1.0, or suggest any flaw in the CAISO's economic planning study of LEAPS or other project proposals.

#### *2. The CAISO's Evaluation of Local Capacity Benefits Was Reasonable Under the Circumstances, and Even if the CAISO Were to Adopt Nevada Hydro's Estimate of Local Capacity Benefits, LEAPS Would Still Have a Benefit-to-Cost Ratio Far Below 1.0*

The CAISO also studied the benefits of LEAPS and other economic projects in reducing local capacity requirements in the San Diego area. The CAISO conducted local capacity benefit analysis through powerflow modeling. The powerflow modeling allowed the CAISO to assess the effectiveness of LEAPS and other proposals to reduce reliance on current gas-fired local capacity resources. The CAISO attributed a value for reducing dependence on local gas-fired generation based on current specific local and system capacity needs. In the planning cycle, the CAISO valued local capacity requirement reductions based on the difference between local and system, and between local and south of Path 26, resources. As discussed in the 2018-2019 Transmission Plan,[256] the CAISO applied this methodology considering that transmission solutions capable of reducing local capacity requirements might not provide sufficient flexible and system capacity. The CAISO also applied this methodology recognizing the CPUC was in the middle of its IRP proceeding evaluating the future of the gas-fired generation fleet, which would require further coordination to determine the present and future need for gas-fired resources.

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[256] 2018-2019 Transmission Plan at 357.

- Nevada Hydro objects to the CAISO's calculation of local capacity benefits for LEAPS and other projects in the San Diego/Imperial Valley area of the CAISO grid. Nevada Hydro believes that the CAISO placed too low a value on local capacity reductions in its study. Nevada Hydro argues that the CAISO should have calculated local capacity benefits using the Capacity Procurement Mechanism (CPM) soft offer cap of $6.31/kW-year, which it claims the CAISO used as a proxy for local capacity benefits in the 2017-2018 transmission planning process.[257] Nevada Hydro states that using the CPM soft offer cap price would produce an annual local capacity reduction benefit for LEAPS of $38 million, compared to the $10.2 million value the CAISO derived.[258]

- Nevada Hydro's claim that "In the 2017-2018 planning cycle the CAISO used its Tariff-based soft offer cap of $6.31/kW-month as a proxy for the value of [local capacity reductions] in southern California" only tells half the story.[259] The full passage from the 2017-2018 Transmission Plan that Mr. Alaywan partially quotes in his testimony indicates that the CAISO used the CPM soft offer cap price "as an estimate of the *high end of the range* of the benefit" but also used "half of the local capacity price" as "a reasonable *low end* of the benefit" given that local capacity in the San Diego area could also provide benefits such as flexible generation.[260] In the 2017-2018 transmission planning

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257 Exhibit NHI-2 at 51-52.

258 *Id.* at 54.

259 Complaint at 44. *See also* Exhibit NHI-2 at 51-52.

260 *Id.,* citing 2017-2018 Transmission Plan at 253 (emphasis added).

process, the CAISO derived and considered a *range* of potential annual local capacity benefits, not the single high value as Nevada Hydro suggests.[261]

As the CAISO acknowledged in the 2018-2019 Transmission Plan, it took a conservative approach in assessing the value of local capacity reduction benefits in considering transmission reinforcements and other alternatives that might reduce the need for existing gas-fired generation providing local capacity.[262] As explained below, the conservative value attributed to the potential for reducing dependence on local gas-fired generation was reasonably and prudently based on the circumstances when the CAISO performed the analysis, including the need for further coordination with — and direction from — the CPUC, and uncertainty regarding future grid conditions.

First, for these study areas, there generally was no shortage of local capacity to meet local requirements, which would have otherwise led to a reliability need being identified.

Second, the status of the CPUC's IRP proceeding created uncertainty regarding the need for gas-fired resources to provide system and flexible capacity over the planning horizon. The concerns extended not only to having sufficient capacity available at time of peak loads, but also the ability of a steadily growing solar/storage fleet to meet sustained periods of low solar output. The concern over meeting system demand without the gas-fired generators could still exist even with LEAPS and other storage proposals. This uncertainty led the

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261 2017-2018 Transmission Plan at 253

262 2018-2019 Transmission Plan at 232, 361.

CAISO to conclude that prudence was required in assessing the potential economic benefit of displacing the existing gas-fired generation with transmission or storage.[263] The CAISO recognized that the 2018-2019 transmission planning cycle was taking place in the first year of the CPUC's first IRP process (which is a two-year process), with no time for the CPUC to provide timely feedback through the IRP process. The IRP process was addressing long-term needs for gas-fired resources for purposes other than local capacity, *e.g.*, to meet system and flexible capacity needs.[264]

These factors meant that uncertainty regarding capacity values in the 2018-2019 cycle was higher than previous planning cycles. The CAISO recognized that (1) it could not simply assume that gas-fired resources no longer needed for local capacity would not be needed for system or flexible capacity needs and (2) future integrated resource planning efforts would provide more guidance and long-term direction regarding expectations for the gas-fired fleet at a policy level.[265] Accordingly, the CAISO stated in the 2018-2019 Transmission Plan:

> While future IRP efforts are expected to provide more guidance and direction regarding expectations for the gas-fired generation fleet at a policy level, without that broader system perspective available at this time, the CAISO has taken a conservative approach in assessing the value of a local capacity reduction benefit when considering a transmission reinforcement or other alternatives that could reduce the need for existing gas-fired generation providing local capacity. In this planning cycle, the CAISO therefore applied the differential between the local capacity price

263 *Id.*

264 *See* IRP Proceeding Decision at 143-146.

265 2018-2019 Transmission Plan at 232, 357.

> and system capacity price to assess the economic benefits of reducing the need for gas-fired generation when considering both transmission and other alternatives.[266]

- The CAISO also recognized that "additional coordination on the long term resource requirements for gas-fired generation for system capacity and flexibility requirements will need to take place with the CPUC through future integrated resource planning processes."[267]

- Under these circumstances, using local capacity values based on the average weighted cost of local capacity in San Diego and the Los Angeles Basin above system capacity values (for which local gas-fired resources can also count) in these areas and in southern California generally was not unreasonable. Adopting a less prudent approach could have significant adverse and unnecessary effects on CAISO ratepayers. The CAISO notes that it applied its assumptions to all economic planning studies it conducted in the 2018-2019 transmission planning cycle.

- The CAISO's conservative approach regarding the local capacity benefit did not hurt Nevada Hydro. Even if the CAISO had adopted Nevada Hydro's proposed calculation of the local capacity benefit, which produces a $38 million annual benefit, LEAPS' benefit-to-cost ratio would still be far below the 1.0 level. As discussed in Mr. Millar's Declaration,[268] adding the dollar difference between the CAISO's local capacity benefit calculation values and Nevada

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266 *Id.* at 232.

267 *Id.* at 231.

268 Exhibit CAISO-1 at 39-40.

Hydro's local capacity benefit calculation values would still only produce a benefit-to-cost ratio for LEAPS of 0.50.[269] If the CAISO were to apply the low end of the range it considered in the 2017-2018 transmission planning process, the benefit would be $20.2 million annually,[270] resulting in a total benefit-to-cost ratio of 0.39.[271]

- Further, Nevada Hydro is not unduly prejudiced by the CAISO's assessment. The CAISO applied the same local capacity values to the other competing projects, including those that demonstrated superior benefit to cost ratios to LEAPS. Nevada Hydro is not precluded from requesting that the CAISO study LEAPS as an economic planning study or submitting LEAPS into the CAISO's reliability project request window in future planning cycles. The CAISO's 2019-2020 study plan notes that LEAPS has been submitted as an economic planning study request.[272] Also, the CAISO has recognized that additional coordination will be required regarding this matter and that it probably will need to revisit the local capacity values in future transmission planning

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[269] Calculated by replacing the CAISO value of $140.35 million under Option 2 in Table 4.9-44 on page 359 with $524 million found on page 58 of Mr. Alaywan's testimony, Table 5, Column "Local Capacity Benefit (millions)," Row "Present Value (millions),"

[270] Calculated by multiplying the CAISO value of $10.2 million under Option 2 in Table 4.9-44 on page 359 by the ratio of ($37,860/MW-year / $19,080/MW-year), which is the low end of the range used in the 2017-2018 Transmission Plan per page 253, divided by the value used to produce the $10.2 million.

[271] Calculated by replacing the CAISO value of $140.35 million under Option 2 in Table 4.9-44 on page 359 by pro-rating the $140.35 million by ($37,860/MW-year / $19,080/MW-year), which is the low end of the range used in the 2017-2018 Transmission Plan per page 253, divided by the value used to produce the $140.35 million.

[272] 2019-2020 Transmission Planning Process Unified Planning Assumptions and Study Plan (April 3, 2019) (2019-2010 Unified Planning Assumptions) available at http://www.caiso.com/Documents/Final2019-2020StudyPlan.pdf.

cycles.[273]

### 3. *There is No Basis for Additional Benefits from Other TEAM Categories*

- Nevada Hydro asserts that the CAISO "low-balled" its results for LEAPS by omitting an analysis of four purported "mandatory" TEAM benefit categories: (1) "RPS savings"; (2) "avoided interconnection costs"; (3) improved deliverability benefits; and (4) reliability cost savings. Nevada Hydro claims that the CAISO gave no reason for omitting these benefits.[274] In his testimony, Mr. Alaywan provides the allegedly "missing" benefit calculations. Mr. Alaywan estimates avoided interconnection costs for 320 MW of renewable generation, equaling $9 million per year or a net present value of $114 million.[275] Mr. Alaywan also claims that LEAPS can improve deliverability and quantifies that benefit at $31 million per year. He states that LEAPS would "unload" approximately 311 MW of capacity on a major 500 kV transmission line between Imperial Valley and San Diego.[276] Finally, the Complaint contends that the CAISO did not consider reliability cost savings from LEAPS, and Mr. Alaywan calculates the benefit to be $33 million per year.[277]

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273 2018-2019 Transmission Plan at 231,361.

274 Complaint at 47. Nevada Hydro also includes capacity benefits in its list of TEAM criteria that it asserts that the CAISO "failed to calculate." However, Nevada Hydro's dispute regarding this category was not that the CAISO failed to calculate capacity benefits altogether, but rather, the manner in which the CAISO calculated such benefits. Therefore, the CAISO has addressed it separately in Section III.C.2 above.

275 Exhibit NHI-2 at 47.

276 *Id.* at 49.

277 *Id.* at 59.

- The CAISO discusses each of the "purported omissions" below and shows that, consistent with the CAISO tariff and TEAM, the CAISO appropriately did not credit LEAPS for any benefits associated with the benefit categories Nevada Hydro has devised. Also, Nevada Hydro's argument these criteria are "mandatory" mischaracterizes TEAM. TEAM makes clear that benefits other than production cost impacts are considered "additional" benefits and "for a specific project there may be only some types of these additional benefits applicable, and it should be case by case based and would be depending on numbers of factors such as the location of the project, the type of upgrade, etc."[278]

#### *(a) The CAISO Appropriately Did Not Credit LEAPS with Any Additional Benefits for RPS Savings or Avoided Interconnection Costs*

Nevada Hydro alleges that the CAISO did not credit LEAPS with "RPS savings" and "avoided interconnection costs" associated with "facilitating the integration of lower cost renewable resources located in a remote area or by avoiding over-build."[279] Mr. Alaywan claims that the RPS over-build savings would be about $98 million per year and that avoided interconnection costs would be $9 million per year.[280] Nevada Hydro further claims that the CAISO's 2018 large scale bulk storage study showed potential RPS over-build savings as

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278 *See* Exhibit CAISO-2 at 21.

279 Complaint at 38-39.

280 Exhibit NHI-2 at 44, 47.

high as $73 million per year.[281] Nevada Hydro claims that the CAISO's reason for denying the RPS over-build savings was that LEAPS functioned as an energy or capacity resource in CAISO markets rather than as a transmission function.[282] Nevada Hydro claims that the CAISO misapplied tariff section 24.4.6.7 by requiring an economic project to provide both congestion relief and resource integration.[283] Last, Nevada Hydro claims that the CPUC-developed generation portfolios that the CAISO used as base cases are (1) unreliable, (2) do not account for the supply needs of community choice aggregators, and (3) improperly incorporate 4,138 MW of hypothetical renewable generation.[284]

As an initial matter, Nevada Hydro mischaracterizes TEAM. There is no "RPS Savings" benefit category in TEAM. The potential additional benefit that Nevada Hydro is apparently seeking to invoke is the "public policy benefit."[285] It is unclear why Nevada Hydro does not use the appropriate TEAM terminology, although perhaps Nevada Hydro wished to avoid having to address the fact that the CPUC is responsible for resource planning and procurement and plays an important role in submitting renewable resource portfolios to the CAISO for consideration in the transmission planning process, and that these portfolios are especially relevant in the context of approving public policy transmission solutions. The Commission has recognized the CPUC's, and other local

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281 Complaint at 39.

282 *Id.* at 42.

283 *Id.* at 40.

284 *Id.* at 41-42.

285 Exhibit CAISO-2 at 2.

regulatory authorities', important role in providing resource portfolios to the CAISO for use in the transmission planning process, particularly in preventing stranded costs and overbuild. Indeed, the TEAM document itself recognizes that the data used for the CAISO's benefit calculations for "public policy benefits" and other additional benefit categories may not be from the CAISO's transmission planning process but may be obtained through coordination with state agencies such as the CPUC.[286]

The CAISO also notes that the RPS "over-build" savings and avoided interconnection costs cited by Nevada Hydro are not distinct benefits, and are not separate TEAM categories. The purported avoided interconnection costs are proportional to the reduced renewable resource over-build that Nevada Hydro claims would otherwise be required without LEAPS.

Nevada Hydro fails to recognize that both the RPS over-build savings and the reduced interconnection costs are considered in the CPUC's integrated resource planning process and reflected in the renewables portfolios provided to the CAISO for use in the transmission planning process.[287] The CPUC-developed generation portfolios provided for the CAISO's use in the 2018-2019

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[286] Exhibit CAISO-2 at 21-22. TEAM also recognizes that for the additional benefits categories, which includes the "public policy benefit," not all additional benefits will be applicable, and it will be case-by-case based and depending on a number of factors including, *inter alia*, the location of the project and the type of upgrade. *Id.* at 21.

[287] *See* CPUC Energy Division Presentation on Proposed Reference System Plan at 76-77, 102 ("Adding 1,000 MW of pumped storage to the portfolio in 2022 primarily displaces in-state solar PV…but ultimately increases costs to ratepayers in all scenarios.") https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/ElectPowerProcurementGeneration/irp/AttachmentA.CPUC_IRP_Proposed_Ref_System_Plan_2017_09_18.pdf.

transmission planning process incorporated RPS overbuild and interconnection savings associated with various generation options including pumped storage.[288] The results of the CPUC's analysis indicated that pumped storage was not cost-effective when compared with other resources.[289]

TEAM recognizes that the CAISO will use renewable portfolios from the CPUC for purposes of examining the additional TEAM benefits such as the "public policy benefit."[290] Accordingly, the CPUC's integrated resource plan proceeding is the more appropriate venue to compare RPS over-build savings of pumped storage versus other generation options because any RPS over-build savings are directly the result of adjusting the state's overall generation mix to more cost-effectively meet state RPS goals. Pumped storage resources like LEAPS could potentially reduce the quantity of new renewable resources that must be built to meet state RPS goals, but the costs of displacing additional renewable over-build must be balanced against the costs of the pumped storage. In addition, the state may elect to pursue different renewable generation portfolios that would reduce over-build necessary to meet the RPS, reducing the potential benefits of pumped storage.

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[288] *Id* at 44. The CPUC uses an incremental total resource cost metric to compare annualized incremental cost across various different scenarios. The CPUC explained that the incremental total resource cost metric captures (1) "Fixed costs of new electric sector investments (generation & transmission)" and (2) "CAISO portion of WECC operating costs (including net purchases & sales)." *See also* IRP Proceeding Decision at 38.

[289] *Id.* at 76. Pumped storage was not selected in any of the 26 sensitivities conducted on the Default Scenario.

[290] Exhibit CAISO-2 at 21. The CAISO Tariff also provides that the CAISO will "consider the results and identified priorities of the California Public Utilities Commission's or Local Regulatory Authorities' resource planning processes" in assessing the need for public policy transmission solutions. Section 24.4.6.6 (b) of the CAISO tariff.

In its integrated resource planning process, the CPUC explicitly considered these tradeoffs as part of its studies reviewing the benefits of long-lead time resources, including pumped storage, out-of-state wind, and geothermal. CPUC staff's analysis of long-lead time resources concluded that out-of-state wind could be a cost-effective means of diversifying the state's portfolios, but that "[e]arly procurement of pumped hydro and geothermal, on the other hand, would tend to increase total portfolio costs based on current cost estimates."[291]

The CPUC's integrated resource planning process is the more appropriate forum to compare pumped storage against competing generation options to meet the state's environmental goals in the most cost-effective manner, particularly when such pumped storage resources are providing market services like ancillary services, load following, and flexible ramping, as Nevada Hydro states that LEAPS will perform.[292]

In contrast, the tariff-defined purpose of the CAISO's economic planning transmission study process is to determine whether the benefits of a particular transmission solution outweigh the costs. The CAISO tariff specifies that the "benefits of the solutions may include a calculation of any reduction in production costs, Congestion costs, Transmission Losses, capacity or other electric supply costs resulting from improved access to cost-efficient resources."[293] The CAISO

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291 IRP Proceeding Decision at 43.

292 *See* Exhibit NHI-7; *see also* discussion at III.D, *infra.*

293 Section 24.4.6.7 of the CAISO tariff.

notes that each potential reduction in cost—whether related to production, congestion, losses, or capacity—is qualified by the final phrase "resulting from improved access to cost-efficient resources." This means that any successful economic transmission solution must provide benefits by improving access to cost efficient resources, rather than actually providing the capacity, energy, or ancillary services itself. The CAISO, not the CPUC, has the authority to identify economic transmission solutions that provide benefits based on improving access to cost-efficient resources. But the CPUC has authority over resource procurement and planning.

Nevada Hydro makes several arguments that further confirm the CPUC's IRP proceeding is the appropriate forum for addressing the issues Nevada Hydro raises. First, Nevada Hydro suggests that the CPUC "needs to plan for more generation than in its current models or face a serious reliability threat."[294] In doing so, Nevada Hydro states that the "CAISO has advised the CPUC that the 'hybrid conforming portfolio' that the CPUC provided to the CAISO for use in its transmission planning process 'does not have sufficient capacity to serve load and meet reserve requirements during critical net load hours."[295] Second, Nevada Hydro suggests that the CPUC's portfolio does not account for the supply needs of community choice aggregators who may not be planning for enough renewable resources to meet future needs.[296] Nevada Hydro then

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294 Complaint at 41.

295 *Id.*

296 *Id*. at 41-42.

claims that the CAISO "failed to consider the possibility that LEAPS would reduce this rapidly growing supply burden and the associated cost savings."[297] In short, Nevada Hydro wants the CAISO to consider LEAPS as a replacement supply resource to reduce these purported shortfalls in generation.

Nevada Hydro is essentially seeking to second guess and circumvent the CPUC's generation portfolio through the CAISO's transmission planning process. Such a role falls well outside the CAISO's transmission planning function. Nevada Hydro attempts to obfuscate this distinction between transmission and generation planning by accusing the CAISO of "deferring" to the CPUC on whether to include transmission projects.[298] However, the statement Nevada Hydro cites to support this assertion explicitly and appropriately recognized the distinct jurisdictional roles of the CAISO and the CPUC, pointing out that energy storage, *when used for resource substitution*, is more properly approved through the CPUC's resource planning function, rather than identified through the CAISO's transmission planning process.[299]

Nevada Hydro's comments regarding the HCP further demonstrate fatal flaws in its arguments. As discussed above, the CAISO did not use the HCP in the transmission planning process;[300] it used the Default Scenario recognized in

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297 *Id.*

298 Exhibit NHI-2 at 42-43.

299 *See id*. at 42.

300 Nevada Hydro correctly notes that the CAISO commented on the Hybrid Conforming Portfolio in the CPUC's IRP proceeding in January 2019. The CAISO's comments raised concerns that the portfolio did not have sufficient capacity to serve load and meet reserve requirements during critical net load hours. In response to comments from the CAISO and other stakeholders, the CPUC rejected the Hybrid Conforming Portfolio and, instead, adopted a revised

the 2018 Uniform Planning Assumptions. Also, Nevada Hydro ignores that the CPUC has rejected use of the HCP. Nevada Hydro's argument also demonstrates an internal inconsistency in its position: On one hand, Nevada Hydro attempts to disparage the CAISO for purportedly using the HCP in the transmission planning economic study process, which the CAISO did not. On the other hand, Nevada Hydro relies on the inapplicable results of the Chapter 7 Informational Study, which was based on the HCP, to support its claim that LEAPS should be accorded more benefits than the CAISO's economic planning study found. The Commission should not countenance this.

Separately, Nevada Hydro's claims (1) that the CPUC portfolios did not account for the supply needs of community choice aggregators, and (2) that the CPUC and community choice aggregators may not be planning for enough renewable resources to meet future needs, are false. In discussing the application of its integrated resource planning process to CCAs, the CPUC noted that

> The [CPUC]'s portfolio aggregation and evaluation process, which relies on fulfillment of IRP filing requirements by LSEs, is the only process capable of assessing the overall needs of the CAISO grid and meeting the statewide GHG, reliability, and least-cost goals collectively. While LSEs may use their IRP process to meet local planning needs as well, the statewide planning function is the statutorily required process, and not subservient to the CCAs' other

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portfolio for 2019-2020 transmission planning purposes. Preferred System Portfolio and Integrated Resource Plan Decision at 172. ("The Commission should not adopt the hybrid conforming portfolio as the preferred system plan, because it does not meet the GHG emissions goals or the RPS requirements in 2030, and also represents a less reliable portfolio than the RSP adopted in D.18-02-018, as updated to reflect the 2017 IEPR assumptions.") The CPUC adopted a portfolio that included a more diversified set of renewable resources in an attempt to address reliability concerns.

purposes.[301]

The CPUC confirmed its role in evaluating whether resource procurement by all jurisdictional entities, including community choice aggregators, results in a reliable and affordable electric system that meets the GHG emissions reduction requirements of state law and policy.[302] Based on these findings, the CPUC required each individual community choice aggregator to file an integrated resource plan with the CPUC for review and certification.[303] As load migrates to community choice aggregators, their share of capacity and energy needs is expected to grow, but there is no basis for Nevada Hydro's statement that the CPUC portfolios do not account for community choice aggregator supply needs.

Finally, Nevada Hydro believes that the CAISO's failure to grant LEAPS any RPS savings benefit turns on a faulty tariff interpretation of the CAISO tariff. Nevada Hydro suggests that the CAISO "appears to interpret section 24.4.6.7 of the Tariff to require an economic project to address both" (1) congestion relief and (2) resource integration.[304] The CAISO has never interpreted the economic planning study tariff provisions in that manner, and has never applied section 24.4.6.7 in such manner in determining whether it needs additional transmission solutions.

Again, Nevada Hydro is conflating apples and oranges to its own benefit. The specific tariff language cited by Nevada Hydro pertains to the conditions

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301 Preferred System Portfolio and Integrated Resource Plan Decision at 18.

302 *Id*. at 104.

303 IRP Proceeding Decision at 165.

304 Complaint at 40.

under which the CAISO may conduct an economic planning study—if the CAISO "concludes additional studies are necessary to determine whether additional transmission solutions are necessary to address" congestion, local capacity area resource requirements, or integration of new resources or loads on an aggregated or regional basis. The CAISO already applied this standard in studying LEAPS as a High Priority Economic Planning Study. However, the standard for deciding whether to conduct a specific economic planning study is not the standard under tariff section 24.4.6.7 for determining whether a particular solution constitutes an economically-driven "transmission solution" whose benefits "outweigh the costs" and "result[] from improved access to cost-efficient resources."[305] A prerequisite for the CAISO to approve an economic transmission solution in the transmission planning process is that the identified benefits of the transmission solution, whether from congestion relief or resource integration (or something else), must (1) exceed the costs of the project and (2) result "from improved access to cost-efficient resources." LEAPS benefit to cost ratio is well-below 1.0 and, as discussed *infra* in Section III.D, the LEAPS pumped storage unit is not providing improved access to cost-efficient resources—it *is* the resource.

The CAISO's Compliance Filing with Order No. 890,[306] which originally

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[305] Section 24.4.6.7 of the CAISO tariff.

[306] *Preventing Undue Discrimination and Preference in Transmission Service,* Order No. 890 72 FR 23,266 (March 15, 2007), FERC Stats. & Regs. ¶ 31,241 (2007); *order on reh'g and clarification* (Order No. 890-A), 121 FERC ¶ 61,297 (December 28, 2007), *order on reh'g and clarification* (Order No. 890-B), 123 FERC ¶ 61,299 (June 23, 2008) (Order No. 890).

incorporated the economic planning study process into the CAISO tariff, explained that the "Economic Planning Studies focus on identifying future congestion and exploring potential mitigation plans for bottlenecks on the grid."[307] The CAISO explained that "mitigation plans recommended from the Economic Planning Study will consider: (1) expansion or acceleration of previously approved transmission projects and (2) new proposed upgrades or conceptual projects that can relieve the constraint."[308] This language indicates that economic transmission solutions must relieve transmission constraints by improving access to cost-efficient resources rather than acting as a generation (or load) resource itself. If an economic transmission solution need not improve access to cost-efficient resources, it logically follows that any generation resource or demand side management program—not just storage—could provide economic benefits within the context of the CAISO tariff and be considered a transmission facility. Such a reading would contravene the FPA, Commission precedent, and both the plain language and intent of the CAISO tariff.

***(b) LEAPS Does Not Provide The Increased Deliverability Benefits TEAM Contemplates***

- Nevada Hydro claims that LEAPS increases import capability into the CAISO-Controlled Grid by freeing-up 311 MW of capacity on the existing Sunrise 500 kV transmission line that would allow more renewable resources to

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307 CAISO Order 890 Compliance Filing (December 21, 2007), Docket No. OA08-62-000, at 29, available at http://www.caiso.com/Documents/December21_2007FilinginCompliancewithTransmissionPlanningRequirements-Order890inDocketNo_OA08-62-000.pdf.

308 *Id.*

be delivered into the San Diego area.[309] Nevada Hydro argues that the CAISO failed to credit LEAPS for this increased deliverability benefit, which Mr. Alaywan calculated as $31 million annually.[310]

- TEAM recognizes that a "[t]ransmission upgrade can potentially increase generator deliverability to the region under study through the *directly increased transmission capacity or the transmission loss saving.*"[311] The TEAM document notes that "[s]imilar to the resource adequacy benefit as described in section 3.5.1, such deliverability benefit can only materialize when there will be capacity deficit in the region under full study" and that assessment of such benefit will be on a case-by-case basis.[312]

- Nevada Hydro fails to make even a *prima facie* case that LEAPS is entitled to a deliverability benefit. Under TEAM, the deliverability benefit only arises if there will be a capacity deficit in the region being studied. Because there is no capacity deficit in the San Diego/Imperial Valley region for the 10-year planning period studied,[313] there can be no deliverability benefit for LEAPS. Nevada Hydro also fails to show that LEAPS will produce any transmission loss savings.[314]

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309 *Id.* at 47-48.

