BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans	Rulemaking No. 13-12-010 (Filed December 19, 2013)
Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans	Rulemaking No. 12-03-014 (Filed March 22, 2012)

OPENING COMMENTS OF EAGLE CREST ENERGY COMPANY ON PLANNING ASSUMPTIONS AND SCENARIOS WORKSHOP

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Eagle Crest Energy Company ("Eagle Crest"), the developer of the 1,300 MW Eagle Mountain Pumped Storage Project ("the Eagle Mountain Project") near Desert Center, California, respectfully submits these Opening Comments in Response to the December 18th, 2013 Workshop and the draft Planning Assumptions and Scenarios for Use in the CPUC 2014 Long Term Procurement Plan Proceeding and the CAISO 2014-2015 Transmission Planning Process ("Assumptions and Scenarios"). These Opening Comments are submitted pursuant to the December 19, 2013 e-mail ruling issued by Administrative Law Judge ("ALJ") Gamson.

As detailed below, perhaps more than in any prior year, the Assumptions and Scenarios that the Commission develops in 2014 will be essential to enable the paradigm shift in California's energy portfolio. We need to make a significant pivot in order to lay the foundation for a carbon constrained future -- a future that, almost necessarily, must reflect continued growth in renewables coupled with bulk storage of the sort the Eagle Mountain Project will offer.

Currently, the Assumptions and Scenarios fall short. Eagle Crest urges the Commission to revise the study assumptions to include much more robust assumptions regarding bulk storage in the Trajectory Scenario as well as the other scenarios. In addition, Eagle Crest wants to ensure that the latest dynamic models will be used to determine a wider definition of need under this proceeding. Outdated assumptions, if relied upon, will result in an LTPP process that will delay or impede the planning and procurement decisions the Commission needs to make now.

I. INTRODUCTION

A. The LTPP Proceeding Should Facilitate Long-Term Climate Change Goals

Since 2005, California has had two primary greenhouse gas ("GHG") reduction targets: (1) reduce GHG emissions to 1990 levels by 2020, and (2) reduce GHG emissions to *80 percent*

below 1990 levels by 2050.[1] While the State has made great strides in working towards the more immediate target, relatively little has been done with regard to climate reductions beyond 2020. With renewed load growth throughout the State, and significant increases in GHG emissions in the power sector caused by the closure of the San Onofre Nuclear Generating Station ("SONGS"),[2] the road to achieving California's ambitious goals has grown steeper. While 2050 is beyond the scope of the LTPP process, procurement done today will impact the long-term economics and pathways to achieve our 2050 goals. Accordingly, the Commission must shape the 2014 LTPP process to drive a paradigm in which the dramatic changes necessary to achieve our near-term and long-term climate change objectives have a chance of becoming reality.

Achieving our near- and long-term GHG emissions reduction goals requires major increases in both renewables and bulk storage to integrate those renewables into grid operations without increasing GHG emissions. Indeed, in the face of the possible retirement of the Diablo Canyon Power Plant on top of SONGS, higher penetrations and integration of renewable energy production will be all the more important. Thus, higher renewable penetrations, coupled with storage solutions for capacity and flexibility needs, should be studied to insure that investments made now serve needs in both the 10-year planning horizon and further into the future. The dramatic shifts in our energy infrastructure driven by State policy objectives necessitates that planning and procurement decisions be made with a longer-term horizon in mind. The Commission can and should use its authority to plan for at least 20 years into the future, and use long-term objectives to guide near-term investments.

The current scenario framework is too narrow in its analysis and valuation of both renewables and storage. The current set of scenarios being considered by the Commission includes only one scenario that incorporates a higher level of renewable penetration - the 40% RPS by 2030 Scenario. More problematic, neither the 40% scenario nor any of the others include substantial amounts of utility scale storage. Indeed, there is no bulk energy storage contemplated as of 2020 or beyond in the Assumptions and Scenarios, despite the current

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[1] *See* California Executive Order S-3-05 (June 1, 2005).