310 *Id.* at 50-51.

311 Exhibit CAISO-2 at 22 (emphasis added).

312 *Id.* The TEAM Document erroneously refers to Section 3.5.1. It should read section 2.5.1.

313 *See* 2018-2019 Transmission Plan at Appendix G at 1-2 (showing zero capacity deficiency for the San Diego/Imperial Valley local area for both 5- and 10-year planning horizons).

314 The gaps in Nevada Hydro's analysis are also exposed by how Nevada Hydro assessed the value of the deliverability benefit. Instead of determining what type of upgrade might

- Nevada Hydro's argument is premised on the notion of LEAPS freeing-up capacity on an existing line into San Diego to allow some additional renewable resources to flow on that line. However, even assuming, *arguendo*, that Nevada Hydro's claim is correct, the CAISO's reliability studies showed no need to unload capacity on this line. Further, the CAISO's public policy transmission analysis showed no need to bring additional renewable resources in on this line. The CAISO did not identify a need for any additional transmission upgrades to support the deliverability of renewable resources identified as full capacity delivery status resources.[315] The fact that LEAPS may be able to provide services the CAISO has not found are needed cannot serve as a basis for approving a $2 billion project as a necessary economically-driven solution. As the Commission previously recognized, arguments that LEAPS is a transmission facility are "too general to support such a finding absent specific, transmission planning process-identified transmission needs and an explanation of how LEAPS will operate to meet those needs."[316] Any capacity benefits that might accrue to the San Diego/Imperial Valley local area would have been accounted for in assessing the local capacity benefit and, if there is congestion on the existing line, any congestion relief that LEAPS might provide would be

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accommodate the 311 MW and the avoided cost of such upgrade, Mr. Alaywan instead estimated the value of the 311 MW of deliverability by comparing it to the annual revenue requirement of a different transmission pathway into SDG&E, stating that such value is approximately equal to what it would cost to build a new transmission line with equivalent capacity. Complaint at 48, citing Exhibit NHI-2 at 59.

315 2018-2019 Transmission Plan at 191-224.

316 Order Dismissing Declaratory Petition at P 24.

accounted for in the CAISO's production cost analysis. Thus, providing LEAPS a separate "deliverability" benefit would constitute double-counting.[317]

### *(c) LEAPS Does Not Avoid the Costs Associated with Other Approved Reliability or Policy Projects*

- TEAM recognizes that if a reliability or policy project can be avoided because of an economic project under study, then the avoided cost of such project or projects is counted as a benefit of the economic project.[318] The CAISO has not approved a new reliability or policy project that can be avoided by LEAPS. LEAPS produces no avoided reliability or policy project cost benefits.

- The Complaint nevertheless alleges that the CAISO failed to consider "reliability cost savings" in the form of avoided curtailment payments to renewable generators and out-of-merit dispatch payments to gas-fired resources "at about $33 million per year." [319] However, a review of Mr. Alaywan's testimony on this issue makes clear that the $33 million figure is not based on avoided curtailment payments or out-of-merit dispatch payment. Rather, Mr. Alaywan calculates the $33 million based "on the cost of the facilities that would need to be built to relieve the overloads."[320] Specifically, Mr. Alaywan calculates the annual avoided cost number based on the capital costs to upgrade six

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317 Exhibit CAISO-1 at 44. Freeing-up capacity on an existing line to allow additional renewable resources to flow on it is not "directly increasing transmission capacity" as required by TEAM to receive a deliverability benefit. LEAPS would essentially be replacing energy that would otherwise be delivered via the existing Sunrise transmission line. Mr. Alaywan's testimony indicates as much, noting that the Imperial Valley substation would serve 36 percent of SDG&E's load with LEAPS, compared to 43 percent without LEAPS. Exhibit NHI-2 at 49.

318 Exhibit CAISO-2 at 2, 23.

319 Complaint at 48, citing Exhibit NHI-2 at 59.

320 Exhibit NHI-2 at 23.

transmission facilities at a total capital cost of $459 million.[321] Mr. Alaywan claims that building LEAPS would allow the CAISO to avoid physically upgrading these six transmission facilities.[322] But even that figure were accurate, it is irrelevant because the CAISO has not identified a reliability need for these transmission upgrades and did not approve them in the 2018-2019 Transmission Plan.[323] Avoiding transmission upgrades not needed for reliability in the first instance plays the role of both arsonist and fireman, and cannot serve as the basis for counting avoided reliability project costs under TEAM. Moreover, as noted above, Nevada Hydro's argument here ignores that even if the CAISO were to approve LEAPS, (1) the CAISO would still need to retain the RAS, and (2) the P6/N-1-1 contingencies that LEAPS could purportedly mitigate are not only sufficiently mitigated by the operating measures identified by the CAISO, but such operational measures meet a higher requirement than imposed by NERC reliability standards.[324] There simply is no basis for the $459 million capital cost investment in new transmission over the next 10-year planning horizon that Mr. Alaywan relies on, especially given that existing measures sufficiently address the contingencies.

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321 *Id.* Mr. Alaywan makes no attempt to calculate the costs associated with curtailment and out-of-market dispatch, which the Complaint states is the basis for the avoided $33 million in costs.

322 *Id.*

323 2018-2019 Transmission Plan at 181-190.

324 *See* Section III.B, *supra*.

- Further, P6, N-1-1 contingencies are contingencies that only arise after there has been a loss of a single generator or transmission component, followed by a system adjustment for which the CAISO has 30-minutes to make, followed by another loss of a generator or transmission component. They are not common occurrences. The costs of any residual impacts would be *de minimis,* especially given that LEAPS would not eliminate the need for the RAS.[325]

- Nevada Hydro's approach is also flawed because it is based on the recurring and speculative assumption that no natural gas-fired generation is available in the SCE and SDG&E service areas and, as such, transmission upgrades are necessary.[326] There is no basis for such an assumption within the CAISO's 10-year planning horizon, except for resources with once-through cooling compliance obligations. The CAISO's studies already account for known and expected retirements. As indicated above, the CAISO has no evidence that other gas-fired units in the area are retiring.

#### *3. The CAISO Did Not Violate TEAM By Only Considering Benefits from 2028*

- Nevada Hydro notes that the CAISO estimated $73 million per year in market revenues from LEAPS, but nonetheless claims the CAISO undercounted these revenues because it only looked at revenues for 2028.[327] Nevada Hydro states that TEAM contemplates studying at least two years – five,

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325 Exhibit CAISO-1 at 46.

326 Exhibit NHI-2 at 19-20.

327 Complaint at 48.

and ten years into the future – and conducting s sensitivities to test the results.[328] Nevada Hydro asserts that by not at least having two points of reference, the CAISO failed to account for the slope of benefits and failed to account for long-term changes in fuel costs and RPS requirements.[329] In his affidavit, Mr. Alaywan calculates prices for 2026, 2030, and 2045, and, after linearly increasing the values between 2026 and 2045, concludes that the average market revenues for LEAPS should be $91 million per year instead of $73 million.[330]

- The CAISO's analysis is consistent with TEAM and the CAISO's practice; Nevada Hydro's analysis is not. The TEAM document notes that the CAISO conducts economic planning studies five years out and ten years out, and benefits for the years between five and ten years are estimated through linear interpolation.[331] However, the ten-year planning case is the primary case for both congestion analysis and benefit calculation, and the CAISO will typically only develop a five-year planning case if the ten-year case indicates sufficient benefits for any of the high priority study areas to warrant developing the additional five-year data point.[332] In the CAISO's analysis of LEAPS, study

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328 *Id*. at 49, citing Exhibit CAISO-2 at 19, 26.

329 Complaint at 49.

330 *Id*. at 50, citing Exhibit NHI-2 at 56-59. Mr Alaywan also claims that these "market revenues" should be considered "renewable integration benefits" because they relate to avoided renewable generation curtailment payments. *Id*. at 27. However, there is no basis for treating market revenues in this manner, as TEAM explicitly defines "renewable integration benefits" as limited to "interregional transmission upgrades [that] help mitigate integration challenges, such as over-supply and curtailment*, by allowing sharing energy and ancillary services (A/S) among multiple BAAs*." Exhibit CAISO-2 at 2.

331 *Id.*

332 2016-2017 Transmission Plan at 169; 2017-2018 Transmission Plan at 224 (study for 5th planning year is optional if needed to provide a data point in the energy benefit assessment for

results for the ten-year planning case in the 2018-2019 transmission planning process—2028—did not show net economic benefits anywhere near 1.0 for LEAPS (or other proposed economic transmission solutions); thus, studying benefits for the 5th planning year—2023—was unnecessary, particularly because that LEAPS projected in-service date was not until *2025*.[333]

- Regardless, even if the CAISO developed and utilized a five-year planning case, it would not have provided Nevada Hydro with any increase in benefits. First, the planned in-service date of LEAPS will not occur until 2025. TEAM provides that "[b]eyond ten years, the benefits are assumed to be flat at the same value as the 10-year's benefit."[334] Therefore, any increases between a five-year and ten-year planning case would be treated as flat after the ten-year planning case (*i.e.,* 2028) anyhow. Given this and the fact that Nevada Hydro's own analysis shows lower benefits in the early years (Exhibit NHI-2 at 58), it is unclear why Nevada Hydro believes that including a five-year planning horizon case would have provided it with a higher benefit calculation. The CAISO's approach in its 2018-2019 transmission planning process, which it applied to all

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transmission project economic justification); 2018-2019 Transmission Plan at 224 (the CAISO normally develops the 10-year case as the primary case for congestion analysis and benefit calculation and may also develop a five-year case for providing a data point in validating the benefit calculation of transmission upgrades by assessing a five-year period of benefits before the ten-year period becomes relevant). *See also* 2018-2019 Unified Planning Assumptions at.49; 2017-2018 Unified Planning Assumptions at 56.

333 Exhibit NHI-7 at 1.

334 Exhibit CAISO-2 at 19. Despite his claims to the contrary, Mr. Alaywan also kept benefits flat after year four of his analysis except for the categories of RPS cost reductions and interconnection cost reductions (*i.e.*, overbuild costs). *See* Exhibit NHI-2 at 58. As discussed above, these cost reduction categories were not considered by the CAISO because they are incorporated into the CPUC's resource portfolios provided to the CAISO as indicated in the TEAM Document.

potential transmission solutions, is consistent with TEAM and CAISO practice.[335]

- Ironically, after attacking the CAISO for failing to develop and apply five-year and ten-year planning cases, Nevada Hydro presents as the "correct" analysis Mr. Alaywan's assessments for 2026, 2030, and 2045, which are obviously neither five-year nor ten-year planning studies.[336] Rather, they are eight, twelve, and twenty-seven year planning studies. Furthermore, contrary to the plain directive of TEAM, Mr. Alaywan did not keep projected revenues flat after the ten-year case.[337]

- Mr. Alaywan also calculates RPS avoided cost benefits through 2045, escalating them annually.[338] This is inconsistent with TEAM, which only looks out over a 10-year planning horizon and assumes flat benefits after the tenth planning year.[339] This approach is also inconsistent with the CAISO's 2018-2019 Unified Planning Assumptions (pages 7, 49) for the 2018-2019 planning cycle that indicated the CAISO would span a 10-year planning horizon. Again it is ironic that Nevada Hydro (erroneously) accuses the CAISO of not following the 2018-2019 Unified Planning Assumptions, yet fails to do so itself.

- Because Mr. Alaywan's analysis is based on assumptions directly at odds with TEAM and the 2018-2019 Unified Planning Assumptions, the

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335 *See, e.g.,* 2016-2017 Transmission Plan at 175-176; 2017-2018 Transmission Plan at 229.

336 Exhibit NHI-2 at 58.

337 *Id.*

338 *Id.*

339 Exhibit CAISO-2 at 19.

Commission should not give it any weight.

- Finally, Nevada Hydro's claim that the CAISO failed to include sensitivities to account for uncertainties in its analysis of LEAPS is incorrect. The CAISO explored key sensitivities such as renewable curtailment pricing,[340] locational impacts,[341] and as discussed above no export limits.[342] Other sensitivities were considered unlikely to have a material impact given the base benefit-to-cost ratio for LEAPS.

### D. The CAISO Properly Studied All of LEAPS' Attributes and Capabilities, and the Economic Studies Show that the Primary Benefits of LEAPS Result from the Pumped Storage Unit Providing Market Services and Earning Market Revenue

- Nevada Hydro states that the Commission expressed interest in how the CAISO would require LEAPS to be operated to meet transmission needs, but claims that the CAISO's focus was on LEAPS as a preferred resource, not on how the CAISO would operate LEAPS as a transmission resource.[343] Nevada Hydro claims that the CAISO wrongly assumed that LEAPS would operate to maximize market revenues instead of transmission benefits. Nevada Hydro further claims the 2018-2019 Transmission Plan discusses nowhere how the CAISO would operate LEAPS to relieve congestion in the

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340 *See* 2018-2019 Transmission Plan at 353-55 (noting that in order to test the impact of its renewable curtailment model, the CAISO conducted a sensitivity with the renewable curtailment price set at negative $25).

341 *See id.* at 352 (noting that in order to more fully understand the modeling results and locational impacts, the CAISO examined the impact of modeling LEAPS connected to a relatively unconstrained pricing location in southern California).

342 *See supra* at Section III.C.1.b.

343 Complaint at 51.

SDG&E or SCE load pockets, support system reliability by reducing thermal overloads on the SDG&E system, aid system stability, or facilitate energy imports or exchanges.[344]

Nevada Hydro's claim that the CAISO failed to properly consider LEAPS is both incorrect and wholly unsubstantiated. The CAISO studied LEAPS with all of the attributes, capabilities, and operating characteristics described in Nevada Hydro's Request Window Submission and the 2018-2019 CAISO Transmission Plan. [345] The CAISO did not limit LEAPS' functions and ability to earn market revenues.[346] Nevada Hydro identifies no specific errors in how the CAISO modeled LEAPS in its economic planning studies.

What Nevada Hydro fails to recognize is that most of the benefits LEAPS would provide stem from the pumped storage unit's ability to earn market revenues by providing services such as load following, ancillary services, flexible ramping, and energy arbitrage. Even though these are benefits common to generation facilities, the CAISO's cost/benefits analysis gave LEAPS the full benefit of *all* the services it would provide and functions it could perform, including those associated with market services. LEAPS still did not have a benefit-to-cost ratio anywhere near 1:1 even when assessed in the most favorable light possible. LEAPS' benefit-to-cost ratio would have been significantly less had the CAISO constrained LEAPS' operations and imposed

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344 *Id.* at 52.

345 Exhibit CAISO-1 at 22, 47.

346 *Id.* at 22.

restrictions on LEAPS' ability to earn market revenues through market services.

Contrary to Nevada Hydro's attempt to paint the CAISO as "bias[ed]" against approving energy storage as part of its transmission planning process, the CAISO is well aware that storage units can provide reliability services such as mitigating thermal overloads and providing voltage support, as the Commission has recognized in prior CAISO-related orders.[347] Indeed, in prior transmission plans the CAISO has approved storage units as reliability transmission solutions to mitigate thermal overloads.[348] The CAISO expressly recognized in the 2018-2019 CAISO Transmission Plan that LEAPS "would be expected to provide reactive power in keeping with the ISO's reactive power requirements set out in the ISO's tariff, but "the ISO has not identified this as a specific need."[349]

In the 2018-2019 Transmission Plan, the CAISO did not suggest that LEAPS was unable to operate to mitigate thermal overloads or provide transmission-related reliability services, nor can Nevada Hydro point to any such statement. Rather, as discussed in Section III.B, *supra*, the CAISO merely found that there was no reliability need for the $2 billion LEAPS project.[350] As described in the 2018-2019 Transmission Plan, the CAISO rejected several other

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347 *Western Grid Dev., LLC,* 130 FERC ¶ 61,056 at P 47 (2010).

348 2017-2018 Transmission Plan at 124, 128-29, 140-142 (approving Oakland Clean Energy Initiative and Dinuba storage as reliability solutions to address thermal overloads).

349 *Id.* at 346.

350 2018-2019 Transmission Plan at 181-190.

proposed solutions in addition to LEAPS for similar reasons.[351] Nevada Hydro's claims that the CAISO unduly discriminated against LEAPS and failed to adequately consider that LEAPS can provide reliability-related transmission services is without merit.[352] The CAISO's studies did not restrict LEAPS from providing voltage support or mitigating thermal overloads.

Moreover, in its economic planning studies the CAISO studied LEAPS based on it full capabilities, including its ability to mitigate congestion, address over-supply, follow load, and provide local capacity.[353] As discussed above, in conducting its economic analysis, the CAISO credited LEAPS with benefits associated with both market revenues as well as reasonable estimates of cost savings that could be achieved by providing congestion relief and local capacity benefits, consistent with the criteria specified in the CAISO tariff and TEAM. LEAPS' benefit-to-cost ratio was still far below 1.0. Nevada Hydro's real complaint appears to be that the CAISO concluded that the economic services LEAPS was providing were primarily market services, not transmission services. However, LEAPS ignores that the distinction was irrelevant because CAISO counted *all* benefits provided by LEAPS. In other words, the CAISO evaluated

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351 *Id.* at 184-188.

352 Nevada Hydro also states that the CAISO did not assess how LEAPS could aid grid stability. The CAISO notes that "aid[ing] grid stability" is not a separate category of transmission under the CAISO tariff. Reliability Driven Solutions under the CAISO tariff are those "required to ensure System Reliability consistent with all Applicable Reliability Criteria and CAISO Planning Standards." *See* section 24.4.6.2 of the CAISO tariff. The only reliability needs the CAISO found were P6/N-1-1 thermal overloads. As discussed above, existing RAS modifications, combined with new resources that were already operational or under construction, addressed such reliability needs. Accordingly, LEAPS was not needed to meet reliability.

353 2018-2019 Transmission Plan at 344-358.

LEAPS from an economic perspective in the light most favorable to LEAPS, and LEAPS still failed to achieve a benefit-to-cost ratio anywhere near 1.0, even after taking into account all potential benefits.

As discussed above, the CAISO evaluated LEAPS in three configurations, including an additional option that Nevada Hydro itself did not even propose: (1) only the transmission lines and phase shifters without the pumped-storage unit (Option 1a); (2) the pumped storage unit plus the transmission lines (and phase shifters) connecting both to SCE and SDG&E (Option 1b); and (3) the pumped storage unit plus the transmission line (and phase shifters) connecting only to SDG&E (Option 2). Nevada Hydro's claim that the CAISO did not study the congestion relief LEAPS might provide strains credulity. The 2018-2019 Transmission Plan expressly discusses the congestion impacts for all three of the LEAPS configurations the CAISO studied.[354] In that regard, the CAISO found that the transmission-line only option resulted in decreased congestion in the SDG&E area, but increased congestion on Path 26.[355] The other two options, which included the pumped storage unit, did not mitigate congestion outside of San Diego.[356]

Regarding the two options with the pumped storage unit, the CAISO's evaluation showed that the positive net revenue was primarily due to the pumped storage unit arbitraging wholesale energy prices. The LEAPS pumped storage

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354 *Id.* at 347-354.

355 *Id.* at 348.

356 *Id.*

unit had positive net revenues primarily because the LEAPS units pumped during hours when renewable resources' (mainly solar) output was high and LMPs were relatively low, and generated during the hours when LMPs were relatively high.[357] This indicated that the positive net revenue for LEAPS was primarily due to arbitraging wholesale energy market prices.[358] The CAISO concluded that these benefits, which are consistent with the pumped storage unit being able to operate in a relatively unconstrained basis, not dependent on transmission location, do not support LEAPS being considered as providing a transmission function to "improve access to cost efficient resources" as required by section 24.4.6.7 of the CAISO tariff.[359] In that regard, section 24.4.6.7 of the CAISO tariff provides:

> In determining whether additional transmission solutions are needed, the CAISO shall consider the degree to which, if any, the benefits of the transmission solutions outweigh the costs, in accordance with the procedures set forth in the Business Practice Manual. The benefits of the solutions may include a calculation of any reduction in production costs, Congestion costs, Transmission losses, capacity, or other electric supply costs *resulting from improved access to cost-efficient resources*.[360]

The CAISO corroborated these results by conducting additional studies with the pumped storage unit connected to the relatively unconstrained Lugo bus in southern California. The production cost model benefits were generally

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357 2018-2019 Transmission Plan at 348.

358 *Id.*

359 *Id.* at 355.

360 *Id*. (emphasis added).

consistent across all three scenarios involving the pumped-storage unit.[361] These results indicated that the production cost benefits arose from the pumped-storage unit essentially functioning as an energy or capacity resource in the CAISO market.[362]

The CAISO's analysis in the transmission planning process also showed that substantial local capacity benefits provided by LEAPS relate to substituting one type of local capacity resource (gas-fired generation) for another (the pumped storage unit).[363] This is supported by the fact that the local capacity benefit of LEAPS with the pumped storage unit is approximately double the benefit provided by the transmission lines alone without the pumped storage unit (Option 1a).[364]

The Commission has found that depending on the circumstances, a storage device can resemble transmission, distribution, generation, or even load.[365] For economic planning study purposes, the LEAPS pumped storage unit is essentially functioning as a generator and a load providing market services.

The TEAM Document identifies the types of transmission facilities that might provide economic benefits: upgrades that create greater access to regional markets; upgrades that increase importing and exporting capability; upgrades

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361 *Id.* at 352-355.

362 *Id.*

363 *Id.* at 355-358.

364 *Id.*

365 *Western Grid Dev., LLC,* 130 FERC ¶ 61,056 at P 44 (2010).

that create a new tie; and upgrades that increase capacity.[366] The LEAPS pumped storage unit does not physically increase the capacity of any transmission line or physically move electricity over a distance, and it is not a new tie or a new transmission line. The LEAPS pumped storage unit does not itself access other resources or increase importing or exporting capability. The LEAPS pumped storage unit does not attach to new suppliers, thus expanding the number of suppliers who can compete to supply energy. The new transmission lines that would connect to LEAPS under one of the LEAPS options can provide these types of "services," but the pumped storage unit itself does not. Attaching the pumped storage unit to one (or two) new transmission lines cannot, by itself, convert the pumped storage unit into a transmission facility or automatically mean that the pumped storage unit is providing an "economic" transmission service. Instead, the LEAPS pumped storage unit basically functions as a substitute generator (or load), delivering energy into and receiving energy from interconnected transmission lines. A non-rate-based pumped storage facility participating in the market at the same location can provide the same services.

Nevada Hydro makes no attempt in the Complaint to rebut the CAISO's specific findings, except to claim that the benefits LEAPS would provide are transmission services and that LEAPS is not operating as a market resource because it will credit back any market revenues against its cost-based revenue requirement. This argument is not sustainable and is inconsistent with its own

366 Exhibit CAISO-2 at 15, 23.

submissions and descriptions of the services LEAPS will provide. Both Mr. Alaywan's testimony and Nevada Hydro's Request Window Submission Form submitted to the CAISO acknowledge that the significant benefits LEAPS provides arise from providing market services. This is supported by the study results, which show that the transmission line-only option has $0 net market revenues, but the two options with the pumped storage unit show $73 million annually in net market revenues for LEAPS.[367]

Nevada Hydro's Request Window Submission Form for LEAPS stated that LEAPS would provide numerous benefits to the CAISO, including regulation, load following, flexible ramping capacity, energy, ancillary services, and spinning reserve.[368] For example, LEAPS' Request Window Submission Form stated

> LEAPS provides the full range of ancillary services, including flexible capacity for load following needed by the CAISO to manage the uncertainty in VER forecasts between Day Ahead schedules and Real Time operations. Market revenue from providing energy and these ancillary services are proposed to offset any revenue requirements from the project and initial TEAM analysis estimates this benefit to consumers to be between *$38 and $60 million annually.*[369]

At pages 24-28 of the Request Window Submission Form, Nevada Hydro describes in detail how it will provide load-following and ramping services acting both as a generator and as a load to meet increasing and decreasing system energy needs. Flexible capacity resources already provide these types of

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367 2018-2019 Transmission Plan at 359, Table 4.9-44.

368 Exhibit NHI-7 at 3, 12, 15, 22-29. The LEAPS Request Window Submission describes how the LEAPS pumped storage unit operates both as a generation resource and as a load. *Id.* at 26-29.

369 *Id.* at 15 (emphasis added).

services in the CAISO markets; these resources are market resources such as generators, battery storage, and demand response, not transmission facilities.

Mr. Alaywan's testimony similarly recognizes the LEAPS benefits that arise from providing market services and functioning as load. Mr. Alaywan states that LEAPS will provide load and resource support services (*i.e*., regulation-up and regulation down services, moment-to-moment load following service, spinning reserve, and black start service).[370] When asked whether LEAPS will participate in the CAISO's wholesale power markets, Mr. Alaywan states: "No. NHI will not seek to earn any portion of the revenue requirement for LEAPS through wholesale market participation. Rather, energy and ancillary services revenues that NHI receives from operating LEAPS will be fully credited against LEAPS' cost-based formula rate to be filed with FERC."[371] The mere fact that LEAPS would credit back energy and ancillary services market revenues and recover LEAPS' revenue requirement solely through transmission rates does mean that LEAPS is only providing transmission services and not providing market-related services. Indeed, Mr. Alaywan states that Nevada Hydro will "use LEAPS similar to Pacific Gas and Electric Company's Helms Pumped Storage Project" and notes that "Helms Pumped Storage participates in the ISO wholesale power market."[372] Helms is *not* a transmission facility.

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370 Exhibit NHI-2 at 14-15.

371 *Id.*

372 *Id.*

Energy, ancillary services, and flexible ramping all are products procured and provided through the CAISO markets. By earning market revenues from providing these services, LEAPS is acting like a market resource, not a transmission resource. To that end, in Order No. 841 the Commission required all ISOs and RTOs to establish a storage market participation model and develop market rules so that electric storage resources could provide all energy, ancillary services, and capacity services, as well as black start and primary frequency response service if available.[373] The Commission adopted these rules to enhance the ability of storage resources to participate in organized electricity market by ensuring those markets appropriately value and accommodate the participation of storage resources based on their physical and operational characteristics. The Commission did not suggest that transmission-cost-based compensation should serve as a substitute to facilitating the ability of storage resources to effectively participate in wholesale electricity market to provide these services. To the contrary, the Commission sought to expand and enhance the participation of storage in wholesale electricity markets. Nevada Hydro seeks to avoid the approaches adopted by the Commission in Order No. 841 by enabling a pumped storage facility that is not needed for reliability to be treated as a cost-of-service asset despite the fact that its benefits arise from providing services that can otherwise be provided by resources participating in the

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373 *Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. and Indep. Sys. Operators,* Order. No. 841, 162 FERC ¶ 61,127 at PP 70, 76 (2018), *order on reh'g and clarification,* Order No. 841-A, 167 FERC ¶ 61,154 (2019) (Order No. 841).

markets, such as generators, demand response, and other storage facilities.

Nevada Hydro claims it will operate LEAPS like the *Western Grid* storage facility that the Commission found would be serving a transmission function.[374] That is not the case. As the Commission recognized, Western Grid's facility would operate "in a manner similar to the way in which high-voltage wholesale transmission facilities are operated by PTOs" and "be operated in a way that is similar to the operation of other transmission assets (*e.g*., capacitors that address voltage issues or alternate transmission circuits that address line overloads or trips."[375] Moreover, any "incidental" revenues Western Grid would receive from charging and discharging would be credited to transmission customers. [376] Unlike LEAPS, the storage facility in *Western Grid* would not receive revenues from market services, would not provide ancillary services, and would not arbitrage wholesale energy markets.[377]

However, LEAPS' projected market revenues are far beyond "incidental." Unlike the operation of Western Grid, Nevada Hydro's Request Window Submission Form[378] shows that LEAPS' market activities would be far more extensive than those contemplated by *Western Grid*, and more akin to how a supply resource or load would function in the marketplace, rather than a transmission facility. The CAISO notes that in *Transmission Tech. Solutions LLC*

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374 Complaint at 13-15.

375 *See Western Grid Dev., LLC,* 130 FERC ¶ 61,056 at P 45 (2010).

376 *Id.* at P 49.

377 *Id.* at PP 23, 49.

378 Exhibit NHI-7.

*v. Cal. Indep. Sys. Operator,*[379] the Commission found that the CAISO correctly did not count benefits associated with a storage facility's ability to provide ancillary services in addition to reliability services because the facility owner described the project as transmission-only that would not provide ancillary services. Unlike the storage unit in that proceeding, Nevada Hydro has acknowledged that LEAPS will provide energy, flexible ramping capacity, and ancillary services.

Finally, unlike *Western Grid*'s proposal, LEAPS will arbitrage wholesale energy market prices by charging when prices are low and discharging during peak hours when prices are higher.[380] Nevada Hydro stated in it Request Window Submission Form that

> LEAPS is an economic solution for integrating new renewables needed to meet 50% (now 60%) by 2030. TEAM analysis prepared by Z Global demonstrates that LEAPS provides economic benefits of between *$34 and $51 million annually* by providing storage of renewable energy that would otherwise be curtailed during oversupply conditions caused by 50% RPS portfolios. The stored energy can then be shifted to other peak-demand hours when renewable energy output is unavailable.[381]

In conclusion, the CAISO has not identified a transmission need for LEAPS. Under these circumstances, the Commission should not permit LEAPS

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379 *Trans. Tech. Solutions LLC v. Cal. Indep. Sys. Operator Corp.,* 135 FERC ¶ 61,077 at P 85 (2011) (Order Denying Complaint).

380 *See Western Grid,* 130 FERC ¶ 61,056 at P 46. *See also Third-Party Provision of Ancillary Servs.; Accounting and Fin. Reporting for New Elec. Storage Tech.,* Notice of Inquiry, 135 FERC ¶ 61,240 at n. 47 (2011) (noting that a storage unit acts like a generator when it arbitrages differences in peak and off-peak energy prices or sells ancillary services).

381 Exhibit NHI-7 at 15. In other words, LEAPS would be arbitraging wholesale energy prices (emphasis added).

to “bootstrap” itself into being treated as a transmission asset (with associated cost of service recovery), when there is no transmission need for it, simply because LEAPS might earn significant energy and ancillary services revenues that can be credited against any fixed cost payments. Even though these benefits arise from market services, the CAISO counted them all in calculating LEAPS benefit-to-cost ratio pursuant to TEAM, which was still far below 1:1. The CAISO’s assessment raises the question whether the LEAPS pumped storage unit would even qualify as transmission, and whether the CAISO could even approve the entire LEAPS configuration as an economic transmission project even if LEAPS’ benefit to cost ratio exceeded 1:1.

### E. The Commission Should Reject Nevada Hydro’s Proposed Remedies

Nevada Hydro requests that the Commission:

> (1) find that the CAISO failed to follow its tariff and otherwise failed to perform a just and reasonable, open, transparent, comparable, and not unduly discriminatory study of LEAPS, (2) order the CAISO to correct its modeling errors and produce new results using the data it already has, (3) find that doing so would lead to a determination that LEAPS is the more economic and cost effective solution for identified reliability needs, (4) find that LEAPS far exceeds the benefits necessary for selection as an economic transmission solution, and (5) direct the CAISO to include LEAPS in the CAISO’s 2018-19 transmission plan as a fully approved project.[382]

With respect to requests 1 and 2, Nevada Hydro has failed to meet its burden to show, by a preponderance of evidence, that the CAISO has failed to follow its tariff or that it has discriminated against LEAPS. Therefore, there is no basis for

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382 Complaint at 9, 56.

the Commission to direct the CAISO to "produce new results" regarding its evaluation of LEAPS as part of the 2018-2019 transmission planning process. As demonstrated herein, the results of these evaluations were just and reasonable, and should stand.

Even if the Commission concluded there is some merit to Nevada Hydro's arguments regarding the CAISO's evaluation of LEAPS, there is no justification for the additional relief that Nevada Hydro requests. First, the relief that Nevada Hydro requests in items 3 through 5 above would require the CAISO to contradict or ignore outright key elements of its transmission planning process and tariff. As shown in the 2018-2019 transmission plan, there were numerous other alternative transmission projects, including pumped storage and battery storage projects, located in the same area as LEAPS that purported to address both reliability and economic needs.[383] Several of those projects had benefit-cost ratios comparable to *or higher* than LEAPS.[384] Even if the Commission were to agree with Nevada Hydro that the CAISO violated its tariff in studying LEAPS, the CAISO would need to restudy all of these proposed transmission projects to determine which, if any, are needed for reliability or economic reasons. Further, as part of the CAISO's "top down" planning process, the CAISO still might reasonably determine that some alternative solution, other than the projects submitted in the planning process, represents the best solution to an identified

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383 2018-2019 Transmission Plan at 181-90, 225-398.

384 *Id.* at 336, 343, 375, 383, 391.

need.[385]

As such, automatically declaring LEAPS to be the "more economic and cost effective solution for identified reliability needs" or that "LEAPS far exceeds the benefits necessary for selection as an economic transmission solution" would be inconsistent with the tariff provisions governing how the CAISO determines which solutions are necessary to address reliability and economic needs. Moreover, directing the CAISO to include LEAPS in the 2018-2019 transmission plan "as a fully approved project," would run afoul of not only these provisions, but also the CAISO's competitive solicitation process.

In its top down transmission process, the CAISO identifies both the transmission need and, after collaborating with stakeholders, the CAISO identifies the transmission solution to meet the identified need. In that process, the CAISO avoids being overly prescriptive and avoids limiting technology choices unnecessarily.[386] The CAISO may also identify several options for addressing the reliability need.[387] For example, there might be several types of storage technologies that could meet a need, and multiple transmission line

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385 *See* Section 24.4.6.2 of the CAISO tariff (noting that in determining solutions to identified reliability needs "the CAISO . . . shall consider lower cost solutions, such as acceleration of expansion of existing transmission solutions, Demand-side management, Remedial Action Schemes, appropriate Generation, interruptible Loads, storage facilities or reactive support"); Section 24.4.6.7 of the CAISO tariff ("The CAISO, in determining whether a particular [economic] solution is needed, shall also consider the comparative costs and benefits of viable alternatives to the particular transmission solution, including: (1) other potential transmission solutions, including those being considered or proposed during the Transmission Planning Process; (2) acceleration or expansion of any transmission solution already approved by the CAISO Governing Board or included in any CAISO comprehensive Transmission Plan, and (3) non-transmission solutions, including demand-side management.").

386 Exhibit CAISO-1, Millar Declaration at 52-53.

387 *Id.*

configurations or interconnection points.

Unlike some other independent system operators and regional transmission organizations, the CAISO does not employ a project sponsorship model whereby individual developers propose a transmission solution, and if it is accepted, the developer is entitled to build the project. Pursuant to tariff section 24.5, once the CAISO identifies the regional transmission solutions that best meet reliability, economic and public policy needs, the CAISO conducts a competitive solicitation process to provide an opportunity for individual project sponsors to submit proposals to finance, own, and construct those facilities that qualify for competitive procurement.[388] Regional solutions subject to competitive solicitation are those over 200 kV that are not upgrades to existing facilities.[389] Any approved solution like LEAPS would be a Regional Transmission Facility and, therefore, would be subject to competitive solicitation. Consistent with Order No. 1000, this competitive solicitation process is a key component of the CAISO's open, inclusive and non-discriminatory regional transmission planning process. Even if the CAISO determined that a storage solution like LEAPS met an identified reliability or economic need, there is no guarantee that Nevada Hydro would be selected as the project sponsor to build and own the project. Thus, requiring the CAISO to treat LEAPS as a "fully approved project" would

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[388] CAISO Tariff, Section 24.5.1 ("[I]n the month following the CAISO Governing Board's approval of the comprehensive Transmission Plan, the CAISO will initiate a period of at least ten (10) weeks that will provide an opportunity for Project Sponsors to submit specific proposals to finance, own, and construct the Regional Transmission Facilities subject to competitive solicitation identified in the comprehensive Transmission Plan.").

[389] Sections 24.4.10 and 24.5.1 of the CAISO tariff, and Appendix A to the CAISO tariff, definition of "Regional Transmission Facility."

essentially mean directing the CAISO to simply ignore its competitive solicitation process in favor of Nevada Hydro.

There are no grounds for the Commission to even consider these requests for relief. Nevada Hydro's complaint focuses solely on the justness and reasonableness of the CAISO's *application* of its transmission planning process tariff provisions. Nevada Hydro does not even allege, much less prove by a preponderance of evidence, that the CAISO's transmission planning process tariff provisions are themselves unjust and reasonable. There is no record on which the Commission could even base a decision that "LEAPS is the more economic and cost effective solution for identified reliability needs," that LEAPS "far exceeds the benefits necessary for selection as an economic transmission solution," or that the CAISO should simply consider LEAPS to be "a fully approved project."

Although the Commission has broad discretion to fashion remedies, it generally does so based on the "relevant equities" and under this principle has declined to order remedies that would be extremely complex, subject to controversy and further litigation, cause significant disruptions and burdens, or otherwise produce an inequitable result.[390] Even if the Commission determined there were flaws in the CAISO's transmission planning studies, pre-selecting LEAPS as the best solution to meet reliability and economic needs and mandating its inclusion in the CAISO's transmission plan would clearly be

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[390] *See, e.g., Mirant Americas Energy Mktg., L.P., et al. v. ISO New England Inc.*, 112 FERC ¶ 61,056 at P 24 (2005); *PJM Interconnection, L.L.C.*, 161 FERC ¶ 61,252 at P 42 (2017); *Midwest Indep. Transmission Sys. Operator, Inc.*, 162 FERC ¶ 61,173 at PP 17-26 (2018).

inequitable because it would discriminate against other potential solutions and project sponsors. For the same reason, it would disrupt the CAISO's transmission planning process and almost certainly lead to significant controversy and further litigation.

From a policy perspective, having the Commission pick specific winners and losers in the CAISO's transmission planning process would establish a poor precedent. Doing so would undermine much of the point of having independent entities such as the CAISO conduct regional transmission planning processes in the first place, because any entity unhappy with the outcome of a planning cycle would have a strong incentive to simply resort to litigation to unravel a transmission plan that does not include its favored project.

Finally, Nevada Hydro also suggests that the Commission should direct the CAISO to include the TEAM study metrics in the CAISO tariff if the Commission believes they significantly affect the rate.[391] However, the Commission has already considered the sufficiency of the economic study provisions of the CAISO tariff and rejected arguments to include additional detail related to the "methods and metrics by which it evaluates economic projects in the tariff."[392] As discussed above, the business practice manual states that in conducting its economic studies, the CAISO considers the quantification of

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391 Complaint at 56.

392 *See Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,057, at P 62 (2013).

potential benefits consistent with TEAM.[393] This same provision was in the business practice manual at the time the CAISO submitted its filing to comply with Order No. 1000.[394] Some commenters on the Order No. 1000 compliance filing argued that it was contrary to the Commission's requirements to include the specific procedures and criteria for evaluating economic projects in the business practice manual rather than in the tariff.[395] The Commission, however, rejected this request and did not require CAISO to make any tariff modifications to its tariff.[396] Nevada Hydro neither addresses this order or, indeed, makes any attempt to show why the CAISO should be required to include the general TEAM "methods and metrics" in the tariff. As such, Nevada Hydro fails to meet its burden to establish that the CAISO's existing tariff is unjust or unreasonable because it does not include the TEAM metrics, and the Commission should reject Nevada Hydro's suggestion that it require their inclusion.

The Commission should conclude that Nevada Hydro's allegations regarding the conduct of its 2018-2019 transmission planning process studies are without merit. Nevertheless, even if the Commission (1) agrees with Nevada Hydro that the CAISO's transmission planning evaluation unduly discriminated against LEAPS and did not comply with the CAISO tariff, and (2) concludes that

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393 Business Practice Manual for the Transmission Planning Process at 51 (stating that "[t]he quantification of potential benefits will be consistent with CAISO's transmission economic analysis methodology (TEAM) approach").

394 *See* page 40 of Version 9 of the Business Practice Manual for the Transmission Planning Process (issued August 2012), available at https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Transmission%20Planning%20Process. The CAISO submitted its filing to comply with Order No. 1000 on October 11, 2012, Docket No. ER13-103-000.

395 *See Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,057, at P 49 (2013).

396 *Id*. at P 62.

correcting such error reasonably might produce a different outcome in the CAISO's Transmission Plan, the only appropriate remedy would be to direct the CAISO to re-do the applicable portions of its studies for all proposed projects.

## IV. CONCLUSION

For all the foregoing reasons, the Commission should deny Nevada Hydro's complaint in its entirety.

Respectfully submitted,

*/s/ Anthony Ivancovich*

Roger E. Collanton,
General Counsel,
Anthony J. Ivancovich
Deputy General Counsel, Regulatory
Jordan Pinjuv
Senior Counsel
William H. Weaver
Senior Counsel
The California Independent
System Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 351-4400
Fax: (916) 608-7222
E-mail: aivancovich@caiso.com

Michael Kunselman
Alston & Bird LLP
The Atlantic Building
950 F Street, NW
Washington, D.C. 20004
Tel: (202) 239-3395
Fax: (202) 654-4872
E-mail: michael.kunselman@alston.com

Counsel for the California Independent System Operator Corporation

July 22, 2019

## CERTIFICATE OF SERVICE

I 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 Folsom, California this 22nd day of July, 2019.

/s/ *Martha Sedgley*
Martha Sedgley

**EXHIBIT CAISO-1**

# Declaration of Neil Millar

**UNITED STATES OF AMERICA**

**BEFORE THE**

**FEDERAL ENERGY REGULATORY COMMISSION**

| | | |
|---|---|---|
| **The Nevada Hydro Company Inc.** | **)** | |
| | **)** | |
| **v.** | **)** | **Docket No. EL19-81-000** |
| | **)** | |
| **California Independent System Operator Corp.** | **)** | |
| | **)** | |

**DECLARATION OF NEIL MILLAR**

I, Neil Millar, state as follows:

**QUALIFICATIONS**

I am currently employed by the California Independent System Operator Corporation ("CAISO") as Executive Director, Infrastructure Development. I received a Bachelor of Science in Electrical Engineering degree at the University of Saskatchewan, Canada, and am a registered professional engineer in the province of Alberta.

I have been employed for over 30 years in the electricity industry, primarily with a major Canadian investor-owned utility, TransAlta Utilities, and with the Alberta Electric System Operator and its predecessor organizations. Within those organizations, I have held management and executive roles responsible for preparing, overseeing, and providing testimony for numerous transmission planning and regulatory tariff applications. I have appeared before the California Public Utilities Commission, the Alberta Energy and Utilities Board, the Alberta Utilities Commission, and the British Columbia Utilities Commission. Since November 2010, I have been employed at the CAISO, leading the Transmission Planning and Grid Asset departments.

## PURPOSE

I have reviewed the Complaint of the Nevada Hydro Company, Inc. ("Nevada Hydro") and the accompanying Testimony of Ziad Alaywan, P.E. alleging system planning tariff violations against the CAISO. The purpose of my Declaration is to explain the CAISO's review of the Lake Elsinore Advanced Pumped Storage ("LEAPS") project in its 2018-2019 transmission planning process and provide details regarding the outcome of that review.

## DISCUSSION

The CAISO's analysis of the LEAPS project took place within the framework of the annual transmission planning process conducted under the provisions of Section 24 of the CAISO tariff. This involved specific study at each stage of the process, including consideration of the LEAPS project as well as other regional or interregional proposals or economic study requests to address identified concerns. The CAISO also studied LEAPS in parallel with other projects, including competing projects seeking approval for providing the same types of benefits as LEAPS. The planning process is structured in three consecutive phases, with the 2018-2019 annual cycle beginning in January, 2018 and extending into 2019. Each of the three phases, and the consideration and study of the LEAPS project specifically, is described below.

### I. The CAISO Transmission Planning Process

#### A. Phase 1: Unified Planning Assumptions and Study Plan

Phase 1 includes establishing the assumptions and models for use in the planning studies, developing and finalizing a study plan, and specifying the public policy mandates that planners will adopt as objectives in the current cycle. This phase takes roughly three months from January through March of the beginning year.

The unified planning assumptions establish a common set of assumptions for the reliability and other planning studies the CAISO performs in phase 2. The starting point for the assumptions is the information and data derived from the comprehensive transmission plan developed during the prior planning cycle. The CAISO adds other pertinent information, including network upgrades and additions identified in studies conducted under the CAISO's generation interconnection procedures and incorporated in executed generator interconnection agreements (GIA). In the unified planning assumptions the CAISO also specifies the public policy requirements and directives that it will consider in assessing the need for new transmission infrastructure.

Development of the unified planning assumptions for the 2018-2019 transmission planning cycle benefited from efforts between the California Public Utilities Commission (CPUC), California Energy Commission (CEC), and the CAISO, to improve infrastructure planning coordination within the three core processes:

1. Long-term forecasts of energy demand produced by the CEC as part of its biennial Integrated Energy Policy Report (IEPR);
2. Biennial Integrated Resource Planning (IRP) proceedings conducted by the CPUC; and,
3. The Annual Transmission Planning Process (TPP) performed by the CAISO.

That coordination resulted in improved alignment of the three core processes and agreement on an annual process to be undertaken in the fall of each year to develop planning assumptions and scenarios to be considered in infrastructure planning activities in the upcoming year. The assumptions include demand, supply, and system infrastructure elements, including the renewables portfolio standard (RPS) portfolios discussed in more detail below, which are a key assumption.

The results of that annual process fed into the 2018-2019 transmission planning process and was communicated via a ruling in the CPUC's 2017-2018 IRP process[1]. These process efforts continued in 2018 emphasizing the broad load forecast impacts of distributed generation and other material changes in customer needs and considering renewable integration challenges and the market impacts of increased renewable generation on the existing conventional generation fleet.

The CAISO added public policy requirements and directives as an element of transmission planning process in 2010. Planning transmission to meet public policy directives is also a national requirement under Federal Energy Regulatory Commission (FERC) Order No. 1000. It enables the CAISO to identify and approve transmission facilities that system users will need to comply with specified state and federal requirements or directives. The primary policy directive in prior planning cycles has been California's renewables portfolio standards (RPS). The CAISO's study work and resource requirements determination for reliably integrating renewable resources in support of CPUC integrated resource planning processes is continuing on a parallel track outside of the transmission planning process, but the CAISO has continued to incorporate those results into annual transmission plan activities for transparency and informational purposes.

The CAISO formulates the public policy-related resource portfolios in collaboration with the CPUC, and with input from other state agencies including the CEC and the municipal utilities within the CAISO balancing authority area. The CPUC, as the agency that oversees the bulk of the supply procurement activities within the CAISO area, plays a primary role formulating the resource portfolios. The CAISO reviews the proposed portfolios with stakeholders and seeks their comments, which the

[1] CPUC Decision, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K709/209709519.PDF referring to the Feb 20, 2018 Unified Resource Adequacy and IRP Inputs and Assumptions document: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K709/209709519.PDF.

CAISO then considers in determining the final portfolios. The coordination with state agencies is clearly superior to the CAISO "going its own way," and potentially being in conflict with state resource planning activities and risking the stranding of transmission facilities. The same flexibility exists in considering economic studies; certain provisions build directly or indirectly on the policy portfolio development, and their treatment in economic studies can depend on whether and to what extent they have been considered in the portfolio development process.

The resource portfolios have played a crucial role in identifying needed public policy-driven transmission elements. Meeting the renewables portfolio standard has entailed developing substantial amounts of new renewable generating capacity, which in turn required new transmission for delivery. The CAISO has managed the uncertainty as to where the generation capacity will locate by balancing the need to have sufficient transmission in service in time to support the renewables portfolio standard against the risk of building transmission in areas that do not realize enough new generation to justify the cost of such infrastructure. This has entailed applying a "least regrets" approach, whereby the CAISO first formulates alternative resource development portfolios or scenarios, then identifies the needed transmission to support each portfolio, and then selects for approval those transmission elements that have a high likelihood of being needed and well-utilized under multiple scenarios.

As we move closer to the 33 percent renewables portfolio standard compliance date of 2020, the focus is shifting to the higher requirements set by SB 350 and will now shift onward to SB 100 in future planning cycles. Accordingly, the CAISO's focus in the 2018-2019 planning cycle was to confirm the effectiveness of current plans for achieving the 50 percent renewables portfolio standard established by SB 350 for 2030 and conducting sensitivities that will support higher levels of renewables to accommodate greenhouse gas (GHG) reduction goals that go beyond the 2030 50

percent RPS established by SB 350. This latter effort was reflected in the policy-driven sensitivity study discussed later.

The portfolios inevitably extended into needing to be considered in reliability and economic study requirements, as it would be inconsistent to rely on the renewable generation mapped out as a policy objective in considering policy-driven transmission and then ignore the impacts on reliability studies and economic studies. Thus, the "base scenario" provided in the portfolio development process for policy-driven transmission is generally applied—with CPUC support—as the basis for reliability and economic studies. These tend not to affect reliability results, as issues that could result can generally be addressed either by tripping the renewable generation through remedial action schemes (RAS) or reducing outputs through market operation.

The study plan describes the computer models and methodologies to be used in each technical study, provides a list of the studies to be performed and the purpose of each study, and lays out a schedule for the stakeholder process throughout the entire planning cycle. The CAISO posts the unified planning assumptions and study plan in draft form for stakeholder review and comment. Stakeholders may request specific economic planning studies to assess the potential economic benefits (such as congestion relief) in specific areas of the grid. The CAISO then selects high priority studies from these requests and includes them in the study plan published at the end of phase 1. The CAISO may modify the list of high priority studies later based on new information such as revised generation development assumptions and preliminary production cost simulation results.

In complying with tariff Section 24.3.3(a), the CAISO sent a market notice to interested parties seeking suggestions about demand response programs and generation or non-transmission alternatives that should be included as *assumptions* in the study plan. In response, the CAISO received input for consideration in planning studies from the Nevada Hydro Company and one other project proponent apparently

confusing input assumptions with proposals the CAISO is being asked to study or consider. The CAISO noted to the submission in the study plan reporting the submission:

> The Nevada Hydro Company, proposing a specific pumped storage project that the proponent believes would provide reliability, policy and economic benefits. The ISO suggests the proponent considers submitting the project in the 2018 Request Window specifying the ISO-identified reliability constraints the project could mitigate. The submission will also be considered as an economic study request.[2]

The proposal was subsequently submitted into the planning process later in phase 2 as a reliability request window submission as noted below.

### B. Phase 2: Detailed Study and Recommendations

In phase 2, the CAISO performs studies to identify the solutions to meet the various needs that culminate in the annual comprehensive transmission plan. This phase takes approximately 12 months and ends with Board approval of the transmission plan. Thus, phases 1 and 2 take 15 months to complete. There are three discrete steps in the development of the comprehensive plan, each layering additional needs upon the previous stage. The stages are conducted in a specific order: reliability needs, policy needs, and economic-driven needs. At each stage, a mitigation or solution identified in an earlier stage may be replaced, or enhanced, to better meet the next level of need. A policy need can result in changing or modifying the preferred solution for a reliability need to better meet both requirements, with the result being a "policy-driven" transmission project. An economic study result can change or modify the preferred initial solution for a reliability and/or policy need, with the result being an

[2] 2018-19 Unified Planning Assumptions at 26.

economic-driven project." Only once all three stages are complete can any recommendation be considered final; "for example, a 'policy-driven' project may have also addressed the need met by a previously identified reliability-driven project that was subsequently replaced by the broader policy-driven project."[3]

The CAISO's tariff was written recognizing the need for flexibility, to adapt to the level of detail provided in the CPUC-developed portfolios and the considerations the CPUC took into account in developing those portfolios. Therefore, TEAM sets out certain benefits that relate to lowering the cost of achieving public-policy goals that would be assessed in the economic stage and could result in greater interplay between the policy analysis and economic analysis in the event they were not already addressed in the CPUC's resource planning processes. Below, I discuss the CAISO's study of LEAPS in the 2018-2019 transmission planning process.

## II. The CAISO's Study of LEAPS

### A. The CAISO's Study of LEAPS as a Reliability Transmission Solution

The CAISO's transmission reliability assessment consists of comprehensively testing the transmission system to meet all NERC mandatory standards, WECC regional criteria, and CAISO Planning Standards. The CAISO tabulates initial results and presents them to stakeholders. Stakeholders are provided an opportunity to submit proposals to address identified reliability issues after the CAISO presents this information. The initial results also identify reliability issues that are addressed by existing solutions that cannot be readily modeled in power flow base cases, such as demand response, but these issues do not actually constitute a need for new upgrades. Failing to identify them, and the mitigations already in place, however, could lead

[3] 2018-2019 Transmission Plan at 480.

stakeholders who perform their own analysis to believe there are additional unmitigated needs that the CAISO failed to report.

The CAISO identifies initial preferred reliability solutions based on more conventional cost comparisons to meet reliability needs, *e.g.*, capital and operating costs, and can revisit these later in the economic-driven analysis as discussed below. The CAISO's subsequent economic analysis can take into account the avoided cost of other initial preferred reliability solutions. Several proposals for reliability-driven transmission in the 2018-2019 Transmission Plan that were not found not to be needed for reliability also cited potential economic benefits, and the CAISO also assessed them in the subsequent economic study stage.