[2] *See, e.g.,* Laura Olson, "San Onofre Shutdown Causes Concern About Greenhouse Gas Emissions," Associated Press (July 11, 2013), http://www.huffingtonpost.com/2013/07/11/san-onofre-nuclear-power-plant-shutdown_n_3579265.html (A Southern California Edison official "said the utility's greenhouse emissions rose last year after [SONGS] shut down . . . . In 2012, 30 percent of the utility's electricity came from carbon-free resources, said David Mead, senior vice president for transmission and distribution planning. That's down from 2011, when San Onofre was still running and 50 percent of the utility's electricity came from carbon-free nuclear, hydroelectric and renewable sources, Mead said.").

development of several viable large-scale storage projects in California capable of achieving commercial operation in the relevant timeframe. As currently drafted, the Assumptions and Scenarios include only 700 MW of transmission-level storage in any of the scenarios, all of which are no more than 50 MW in size.[3] This value is based on the procurement targets in the Commission's Decision 13-10-040 in the storage procurement proceeding, which expressly excluded pumped hydroelectric projects which are almost always over 50 MW in size.

D. 13-10-040 certainly did not suggest that 700 MW of transmission-level storage was intended to be a cap beyond 2020. Just the opposite is true: it "strongly encourage[d] the utilities to explore opportunities to partner with developers to install large-scale pumped storage projects where they make sense within the other general procurement efforts underway in the context of the LTPP proceeding or elsewhere."[4] Said otherwise, although the Commission has not yet *mandated* procurement of large pumped hydro projects, it has recognized their importance and signaled that the IOUs should explore them. Moreover, that decision was issued only recently, and the utilities have not yet had time to explore pumped hydro opportunities.

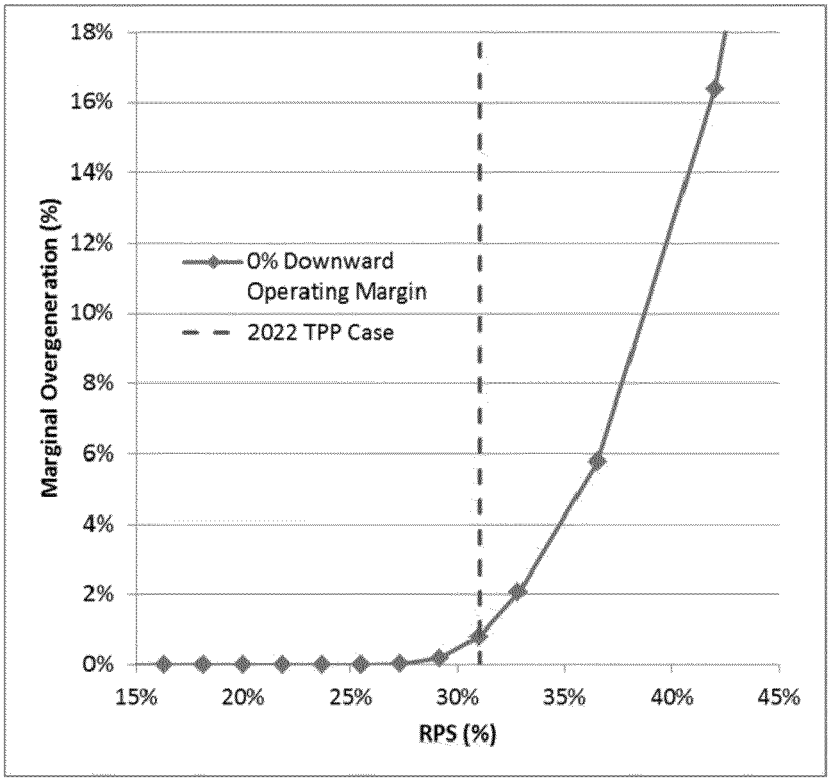
Against that backdrop, the Assumptions and Scenarios should include storage in some, if not all, of the scenarios, including the Trajectory Scenario. This will allow both the Commission and the California Independent System Operator ("CAISO") to make decisions informed by studies that model the beneficial and essential relationship between intermittent renewable resources and bulk storage. The agencies need to make these planning assumptions now to create an environment that enhances development of such projects. Failure to do so could be to the detriment of our climate and renewable policy goals.