The CAISO's 2018-2019 Reliability Assessment -- Preliminary Study Results, San Diego Main, posted on August 15, 2018, listed eight potential reliability issues that the CAISO had identified. The Preliminary Study Results also indicated that the initially identified reliability contingencies were mitigated by existing operational measures and previously approved projects, including energy storage and demand response. On October 1, 2018, Nevada Hydro submitted the LEAPS Request Window Submission Form, Exhibit NHI-7, wherein Nevada Hydro identified thermal overloading issues on six transmission facilities—a subset of the reliability issues[4] initially identified by the CAISO—that it believed the LEAPS project could address. Mr. Alaywan's testimony submitted with Nevada Hydro's complaint similarly states that LEAPS could resolve thermal overloads on six transmission facilities.[5] Both Nevada Hydro and the CAISO's baseline reliability studies identified these as P6/N-1-1 contingencies. NERC reliability

[4] The initial reliability assessments provided in Appendix C of the 2018-2019 Transmission Plan set out individual contingencies and potential resulting thermal overloads or voltage concerns. These were aggregated into eight major overarching reliability issues for the SDG&E "main" system by the CAISO for ease of presentation and study. The subset of potential thermal overloads identified by Nevada Hydro did not line up one-to-one with the CAISO's aggregation in the 2018-2019 Transmission Plan. A table has been provided in Exhibit CAISO-3 to correlate how the issues were presented in the various forums and documents.

[5] Exhibit NHI-2 at 18 (Testimony of Mr. Alaywan).

standards allow load shedding as a permissible response for P6/N-1-1 contingencies, although the CAISO's Planning Standards preclude load shedding for these contingencies in high population density urban areas.

In its 2018-2019 annual Transmission Plan, the CAISO found that there was no reliability need for LEAPS and other projects that had been submitted. Mitigations that were either in place or already under construction mitigated the initially-identified reliability needs. These solutions included demand response programs, battery storage projects, and the Suncrest SVC that were approved by the CPUC and already in operation or under construction. The solutions also included existing operational solutions—congestion management, operating procedures, and remedial action schemes (RAS). I note that the CAISO's initial base case power flow cases and associated contingency files generally include RAS but do not reflect approved demand response, system re-dispatch, and other operational solutions—they are usually only dispatched in each specific area when there is a need to include them to confirm their effectiveness. Once the CAISO accounted for these and considered CPUC-approved storage projects that were either already operational or under construction, and validated their effectiveness in subsequent system tests, there were no remaining reliability needs and thus no need for any new reliability projects. The solutions already in place to meet the six reliability needs called out by Nevada Hydro are itemized below:

*Suncrest–Sycamore 230 kV lines TL23054/TL23055 (1 of 6)*

The Suncrest – Sycamore Canyon 230 kV lines loaded over their long-term emergency rating for various category P6 contingencies of the loss of any segment in SWPL from Imperial Valley to Miguel (TL50001, TL50004, or Miguel Banks) followed by the outage of its parallel 230 kV line. The following existing or previously planned mitigation was simulated to confirm that it remains sufficient for the 10-year planning horizon:

Two parallel 400 MVA Imperial Valley (IV) phase shifters were placed into service in 2017 on the intertie-line with CENACE. After the first contingency, the IV phase shifting transformers were adjusted and generation was re-dispatched in the simulation to prepare for the second contingency to eliminate the overload concerns identified in the baseline scenarios.

Further assessment concluded that up to 16 MW of the existing fast response demand response and up to 201 MW of the existing or already procured energy storage resources in the San Diego area, along with the mitigation described above, were also needed and included in the simulation after the first contingency to prepare for the second contingency to mitigate the overload concerns identified in the summer peak sensitivity scenarios.

The TL23054/TL23055 RAS was placed in-service prior to the summer of 2018 and will drop generation at Imperial Valley when one of these two lines is out and the remaining line is overloaded above its 30-minute rating. After the second contingency, the RAS would trigger and was activated in the simulation.

*Suncrest 500/230 kV Banks #80 and #81 (2 of 6)*

Each Suncrest bank overloaded over its long-term emergency rating under category P6 contingencies of the loss of any segment in SWPL from Imperial Valley to Miguel (TL50001, TL50004, or Miguel banks #80/#81) followed by the outage of other Suncrest bank. The following existing or previously planned mitigation was simulated to confirm that it remains sufficient for the 10-year planning horizon.

In the 2014-2015 CAISO transmission plan, the CAISO approved an operational mitigation to bypass the 500 kV series capacitor banks in ECO-Miguel (TL50001) and Ocotillo-Suncrest 500 kV line (TL50003) under normal operating condition after the Imperial Valley phase shifters and the Suncrest SVC

project are in service. The Suncrest SVC is expected to go into service by the end of 2019. These series capacitors were bypassed in the base case.

In the 2017-2018 CAISO transmission plan the CAISO requested and SDG&E provided 30 minute emergency ratings for the two Suncrest 500/230 kV transformers. These emergency ratings were included in the model and relied upon in the simulation.

After the first contingency, generation re-dispatch and adjustment of the IV phase shifting transformers were utilized to prepare for the second contingency.

*Silvergate-Old Town and Silvergate-Old Town Tap 230 kV lines (3 and 4 of 6)*

Category P6 overloads on Silvergate-Old Town and Silvergate-Old Town Tap 230 kV lines were identified in the 2023~2028 summer peak baseline and the three sensitivity scenarios. The following existing or previously planned mitigation was simulated to confirm that it is sufficient for the 10-year planning horizon.

The CAISO's evaluation confirmed that the overload concerns can be mitigated by relying on congestion management in the CAISO market to re-dispatch generation at Otay Mesa and Pio Pico before or after the first contingency of the P6 events. The short term emergency ratings of the lines can be relied upon after the second contingency to allow time for generation re-dispatch.

*Miguel 500/230 kV Banks #80 and #81 (5 of 6)*

The Miguel 500/230 kV bank thermal overload concerns were identified under various Category P6 contingencies of any segment in Sunrise Power Link (SRPL) from Imperial Valley to Sycamore (TL50003, TL50005, Suncrest banks, or Suncrest–Sycamore 230 kV lines) out of service followed by the outage of other Miguel bank. The following existing or previously planned mitigation was simulated to confirm that it is sufficient for the 10-year planning horizon.

In the 2014-2015 transmission plan, the CAISO approved an operational mitigation to bypass the 500 kV series capacitor banks in ECO-Miguel (TL50001) and Ocotillo-Suncrest 500 kV line (TL50003) under normal operating condition after the Imperial Valley phase shifters and the Suncrest SVC project are in service. The Suncrest SVC is expected to go into service by the end of 2019. These series capacitors were bypassed in the base case. (Another option would be to utilize a RAS to bypass these series capacitors post-contingency but that is an operational consideration, and not necessary to meet reliability standards.)

The Miguel Bank 80/81 Overload SPS was activated in the simulations following the second contingency, to protect the Miguel 500/230 kV transformers for loss of a segment of the SRPL and the parallel Miguel transformer. Incidentally, additional generation dropping had been added to the pre-existing RAS immediately prior to the summer of 2018.

The short-term 30 minute emergency rating on the Miguel transformers could be utilized after the second contingency to commit and dispatch quick start generators in the San Diego load pocket and to adjust the Imperial Valley phase shifters, to further reduce the flow to within the long-term emergency rating of the transformers.

*Talega-San Onofre 230 kV line (6 of 6)*

The Talega-San Onofre 230 kV line overloaded for Category P6 contingency of Talega-Capistrano-Escondido 3-terminal line and SONGS-Capistrano 230 kV line under peak load condition. The following existing or previously planned mitigation was simulated to confirm that it is sufficient for the 10-year planning horizon:

The CAISO's further evaluation confirmed that the overload can be mitigated by relying upon the 30-minute emergency rating of the line that allows time for the operational action to reduce reactive power output from the synchronous condensers at Talega.

Nevada Hydro objects that the CAISO did not compare LEAPS to these existing and under-development mitigations in its reliability analysis. Nevada Hydro ignores, as discussed above, that the 2018-2019 transmission planning reliability studies validated the effectiveness of existing solutions, as opposed to identifying and "choosing" new solutions, with minor enhancement opportunities being identified in several cases as being beneficial but not necessary. This is a critical distinction, as the CAISO's reliability study process is not designed to replace existing reliability solutions barring new reliability requirements; those types of evaluations occur in the economic planning study framework. Thus, contrary to the Nevada Hydro complaint, the CAISO did not select a new solution over LEAPS or other competing wires or storage proposals – the existing solutions were already in place. Accordingly there was no reliability need for a new reliability transmission solution.

As indicated in the Unified Planning Assumptions and in the 2018-2019 Transmission Plan, the existing operational measures, including RAS, and existing or

under-development demand response, and battery storage were all assumptions in the 2018-2019 transmission planning process, they were not proposed new reliability projects and they were not "hypothetical" solutions. These solutions would be available or in place regardless of whether or not the CAISO approved LEAPS.

The LEAPS project would be expected to partially mitigate the P6 overloads identified in Appendix C of the ISO Transmission Plan, but LEAPS would not completely mitigate all of the concerns as, for example, it would not eliminate the need for the RAS discussed above. For example, the existing RAS requires the shedding of approximately 1150 MW of Imperial Valley generation to address reliability concerns whereas LEAPS only provides at most 500 MW of counter flow. Because LEAPS is only 500 MW, it is not large enough to produce counter flow to offset the removal of 1,150 MW at Imperial Valley. Furthermore, Mr. Alaywan's analysis appears to acknowledge this fact.[6] Thus, the RAS would still be needed even if LEAPS was installed and used in the generating mode to reduce the need for the RAS. Interestingly, the RAS is needed most during high solar generation production hours, which is when Nevada Hydro indicates it would want LEAPS to be pumping rather than generating.

The opportunity for LEAPS to supplant existing mitigations would come in the policy or economic planning study stages of the CAISO's transmission planning process. There was no capital cost to avoid as the reliability mitigation solutions were already in place or under construction—generally for other reasons—a consideration that was later reflected in the economic study stage. The demand response, battery storage, and existing operational solutions did not impose any incremental capital costs

[6] Exhibit NHI-2 at 22 (Table 2); Exhibit NHI-7 at 11.

to transmission ratepayers compared to LEAPS' $2 billion in capital costs. They are clearly a more efficient or cost-effective means of reliability mitigation than LEAPS for purposes of approving reliability transmission solutions.

Mr. Alaywan states that RAS and operating solutions are not "long-term" solutions.[7] To the contrary, these can be short-term or long-term solutions, and several such solutions have been in place for many years. For example, the Unified Planning Assumptions set out a list of over 80 RAS,[8] and the "California Oregon Intertie Remedial Action Scheme" has been in place since the early 1990s, with the expectation it will continue to function well past the current planning horizon. None of these existing solutions face limitations that limit their use to being short term mitigations.

Mr. Alaywan also states that the CAISO does not state what the solutions will be when gas-fired resources retire in the area.[9] The CAISO modeled all known and expected retirements in the region within the 10-year planning horizon assessed in the 2018-2019 planning cycle. There is no evidence of additional units in the region retiring within the studied planning horizon.

Mr. Alaywan also criticizes relying on 30-minute operating limits for windows to reposition the system after a first contingency to prepare for a second.[10] This is both common in the CAISO footprint, and expected by stakeholders as a cost effective way to maintain reliability, especially for P-6, "N-1-1" contingencies. Indeed, as discussed above, the NERC reliability standards go so far as to even permit load shedding for such contingencies, although the CAISO Planning Standards set a higher level of performance in high population density urban areas (to avoid load shedding).

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7 Exhibit NHI-2 at 19-21.

8 Also referred to as special protection systems (SPS).

9 Exhibit NHI-2 at 19, 21.

10 Exhibit NHI-2 at 23.

Nevada Hydro is also critical of the CAISO relying on battery storage and demand response programs. However, section 24.4.6.2 of the CAISO tariff expressly provides that the CAISO will consider lower costs solutions to resolve reliability issues including demand side management, remedial action schemes, and storage facilities. In this instance, the batteries and demand response programs were already approved by the CPUC, and are either in place or under construction.

### B. The CAISO Identified No Need for Any Policy-Driven Transmission Projects in the 2018-2019 Transmission Planning Cycle

With the initial preferred reliability solutions established, the CAISO then studies the capability of the transmission system to meet policy needs. As described in CAISO tariff section 24.4.6.6, the CAISO determines the need for policy-driven transmission solutions to meet state, municipal, county, or federal policy requirements or directives. As part of the policy-driven solution evaluation process, the CAISO will designate the policy-driven solutions as either category 1 or category 2. Category 1 solutions are those that will be recommended to the CAISO Board for approval in the current TPP cycle. Category 2 solutions are identified, but are not recommended for approval in the current TPP cycle, because they will be re-assessed in the next planning cycle as candidate category 1 facilities based on new information regarding generation development and other factors related to the need for policy-driven transmission solutions.

Policy-driven transmission planning in prior planning cycles has focused primarily on policy-driven transmission needs to support state policy objectives on the development of renewable generation. The CAISO and the CPUC have a memorandum of understanding under which the CPUC provides the renewable resource portfolio or portfolios for CAISO to analyze in the CAISO's annual TPP. The portfolio development has transitioned from the CPUC's previous long term

procurement plan proceedings to the current integrated resource planning (IRP) proceedings. As the electricity industry in California transitioned to the 33 percent Renewables Portfolio Standard by 2020 established by SBX1-2, to the 50 percent RPS by 2030 established by SB 350, the CPUC's generation planning process transitioned to the new requirements.

The CPUC issued a decision on February 8, 2018 that adopted the integrated resource planning (IRP) process designed to ensure that the electric sector is on track to help the State achieve its 2030 greenhouse gas (GHG) reduction target, at least cost, while maintaining electric service reliability and meeting other State goals.[11] The decision also established a 50 percent RPS scenario[12] to be transmitted to the CAISO to be used in the 2018-2019 TPP reliability (and economic) assessment, and a 56-57 percent scenario[13] to be used as a sensitivity in the 2018-2019 TPP policy-driven assessment to identify Category 2 transmission based on the Reference System Plan. The sensitivity went beyond the 50 percent RPS goal at the time, both due to ongoing discussions of higher RPS goals, and state emissions goals than could require higher amounts of renewable energy than the RPS goal in effect at the time. The decision also stipulated that no base portfolio would be transmitted to the CAISO as part of the 2018-2019 TPP policy-driven assessment. The CPUC considered it unnecessary given the expectation that no additional transmission was necessary at this time to meet the 50 percent RPS goals. This expectation is based on past transmission planning studies and the steadily declining estimates of the amount of grid-connected renewables necessary to achieve the 50 percent by 2030 goal due to the rapid deployment of behind-the-meter solar PV generation.

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11 http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M209/K878/209878964.PDF

12 The "default" scenario as it was identified in the CPUC proceeding.

13 The "42 MMT" Scenario as it was identified in the CPUC proceeding, based on the "Reference System Plan".

Further, it would be premature to commit additional policy-driven transmission capital in the 2018-2019 transmission planning cycle to meet goals beyond the 50 percent goal because the CPUC's decision anticipated that the 2018 IRP effort[14] would develop a portfolio to be utilized in the CAISO's 2019-2020 transmission planning cycle as a policy-preferred portfolio to identify Category 1 policy-driven transmission needs. The policy-driven need for transmission to support renewable generation development generally has focused on the need for additional deliverability of the renewable generation. This is also a category of potential economic benefit included in the CAISO's TEAM, but only to the extent there is a need for the deliverability.

A new goal of 60 percent RPS by 2030 was established by SB 100, which was signed into law on September 10, 2018; as this occurred late in the 2018-2019 transmission planning cycle, it was not explicitly addressed in the development of the study plan in the spring of 2018.

The decision for the 2018-2019 transmission planning process was clear; however, there was no state policy support for advancing new policy-driven transmission in this planning cycle, but future planning cycles would be positioned with the benefit of state policy input.

The portfolio development process through the IRP process takes into account a broad range of parameters and considerations, including the potential for other types of supply resources, *e.g.*, preferred resources, storage (including pumped storage) to play a role.

In summary, the CAISO did not identify any policy-driven transmission needs in the 2018-2019 transmission planning process. As indicated above, the CPUC submitted no base portfolio to the CAISO for consideration in the 2018-2019 policy assessment; although, the CPUC provided a 42 MMT scenario portfolio to be used as a

[14] The second year of the biennial 2017-2018 IRP process.

sensitivity in the 2018-2019 TPP. The CAISO conducted policy-driven transmission analysis of the sensitivity portfolio that the CPUC provided, with the results helping to inform the CPUC's next round of generation planning activities. The CAISO's evaluation showed that no new transmission upgrades were needed to support the 42 MMT sensitivity portfolio in this planning cycle.

### C. The CAISO's Study of LEAPS as an Economic Transmission Solution

The CAISO performs economic studies after the completion of the reliability-driven and policy-driven transmission studies. Economic planning studies in the 2018-2019 planning cycle were identified through a number of channels, including the following:

1) The CAISO's traditional economic evaluation process and vetting of economic study requests focusing on production cost modeling;
2) Reliability request window submissions citing potential broader economic benefits as the reason to "upscale" solutions initially identified in the reliability analysis or to meet local capacity deficiencies;
3) CAISO's review of previously identified reliability solutions for opportunities to "upsize" or replace previously approved solutions with different (economically-driven) projects;
4) A CAISO-initiated review of opportunities to reduce the cost of local capacity requirements (considering capacity costs in particular); and
5) Interregional transmission projects submissions that have potential economic benefits.

The CAISO uses a production cost simulation as the primary tool to identify potential study areas, prioritize study efforts, and to assess benefits by identifying grid congestion and economic benefits created by congestion mitigation measures. This type of economic benefit is normally categorized as an energy benefit or production cost

benefit. The production simulation is a computationally intensive application based on security-constrained unit commitment (SCUC) and security-constrained economic dispatch (SCED) algorithms. The production cost simulation is conducted for all hours for each study year.

In the 2018-2019 transmission planning cycle, the CAISO conducted an exploratory economic study of potential reductions or elimination of local area and sub-area needs, which overlapped with the CAISO's previous commitments to conduct biennial 10-year forward local capacity requirements studies that were previously planned to be performed in 2018-2019 cycle.

In the production cost simulation database, the CAISO initially modeled all transmission solutions previously identified in the 2018-2019 transmission planning cycle for reliability or policy-driven needs. This ensured that all economic planning studies were based on a transmission configuration consistent with the reliability and public policy results documented in the transmission plan. The CAISO then performed the economic planning study to identify additional cost-effective transmission solutions to mitigate grid congestion and increase production efficiency within the CAISO. The CAISO considers more comprehensive benefits at the economic study stage as compared to the reliability and policy-driven study stages. As a result, CAISO can replace or upscale a solution initially identified at the reliability or policy-driven stage during the economic assessment process.

For the 2018-2019 transmission planning process, the CAISO quantified potential economic benefits as reductions in ratepayer costs based on the CAISO Transmission Economic Analysis Methodology (TEAM).[15] This is consistent with the CAISO's Business Practice Manual for the Transmission Planning Process, historic practice, and the 2018-2019 Unified Planning Assumptions. The CAISO shares modeling parameters

[15] Exhibit CAISO-2 (TEAM Document) http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology-Nov2_2017.pdf.

with stakeholders at its September and November stakeholder meetings, which meetings are held concurrently with the CAISO's development of the production cost model to allow stakeholder comments and input. The CAISO received production cost model base cases from WECC in June 2018 and discussed the cases and additional modeling parameters for its economic studies in its stakeholder meetings held on September 21-22, 2028 and November 16, 2018.[16]

The CAISO studied LEAPS and other economic projects using TEAM and following the screening and detailed study process set out below. The study was conducted accounting for all relevant LEAPS capabilities and attributes and did not limit LEAPS functions (or ability) to access market revenues. Among other things, the study fully accounted for LEAPS capabilities to mitigate congestion, address overgeneration, follow load, and provide local capacity benefits. The CAISO studied LEAPS in three configurations, and the highest benefit-to-cost ratio the economic studies showed for LEAPS was 0.34 to 1.0, significantly below the level for a project to be considered as a needed economically-driven transmission project.

[16] 2018-2019 Transmission Planning Process Stakeholder Meeting, Slides of Yi Zhang at 5, Sept. 21-22, 2018 (also noting that the WECC anchor data set Production Cost Modeling case was not released until the end of June); 2018-219 Transmission Planning Process Stakeholder Meeting, Slides of Yi Zhang at 3, Nov. 16, 2018.

### 1. Screening for Detailed Economic Study

After the CAISO prepared the production cost model and performed an initial congestion analysis, it screened the various economic study requests submitted by stakeholders and individually considered each study request for designation as a High Priority Economic Planning Study in the development of the transmission plan. As part of the screening process in the 2018-2019 TPP, the CAISO reviewed Nevada Hydro's economic study request for LEAPS project by conducting a preliminary assessment of potential benefits and CAISO evaluation metrics.[17] In the screening process, the CAISO noted that "the LEAPS project is an alternative to reduce local capacity requirements for gas-fired generation in the San Diego sub-area and combined Imperial Valley/San Diego/LA Basin" and therefore the CAISO included LEAPS in the detailed analysis of those local capacity areas and selected LEAPS for further economic study.[18]

### 2. Detailed Economic Analysis

Following the screening, the CAISO conducted a detailed economic analysis of the LEAPS project and other economic proposals to determine benefits in accordance with the screening exercise. In total, the CAISO studied nine economic project proposals for the San Diego/Imperial Valley system including LEAPS, three battery storage proposals, another pumped storage proposal in addition to LEAPS, and four transmission line proposals. A consistent economic study approach was followed in each case. Interregional projects were also studied in the economic analysis either due to being selected through the screening process, and/or as a potential alterative to a regional project being studied in detail.

[17] 2018-2019 Transmission Plan at 251-253.

[18] *Id*. at 253.

## III. Nevada Hydro's Objections to the CAISO's Economic Studies

Nevada Hydro claims there are several flaws with the CAISO's economic planning studies and application of TEAM to LEAPS. I address each claim below.

### A. Using GridView Rather than PLEXOS Production Cost Modeling

The CAISO uses GridView in its transmission planning process. Nevada Hydro objects that the CAISO used GridView rather than PLEXOS. It points to a CAISO statement that PLEXOS "provides better results for assessing system and flexible capacity benefits."[19]

Nevada Hydro mischaracterizes the CAISO's statement, which was made in the context of discussing the role of preferred resources in providing system and flexible capacity benefits.[20] Preferred resources are generation and storage resources; not transmission facilities. Specifically, the CAISO was noting that with the decline in the size of the natural gas fleet, there was an increased value for preferred resources, including storage, to provide system and flexible capacity even if they were not providing transmission benefits such as relieving congestion. In other words, the CAISO was discussing the benefits of such resources as supply-side resources, not as transmission assets. To that end, the CAISO has used PLEXOS when undertaking studies to inform generation planning and procurement. The rigorous structure and solution techniques incorporated into PLEXOS simplify incorporating ramping and flexible capacity needs and constraints, making it the CAISO's software of choice for studying these needs. For example, over the past several years the CAISO has conducted informational studies regarding the benefits of large-scale storage, and these studies have used PLEXOS, not GridView. The intent of these studies was to inform

[19] Complaint at 37.

[20] 2018-2019 CAISO Transmission Plan at 227.

the CPUC's integrated resource planning process (formerly the long-term procurement plan process) to address generation needs and resource planning to meet RPS and other goals.

However, the CAISO has traditionally used GridView in the transmission planning process because of its superior capability in modeling transmission constraints and contingencies, which is critical for transmission planning. Also, WECC uses GridView for its anchor data set and production cost modeling. Thus, using GridView does not require the CAISO to convert the WECC anchor data set format to PLEXOS.

### B. Calculation of Ratepayer Production Cost Benefits in GridView

The CAISO calculated and reported ratepayer production cost benefits for the LEAPS project by identifying the impact to CAISO ratepayers in three separate categories: (1) CAISO gross load payment, (2) CAISO generator profit (*i.e.*, generator net revenues benefiting ratepayers), and (3) CAISO transmission revenue (*i.e.*, transmission revenue benefiting ratepayers). The CAISO calculated ratepayer benefits (referred to in TEAM as the "net load payment") using the following formula:

*Net load payment = CAISO Gross load payment – CAISO Generator profit – CAISO Transmission revenue*

The CAISO also tracked LEAPS' potential market revenues separately, but ultimately included all LEAPS potential market revenues as a benefit to ratepayers in its benefit-to-cost ratio calculations. The CAISO attributed market revenues as a ratepayer benefit to fully capture the potential benefits of LEAPS and other storage projects.

The CAISO studied storage projects and their benefits without making a distinction between whether the storage projects operated as market participants in the energy and ancillary services market under a generator/load framework or operated as a transmission asset capable of participating in the energy and ancillary services market, or both. The CAISO's analysis assumed that LEAPS would earn market

revenues and credit such revenues back to ratepayers regardless of how the storage resource was categorized. In addition, the CAISO modeled transmission constraints in the GridView nodal production cost model to capture any impacts associated with alleviating any material reliability constraints.

### C. 2,000 MW Net Export Limit

One of the CAISO's economic study parameters was a 2,000 MW net export limit. The CAISO first utilized this as a market limitation in studies supporting the CPUC's integrated resource planning (IRP) process. The CAISO also has used a 2,000 MW net export limit in many of its informational studies regarding the benefits of large scale storage, dating back to 2016. It was also used in the 2017-2018 transmission planning cycle economic studies. Nevada Hydro objects to the CAISO's use of a 2,000 MW net export limit in its economic planning studies, stating that it does not reflect actual transmission constraints, is unreasonable, and violates the 2018-19 Unified Planning Assumptions.

In its Complaint, Nevada Hydro acknowledges that the CAISO has been transparent in using the 2,000 MW net export limit, and that it is not a physical transmission transfer capability limitation.[21]

The net export limit reflects market realities and the existing hurdles to interregional transactions, somewhat like a hurdle rate. Although physical limits on individual interties also need to be respected—which the CAISO did in its modeling—the CAISO also employed a limit on the amount of net exports from the CAISO to reflect western interconnection market dynamics. This limit was reasonable given the circumstances during the 2018-19 planning cycle. There is no fully integrated day-ahead and real-time joint clearing market among all of the balancing authority areas in

[21] Complaint at 33-34.

the West. California has historically been a net importer of energy, even during periods of negative prices. Several load serving entities have must-take arrangements with external resources such as Palo Verde, Hoover, and other out of state renewable resources. Spring 2019 was the first time the CAISO even experienced consistent positive net exports for any period of time.

Also, the CAISO's 2018-2019 Unified Planning Assumptions were clear that the CAISO would use the CPUC's default portfolio in its study analyses.[22] The default portfolio reflects a 2,000 MW net export limit.[23] The 2018-2019 Unified Planning Assumptions also recognize that the CAISO uses TEAM for its economic planning studies, and TEAM contemplates that the CAISO may need to model interface hurdles between balancing authority areas,[24] as the CAISO did in the 2018-2019 transmission planning process. Furthermore, stakeholders were aware of the 2,000 MW net export limit during the development of the 2018-2019 Unified Planning Assumptions as one party provided comments on the draft assumptions that supported the net export limit and requested the CAISO to run additional sensitivities, as the CAISO did.[25]

The CAISO received the base cases from WECC in June 2018, and then informed stakeholders of its continued intent to use the 2,000 MW net export limit at the September 21-22 and November 16, 2018 Transmission Planning Stakeholder sessions. At those sessions, the CAISO informed stakeholders that it would also conduct a sensitivity study using no export limit, primarily for the purposes of estimating system versus transmission congestion in the CAISO's GridView analysis.

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22 2018-2019 Unified Planning Assumptions at 19.

23 CPUC Decision 18-02-18 at 50-51 (Feb. 13, 2018).

24 Exhibit CAISO-2 (TEAM Document) Appendix B-B.1 at 30

25 *See* ITC Holdings Corp Comments on the Draft 2018-19 Unified Planning Assumptions, pp 1-2; *available at* http://www.caiso.com/Documents/ITCGDComments-Draft2018-2019StudyPlan.pdf.

Furthermore, the 2,000 MW net export limit did not negatively impact LEAPS' ratepayer benefits calculation. As the CAISO indicated during its September 21-22 and November 16, 2018 stakeholder meetings, the CAISO conducted GridView sensitivity modeling without the 2,000 MW net export limit. As expected, the results indicated reduced renewable curtailment by removing the net export limit. The CAISO also specifically studied LEAPS with and without the 2,000 MW net export limit. As the table below indicates, applying the net export limit actually increased LEAPS ratepayer benefits, likely due to the fact that the pumped storage had more opportunities to relieve system curtailment with the net export limit in place. The annual value of LEAPS' total production cost modeling CAISO ratepayer benefits (using the pumped storage and San Diego interconnection, which shows the highest benefits) actually declined from $39 million as reflected in the Transmission Plan to $34 million when the export limit was removed.

[see next page]

**Figure 1: LEAPS Ratepayer Benefits – Option 2: SDG&E Connection Only**

**With and Without Net Export Limit**

| | | With 2000 MW Net Export Limit | | | With No Net Export Limit | | |
|---|---|---|---|---|---|---|---|
| | | Pre project upgrade ($M) | Post project upgrade ($M) | Savings ($M) | Pre project upgrade ($M) | Post project upgrade ($M) | Savings ($M) |
| (a) | ISO load payment | 8,457 | 8,589 | -132 | 9,153 | 9,219 | -66 |
| (b) | ISO generator net revenue benefitting ratepayers (excluding LEAPS net revenue) | 2,526 | 2,624 | 99 | 3,093 | 3,167 | 73 |
| (c) | ISO owned transmission revenue | 199 | 198 | -1 | 347 | 327 | -20 |
| (d) | ISO Net payment (excluding LEAPS net revenue) = a-b-c<br>(savings = a+b+c) | 5,733 | 5,767 | -34 | 5,712 | 5,725 | -13 |
| (e) | LEAPS net market revenue | | | 73 | | | 47 |
| | **Total ISO Ratepayer benefit including LEAPS net revenue**<br>**(= d+e)** | | | **39** | | | **34** |

This result is unsurprising because increasing the net export limit reduces the amount of renewable energy curtailment because more energy (that would otherwise be curtailed) can be exported than with a 2,000 MW export limit. Much of the value of a pumped storage unit stems from its ability to arbitrage energy prices by pumping when energy costs are low (such as when the CAISO has solar curtailment) and then generate at higher prices during the evening peak load. When the net export limit is removed, more renewable energy can be exported to other balancing authority areas, increasing prices in the CAISO and reducing the value of pumped storage.

### C. Differences between the CAISO's Storage Studies to Inform Generation Procurement and the CAISO's Economic Planning Studies in the Transmission Planning Process

Nevada Hydro argues that the CAISO's GridView economic planning studies did not determine sufficient benefits from LEAPS. To support its argument, Nevada Hydro points to purported differences in the benefits reflected in the CAISO's transmission planning economic studies and the informational studies that the CAISO conducted regarding the general benefits of large scale storage. Nevada Hydro cites to two sets of informational storage studies that the CAISO conducted: (1) studies that Nevada Hydro refers to as the CAISO 2018 Sensitivity Studies[26] (which built on earlier studies dating back to 2016); and (2) an informational study to inform the CPUC's IRP process that was included in Chapter 7 of the 2018-2019 CAISO Transmission Plan, and which I refer to herein as the Chapter 7 Informational Study. Nevada Hydro notes that the 2018 Sensitivity Studies showed $40 million in production cost benefits and the Chapter 7 Informational Study showed $51 million in production cost benefits. Nevada Hydro suggests that using a 2,000 MW net export limit in the CAISO transmission planning

[26] Complaint at 38 n. 116.

studies may account for the difference between these production cost benefits and the findings in the transmission planning studies.

Nevada Hydro's reliance on the CAISO's informational storage studies, which model pumped storage resources as generators, to justify increased benefits for LEAPS is misplaced. These studies were intended to inform the CPUC's IRP process and generation procurement. Neither of the informational studies calculate CAISO Ratepayer benefits, in addition to other differences between them and the transmission planning studies. As a result, comparisons drawn by Mr. Alaywan are erroneously between production cost savings results from PLEXOS studies and components of CAISO Ratepayer costs from GridView studies. I discuss that in more detail in subsection D below, but there are other issues to highlight first.

Regarding the 2018 Sensitivity Studies,[27] Nevada Hydro ignores that those studies, too, included a 2,000 MW net export limit; did not model the storage at specific locations on the CAISO system; and calculated California and WECC production cost benefits, rather than CAISO benefits. California is not the same as the CAISO and includes other BAAs such as LADWP, SMUD, and IID. Furthermore, the 2018 Sensitivity Studies did not calculate CAISO ratepayer benefits, which are the basis for approving a transmission project under TEAM and do not equate to production savings. Further, the 2018 Sensitivity Studies (and predecessor studies) modeled the CAISO on a zonal basis, whereas the GridView transmission planning studies reflect nodal transmission constraints, which produces a different pattern of load payment and generation revenues that may or may not accrue to ratepayers. Thus, Nevada Hydro is comparing apples and oranges.

The Chapter 7 Informational Study likewise is not an apples-to-apples comparison with the CAISO GridView transmission planning studies. Like the 2018

[27] The most recent of which was included with Nevada Hydro's Complaint as Exhibit NHI-4.

Sensitivity Studies, the Chapter 7 Informational Study modeled the CAISO on a zonal basis, not on a nodal transmission constraint basis, and did not calculate CAISO ratepayer benefits. The Chapter 7 Informational Study was also based on the CPUC's Hybrid Conforming Portfolio (HCP), which was not used as a transmission planning base case in any of the development of the 2018-19 Unified Planning Assumptions. Nevada Hydro's complaint attacks the CAISO's purported reliance on the HCP portfolio in its transmission planning studies noting that the CAISO previously stated that such portfolio was problematic from a reliably perspective. However, the CAISO did not use the HCP in its transmission planning studies; it used the CPUC's Default Portfolio as indicated in the 2018-2019 Unified Planning Assumptions. The CAISO used the HCP in the Chapter 7 Informational Study only to inform the CPUC's IRP process. I note that the CPUC has rejected use of the HCP portfolio used in the Chapter 7 Informational Study because of reliability concerns and concerns it would not meet the state's policy goals. The CAISO raised concerns regarding the HCP portfolio from a reliability perspective based on the results of its PLEXOS modeling. The Chapter 7 Informational Study used the HCP portfolio because the CPUC was still considering using the HCP portfolio for transmission planning purposes at that time. The Chapter 7 Informational Study was therefore used strictly for informational rather than transmission investment purposes. Although the Chapter 7 Informational Study used a 5,000 MW net export limit, this parameter does not benefit LEAPS because—as described in my testimony above—increasing the net export limit diminishes the ratepayer value of pumped storage.

### D. Calculating Ratepayer Benefits versus Production Cost Savings

Both the GridView production cost model used in transmission planning studies and the PLEXOS model used for the 2018 Sensitivity Studies and the Chapter 7 sensitivity seek the lowest production cost across all of WECC. In particular, despite

the GridView model calculating CAISO ratepayer benefits, it does not dispatch the system to optimize CAISO ratepayer costs at the expense of increasing overall costs in the WECC region.

Importantly, both the 2018 Sensitivity Studies and the Chapter 7 Informational Study did not calculate CAISO ratepayer benefits as required by TEAM; they calculated California production cost benefits and CAISO production cost benefits, respectively. These are vastly different than CAISO ratepayer benefits. The CAISO ratepayer benefits calculation takes into account both the production costs of resources serving load, but also the payments, revenues and profits – and their distribution – across market participants. Benefits that accrue to CAISO ratepayers are tracked and may or may not reflect benefits to other market participants inside or outside of the CAISO. In contrast, the calculation of production cost benefits takes into account only the actual cost of production from the generation resources in a given area, and does not consider the distribution of benefits among market participants. The figure below sets out conceptually the difference in the calculation of CAISO Ratepayer benefits in GridView transmission planning studies, versus the calculation of CAISO production cost benefits tabulated for the Chapter 7 Informational Study.

[see next page]

**Figure 2 Ratepayer Benefits versus Production Cost Benefits**

| CAISO Net Ratepayer Benefits from Production Cost Simulations are the sum of: | Types of Revenues and Costs calculated in Production Cost Studies | CAISO "Production Cost" Savings are the sum of: |
|---|---|---|
| **Load Payments at Market Prices for Energy** | | |
| Yes ⇐ | Reductions in ISO Ratepayer Gross Load Payments | |
| **Generation Revenues and Costs** | | |
| Yes ⇐ (CAISO tabulated LEAPS net revenue benefits separately for tracking purposes) | Increases in generator profits inside CAISO for generators owned by or under contract with utilities or load serving entities, being the sum of: | |
| | Increases in these generators' revenues | |
| | Decreases in these generators' costs | Yes |
| | Increases in merchant (benefits do not accrue to ratepayers) generator profits inside CAISO, being the sum of: | |
| | Increases in these generators' revenues | |
| | Decreases in these generators' costs | Yes |
| Yes ⇐ | Increases in profits of dynamic scheduled resources under contract with or owned by utilities or load serving entities, being the sum of: | |
| | Increases in these dynamic scheduled resource revenues | |
| | Decreases in these dynamic scheduled resource costs | |
| **Transmission-related Revenues** | | |
| Yes ⇐ | Increases in transmission revenues that accrue to ISO ratepayers | |
| | Increases in transmission revenue for merchant (e.g. non-utility owned but under ISO operational control) transmission | |

Notwithstanding all of the other modeling changes and different software, both the GridView transmission planning studies and the Chapter 7 Informational Study found somewhat consistent annual WECC-wide production cost savings for a 500 MW pumped storage project; $50 million[28] and $46 million[29] respectively. However, not surprisingly, the $39 million[30] annual CAISO *ratepayer benefits* do not align with the Chapter 7 Informational Study's CAISO *production cost savings* (reductions in the actual operating costs of individual generators) of $51 million[31].

28 2018-2019 Transmission Plan, Option 2, at 347.

29 *Id*. at 467.

30 *Id*. at 359.

31 *Id*. at 467.

Mr. Alaywan alleges that the CAISO's calculation of ratepayer benefits is "suspect" because it shows a "34 million a year production cost impact on California."[32] This statement is factually incorrect because the $34 million cost figure cited by Mr. Alaywan is not a "production cost impact" but rather a component of CAISO Ratepayer impacts, and, as only one component of CAISO Ratepayer benefit, fails to take into account LEAPS market revenues. The CAISO considered potential market revenues of storage projects as a CAISO net ratepayer benefit,[33] but the CAISO calculated and tracked these benefits separately[34] and then added them to the other CAISO net ratepayer benefits before performing CAISO ratepayer benefit-to-cost ratio calculations.[35] In this case, the annual CAISO ratepayer production cost benefit is the sum of CAISO ratepayer net load payment (*i.e.*, the negative $34 million cited by Mr. Alaywan) and the CAISO ratepayer benefit of the LEAPS revenue (*i.e.*, $73 million). This results in an annual CAISO ratepayer benefit of $39 million through the market operation simulated in the production cost model.

It is not surprising that the market-based CAISO ratepayer benefits of LEAPS look dismal if one ignores the revenue earned by the resource itself.

Consider the simple example of a storage facility operated in a manner that effectively displaces the operation of a similar but slightly less efficient resource—with the benefits of both accruing to ratepayers. The efficiency savings would result in the newer more efficient unit displacing the operation of the older unit, thus resulting in marginal overall benefit increases to total production costs, and decreased revenues for

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[32] Exhibit NHI-2 at 34.

[33] All LEAPS revenues were considered ratepayer benefits because LEAPS' costs are proposed to be recovered from ratepayers by Nevada Hydro.

[34] 2018-2019 CAISO Transmission Plan, footnote to Table 4.9-40, at 347.

[35] *Id.* at Table 4.9-44 at 359. The 2018-2019 Transmission Plan shows the sum of CAISO ratepayer benefits associated with production cost modeling as being the sum of the two values (CAISO net ratepayer benefits without the revenue being negative $34, plus the market revenue of $73 million) totaling *positive* $39 to $42 million for Option 2).

the existing facility. The loss of revenue from the existing facility would represent an increase in ratepayer net costs until the revenue generated by the new storage facility is also taken into account. As discussed above, the impacts on ratepayer costs before LEAPS revenue, and LEAPS revenue are separately tracked in Table 4-9-44 of the 2018-2019 CAISO Transmission Plan but summed before calculating benefit-to-cost ratios.

In summary, the GridView model provided overall relatively consistent results for WECC-wide production cost savings with the PLEXOS results, which is the objective function of both programs. However, it is unreasonable simply to assume that the operation of a pumped storage facility to reduce WECC-wide production costs will necessarily also produce net CAISO ratepayer benefits in the GridView analysis equal to either the WECC-wide production cost savings or the CAISO-wide production cost savings. To do so ignores the potential benefits that accrue to parties outside of the CAISO footprint, and also, the potential benefits enjoyed by participants (*e.g.*, merchant generators) inside the CAISO footprint who may see revenue increases that do not accrue to the benefit of the CAISO ratepayer.

The GridView modeling provides both production cost results for all of WECC, which the program is seeking to minimize, and also the more detailed information that attributes production cost benefits and market operation results to the entities that will receive the benefits. This allows the CAISO to determine whether the ratepayer benefits associated with a particular project are sufficient to justify the costs that will ultimately be borne by ratepayers.

### E. The CAISO's Evaluation of Local Capacity Benefits

The CAISO also studied the benefits of LEAPS and other economic projects in reducing local capacity requirements in the San Diego area. The CAISO conducted local capacity benefit analysis through powerflow modeling. The powerflow modeling

allowed the CAISO to assess the effectiveness of LEAPS and other proposals to reduce reliance on current gas-fired local capacity resources. The CAISO attributed a value for reducing dependence on local gas-fired generation based on current specific local and system capacity needs. In the planning cycle, the CAISO valued local capacity requirement reductions based on the difference between local and system, and between local and south of Path 26, resources. As discussed in the Transmission Plan,[36] the CAISO applied this methodology considering that transmission solutions capable of reducing local capacity requirements might not provide sufficient flexible and system capacity, and that the gas-fired generation may need to be retained for those purposes. The CAISO also applied this methodology recognizing the CPUC was in the middle of its first biennial IRP proceeding evaluating the future of the gas-fired generation fleet, which would require further coordination to determine the present and future need for gas-fired resources.

Nevada Hydro argues the CAISO placed too low a value on local capacity reductions in its study. However, for the study areas relevant to LEAPS, there was no shortage of local capacity generators to meet local demand requirements. If there had been, it reasonably would have led the CAISO to identify a reliability need in the local area. Nevertheless, the status of the CPUC's IRP process presented uncertainty regarding the need for gas-fired resources to provide *system* and flexible capacity over the TPP planning horizon, namely, whether there would be sufficient generation to meet demand. These concerns extend not only to having sufficient capacity available at time of peak loads, but also the ability of a steadily growing solar/storage fleet to meet sustained periods of low solar output. Thus, the concern over meeting system demand without the gas-fired generators could still exist even if LEAPS were procured by a load-serving entity and the CPUC to provide local generating capacity. This uncertainty led

[36] Transmission Plan at 357.

the CAISO to conclude that prudence was required in assessing the potential economic benefit of displacing the existing gas-fired generation with transmission or storage. This view was supported by CPUC staff through the 2018-2019 transmission planning cycle stakeholder process.

As the CAISO recognized in the 2018-2019 Transmission Plan,[37] the 2018-2019 transmission planning cycle was taking place simultaneously with the CPUC IRP process. In fact, the IRP process was actively considering the need to retain existing gas-fired generation for purposes other than local capacity requirements*, e.g.*, system or flexible capacity needs.[38] As a result, the CAISO noted that further coordination would be necessary to properly assess the value of local capacity reductions.

Given the circumstances leading to the highly speculative nature of valuing capacity benefits at the time, the 2018-2019 Transmission Plan specifically noted it would take a "conservative approach" in valuing local capacity reduction benefits:

> While future IRP efforts are expected to provide more guidance and direction regarding expectations for the gas-fired generation fleet at a policy level, without that broader system perspective available at this time, the CAISO has taken a conservative approach in assessing the value of a local capacity reduction benefit when considering a transmission reinforcement or other alternatives that could reduce the need for existing gas-fired generation providing local capacity. In this planning cycle, the CAISO therefore applied the differential between the local capacity price and system capacity price to assess the economic benefits of reducing the need for gas-fired generation when considering both transmission and other alternatives.[39]

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[37] Transmission Plan at 231-232.

[38] *See, e.g.*, Proposed Decision, CPUC IRP Proceeding, R.16-02-007,at 133 (April 25, 2019) ("In D.18-02-018, the Commission clearly found that while no new natural gas-fired power plants are identified in the 2030 new resource mix, the modeling also shows that existing gas-fired plants are needed in 2030 as operable and operating resources, providing a renewable integration service. It is possible that there are fewer gas-fired resources needed between now and 2030, but there are certainly some, based on our analysis to date. Eliminating natural gas-fueled resources altogether by 2030, while maintaining reliability, would require technological solutions well beyond any of those that have been surfaced or analyzed in this proceeding to date").

[39] Transmission Plan at 232.

After the CPUC provides more clarity on the future of gas-fired resources, the CAISO expects to revisit its local capacity reduction value assumptions in future planning cycles, as suggested in the 2018-2019 Transmission Plan. But currently there is no shortage of local capacity in the San Diego area in the 10-year planning horizon. Nevertheless, the CAISO's analysis was both prudent and consistent in evaluating all proposals in the economic studies in the 2018-2019 cycle.

The CAISO's conservative approach regarding the local capacity benefit did not adversely affect the outcome for Nevada Hydro. Even if the CAISO adopted Nevada Hydro's proposed calculation of the local capacity benefit, which produces a $38 million annual benefit, LEAPS' benefit-to-cost ratio would still be far below the 1.0. Adding the dollar difference between the CAISO's local capacity benefit calculation and Nevada Hydro's local capacity benefit calculation would still only produce a benefit-to-cost ratio for LEAPS of 0.50. This was calculated by replacing the CAISO value of $140.35 million under Option 2 in Table 4.9-44[40] with Mr. Alaywan's $524 million.[41] Moreover, for the LEAPS configuration with the highest benefit-to-cost ratio, if the CAISO were to apply the low end of the range it considered in the 2017-2018 transmission planning process, the benefit would be $20.2 million annually, resulting in a total benefit-to-cost ratio of 0.39. The annual benefit was calculated by multiplying the CAISO value of $10.2 million under Option 2 in Table 4.9-44[42] by the ratio of ($37,860/MW-year / $19,080/MW-year), which is the low end of the range used in the 2017-2018 Transmission Plan,[43] divided by the value used to produce the $10.2 million. The benefit-to-cost ratio was calculated by replacing the CAISO value of $140.35 million

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[40] Transmission Plan at 359.

[41] Exhibit NHI-2 at 58, Table 5, Column "Local Capacity Benefit (millions)", Row "Present Value (millions)".

[42] Transmission Plan at 359.

[43] *Id*. at 253.

under Option 2 in Table 4.9-44[44] by pro-rating the $140.35 million by ($37,860/MW-year / $19,080/MW-year), which is the low end of the range used in the 2017-2018 Transmission Plan[45] divided by the value used to produce the $140.35 million.

The CAISO applied the same methodology used to study LEAPS in assessing all other competing economic transmission proposals in the area, including those that demonstrated superior benefit-to-cost ratios to LEAPS. Nevada Hydro is not precluded from requesting that the CAISO study LEAPS as an economic planning study or submitting LEAPS into the CAISO's reliably project request window in future planning cycles.

### F. Consideration of Additional Public-Policy Benefits for RPS Savings or Avoided Interconnection Costs

Nevada Hydro argues that the CAISO failed to credit LEAPS with an additional benefit for RPS savings and avoided interconnection costs. I note that TEAM does not have an independent "RPS Savings" benefit category. TEAM has "public-policy benefit" that can include the benefits associated with accessing resources located in remote areas and reducing over-build.[46] TEAM also recognizes that the data used for the CAISO's benefit calculations for "public-policy benefits" and other additional benefit categories may not be from the CAISO's transmission planning process but may be obtained through coordination with state agencies such as the CPUC, in particular using state agency resource portfolios.[47] The CPUC considered these benefits in its development of the renewable generation portfolios produced in its integrated resource

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[44] *Id*. at 359.

[45] *Id*. at 253.

[46] Exhibit CAISO-2 (TEAM Document) at 2.

[47] *Id*. at 21-22. TEAM also recognizes that for the additional benefits categories, which includes the "public policy benefit," not all additional benefits will be applicable, and it will be case-by-case based and depending on a number of factors including, *inter alia*, the location of the project and the type of upgrade. *Id*. at 21.

plan proceeding. The CAISO accordingly did not reconsider the CPUC's decision regarding generation development in the 2018-2019 transmission planning process. The CAISO notes that it has consistently declined to reconsider the CPUC's generation development portfolios in the transmission planning process and has rejected numerous requests from transmission developers to study generation portfolios that deviate from the CPUC-developed portfolios to benefit a particular transmission solution proposals. Most recently, several interregional transmission project proposals submitted in the 2018-2019 transmission planning cycle cited as benefits the reduced capital costs of achieving state policy objectives—and changing the renewable generation expectations from the CPUC-provided portfolios.[48] The CAISO's public policy transmission assessment similarly relies on renewables portfolio and resource plans from the CPUC and local regulatory authorities. Consistent with TEAM and the 2018-2019 Unified Planning Assumptions, the CAISO used renewable portfolios provided by the CPUC from its IRP process.

I note that the RPS "over-build" savings and avoided interconnection costs cited by Nevada Hydro are not distinct and unrelated benefits. The purported avoided interconnection costs are essentially proportional to the reduced renewable resource over-build that would otherwise be required. Both the RPS over-build savings and the reduced interconnection costs are considered in the CPUC's integrated resource planning process and reflected in the renewables portfolios provided to the CAISO for use in the transmission planning process.

Nevada Hydro's arguments regarding its so-called RPS benefit are aimed at the CPUC's resource portfolio decisions and suggesting that "LEAPS would reduce this rapidly growing supply burden."[49] However, the CPUC's IRP proceeding is the

[48] 2018-2019 Transmission Plan at Section 5.

[49] Complaint at 41-42.

appropriate venue to compare RPS over-build savings of pumped storage versus other generation options because any RPS over-build savings are directly the result of adjusting the state's overall generation mix to more cost-effectively meet state RPS goals. The CPUC considered pumped storage in the IRP proceeding that determined the portfolios to be submitted to the CAISO for use in the transmission planning process.[50] Pumped storage resources like LEAPS could potentially reduce the quantity of new renewable resources that must be built to meet state RPS goals, but the costs of displacing additional renewable over-build must be balanced against the costs of the pumped storage. In addition, the state may elect to pursue different renewable generation portfolios that would reduce the amount of over-build necessary to meet the RPS, thereby reducing the potential benefits of pumped storage. The CPUC takes these considerations into account in the IRP to produce renewable generation portfolios for use in the transmission plan.

The CAISO does not use the economic study process to rethink the policy direction of the state agencies that have jurisdiction over generation procurement. The public policy benefit of reducing the cost of "overbuild" has already been taken into account in the CPUC's generation planning process, and the CAISO is an active participant in those proceedings and provides relevant transmission planning information to the CPUC.[51]

Mr. Alaywan asserts that the 2018-2019 Transmission Plan "acknowledged" that the use of "generic" resources contained in the CPUC's "default" generation portfolio constituted a change from past practice and infers that such an approach is inconsistent with the Unified Planning Assumptions.[52] This mischaracterizes the transmission plan

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[50] CPUC Decision D.18-02-018 at 78.

[51] The TEAM analysis could be used if the CAISO no longer relied on the CPUC's portfolios, but that is not the case.

[52] Exhibit NHI-2 at 44.

as the comment Mr. Alaywan refers to does not describe any change in the CAISO's treatment of generic resources identified in the CPUC's portfolios. Instead, the statement that Mr. Alaywan refers to indicated that "the portfolio now includes only the new generic (not contracted) resources. In the past, portfolios were comprised of contracted and generic resources."[53] In previous cycles, only generation that was actually online was considered pre-existing and the CPUC portfolios included both contracted for and generic resources. The only difference in the 2018-2019 planning process was to include "contracted for, but not in service" resources as pre-existing rather than in the CPUC portfolios. This has nothing to do with the CPUC's continued use of "generic" resources in developing renewable generation portfolios. Instead, the change was purely an accounting change related to contracted-for resources that had no material impact on the CAISO's transmission planning analysis.

### G. LEAPS Does Not Provide the Increased Deliverability Benefits TEAM Contemplates

Nevada Hydro also claims that LEAPS should be given an additional deliverability benefit because it can free up capacity on the Sunrise transmission line, potentially allowing more renewables to be transmitted on that line. Although LEAPS should be expected to provide some level of counter flow on these transmission lines, it does not provide any additional economic benefit based on the application of TEAM. TEAM's description of a deliverability benefit states a "[t]ransmission upgrade can potentially increase generator deliverability to the region under study through the *directly increased transmission capacity or the transmission loss saving.*"[54] TEAM goes on to clarify that "such deliverability benefit can only materialize when there will be

[53] 2018-2019 CAISO Transmission Plan at 193.