B. The Assumptions and Scenarios Must Recognize and Resolve the Operational Challenges Created by Renewable Over-Generation

Bulk energy storage (*i.e.,* > 50 MW) can be one of the most effective solutions both to deal with renewable over-generation and realize the full value of the State's heavy investment in renewables by reducing the need for curtailment and, potentially, new transmission. The graph below shows estimates of the marginal over-generation or curtailment needed as renewable generation increases. This CAISO-commissioned analysis was performed at the CAISO

[3] To put the matter in perspective, the Eagle Mountain Pumped Storage project *alone* is 1,300 MW, almost twice the size of the 700 MW currently included in the LTPP Planning Assumptions.
[4] Commission Decision 13-10-040, *Decision Adopting Energy Storage Procurement Framework and Design Program* (October 17, 2013) at p.36.

balancing area level and could be more severe in specific areas like southern California where there is expected to be a disproportionate amount of solar resources coming online.



Source: Energy+Environmental Economics, "Renewable Energy + Flexibility (REFLEX) Results" at p. 46, presented at CPUC Workshop August 26, 2013; available for download at: http://www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/ltpp_history.htm.

It is critical that both the models and the scenarios used in the LTPP process are able to show the detailed operational challenges created by renewable integration and properly assess both conventional resources as well as storage and demand side solutions for those operational integration needs. Moreover, aside from the GHG implications, curtailment of renewable energy on this scale could jeopardize the financial viability of such resources, since nearly all of their revenue under utility contracts is likely based on the volume of energy produced.

C. The Assumptions and Scenarios Must Grapple With the New Planning Paradigm

As long as the power system was comprised predominately of fast moving dispatchable resources, bulk system reliability was primarily a function of the amount of generation resources available to meet peak loads. The system only required planning for peaking capability, not ramping and minimum generation conditions. In contrast, the new planning problem has *four* dimensions, outlined in the chart below, that need to be solved together. Each dimension has a

set of potential solutions which solve the operational challenge. The Commission's job is to identify how big each of these problems is for the 10-30 year time frame of the investments and select the least cost solution.

Planning Problem	Explanation	Methods for Solving the Problem
1. Downward ramping capability	Thermal resources operating to serve loads at night must be ramped downward and potentially shut down to make room for a significant influx of solar energy after the sun rises.	a. Add storage b. Increase generator downward ramp rate c. Shorten shut-down time d. Decrease minimum up-time e. Curtail renewables
2. Minimum generation flexibility	Over-generation may occur during hours with high production of variable renewable energy resources even while thermal resources and imports are reduced to their minimum levels. A system with more flexibility to reduce thermal generation will incur less over-generation.	a. Add storage b. Decrease minimum generation level c. Increase exports d. Shorten minimum down times e. Shorten shut-down time f. Curtail renewables
3. Upward ramping capability	Thermal resources must ramp up quickly from minimum levels during the daytime hours and new units may be required to start up to meet a high net peak demand that occurs shortly after sundown.	a. Add storage b. Increase generator ramp rate c. Shorten start-up time d. Decrease minimum down-time e. Pre-curtailment of renewables
4. Peaking capability	The system will need enough resources to meet the highest peak loads with sufficient reliability.	a. Add storage b. Increase imports/generation c. Decrease peak load

As noted above, storage provides one, perhaps the singular, sensible approach to addressing the planning problems we face going forward. But that analysis cannot be done if the planning assumptions used by the Commission do not include any scenarios with significant bulk storage figures. The Eagle Mountain Project, alone, is 1,300 MW and, as detailed below, is essentially done with the permitting process and on track to be on line as early as 2020. Moreover, the Eagle Mountain Project is not the only bulk storage project under development -- there are at least another 2,500 MW in development in the CAISO area.[5] While some of these projects may not make it across the finish line, there is no reason to believe that *none* of them

[5] Eagle Crest is aware of at least three other pumped storage projects in the CAISO area, the possible development of which the Commission should consider in updating its planning scenarios. These include: (1) Alton Energy - Bison Peak (1,000 MW), (2) EDF Renewables - Swan Lake North (1,144 MW), and (3) Brookfield - Mulqueeenie Ranch (400 MW).

will. The essential point, therefore, is that the Assumptions and Scenarios must be revised to incorporate a substantial amount of bulk storage on top of the limited quantity of storage (700 MW) currently included in the Assumptions and Scenarios. In addition, the actual modeling methodology chosen will strongly influence the need that is determined.