[54] Exhibit CAISO-2 (TEAM Document) at 22 (emphasis added).

capacity deficit in the region under full study."[55] Because there is no capacity deficit in the San Diego/Imperial Valley region for the 10-year planning period,[56] there is no deliverability benefit associated with LEAPS.[57]

Nevada Hydro's purported deliverability benefits are premised on the notion of LEAPS freeing-up capacity on an existing line into San Diego to allow some additional renewable resources to flow on that line. Even assuming that LEAPS could free-up capacity on Sunrise, the CAISO's reliability studies showed no need to unload capacity on this line. The CAISO's public policy transmission analysis also showed no need to access additional renewable resources via this (or any other) transmission line to meet public policy requirements.[58]

Further, any capacity benefits that might accrue to the San Diego/Imperial Valley local area would have been accounted for in assessing the local capacity benefit and, if there is congestion on the existing line, any congestion relief that LEAPS might be able to provide would be addressed in the CAISO's production cost analysis. Thus, providing LEAPS a separate "deliverability" benefit would constitute double-counting.[59]

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[55] *Id.* The TEAM document erroneously refers to Section 3.5.1. It should read section 2.5.1.

[56] *See* 2018-2019 CAISO Transmission Plan. Appendix G at 1-2 (showing zero capacity deficiency for the San Diego/Imperial Valley local area for both 5- and 10-year planning horizons).

[57] The gaps in Nevada Hydro's analysis are also exposed by how Nevada Hydro assessed the value of the deliverability benefit. Instead of determining what type of upgrade might accommodate the 311 MW and the avoided cost of such upgrade, Mr. Alaywan instead estimated the value of the 311 MW of deliverability by comparing it to the annual revenue requirement of a different transmission pathway into SDG&E, stating that such value is approximately equal to what it would cost to build a new transmission line with equivalent capacity. Complaint at 48, citing Exhibit NHI-2 at 59.

[58] 2018-2019 CAISO Transmission Plan at 191-224.

[59] Freeing-up capacity on an existing line to allow additional renewable resources to flow on it is not "directly increasing transmission capacity" as required by TEAM to receive a deliverability benefit. LEAPS would essentially be replacing energy that would otherwise be delivered via the existing Sunrise transmission line. Mr. Alaywan's testimony indicates as much, noting that the Imperial Valley substation would serve 36 percent of SDG&E's load with LEAPS, compared to 43 percent without LEAPS. Exhibit NHI-2 at 49.

### H. LEAPS Does Not Avoid the Costs Associated with Other Approved Reliability or Policy Projects

Nevada Hydro argues that the CAISO failed to grant LEAPS any benefit associated with avoiding a reliability or public policy project. TEAM recognizes that if a reliability or policy project can be avoided because of an economic project under study, then the avoided cost of such project or projects is counted as a benefit of the economic project.[60] Because the CAISO has not approved a new reliability or policy project in the 2018-2019 planning cycle that can be avoided by LEAPS, LEAPS does not produce any avoided reliability or policy project cost benefits.

The complaint nevertheless alleges that the CAISO failed to consider "reliability cost savings" in the form of avoided curtailment payments to renewable generators and out-of-merit dispatch payments to gas-fired resources "at about $33 million per year."[61] However, Mr. Alaywan's testimony shows that the $33 million figure is not based on avoided curtailment payments or out-of-merit dispatch payments. Rather, Mr. Alaywan calculates the $33 million based "on the cost of the facilities that would need to be built to relieve the overloads."[62] He calculates the annual avoided cost number based on the capital costs to upgrade six transmission facilities at a total capital cost of $459 million.[63] In other words, building LEAPS would purportedly allow the CAISO to avoid physically upgrading these six transmission facilities.[64] This is irrelevant because the CAISO has not identified a reliability need for these transmission upgrades and did not approve such upgrades in the 2018-2019 Transmission Plan.[65] Avoiding transmission upgrades

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60 Exhibit CAISO-2 (TEAM Document) at 2, 23.

61 Complaint at 48, citing Exhibit NHI-2 at 59.

62 Exhibit NHI-2 at 23.

63 *Id.* Mr. Alaywan makes no attempt to calculate the costs associated with curtailment and out-of-market dispatch, which the complaint states is the basis for the avoided $33 million in costs.

64 *Id.*

65 2018-2019 CAISO Transmission Plan at 181-90.

that are not needed for reliability does not serve as the basis for counting avoided reliability project costs under TEAM. Nevada Hydro's argument also ignores that even if the CAISO were to approve LEAPS, it would still need to retain the RAS.[66] As a result, there is no reasonable basis for Nevada Hydro's purported $459 million in avoided capital cost for new transmission, especially given that existing measures sufficiently address the contingencies.

Finally, the P6, N-1-1 contingencies that Nevada Hydro purports to address are contingencies that only arise after there has been a loss of a single generator or transmission component, followed by a system adjustment, followed by another loss of a generator or transmission component. They are uncommon. Any residual impacts to generation output lost during P6/N-1-1 contingencies themselves and their costs would be *de minimis*, particularly because LEAPS might reduce the reliance on the RAS but would not eliminate the need for the RAS.

### I. Most of LEAPS' Benefits Are Obtained from the Pumped Storage Unit Providing Market Services and Receiving Market Revenues

Mr. Alaywan's testimony provides a number of rationales as to why LEAPS is a transmission facility, referring to physical characteristics, to system reliability and resilience benefits, and to how Nevada Hydro proposes to operate LEAPS. I discuss above how LEAPS does not produce any avoided reliability or policy project cost benefits but also reviewed the economic benefits the CAISO did identify for LEAPS to inform consideration as to whether the benefits stemmed from transmission services or market services. The results of this review indicate that the majority of the benefits associated with LEAPS appear to be based on providing market services, rather than transmission services.

[66] *See* Section III.B, *supra*.

To illustrate the dichotomy between transmission service related benefits and market service related benefits, the CAISO evaluated LEAPS in three configurations, including one option that Nevada Hydro itself did not even propose:

(1) Option 1(a) - only the transmission lines and phase shifters without the pumped-storage unit (a study configuration beyond what Nevada Hydro proposed);

(2) Option 1(b) - the pumped storage unit plus the transmission lines connecting both to SCE and SDG&E; and

(3) Option 2 - the pumped storage unit plus the transmission line to SDG&E.

Applying TEAM, the CAISO studied LEAPS with all of its capabilities, attributes and characteristics as described in Nevada Hydro's Request Window Submission Form, allowing it to provide all of the functions for which it was capable in each configuration.

The CAISO's study of Option 1(a) showed a benefit-to-cost ratio ranging from 0.10 to 0.13. Option 1(b) had a benefit-to-cost ration ranging from 0.27 to 0.29, and Option 2 had a benefit-to-cost ratio ranging from 0.30 to 0.32. The primary reason that Option 1(b) and Option 2 had higher benefit-cost-ratios is that they showed $73 million annual market revenues from the LEAPS pumped storage unit; Option 1(a) had none. The CAISO's production cost study analysis showed that the positive net revenues were primarily due to the pumped storage unit arbitraging wholesale energy prices. The LEAPS pumped storage unit had positive net revenues primarily because the LEAPS units pumped during hours when renewable resources (mainly solar) output was high and LMPs were relatively low or negative, and generated during the hours when LMPs were relatively high.[67] Nevada Hydro (Exhibit NHI-7 at 15) likewise indicated that it would earn between $34 million and $51 million annually by storing energy during

[67] 2018-2019 Transmission Plan at 352 (Figure 4.9-34).

oversupply conditions and then generating energy during peak demand hours when other generation is unavailable.

The CAISO further corroborated these results by conducting studies with the pumped storage unit connected to the relatively unconstrained Lugo bus in southern California.[68] The production cost model benefits were generally consistent across all scenarios involving the pumped-storage unit, indicating that the production cost benefits arise from the pumped-storage unit essentially functioning as an energy or capacity resource in the CAISO market, rather than resolving transmission constraints. These benefits, which are consistent with the pumped storage unit being able to operate in a relatively unconstrained basis rather than dependent on transmission location, do not support the pumped storage facility being considered as providing a transmission function. The CAISO's local capacity assessment also showed the benefits of LEAPS related to substituting one type of local capacity resource—gas-fired generation—with another—the generating capacity of pumped storage.

The pumped storage unit does not improve geographic access to cost efficient resources. Specifically, it does not increase the physical capacity of any lines, it does not create a new tie, and it does not connect remote resources to the CAISO grid. Rather, the LEAPS pumped storage unit operates more like a supply resource and load connected to one or two new transmission lines. In other words, the LEAPS pumped storage unit is acting more like a generator, a demand response resource, load, or a storage facility that is a market participant (and depending on the circumstances can act as more than one of these in a given day). That being said, the CAISO's TEAM study counted all of the applicable benefits provided by the pumped storage unit, and LEAPS' benefit-to-cost ratio was still far below a 1:1 ratio based on Nevada Hydro's estimated cost of the project.

[68] *Id*. at 354 (Table 4.9-42).

TEAM identifies the types of transmission projects that might provide economic benefits: upgrades that create greater access to regional markets; upgrades that increase importing and exporting capability; upgrades that create a new tie, or upgrades that increase capacity.[69] The study of the benefits provided by LEAPS demonstrate that:

- The pumped storage unit itself did not improve access to remote, cost efficient resources nor increase import or export capability.
- The pumped storage unit did not physically increase the capacity of any transmission line or physically move electricity over a distance, and it is not a new tie or a new transmission line.
- The pumped storage unit did not provide access to an increased number of suppliers who can compete to supply energy.

The proposed transmission lines that would connect to LEAPS potentially can provide these types of "services," but the pumped storage unit itself does not. The fact that the pumped storage unit will be attached to one (or two) new transmission lines does not make the pumped storage unit itself a transmission facility or mean that the pumped storage unit is providing a transmission service. The LEAPS pumped storage unit basically functions as a substitute generator (or load), often delivering energy into the system to the interconnected transmission lines or receiving energy from the same transmission lines. I did not identify any benefits being provided that a non-transmission pumped storage facility (or other type of storage) participating in the market at the same location could not provide.

This appears consistent with Nevada Hydro's own submissions, which recognize the significant benefits LEAPS provides and revenues LEAPS can earn arise from providing market services such as regulation, load following, flexible ramping capacity,

[69] Exhibit CAISO-2 (TEAM Document) at 15, 23.

energy, ancillary services, and spinning reserve.[70] For example, Nevada Hydro's Request Window Submission Form (Exhibit NHI-7 at 15) notes that

> LEAPS provides the full range of ancillary services, including flexible capacity for load following…Market revenue from providing energy and these ancillary services are proposed to offset any revenue requirements from the project and initial TEAM analysis estimates this benefit to consumers to be between $38 and $60 million annually.

The LEAPS Request Window Submission Form describes the pumped storage unit's provision of market-services like ancillary services, spinning reserve, regulation, flexible ramping capacity, and load following and ability to earn market revenues elsewhere in the document (Exhibit NHI-7 at 3, 12, 22, 25). For example, the Request Window (p. 26) describes how the pumped storage unit can quickly "supply" 500 MW in a few minutes and then turn around and shut down and act as a "load." At pages 27-29, it describes how LEAPS can provide "load following" by adjusting its "generation" output. Mr. Alaywan's testimony similarly notes the benefits that LEAPS will provide include load and resource support services such as regulation-up and regulation down services, moment-to-moment load following service, spinning reserve, and black start service.[71] Mr. Alaywan states that Nevada Hydro will use LEAPS similar to Pacific Gas and Electric Company's Helms Pumped Storage Project, and acknowledges that "Helms Pumped Storage participates in the CAISO's wholesale power markets."[72] I note that Helms is not a transmission facility.

The CAISO identified no transmission need for LEAPS. I acknowledge that LEAPS is capable of providing voltage support and mitigating thermal overloads, but the CAISO found no need for those services in the planning horizon. LEAPS might also earn significant market revenues from products typically procured through the CAISO

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70 LEAPS Request Window Submission, Exhibit NHI-7 at 3, 12, 15, 22-29 (October 1, 2018).

71 Exhibit NHI-2 at 14-15 (Testimony of Mr. Alaywan).

72 *Id*. at 73 n. 101.

markets, but that is not a criterion for qualifying pumped storage as providing a needed transmission solution under the CAISO tariff. Also, the total CAISO net ratepayer benefits from production cost modeling of Option 2 (radially connected to the SDG&E system) were superior to the benefits for Option 1(b) (connected to both SCE and SDG&E systems) reinforcing that the pumped storage, as opposed to the SDG&E/SCE path created under Option 1(b), is providing the bulk of the benefits.

In summary, even though LEAPS' benefits arise primarily from providing market services and earning market revenues, the CAISO counted all of the benefits in calculating LEAPS benefit-to-cost ratio, and its benefit-to-cost ratio was still far below 1:1. Had the CAISO restricted LEAPS' market operations in some way in the study process to reserve the facility for transmission needs—thus limiting its opportunities to earn market revenues—its benefits would have been even lower.

## IV. Nevada Hydro's Request to Include LEAPS in the 2018-2019 Transmission Plan Is Inappropriate and Inconsistent with the CAISO Tariff

Nevada Hydro requests that the Federal Energy Regulatory Commission direct the CAISO to include LEAPS in the 2018-2019 CAISO Transmission Plan. This is problematic on many fronts.

The 2018-2019 Transmission Plan shows that there were other alternative transmission projects in addition to LEAPS seeking to address reliability and economic needs in the same area of the grid. These alternatives included another pumped storage project and some battery storage projects. Some of these projects had benefit-cost ratios higher than LEAPS. Even if the Commission finds that one or more aspects of the CAISO's study process was flawed, the CAISO would need to restudy all of these transmission projects to determine which, if any, are needed or provide a benefit-to-cost ratio greater than 1:1. Also, in any restudy, the CAISO might determine that some alternative solution represents the best solution to an identified need. In that regard, the

CAISO conducts a “top down” transmission planning process where it identifies a transmission need and then collaborates with stakeholders to identify the more efficient or cost effective solution, which may be a project or economic study request submitted by an individual stakeholder, or some other solution developed by the CAISO or suggested by a stakeholder in the transmission planning process. Simply declaring LEAPS to be the “more economic and cost effective solution for identified reliability needs” or that “LEAPS far exceeds the benefits necessary for selection as an economic transmission solution” would be inconsistent with the tariff provisions governing how the CAISO determines which solutions are necessary to address reliability and economic needs.

Moreover, directing the CAISO to include LEAPS in the 2018-2019 transmission plan “as a fully approved project,” would violate the CAISO’s tariff, in particular its competitive solicitation process tariff provisions. Nevada Hydro notes on page 17, “Phase 3, pertaining to competitive solicitations, is not relevant to the Complaint.” That is incorrect and inconsistent with the CAISO tariff. First, the CAISO does not approve specific projects with specific sponsors in the transmission planning process. Unlike some other transmission providers, the CAISO does not have a “project sponsorship” model where it awards projects to those who proposed them. Rather, under tariff section 24.4.7, the CAISO identifies general transmission solutions that can meet the identified transmission need, and it provides a detailed description and sufficient engineering detail so that interested developers can submit proposals. For example, the CAISO would find that it needs a particular type of transmission facility(ies) in a particular (or general) area and would provide the parameters and potential interconnection points etc. Second, under tariff section 24.5, after the CAISO identifies the regional transmission solutions that best meet reliability, economic, and public policy needs, the CAISO then conducts a solicitation process that allows any transmission developer to submit proposals to finance, own and construct those facilities that qualify

for competitive procurement. Under tariff sections 24.4.10 and 24.5.1, all regional transmission solutions (200 kV and above) found to be needed by the CAISO that are not upgrades to existing facilities are subject to competitive solicitation. Such competitive solicitation processes are open to all interested developers. The competitive solicitation process is a key component of the CAISO's non-discriminatory regional transmission planning process. Even if the CAISO determined that a storage solution in the San Diego area was necessary to meet an identified reliability or economic need, there is no guarantee that Nevada Hydro would be selected as the project sponsor to build and own the solution.

The CAISO also avoids limiting technology choices unnecessarily; for example, in the case of the two dynamic reactive support projects approved and found eligible for phase 3 competitive procurement, the CAISO identified a range of technologies that could provide the service, such as synchronous condensers, static var compensators, or STATCOMs. Similarly, the CAISO would seek to avoid being overly prescriptive, especially given the other pumped storage project and battery storage projects competing for opportunity in the San Diego area that were also studied in the 2018-2019 Transmission Plan. It could be that a number of different technologies and/or transmission line configurations/interconnections would best meet any identified need.

Requiring the CAISO to treat LEAPS specifically as a "fully approved project" with Nevada Hydro as the approved project sponsor would be contrary to the CAISO's tariff and inappropriately bypass the competitive solicitation process.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 22nd day of July, 2019 at Folsom, California.

*/s/ Neil Millar*
Neil Millar

EXHIBIT CAISO-2

# Transmission Economic Assessment Methodology (TEAM)

California ISO

# Transmission Economic Assessment Methodology (TEAM)

November 2, 2017

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# Table of Contents

# Executive Summary

## ES.1 Purpose of this Document

Transmission Economic Assessment Methodology (TEAM) [1] proposed principles for economic planning and outlined a framework to implement these principles. TEAM was first proposed by the ISO as the methodology for transmission economic assessment in 2004. While the general applicability of the main concepts has been proven, implementations of TEAM principles have changed since then along with the power market evolution and renewable integration, and the progress of study stools and models. The CAISO considers it necessary to update the TEAM document to reflect current practices and interpretations, and remove obsolete detail from existing document, as process improvement for the current planning processes as well as to set a more meaningful foundation for any future discussions.

## ES.2 Key Principles of the Evaluation Methodology

There are aspects of our methodology we consider critical for any economic evaluation of transmission upgrades. We call these aspects *"key principles*". Other aspects of our methodology are evolving as the modeling and analytical technology improves. We identify and discuss these *"potential enhancements"* in later portions of the report.

Although the specific application of the key principles may vary from study-to-study, the CAISO requires that the following five requirements be considered in any economic evaluation of proposed transmission upgrades presented to the CAISO for review.

### *ES.2.1 Benefit Framework*

TEAM provides a standard for measuring transmission expansion benefits for consumers, producers, and transmission owners. While the original methodology explored a range of perspectives, the "ratepayer" perspective has been relied upon consistently since the methodology was introduced. This is because cost covering of transmission upgrades is collected from the ratepayers by the TAC, and the ratepayer perspective best reflects the regulatory framework. Other options that had been considered initially and subsequently discarded were society and participant perspectives. However, WECC societal benefit perspective is used as well in order to assess if there is any impact on the system level of the entire WECC system.

TEAM original document focused on production benefit assessment based on production cost simulation. Additional benefits were discussed, but lacked details of implementation due to

[1] http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology.pdf

data and modeling limitations at the time when TEAM was introduced. In the current ISO's planning practice, benefits can be categorized into:

- Production benefits: Benefits resulting from changes in the net ratepayer payment based on production cost simulation as a consequence of the proposed transmission upgrade.
- Capacity benefits: Benefits resulting from increased importing capability into the CAISO BAA or into an LCR area. Decreased transmission losses and increased generator deliverability contribute to capacity benefits as well.
- Public-policy benefit: Transmission projects can help to reduce the cost of reaching renewable energy targets by facilitating the integration of lower cost renewable resources located in remote area, or by avoiding over-build.
- Renewable integration benefit: Interregional transmission upgrades help mitigate integration challenges, such as over-supply and curtailment, by allowing sharing energy and ancillary services (A/S) among multiple BAAs.
- Avoided cost of other projects: If a reliability or policy project can be avoided because of the economic project under study, then the avoided cost contribute to the benefit of the economic project.

### *ES.2.2 Network Representation*

In order to perform a correct economic assessment of an upgrade, the actual physical impact of the upgrade has to be modeled correctly. Accurate physical transmission modeling is also important to ensure that reliability and delivery standards are achieved. Since these standards are based on physical line flows, a full network model is implemented, satisfying the following requirements:

**Table ES-1: Production Cost Simulation Requirements Relating to the Network Model Requirement**

| No | Requirement |
|---|---|
| 1 | Must use a network model that is derived from a WECC power flow case. |
| 2 | Performs either a DC or AC OPF that correctly models the physical power flows on transmission facilities for each specific hourly load and generation pattern. |
| 3 | Capable of modeling and enforcing individual facility limits, linear nomograms, and path limits. |
| 4 | Capable of modeling limits that vary based on variables such as area load, facility loading, or generation availability. |
| 5 | Capable of modeling transmission limits |
| 6 | Models phase shifters, DC lines, and other significant controllable devices |
| 7 | Capable of calculating nodal prices. |
| 8 | Capable of plotting the hourly flows (either chronologically or by magnitude) on individual facilities, paths, or nomograms. |
| 9 | While not required, it is desirable for the simulations to model transmission losses. |

### *ES.2.3 Market Prices*

Modeling the underlying prices is the basis for any economic assessment. A new transmission project can enhance market competitiveness by both increasing the total supply that can be delivered to consumers and the number of suppliers that are available to serve load. In a liberalized electricity market, suppliers are likely to optimize their bidding strategies in response to such changing system conditions or observed changes in the behavior of other market participants. Theoretically, strategic bidding can be modeled using game theoretic or empirical approaches.

However, in the long term, no generator can operate below its short run marginal cost. Furthermore, the current market design performs market power mitigation. Additionally, strategic bidding is closely related to the location and technology of certain generators. Due to the long-term horizon of transmission planning, the existence of these circumstances favoring strategic bidding is uncertain. This uncertainty is assumed to be greater than the added value of including strategic bidding in the analysis.

As a consequence, in the ISO's current economic planning studies, cost-based production cost simulation is used.

### *ES.2.4 Uncertainty*

Decisions on whether to build new transmission are complicated by risks and uncertainties about the future. Future load growth, fuel costs, additions and retirements of generation capacities and the location of those generators, and availability of hydro resources are among some of the many factors impacting decision making. Some of these risks and uncertainties can be easily measured and quantified, and some cannot.

The economic assessment of a proposed transmission upgrade can be sensitive to specific input assumptions. Sensitivity studies are needed to test the robustness of the economic assessment results. In the ISO's current practice, sensitivity cases are created by varying the most critical assumptions for the project under evaluation. Such cases may include high load growth, high gas prices, wet or dry hydrological years, and different resource plans.

### *ES.2.5 Evaluating Alternatives for Transmission Expansion*

The evaluation of alternatives to a proposed transmission upgrade is an integral part of the ISO's transmission planning process. Economic assessment is performed for projects that are proposed by potential project sponsors and that are found to significantly alleviate congestion. If there are several proposals that are found to mitigate the same congestion, the alternatives are compared and the most cost-effective one is the preferred solution. The test for alternatives also includes modified operating procedures and additional special protection schemes (SPS). Reliability studies are needed to validate that alternatives do not have reliability concerns.

Considering resources – and preferred resources in particular – as an alternative to transmission expansion to achieve economic efficiency benefits is another principle that has been proposed in TEAM.

## ES.3 Applicability of Methodology

The five key principles of the proposed CAISO methodology do not need to be applied in exacting detail for each study. Rather, the type of study and initial study results will dictate at what level the principles should be applied.

For all transmission upgrade studies, we will require as a minimum, the use of a transmission network model and the consideration of alternatives. If preliminary economic feasibility studies show the proposed upgrade to be strongly economic from CAISO ratepayer perspective and no negative impact to the WECC system, then uncertainty analyses may not be necessary. If the economic benefits are marginal, uncertainty analyses may be needed to better understand the distribution of benefits and their root causes.

## ES.4 Potential Enhancements

As stated at the beginning of this summary, the CAISO-proposed methodology is based on five key principles. Although these principles were established as requirements, their exact implementation is subject to enhancements, as suggested by the experiences and practical needs along with the constant application of the methodology. For example, the ISO works with WECC and other planning regions to continuously improve the transmission and market modeling. Also a potential enhancement of applying a stochastic approach for a range of parameters could create additional analytical value. It is worth noting that there is not an exhaustive list of potential enhancements as the process and practical need evolve.

## ES.5 CAISO Decision Process

TEAM framework serves as consistent means of conducting a project evaluation. If a sponsor does not privately finance a project, and a proposal is submitted to the CAISO for funding through an access charge, the CAISO will utilize the TEAM framework to evaluate project economics. The project must receive a favorable evaluation prior to being recommended for CAISO Board approval.

The CAISO will primarily rely on ISO ratepayer perspective when evaluating the economic viability of a potential transmission upgrade since cost covering of transmission upgrades is collected from the ratepayers by the TAC. Additionally, the societal perspective is applied as a test for the benefit of the whole WECC region. This second perspective is especially considered for upgrades with interregional impacts.

Regarding interregional project, other perspectives may be evaluated to determine if other parties will benefit from the potential upgrade and can contribute to the capital cost of the upgrade. This evaluation will help to identify if large amounts of benefits transfer from one region to another or one market participant to another. Although not everyone may be compensated for a change in regional prices, the ultimate aim of an upgrade is to improve productive efficiency so all load may be served at a lower cost.

## ES.6 CA Regulatory Framework for Transmission Evaluation

The regulatory framework for the economic assessment of transmission assets is outlined in the tariff section 24.3.1 and specified in the corresponding business practice manual for the transmission planning process.

## ES.7 Conclusion

TEAM provided principles and a framework for economic planning studies. Implementations of TEAM principles have changed as the environment changes. This updated document provides a summary of the application of TEAM in ISO's economic planning practices and the corresponding updates in the TEAM implementation, including removing the obsolete components, while the framework of TEAM remains the same.

# 1. Overview of Transmission Planning Process

The TEAM methodology is intended to be a tool for providing market participants, policy-makers, and permitting authorities with information necessary to make informed decisions when planning and constructing a transmission network for reliable and efficient delivery of electric power to California consumers. This section of the TEAM report discusses the current transmission planning and siting process and demonstrates how the TEAM methodology enhances that process. It also identifies changes in the regulatory environment that are occurring, or may occur in the near future.

The annual planning process is structured in three consecutive phases with each planning cycle identified by a beginning year and a concluding year. Each annual cycle begins in January but extends beyond a single calendar year. The 2014-2015 planning cycle, for example, began in January 2014 and concluded in March 2015.

Phase 1 includes establishing the assumptions and models for use in the planning studies, developing and finalizing a study plan, and specifying the public policy mandates that planners will adopt as objectives in the current cycle. This phase takes roughly three months from January through March of the beginning year.

Phase 2 is when the ISO performs studies to identify the needed solutions to the various needs that culminate in the annual comprehensive transmission plan. This phase takes approximately 12 months that ends with Board approval. Thus, phases 1 and 2 take 15 months to complete. The identification of non-transmission alternatives that are being relied upon in lieu of transmission solutions also takes place at this time. It is critical that parties responsible for approving or developing those non-transmission alternatives are aware of the reliance being placed on those alternatives.

Phase 3 includes the competitive solicitation for prospective developers to build and own new transmission facilities identified in the Board-approved plan. In any given planning cycle, phase 3 may or may not be needed depending on whether the final plan includes transmission facilities that are open to competitive solicitation in accordance with criteria specified in the ISO tariff.

In addition, specific transmission planning studies necessary to support other state or industry informational requirements can be incorporated into the annual transmission planning process to efficiently provide study results that are consistent with the comprehensive transmission planning process. In this cycle, these studies focus primarily on beginning the transition of incorporating renewable generation integration studies into the transmission planning process.

**In Phase 1** the ISO develops and completes the annual unified planning assumptions and study plan. The generating resource portfolios used to analyze public policy-driven

transmission needs were developed as part of the unified planning assumptions in phase 1.

The purpose of the unified planning assumptions is to establish a common set of assumptions for the reliability and other planning studies the ISO will perform in phase 2. The starting point for the assumptions is the information and data derived from the comprehensive transmission plan developed during the prior planning cycle. The ISO adds other information, including network upgrades and additions identified in studies conducted under the ISO's generation interconnection procedures and incorporated in executed generator interconnection agreements (GIA). In the unified planning assumptions the ISO also specifies the public policy requirements and directives that will affect the need for new transmission infrastructure.

The study plan describes the computer models and methodologies to be used in each technical study, provides a list of the studies to be performed and the purpose of each study, and lays out a schedule for the stakeholder process throughout the entire planning cycle. The ISO posts the unified planning assumptions and study plan in draft form for stakeholder review and comment, during which stakeholders may request specific economic planning studies to assess the potential economic benefits (such as congestion relief) in specific areas of the grid. The ISO then specifies a list of high priority studies among these requests (i.e., those which the engineers expect may provide the greatest benefits) and includes them in the study plan when it publishes the final unified planning assumptions and study plan at the end of phase 1. The list of high priority studies may be modified later based on new information such as revised generation development assumptions and preliminary production cost simulation results.

In **phase 2**, the ISO performs all necessary technical studies, conducts a series of stakeholder meetings and develops an annual comprehensive transmission plan for the ISO controlled grid. The comprehensive transmission plan specifies the transmission solutions to system limitations needed to meet the infrastructure needs of the grid. This includes the reliability, public policy, and economically driven categories. In phase 2, the ISO conducts the following major activities:

- performs technical planning studies as described in the phase 1 study plan and posts the study results;
- provides a request window for submitting reliability project proposals in response to the ISO's technical studies, demand response storage or generation proposals offered as alternatives to transmission additions or upgrades to meet reliability needs, Location Constrained Resource Interconnection Facilities project proposals, and merchant transmission facility project proposals;

- coordinates transmission planning study work with renewable integration studies performed by the ISO for the CPUC long-term procurement proceeding to determine whether policy-driven transmission facilities are needed to integrate renewable generation, as described in tariff section 24.4.6.6(g);
- reassesses, as needed, significant transmission facilities starting with the 2011-2012 planning cycle that were in GIP phase 2 cluster studies to determine — from a comprehensive planning perspective — whether any of these facilities should be enhanced or otherwise modified to more effectively or efficiently meet overall planning needs;
- performs a "least regrets" analysis of potential policy-driven solutions to identify those elements that should be approved as category 1 transmission elements,[2] which is based on balancing the two objectives of minimizing the risk of constructing under-utilized transmission capacity while ensuring that transmission needed to meet policy goals is built in a timely manner;
- identifies additional category 2 policy-driven potential transmission facilities that may be needed to achieve the relevant policy requirements and directives, but for which final approval is dependent on future developments and should therefore be deferred for reconsideration in a later planning cycle;
- performs economic studies, after the reliability projects and policy-driven solutions have been identified, to identify economically beneficial transmission solutions to be included in the final comprehensive transmission plan;
- performs technical studies to assess the reliability impacts of new environmental policies such as new restrictions on the use of coastal and estuarine waters for power plant cooling, which is commonly referred to as once through cooling and AB 1318 legislative requirements for ISO studies on the electrical system reliability needs of the South Coast Air Basin;
- conducts stakeholder meetings and provides public comment opportunities at key points during phase 2; and
- consolidates the results of the above activities to formulate a final, annual comprehensive transmission plan to post in draft form for stakeholder review and comment at the end of January and present to the Board for approval at the conclusion of phase 2 in March.

When the Board approves the comprehensive transmission plan at the end of phase 2, its approval constitutes a finding of need and an authorization to develop the reliability-driven

[2] In accordance with the least regrets principle, the transmission plan may designate both category 1 and category 2 policy-driven solutions. The use of these categories better enable the ISO to plan transmission to meet relevant state or federal policy objectives within the context of considerable uncertainty regarding which grid areas will ultimately realize the most new resource development and other key factors that materially affect the determination of what transmission is needed. The criteria to be used for this evaluation are identified in section 24.4.6.6 of the revised tariff.

facilities, category 1 policy-driven facilities and the economically driven facilities in the plan. The Board's approval authorizes implementation and enables cost recovery through ISO transmission rates of those transmission projects included in the plan that require Board approval under current tariff provisions.[3] As indicated above, the ISO will solicit and accept proposals in phase 3 from all interested project sponsors to build and own the transmission solutions that are open to competition.

**Phase 3** will take place after the approval of the plan by the Board, if projects eligible for competitive solicitation were approved by the Board in the draft plan at the end of phase 2. Projects eligible for competitive solicitation are reliability-driven, category 1 policy-driven or economically driven elements, excluding projects that are modifications to existing facilities or local transmission facilities.[4]

If transmission solutions eligible for competitive solicitation are identified in phase 2 and approved, phase 3 will start with the ISO opening a project submission window for the entities who propose to sponsor the facilities. The ISO will then evaluate the proposals and, if there are multiple qualified project sponsors seeking to finance, build and own the same facilities, the ISO will select the project sponsor by conducting a comparative evaluation using tariff selection criteria. Single proposed project sponsors who meet the qualification criteria can move forward to project permitting and siting.

[3] Under existing tariff provisions, ISO management can approve transmission projects with capital costs equal to or less than $50 million. Such projects are included in the comprehensive plan as pre-approved by ISO management and not requiring further Board approval.

[4] The description of transmission solutions eligible for the competitive solicitation process was modified as part of the ISO's initial Order 1000 compliance filing. It was accepted by FERC in an April 18, 2013 order and became effective on October 1, 2013 as part of the 2013-2014 transmission planning process. Further tariff modifications were submitted on August 20, 2013 in response to the April 18, 2013 order and a final ruling March 20, 2014.

# 2. Quantifying Benefits

## 2.1 Updated benefit framework

TEAM provides a standard for measuring transmission expansion benefits for consumers, producers, and transmission owners. While the original methodology explored a range of perspectives, the "ratepayer" perspective has been relied upon consistently since the methodology was introduced. Other options that had been considered initially and subsequently discarded were society and participant perspectives.

Cost recovery of transmission upgrades is ultimately collected from ratepayers. Thus, the ratepayer perspective best reflects the regulatory framework and is the prevailing perspective used in the economic evaluation of transmission upgrades. However, the WECC societal benefit perspective is used as well in order to assess the impact on a system level. This perspective is especially important for projects with obvious interregional impacts.

TEAM original document focused on production benefit assessment based on production cost simulation. Additional benefits were discussed, but lacked details of implementation due to data and modeling limitations at the time when TEAM was introduced. In the current ISO's planning practice, additional benefits can be included.

In this chapter, benefit framework and the methods of quantifying benefits are presented in the context of production benefit first, followed by the discussion of additional benefits and their assessment methodologies.

## 2.2 Welfare Measures in Electricity Wholesale Markets

### *2.2.1 Define Market and Relevant Market Participants*

Because of the interconnected nature of the Western electricity system, the relevant geographic area for a transmission expansion project sited primarily in the CAISO controlled area could be much broader than the CAISO control area itself. Full network model for the entire Western electricity system is used in the ISO's economic planning study.

Classical economic surplus measures are used to define the welfare of all participants in the electricity wholesale market.[5] In the electricity wholesale market, participants involved with physical production, transport, and use of electricity may be buyers (i.e., consumers), sellers (i.e., generators), and facilitators (i.e., transmission owners).[6] Consumers are often

[5] As previously mentioned, economic benefits of reliability changes are not the main focus of this methodology.
[6] There are other market participants as well, such as the marketers/traders, but they do not necessarily handle the physical supply, transport, or consumption.

represented by their electricity distribution companies (public utilities) that purchase power to meet residential and commercial customers' load. The cost of operating such public utilities (i.e., revenue requirement) is often recovered through regulated customer rates. Sellers are electricity generators including both merchant generators and utility-owned generators. Merchant generators are usually un-regulated, selling power for profit. Utility-owned generation is often used to meet the utility's own native load. Revenues from utility-owned generation from power sales surplus to its own customers' needs usually offset the utility's regulated revenue requirement.

As noted above, there are two types of transmission owners – merchant (or private or independent) transmission owner and regulated Participating Transmission Owners (PTOs). The cost of transmission investment for a PTO is rolled into the CAISO's PTO Transmission Revenue Requirements Balancing Account and charged as a Transmission Access Charge (TAC) to the load. Thus the regulated investment cost of a transmission upgrade can be recovered through a regulated customer rate. The private investment cost of a merchant transmission upgrade is often recovered by receiving Congestion Revenue Rights (CRRs) for the incremental transmission capacity resulting from an upgrade[7]. In this case, the merchant transmission will receive no payment other than the FTR or CRR revenues allocated to it.

The distinction between private investment and regulated investment is important because it determines who pays for such investment and whose benefits should be considered in transmission expansion cost-benefit analysis. We believe the key elements of any economically driven transmission investment decision are identifying potential beneficiaries of the investment, quantifying all benefits to the transmission funding participants, and comparing expected benefits of a transmission investment against its cost under a wide range of future system conditions. If a transmission upgrade project is ratepayer funded and the cost will be recovered through regulated cost sharing, the regulatory authorities have to identify exactly who those ratepayers are and how much they benefit. If a project is a merchant transmission investment and the cost will not be recovered by regulated rates, then the merchant transmission company needs to make sure the project meets their financial goals. The CAISO (or any other entities responsible for transmission expansion coordination) has to make sure such project does not jeopardize the stability and reliability of the controlled grid. Although the CAISO's focus is on regulated transmission investment, this methodology is general enough that any market participant can use it to evaluate the effectiveness of its project.

### *2.2.2 Define Market Participants' Surplus Components*

#### Consumer Surplus

Consumer surplus is the difference between what consumers are willing to pay for a product versus what they actually pay. In an energy market, a consumer's willingness to pay can be measured by Value of Lost Load (VOLL). This measure indicates the approximate value of avoiding involuntary energy curtailments.

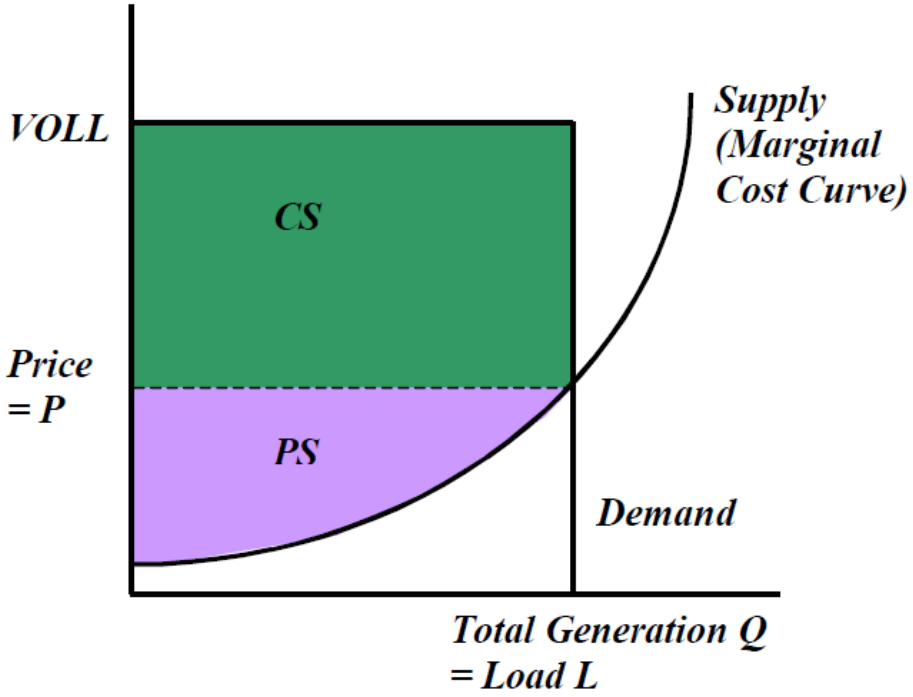


**Figure 2.1: Consumer and Producer Surplus**

Figure 2.1 graphically depicts consumer and producer surplus under the simple case of an un-congested system where prices are the same across the whole network and all generators bid their marginal costs. The example also assumes that demand is perfectly inelastic and there are no transmission losses or wheeling charges.[7] The green rectangle area marked as CS denotes consumers' surplus. It can be computed as

$$CS = (VOLL - Price) \cdot Load = VOLL \cdot L - CTL$$

where VOLL is Value of Lost Load, L is total load (equal to total generation in this case), and CTL is total Cost-to-Load. If there is congestion in the system, prices will differ by location. However, consumer surplus can be still computed in the same fashion by multiplying load by the price load pays and summing it up for the appropriate geographic region and time horizon. The total WECC consumer surplus is the sum of each region's consumer surplus. Each region's annual cost-to-load is computed as the following:

$$CTL_{i,t} = P_{i,t} \cdot L_{i,t}$$

[7] The CAISO methodology can be generalized to account for price elastic demand. As demand- response programs based on real-time pricing become more important, such an enhancement should be investigated.

where *i* (= 1, 2, 3, …, 21) is the *i*th region in WECC area, *t* (= 1, 2, …, 8760) is the *t*th hour per year, and $P_{i,t}$ is quantity-weighted average Locational Marginal Price (LMP) in region *i* at hour *t* and $L_{i,t}$ is total load in region *i* at hour *t*. Thus the total WECC consumer surplus summed over all 21 WECC regions is

$$WECC\ CS_t = \sum_{i=1}^{t} \left[ VOLL \cdot L_{i,t} - CTL_{i,t} \right]$$

We assumed that the same VOLL applies to all loads in all regions. In practice, VOLL may be different for different categories of consumers, such as industrial, commercial, residential, etc. But the formula can be generalized if needed, to account for different VOLL levels for different regions and consumer classes. However, it is important to note that in the end, we are interested in capturing the change in consumer surplus resulting from a transmission upgrade. If there is no change in reliability (i.e., the total amount of load is served), then when calculating the change in consumer surplus, all VOLL terms will cancel out. Therefore the value used for VOLL is immaterial in the end. The value of a project to improve the reliability of serving load will be evaluated separately as reliability benefit.

The definition of consumer surplus for the entire WECC area is subject to the following caveats. The WECC area outside of the CAISO controlled area does not currently have a central market and will likely not have one in the near future. As a result, there is no specific price at each load center or generation bus. Transactions are usually accomplished through bilateral agreements. Nevertheless, our defined calculation of consumer surplus indicates how much consumers will gain if the rest of WECC moves into a centralized wholesale market (or several markets). Furthermore, even with the current market structure we can still assume that through price discovery in California's energy market and trading hubs elsewhere in the WECC, the bilateral transaction prices throughout the WECC will over time converge in a "long-term expected value" sense to levels that would otherwise result from a seamless centralized WECC market.

### Producer Surplus

Producer surplus is the difference between the total payment producers received (Producer Revenue, PR) and the total variable production cost (PC).

$$PS = PR - PC$$

In Figure 2.1, the purple area indicates total producer surplus in the whole system in the case of no congestion and inelastic demand. But when there is congestion in the system, generators may receive different locational prices. Nevertheless producer revenue can be still computed as output quantity multiplied by price received and summed to the appropriate geographic region.

The generation revenue is not only from the generation times LMP, but also can be from ancillary services. Therefore it is needed to add an item or multiple items to reflect AS

revenues. On the other hand, emission cost and startup cost need to be counted as part of the total producer cost. The pumping cost of pumped storage station and pumping station, or the charging cost of battery storage, is also counted as part of the total producer cost. With generation G, price for generation $P_G$, ancillary service production AS, the corresponding price $P_{AS}$ and VOM denoting variable operation and maintenance cost, producer surplus is

$$PS = G \cdot P_G + AS \cdot P_{AS} - VOM - Fuel\ Cost - Emission\ Cost - Start\ Cost - Pump\ Cost - AS\ Cost$$

Total WECC producer surplus is the sum of each region's producer surplus. Thus the total WECC producer surplus is

$$WECC\ PS_t = \sum_{i=1}^{21} PS_{i,t}$$

This definition of producer surplus for the outside CAISO area is also subject to the caveats previously discussed.

### Congestion Revenue

As full network model has been used in production cost simulation, the shadow prices for all congested branches are available hence the congestion revenue for the congested branch is the product of it shadow price and the binding limit of the branch flow. Congestion revenues for interfaces and nomograms can be obtained with the same approach. With shadow price $\lambda$, and b,i,n denoting single branches, interfaces and nomograms, and with B,I,N denoting corresponding total number of branches, interfaces and nomograms, the equation is:

$$CR = \sum_{b=1}^{B} \lambda_b \cdot R_b + \sum_{i=1}^{I} \lambda_i \cdot R_i + \sum_{n=1}^{N} \lambda_n \cdot R_n$$

### Total Social Surplus

Total surplus is the sum of consumer surplus, producer surplus, and congestion revenue.

$$TS = CS + PS + CR$$

We can compute total social surplus at both the WECC level and regional level.

### *2.2.3 Impact of Strategic Bidding on Surpluses*

It is recognized that market power can still exist and will allow participants who have the market power to use strategic bidding. However, market power mitigation process in a well-designed market environment would force such strategic bidding to be replaced with the participants' default bids, which normally are the marginal costs. Therefore, strategic bidding is not used in the current ISO's economic planning study, in which all generators are assumed participating in the economic dispatch based on their variable cost.

## 2.3 The Impact of Transmission Expansion on Surpluses

The fundamental benefits of a transmission upgrade are to improve reliability and facilitate commerce; the latter category of benefits is the focus in this CAISO methodology. A transmission upgrade facilitates commerce by creating greater access to regional markets, which may result in greater access to lower cost supply and greater market competition. A transmission upgrade may expand the number of suppliers who can compete to supply energy at any location in a transmission network. With sufficient transmission capacity to all locations in a network, generators will face significant competition from multiple independent suppliers, which will reduce their financial incentive to bid above marginal cost since doing so would more likely result in their bids not being selected.

As we discussed above there are three categories of participants in the market: (1) consumers; (2) producers; and (3) transmission owners. If one wants to evaluate an upgrade, the benefits for all market participants must be considered and calculated, especially for those parties who will ultimately pay for the transmission upgrade. Since there are many ways to allocate the cost of a transmission investment, decision makers must evaluate all aspects of the benefit components. Moreover, the transmission valuation methodology must provide the building blocks necessary to evaluate the benefits of a variety of transmission projects. In the following sections, we discuss these benefit building blocks.

### *2.3.1 Societal Benefit*

The fundamental economic impact of transmission upgrade is that it may make the system more efficient and thus lead to more efficient economic dispatch. Thus the societal benefit of a transmission upgrade can be measured as the reduction in total variable production cost of serving load (i.e. the production cost savings).[8] Let $PC_{w/o}$ denote a system's total variable production cost without an expansion project, and let $PC_w$ denote the total variable production cost with the expansion. Then the total societal benefit (SB) is:[9]

$$SB = PC_{w/o} - PC_w$$

It is easy to determine whether a transmission upgrade project is beneficial or not from the societal point of view. However, not all market participants benefit when additional transmission is built to relieve congestion. It is important to quantify who benefits from expansion and who does not. Furthermore, total societal benefit, as measured in total variable production cost savings, can be further disaggregated into three components across regions:

- Consumer benefit from upgrade

[8] Note that this situation holds only when demand is perfectly inelastic (i.e., zero price elasticity). If demand is not perfectly inelastic, this statement needs to be modified to reflect the substitution effect between price and quantity.
[9] In the presence of price elastic demand, welfare is instead equal to total surplus, equal to total consumer willingness to pay for the electricity consumed minus the cost of providing it. The CAISO methodology does not presently consider elastic demand.

- Producer benefit from upgrade
- Transmission owner benefit

The following sections discuss each component in more detail.

### *2.3.2 Consumer Benefit, Producer Benefit, and Transmission Owner Benefit*

In a two-zone model, let Zone 1 and Zone 2 be connected by a transmission line with capacity T. Suppose we plan to expand the line limit to T + ΔT and would like to measure the benefit due to this expansion. The line may still be congested after expansion. With the transmission expansion, it is likely that generators in Zone 1 will produce less output and generators in Zone 2 will produce more output than they would without expansion. It is also likely that the Price in Zone 1 will be lower and price in Zone 2 will be higher compared to the no expansion case. In order to quantify the impact of transmission expansion on welfare, we need to:

- Compute all welfare measurements (i.e., all surpluses) for cases without and with expansion
- Subtract surplus without expansion from surplus with expansion
- Obtain the net impact of transmission expansion on surpluses

We call the change in surpluses caused by a transmission expansion the "transmission benefit". Figure 2 shows how consumers and producers in each zone are benefited or harmed by a transmission upgrade in this two-zone example.

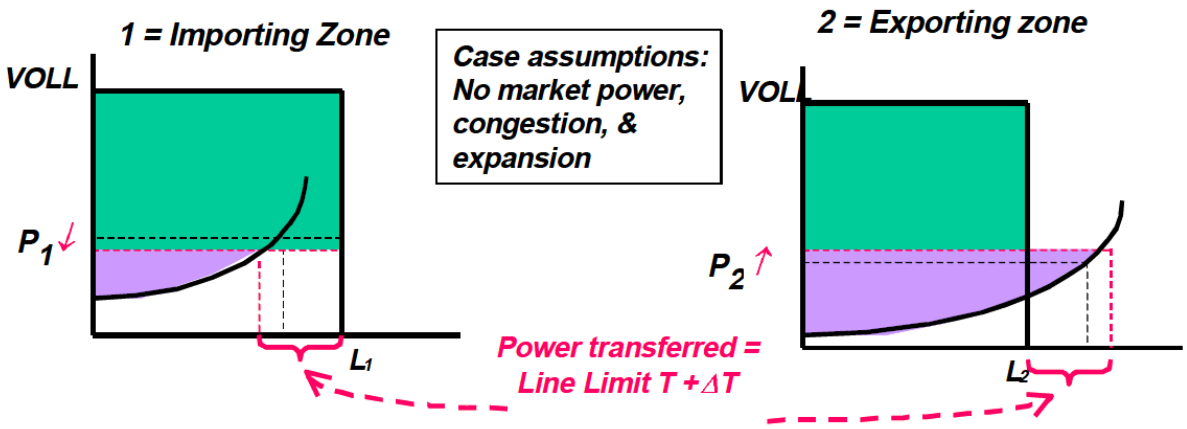


**Figure 2.2: Transmission Benefit in the Two-Zone Example**

If the amount of power transferred from Zone 2 to Zone 1 is increased, then consumers in Zone 1 may benefit from a lower price and consumers in Zone 2 may be harmed from a higher price.

$$\Delta CS_1 = -\Delta P_1 \cdot L_1 > 0$$

$$\Delta CS_2 = -\Delta P_2 \cdot L_2 < 0$$

However, producers in Zone 1 are harmed due to having less of their output dispatched and from receiving a lower price for their dispatch. On the other hand, producers in Zone 2 benefit from expansion due to having more of their output dispatched and from receiving a higher price for their dispatch.

$$\Delta PS_1 = \Delta PR_1 - PC_1 < 0$$

$$\Delta PS_2 = \Delta PR_2 - PC_2 > 0$$

Transmission owners of the line may or may not benefit from expansion depending how much the flow is increased and how much the price difference is changed.

$$\begin{aligned}\Delta CR = CR_w - CR_{w/o} &= (\Delta P_1 - \Delta P_2) \cdot T + \Delta T \cdot (P_{1w} - P_{2w}) \\ &= (P_{1w} - P_{2w}) \cdot T_w - \left(P_{1w/o} - P_{2w/o}\right) \cdot T_{w/o}\end{aligned}$$

If the line is no longer congested with expansion, TOs may have a net loss.

### *2.3.3 The Identity and Its Importance*

The method of calculating consumer benefit, producer benefit, and congestion revenue benefit can be generalized from the simple two-zone model and applied to the complicated WECC network. One way to check the validity of the partitioning of total benefits among different market participants is to check whether the following identity holds at the system (i.e., WECC) level:

$$SB = -\Delta PC = \Delta CS + \Delta PS + \Delta CR$$

Our first step in benefit evaluation of any transmission project is to make sure the total societal benefit calculated can be correctly disaggregated into three major components: consumer benefit, producer benefit, and transmission owner benefit. If a transmission project's total societal benefits exceed its total project cost, the project is beneficial to the society as a whole. However, such a project may not benefit everybody, some market participants will benefit and some may not. Thus it is important to further examine the distributional impacts of a transmission project on the various market entities. In the next section we will present our economically driven transmission expansion evaluation criteria and discuss various different perspectives.

## 2.4 Economically Driven Transmission Evaluation Criteria

### *2.4.1 Cost-benefit framework*

We use a traditional cost-benefit framework in deciding whether a proposed project is desirable from varying welfare perspectives. In theory, the optimal investment rule requires that for investment, the evaluator should make sure that each candidate investment satisfies a two-part test, namely

- A project's net present value (NPV), with benefits and costs over the project's lifetime factored into the calculation that exceeds zero. With subscript t = 1, 2,

…, T, representing the years during the planning period, d, representing the discount rate for benefit and cost calculation, and B and C, representing benefits and costs, this can be expressed as

$$NPV = \sum_{t=0}^{T} \left( \frac{B_t}{(1+d)^t} - \frac{C_t}{(1+d)^t} \right) > 0$$

The NPV criterion is also can be replaced equivalently with the Benefit-Cost-Ratio (BCR) criterion

$$BCR = \frac{\sum_{t=0}^{T} \left( \frac{B_t}{(1+d)^t} \right)}{\sum_{t=0}^{T} \left( \frac{C_t}{(1+d)^t} \right)} > 1$$

- The project selected has the highest NPV or the highest BCR

  As a practical matter, the second part of the test, which is for the cost, is often narrowly done by reviewing a limited number of alternatives (alternative timing, alternative transmission project, alternative generation project, or demand-side management projects). Thus the main focus is on the NPV calculation and testing.

The NPV of a transmission upgrade may also hinge on who will ultimately bear the cost of the project. Depending on who ultimately funds the transmission project the applied discount rate could be different. For instance, if the transmission project is funded by CAISO ratepayers then a social discount rate or a regulated discount rate should be applied. However, if an independent merchant entity funds the project, a private discount rate should be applied. What should be included in the benefit and cost calculation depends on who ultimately funds the project and who benefits from the project. Fundamentally, net benefits should be the summation of the benefits for all market participants who pay for the project less their costs. Since most projects will enhance the welfare of some market participants while diminishing the welfare of others, a project's acceptability should be judged based on the impact in aggregate.