The importance of having realistic assumptions becomes increasingly plain given the considerably more complex considerations the Commission must factor into its analysis going forward. Since the 2010 LTPP proceeding, a set of best practices have emerged whereby the incremental value of investing in additional flexible resources can be estimated against the incremental costs. Given uncertain load (due to distributed resources), variable renewable resource output, and carbon constraints, the approach the Commission adopts will have to model more than just the incremental value of investing in additional flexible resources. The modeling completed by the CAISO and Commission must be able to identify all four operational needs (described above) and how those needs change with different sets of flexible capacity solutions which should include storage and demand response as well as faster ramping new gas resources.

One such additional element is maximizing the value of the nearly $90 billion investment in renewable resources that California has made. Most of these resources are not located in load pockets and, absent substantial transmission upgrades, will not be able to reduce local capacity needs, thereby obliging the need for additional local generation, storage, or demand response solutions. The CAISO has committed to relying on the Assumptions and Scenarios developed here for use in its Transmission Planning Process ("TPP").[6] While the CAISO's transmission planning process generally has not been used to see if renewable resources, potentially combined with storage and transmission, could reduce or eliminate certain local capacity resource needs, it will invariably not do so if the Assumptions and Scenarios on which it is to rely fails to include *any* bulk storage.

II. EAGLE MOUNTAIN PUMPED STORAGE PROJECT

Eagle Crest is developing the 1,300 MW Eagle Mountain Project near Desert Center, California. As noted previously, the Eagle Mountain Project is just one of several pumped hydro storage solutions under development in California and is very likely to come online not just

[6] *See, e.g.,* December 17, 2013 letter from Steve Berberich, President and Chief Executive Officer of the CAISO, to President Peevey and the CPUC Commissioners, served by Neal Rosen on parties to the 2012 LTPP Proceeding on December 19, 2013.

within the 20-year planning horizon of the 2014 LTPP Proceeding but, indeed, as soon as the 2020 start of the planning horizon. We include this information to underscore the appropriateness of including substantially larger storage figures in the LTPP Planning Scenarios.

A. Project Overview

The Eagle Mountain Project is designed as a closed loop project and will be located on the site of the largely inactive former Eagle Mountain iron ore mine, thereby avoiding many of the environmental issues typically raised by hydroelectric generation or pumped hydro storage facilities. It makes use of the abandoned former lower and upper mining pits of the old mine.

The project will be sited near the existing Palo Verde-Devers transmission corridor and adjacent to the currently operating Desert Sunlight project (550 MW once fully constructed) and the Desert Harvest project that is being developed (100-150 MW) as well as close to the many other utility scale solar and wind projects in operation or under development in Eastern Riverside County. It will provide fast ramping response, thereby helping integrate renewable generation -- especially during critical morning and evening ramp periods -- in Southern California, and a place to store renewable generation during over-generation or congestion periods that are predicted to occur with increased penetration of renewables.

Technical specifics (subject to change as project design is finalized) include:

- *Generation Capacity*: 1,300 MW (four 375 MW pump/turbines)
- *Storage Capacity*: 22,200 MWh; approximately 18.5 hours at maximum generating discharge
- *Ramp Rate*: 10 MW/sec (different ramp rates are possible based on final design criteria)
- *Response Time*: The project can be designed utilizing advanced electronic control systems to respond to system signals within a fraction of a second.