The annual costs of a transmission project should be evaluated against the estimated annual revenue that a transmission owner would require to undertake the project. The total revenue requirement instead of the capital cost of a project is used as the cost of the project

to be compared with its benefit. The details of total revenue requirement are discussed in Appendix A.

In the CAISO's economic planning, 5-year and 10-year studies are conducted to get the benefits for these two years. The benefits for the years between the 5-year and 10-year are estimated through linear interpolation. Beyond 10 years, the benefits are assumed to be flat at the same value as the 10-year's benefit. Then the NPVs at the in-service year of the project are calculated for each year through the life time of the project. The total benefit is the summation of the NPVs of every year.

### *2.4.2 WECC Societal Perspective*

The societal perspective focuses on the overall benefit across the entire Western Interconnection. It looks at the societal benefit of a transmission project at a system-wide level with all relevant regions and relevant market participants included. Given that western systems are all inter-connected, a significant transmission project can pass the societal test if the WECC region as a whole benefits from the project. Furthermore, the societal benefit to the WECC region from a transmission project can be measured as the reduction in total WECC variable production cost of energy:

$$SB_{WECC} = -\Delta PC_{WECC}$$

If everyone is part of the unified market, costs of new transmission can be spread across all users of the transmission system and the unified market could be the vehicle through which costs are recovered from all users.

### *2.4.3 CAISO ratepayer perspective*

The CAISO ratepayers are defined as all parties that are responsible for contributing to the transmission revenue requirement balance account for the CAISO Participating Transmission Owners (PTOs). Utility-retained generation is also included in the CAISO ratepayer perspective since profits (or negative profits) from this generation flow into the balance account. Furthermore, transmission owners of the CAISO controlled grid, which are acting as agents for the final ratepayers (i.e. retail consumers within the CAISO controlled grid), are also included in the CAISO ratepayers since their congestion revenues flow into the balance account.

The CAISO ratepayer test focuses on the benefits that would accrue to those entities funding the upgrade. The CAISO ratepayers' production benefit from transmission upgrade can be calculated as the difference of net load payment between the cases pre and post project.

Generally, net load payment can be calculated as

$$\textbf{Net load payment} = \textit{ISO's Gross load payment} - \textit{ISO's Generator profit} - \textit{ISO's Transmission revenue}$$

$$\textbf{Gross load payment} = \sum(\textit{Load X LMP})$$

$$\textbf{Generator profit} = \sum(\textit{Generator revenue} - \textit{Generator cost})$$

$$\textbf{Transmission revenue} = \sum(\textit{Congestion cost} + \textit{Export wheeling cost})$$

Ownership is used to indicate which transmission's revenue and generator's profit will be counted to offset ratepayer's payment, and usually defined as ISO "owned" in the ISO's production cost model

"Owned facilities" operated to the ISO ratepayer advantage include

- PTO owned transmission
- Generators owned by the utilities serving ISO's load
- Wind and Solar under contract with an ISO load serving entity to meet the state renewable energy goal
- Other generators under contracts of which the information is available for public may be reviewed for consideration of the type and the length of contract

## 2.5 Additional benefits of economically driven transmission expansion

In this updated document, the benefit framework of TEAM is expanded to other benefits, which are discussed in the following sections. The criteria and perspectives for benefit calculation discussed above for production benefit apply to all categories of benefits, although the specific benefit assessments use different approaches.

It is worth noting that for a specific project there may be only some types of these additional benefits applicable, and it should be case by case based and would be depending on numbers of factors such as the location of the project, the type of upgrade, etc. Also, some data used in the additional benefits calculation may not be from the ISO's transmission planning process, such as capacity shortfall, renewable portfolios, etc. Instead, coordination may be needed with state agencies (e.g. CPUC) and other ISO processes to obtain such data.

### *2.5.1 Resource adequacy benefit from incremental importing capability*

A transmission upgrade can provide RA benefit when the following four conditions are satisfied simultaneously:

- The upgrade increases the import capability into the CAISO's controlled grid in the study years.
- There is capacity shortfall from RA perspective in CAISO BAA in the study years and beyond.
- The existing import capability has been fully utilized to meet RA requirement in the CAISO BAA in the study years.
- The capacity cost in the CAISO BAA is greater than in other BAAs to which the new transmission connects.

Reliability assessment, which includes power flow and stability studies, is needed in order to assess the RA benefit. The peak load condition is studied to identify the incremental capacity on the import into the ISO's controlled grid with the transmission upgrade modeled. If all above four conditions are satisfied, the RA capacity is calculated as below:

> RA benefit = Incremental capacity * (Cost of the marginal unit in RA procurement at the receiving end – Cost of the marginal unit in RA procurement at the sending end)

Given the current market design and data availability, the cost of the marginal unit in RA procurement in the ISO's controlled grid can be approximated with the per MW investment cost of gas turbine units that will be built inside ISO's controlled grid. The cost of the marginal unit in RA procurement in the sending end will depend on whether there will be capacity deficiency in the areas at the sending end. If there is deficiency in the sending area, then the cost can be approximated similarly with the per MW investment cost of gas turbine units. Otherwise, the actual RA procurement marginal cost at the sending end will be used.

### *2.5.2 Transmission loss saving benefit*

Transmission upgrade may reduce transmission losses. The reduction of transmission losses will save energy hence increase the production benefit for the upgrade, which is incorporated into the production cost simulation with full network model. In the meantime, the reduction of transmission losses may also introduce capacity benefit in a system that potentially has capacity deficit.

Using production cost modeling, the capacity benefit from the transmission loss saving can be assessed in two ways. One is to reduce the peak demand so that the need for generation capacity in the peak hours would reduce. The other way is to increase the net qualified capacity for the existing generation resources.

### *2.5.3 Deliverability benefit*

Transmission upgrade can potentially increase generator deliverability to the region under study through the directly increased transmission capacity or the transmission loss saving. Similarly to the resource adequacy benefit as described in Section 3.5.1, such deliverability benefit can only be materialized when there will be capacity deficit in the region under study. Full assessment for assessing the deliverability benefit will be on case by case basis.

### *2.5.4 LCR benefit*

Some projects would provide local reliability benefits that otherwise would have to be purchased through LCR contracts. The Load Serving Entities (LSE) in the CAISO controlled grid pay an annual fixed payment to the unit owner in exchange for the option to call upon the unit (if it is available) to meet local reliability needs. LCR units are used for both local reliability and local market power mitigation. LCR benefit is assessed outside the production cost simulation. This assessment requires LCR studies for scenarios with and without the transmission upgrades in order to compare the LCR costs. It needs to consider the difference between the worst constraint without the upgrade and the next worst constraint with the upgrade. The benefit of the proposed transmission upgrade is the difference between the LCR requirement with and without the upgrade.

### *2.5.5 Public-policy benefit*

If a transmission project increases the importing capability into the CAISO controlled grid, it potentially can help to reduce the cost of reaching renewable energy targets by facilitating the integration of lower cost renewable resources located in remote areas.

When there is a lot of curtailment of renewable generation, extra renewable generators would be built or procured to meet the goal of renewable portfolio standards (RPS). The cost of meeting the RPS goal will increase because of that. By reducing the curtailment of renewable generation, the cost of meeting the RPS goal will be reduced. This part of cost saving from avoiding over-build can be categorized as public-policy benefit.

### *2.5.6 Renewable integration benefit*

As the renewable penetration increases, it becomes challenging to integrate renewable generation. Interregional coordination would help mitigating integration problems, such as over-supply and curtailment, by allowing sharing energy and ancillary services (A/S) among multiple BAAs.

A transmission upgrade that increases the importing and exporting capability of BAAs will facilitate sharing energy among BAAs, so that the potential over-supply and renewable curtailment problems within a single BAA can be relieved by exporting energy to other BAAs, whichever can or need to import energy.

A transmission upgrade that creates a new tie or increases the capacity of the existing tie between two areas will also facilitate sharing A/S Sharing between the areas, if the market design allow sharing A/S. The total A/S requirement for the combined areas may reduce when it is allowed to share A/S. The lower the A/S requirement may help relieving over-supply issue and curtailment of renewable resources.

It is worth noting that allowing exporting energy, sharing A/S, and reduced amount of A/S requirement will change the unit commitment and economic dispatch. The net payment of the CAISO's ratepayers and the benefit because of a transmission upgrade will be changed thereafter. However, such type of benefit can be captured by the production cost simulation and will not be considered as a part of renewable integration benefit.

### *2.5.7 Avoided cost of other projects*

If a reliability or policy project can be avoided because of the economic project under study, then the avoided cost contribute to the benefit of the economic project. Full assessment of the benefit from avoided cost is on a case-by-case basis.

# 3. Production Cost Simulation using Full Network Model

In order to perform a correct economic assessment of an upgrade, the actual physical impact of the upgrade has to be modeled correctly. Accurate physical transmission modeling is also important to ensure that reliability and delivery standards are achieved. Since these standards are based on physical line flows, a full network model is implemented, satisfying the following requirements:

**Table 3-2: Production Cost Simulation Requirements Relating to the Network Model Requirement**

| No | Requirement |
|---|---|
| 1 | Must use a network model that is derived from a WECC power flow case. |
| 2 | Performs either a DC or AC OPF that correctly models the physical power flows on transmission facilities for each specific hourly load and generation pattern. |
| 3 | Capable of modeling and enforcing individual facility limits, linear nomograms, and path limits. |
| 4 | Capable of modeling limits that vary based on variables such as area load, facility loading, or generation availability. |
| 5 | Capable of modeling transmission limits |
| 6 | Models phase shifters, DC lines, and other significant controllable devices |
| 7 | Capable of calculating nodal prices. |
| 8 | Capable of plotting the hourly flows (either chronologically or by magnitude) on individual facilities, paths, or nomograms. |
| 9 | While not required, it is desirable for the simulations to model transmission losses. |

Production cost simulation is performed using DC power flow and least cost dispatch to simulate system operations in 8760 hours in a year. The simulation uses a full network model and computes locational marginal prices for every node, consisting of the short run marginal cost of energy, the marginal cost of congestion and the marginal cost of losses. The data used are usually developed on the basis of one of the TEPPC Common Cases. They contain operation and maintenance costs, fuel costs, $CO_2$ costs as well as basic technical parameters, such as efficiency, emission rates and ramp up and down rates, among others. The full network model is included in the TEPPC cases as well.

Production cost simulation based on full network model also considers other market and grid operation in the future years, such as ancillary services (A/S) and the hurdle rates among balancing authority areas (BAA), and potentially the energy imbalance market (EIM). The details of these market and grid modeling are discussed in Appendix B and Appendix C.

# 4. Modeling Prices

Modeling the underlying prices is the basis for any economic assessment. A new transmission project can enhance market competitiveness by both increasing the total supply that can be delivered to consumers and the number of suppliers that are available to serve load. In a liberalized electricity market, suppliers are likely to optimize their bidding strategies in response to such changing system conditions or observed changes in the behavior of other market participants. Theoretically, strategic bidding can be modeled using game theoretic or empirical approaches.

However, in the long term, no generator can operate below its short run marginal cost. Furthermore, the current market design performs market power mitigation. Additionally, strategic bidding is closely related to the location and technology of certain generators. Due to the long-term horizon of transmission planning, the existence of these circumstances favoring strategic bidding is uncertain. This uncertainty is assumed to be greater than the added value of including strategic bidding in the analysis.

As a consequence, in the ISO's current economic planning studies, cost-based production cost simulation is used.

# 5. Sensitivity Case Selection

Decisions on whether to build new transmission are complicated by risks and uncertainties about the future. Future load growth, fuel costs, and availability of hydro resources are among some of the many factors impacting decision makers. Some of these risks and uncertainties can be easily measured and quantified, and some cannot.

It is needed to consider risk and uncertainty in economic transmission planning. In order to do so, sensitivity studies would be needed to test the robustness of the economic assessment results. Different from the original TEAM document, in which a stochastic approach was proposed to select sensitivities, the current economic planning practice in the CAISO takes a practical approach to study sensitivities by varying critical assumptions depending on the data availability of the project under evaluation. Table 5-1 shows the typical sensitivity analyses in production cost simulation. It is worth noting that sensitivity studies can also be conducted in assessment of benefits other than the production benefit on case by case basis. The selection of sensitivities will depend on the particular project.

**Table 5-1: Typical sensitivity analyses**

| Sensitivity analyses | Note and typical variation |
|---|---|
| Load - High | +6% above forecast |
| Load - Low | -6% below forecast |
| Hydro - High | if applicable and data available |
| Hydro - Low | if applicable and data available |
| Natural gas prices - High | +50% |
| Natural gas prices - Low | -25% |
| CO2 price | If data available |
| CA RPS portfolios | If data available |
| Other sensitivities per requested | |

# 6. Evaluating Alternatives for Transmission Expansion

The evaluation of alternatives is an integral part of the ISO's transmission planning process. Economic assessment is performed for projects that are proposed by potential project sponsors and that are found to significantly alleviate congestion. Alternatives could be either transmission or non-transmission solutions. Resources, and especially preferred resources, as a non-transmission alternative to transmission expansion is another principle that has been proposed in TEAM. If there are several proposals that are found to mitigate the same congestion, the alternatives are compared and the most cost-effective one is the preferred solution. The test for alternatives also includes modified operating procedures and additional special protection schemes (SPS). Reliability studies are needed to validate that alternatives do not have reliability concerns.

# 7. Summary

TEAM provided principles and a framework for economic planning studies. Implementations of TEAM principles have changed as the environment changes. This updated document provides a summary of the application of TEAM in ISO's economic planning practices and the corresponding updates in the TEAM implementation.

While the Implementation has been updated to reflect the changes on market and grid operation, and planning processes, the framework of TEAM remains the same. In the current ISO's practice and in this updated document, ISO "ratepayer's" perspective is the perspective relied upon for benefit calculations, as the ratepayers are ultimately funding the development through rates. In addition to production benefit, assessment of other benefits has been added to the TEAM framework.

Other updates include:

- Enhanced production cost model has been applied to reflect market and grid operation.
- Cost-based production cost simulation is used. Strategic bidding is no longer modeled.
- Uncertainty is considered by simulating pre-determined sensitivity scenarios by varying the most critical assumptions for the project under evaluation

With this documentation update, it is expected to set a consistent base for applying TEAM as process improvement, and also to set a more meaningful foundation for any future discussions.

# Appendix A: Revenue requirement calculation and generic parameters for NPV of benefit and revenue requirement

The cost calculation for a transmission upgrade needs to be clarified depending on who proposed the upgrade and what process is taken. An upgrade can be proposed by the CAISO or by a transmission investor through request window.

If an upgrade needs to go through the solicitation process, the cost will be the actual revenue requirement of the project as the project sponsor proposed. For an ISO proposed project, the revenue requirement is calculated based on the model and assumptions that are consistent with the CAISO Transmission Access Charge (TAC) model[10].

The parameters in the TAC model are summarized in Table A.1. The same social discount rate is used for calculating the NPV of benefit and revenue requirements. In the current studies, the discount rate is 7% (real).

**Table A-1: Parameters for revenue requirement calculation in CAISO TAC model**

| Parameter | Value in TAC model |
|---|---|
| Debt Amount | 50% |
| Equity Amount | 50% |
| Debt Cost | 6.0% |
| Equity Cost | 11.0% |
| Federal Income Tax Rate | 35.00% |
| State Income Tax Rate | 8.84% |
| O&M | 2.0% |
| O&M Escalation | 2.0% |
| Yeas of depreciation | 15 |
| Depreciation Rate | 2.5% |

[10] http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=7A2CFF1E-E340-4D46-8F39-33398E100AE7

For general screening, per unit cost on the ISO website is used to estimate the capital cost, and the present value of the annual revenue requirement is estimated as 1.45 times of the capital.

# Appendix B: Market and grid modeling

## B.1 Hurdle rate

Hurdle rate is used to mimic the actual transaction hurdles between Balancing Authority Areas (BAA) or regions. Normally, hurdle rates include Transmission Access Charge (TAC); Grid management charge (GMC), and other frictions. Hurdle rates can be modeled as exporting hurdles (in most cases) or interface hurdles in production cost simulation.

Hurdle rates are normally implemented by adding an extra cost to generators contributing to the flow, and can be enforced on commitment or dispatch or both in production cost model.

## B.2 Ancillary services

Ancillary services (A/S) are co-optimized with energy in the production cost simulation. The A/S that are considered are Regulation up/down, Load following up/down, spinning/non-spinning. Frequency response is modeled as an A/S.

A/S requirements for Regulation and Load Following need to be calculated separately based on the load and renewable modeling, in consistent with ISO's renewable integration process and methodology[11].

## B.3 Transmission constraints

The production cost database reflects a nodal network representation of the western interconnection. Transmission limits were enforced on individual transmission lines, paths (i.e., flowgates) and nomograms.

The ISO made an important enhancement in expanding the modeling of transmission contingency constraints. The ISO modeled contingencies on multiple voltage levels (including voltage levels lower than 230 kV) in the California ISO transmission grid to make sure that in the event of losing one transmission facility (and sometimes multiple transmission facilities), the remaining transmission facilities would stay within their emergency limits. The contingencies that were modeled in the ISO's database mainly are the ones that identified as critical in the ISO's reliability assessments, local capacity requirement (LCR) studies, and generation interconnection (GIP) studies. While all N-1 and N-2 (common mode) contingencies were modeled to be enforced in both unit commitment and economic dispatch stages in production cost simulation, N-1-1 contingencies that included multiple transmission facilities that were not in common mode, were normally modeled to be enforced in the unit commitment stage only. This modeling approach reflected the system reliability need identified in the other planning studies in production cost simulation, and also considered the fact that the N-1-1 contingencies

[11] https://www.caiso.com/Documents/Aug13_2014_InitialTestimony_ShuchengLiu_Phase1A_LTPP_R13-12-010.pdf+&cd=1&hl=en&ct=clnk&gl=us

normally had lower probability to happen than other contingencies and that system adjustment is allowed between the two N-1 contingencies. In addition, transmission limits for some transmission lines in the California ISO transmission grid at lower voltage than 230 kV are enforced.

Scheduled outages and derates of transmission lines or paths also need to be considered either based on the ISO's historical data or the data provided by the facility owners. Normally only the outages and derates that may produce routine congestion are considered as the baseline assumption.

# Appendix C: EIM Modeling

Since 2014 several utilities outside of the CAISO's control grid have joined the CAISO's Energy Imbalance Market (EIM). By the market rule, EIM is the energy imbalance market in 15 minutes to 5 minutes time frame. The difference for the energy transactions in EIM and in the hour-ahead or day-ahead market is that the energy transaction across the boundary of BAAs in EIM is not subject to the wheeling charge.

With and without EIM modeled in the production cost simulation would impact the economic assessment results for transmission upgrades, and the economic justification may be alternated. Mainly due to the relative ease for entities to exit EIM and the long life of transmission assets, it is not recommended to consider the full effect of EIM in project justification. Particularly,

1. If a transmission upgrade is within the CAISO's control grid, or is seeking full funding by CAISO's ratepayers through transmission access charge, which is deemed an internal project financially, then the base case for economic assessment will be the one without EIM modeled. Meanwhile, there will be sensitivity studies with EIM modeled to test if the EIM has any impact on the economic benefit. The purpose of doing this is to avoid putting CAISO's ratepayers on risk if a transmission upgrade can only be justified economical with EIM modeled.
2. If a transmission upgrade is an inter-regional project that may benefit multiple planning regions' ratepayers or is seeking financial commitment from different regions, using with EIM or without EIM model as the base of the economic assessment will be case by case depending on the arrangement of cost sharing of the project between planning regions.

CAISO's EIM tariff can be used as the guidance of modeling EIM in the production cost simulation when the EIM effect needs to be considered in economic planning. Particularly:

1. Per CAISO Tariff Section 29.26.(a).(2) "Wheeling Access Charge. EIM Transfers from the CAISO Controlled Grid to another EIM Entity Balancing Authority Area using the contractual or ownership rights of an EIM Entity shall not constitute Wheeling Out and shall not be subject to the Wheeling Access Charge under Section 26."
2. Per CAISO Tariff Section 29.34.(m).(1) "Each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area will be responsible for meeting its own portion of the combined Flexible Ramping Constraint capacity requirements for the next hour as determined by Section 29.34(m)."
3. Per CAISO Tariff Section 29.34.(m).(5) "The CAISO shall determine the Flexible Ramping Constraint capacity requirement for all possible combinations of sufficient Balancing Authority Areas in the EIM Area, including requirements for individual Balancing Authority Areas in each combination, by reducing the total Flexible Ramping

Constraint capacity requirement for each group of Balancing Authority Areas by the total amount of EIM Internal Intertie import capability to that group from each Balancing Authority Area outside the group.

A proxy approach has been used in some production cost simulations for variety of studies in order to reflect the impact of EIM on generation dispatch:

- Define a group of EIM BAAs
- Assign a discount to the export wheeling charge rate for each of all EIM BAAs
- The discounted wheeling charge rates are applied to the generators in any of the EIM BAAs, and the generators in non-EIM BAAs are still subject to the full wheeling charge rates
- Allow sharing flexible ramping between EIM BAAs
    - Calculate standalone requirements for all BAAs
    - Calculate combined requirements
    - Calculate requirements in EIM:

      Req. in EIM = Standalone Req. * Combined Req. / sum of Standalone Req.

For the wheeling charge rates within the current CAISO EIM, the relative size of real time market to the day ahead market in terms of dollar value was recommended. For example, according to the Benefit report of PacifiCorp and California ISO Integration12 the energy cost in day-ahead market was about 93~96% of the total energy cost. In the current economic planning studies, it was assumed the day-ahead energy cost is 95% of the total energy cost. The discount to the export wheeling charge rates for EIM BAAs hence was 5%.

[12] https://www.caiso.com/Documents/StudyBenefits-PacifiCorp-ISOIntegration.pdf.

**EXHIBIT CAISO-3**

# 2018-19 CAISO Transmission Plan Reliability Assessment – Study Results
# San Diego Area Main Study Area
# Thermal Overloads: High/Low Voltages

Note: The steady state assessment of the baseline scenarios identified a total of eight thermal overload and voltage concerns under Category P1/P2/P3/P4/P6 contingencies in the SDG&E main systems and two thermal overload concerns under P1 and P3 contingencies in the SDG&E sub-transmission system. The 8th and 9th items in Column 4 were local issues only.

| Alaywan Affidavit Page 18 | Affidavit Table 2028 Results Page 22 | Sep. 2018 Presentation Slide 8 | Transmission Plan App. B | App. C | Overloaded Facility/Substation Voltage Issue | Contingency (All and Worst P6) | Baseline Scenario |
|---|---|---|---|---|---|---|---|
| 1 | 1st | No. 6 | 3rd Item | 1 | 22886 SUNCREST 230 to 22832 SYCAMORE 230 Ckt #1 or #2 | P1L-50001RAS1-P1_ 22930 ECO - 22468 MIGUEL 500KV &1 - AND - P1L-23055RAS1-P6_ 22886 SUNCREST - 22832 SYCAMORE Ckt #2 or #1 with applicable RAS | P6 |
| | | | | 2 | 22886 SUNCREST 230 to 22832 SYCAMORE 230 Ckt #1 or #2 | P1L-23055RAS1-P1_ 22886 SUNCREST - 22832 SYCAMORE Ckt #2 or #1 - AND - P1L-50001RAS1-P6_ 22930 ECO - 22468 MIGUEL 500KV &1 with applicable RAS | |
| 2 | 2nd | No. 5 | 2nd Item | 3 | 22886 SUNCREST 230 to 22888 SNCRSMP1 500/230KV BK80 or BK81 | P1L-50001RAS1-P1_ 22930 ECO - 22468 MIGUEL 500KV &1 - AND - P1T-50022RAS0_ 22885 SUNCREST 500/230KV BK81 or BK80 | P6 |
| 3 | 5th | No. 3 | 6th Item | 8 | 22430 SILVERGT 230 to 22596 OLD TOWN 230 1 1 | P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 1 - AND - P1L-50003RAS1-P1_ 23310 OCOTILLO -22885 SUNCREST 500KV & 1 | P6 |
| | 4th | | | 9 | | P1ML-23019_ 22596 MISSION-OLD TOWN-SILVERGT 3T 230 1 1 - AND - P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1 | |
| 4 | 6th | No. 3 | 6th Item | 6 | 22430 SILVERGT 230 to 22596 OLD TOWN 230 1 1 | P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1 - AND - P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1 | P6 |
| | 7th | | | 7 | | P1L-23011_ 22430 SILVERGT 230 22596 OLD TOWN 230 1 1 - AND - P1L-50003RAS1-P1_ 23310 OCOTILLO - 22885 SUNCREST 500KV &1 | |
| 5 | 3rd | No. 4 | 1st Item | 4 | 22464 MIGUEL 230 to 22468 MIGUEL 500/230 BK80 or BK81 | P1L-50003RAS1-P1_ 23310 OCOTILLO - 22885 SUNCREST 500KV &1 - AND - P1T-50012RAS1-P6_ 22464 MIGUEL 500/230KV BK81 or BK80 with applicable RAS | P6 |
| 6 | 9th | No. 1 | 4th Item | 12 | 22844 TALEGA 230 to 24131 S.ONOFRE 230 1 1 | P1ML-23061_ 22846 TALEGA-CAPSTRNO-ESCNDIDO 3T 230 1 1 - AND - P1L-TIE23_ 22113 CAPSTRNO 230 24131 S.ONOFRE 230 1 1 | P6 |
| | 8th | | | 13 | | P1L-TIE23_ 22113 CAPSTRNO 230 24131 S.ONOFRE 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1 | |
| Not identified by Nevada Hydro as possibilities for LEAPS to provide mitigation | | No. 2 | 5th Item | 10 | 22716 SANLUSRY 230 to 22232 ENCINA 230 1 1 | P1ML-23064_ 22227 ENCINA-SANLUSRY-PEN 3T 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1 | P6 |
| | | | | 11 | 22227 ENCINATP 230 to 22716 SANLUSRY 230 1 1 | P1L-23027_ 22716 SANLUSRY 230 22232 ENCINA 230 1 1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1 | |
| | | No. 7 | 10th Item | 15 | Suncrest 500 kV Bus | P2/P4 OCOTILLO CB 2T w/o coordination of the Suncrest SVC facility and the existing shunt capacitors/reactors in the Suncrest 500/230 kV substation | P2/P4 |
| | | No. 8 | 7th Item | 14 | 22356 IMPRLVLY 230 to 21025 ELCENTSW 230 1 1 | P1G_TDM_TDM Plant G-1 - AND - P1L-50002_ 22536 N.GILA - 22360 IMPRLVLY 500KV &1 | P3 |