B. Development Progress and Timeframe

Eagle Crest has completed all the required state and federal environmental reviews for the project and has secured most of the major permits necessary for development of the Eagle Mountain Project. The key final permit remaining is the FERC Hydroelectric Generation License, which Eagle Crest anticipates will be issued in the next two to three months.[7] If Eagle

[7] The project has secured: (1) Water Quality Certification from the State Water Resources Control Board, which included review under the California Environmental Quality Act ("CEQA"), subject to several pending requests for reconsideration by intervenors; (2) Federal Biological Opinion from the U.S. Fish and Wildlife Service; (3)

Crest can secure a financing mechanism, likely through a procurement opportunity developed in this LTPP cycle, construction and final development of the Project can commence and the project could begin commercial operation as soon as 2020.

C. Anticipated Interconnection Information

Eagle Crest does not yet have an interconnection request pending with the CAISO. It anticipates making one in the coming months in time to be part of the next cluster (Cluster 7) in the CAISO Large Generator Interconnection Process (LGIP). The request would be to interconnect with the CAISO-controlled transmission grid at Red Bluff (500 kV). Based on the CAISO's schedule for handling Cluster 7 requests, the necessary interconnection studies would be completed by mid- to late 2015.

Given substantial dropouts from the interconnection queue and the expected 2019-2020 completion of the West of Devers transmission upgrades, it is possible that there will be sufficient transmission capacity available for operation of the project without substantial additional transmission upgrades. Whether that proves to be true, however, will depend on many factors, including how the CAISO ultimately models the Eagle Mountain Project. Currently the CAISO's LGIP makes no specific accommodation for storage and the way in which such projects are expected to operate -- *i.e.*, providing generation (or load) at times when there is a shortfall (or excess) of generation. Instead, the LGIP would treat the Eagle Mountain Project as a generator, a very large one at that, and will study the 1,300 MW along with the other generators in its cluster on top of all other existing and higher-queued interconnection customers under the incorrect assumption that it would generate peak output concurrently with other generation, potentially driving substantial additional interconnection costs.

This is an area that the CAISO will need to reexamine as the Eagle Mountain Project and other pumped storage projects advance toward construction. For example, these projects clearly are not likely to be generating when renewable resources are at peak generating levels (and contributing to the problem) during over-generation and congestion periods; during such times

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California Endangered Species Act Consistency Determination from the Department of Fish and Wildlife; and (4) State Historic Preservation Office Programmatic Agreement for cultural resources.

Eagle Crest expects to secure early in 2014 its final two major permits: (1) the License from the Federal Energy Regulatory Commission, which includes review under the National Environmental Policy Act ("NEPA"); and (2) a Right-of-Way from the U.S. Bureau of Land Management.

Upon request, Eagle Crest can provide Commission staff with any publicly available permitting document.

pumped storage facilities will, instead, likely be operating in pumping mode during these periods, thus actually mitigating the situation.

Along these same lines, the CAISO will need to consider in its TPP whether other transmission upgrades can be undertaken to allow renewable projects backstopped by projects like Eagle Mountain effectively to reduce local capacity requirements that would otherwise require the development of new local generation. This is another reason the Assumptions and Scenarios must include scenarios with substantially increased bulk storage figures.

D. Anticipated Operational and Dispatch Characteristics

The Eagle Mountain Project will have unparalleled flexibility and be able to swing from 1,300 MW of load to 1,300 MW of generation in a matter of minutes. Depending on final engineering and design details, it will have the capability to provide the full suite of ancillary services including black start capability. It will have the ability to generate at full output for an 18-hour block although it would not be expected to operate in that fashion.[8] Instead, we would expect it to operate intermittently throughout the day, depending on system conditions and renewable generation output. Similarly, we would expect the project to provide load when necessary to balance the system, particularly at particular points in the day, such as at sunrise when sudden spikes in solar generated output will hit the system before there is load to absorb it.

How the project will ultimately be dispatched will depend not only on system conditions but also on changes that will need to be made to the CAISO tariff regarding the services provided by storage. For example, when the unit is pumping, will that load be viewed as a service for which the unit is compensated by the CAISO or will its demand for power while in pumping mode be viewed merely as a power purchase? These and other issues must still be resolved even as the need for such facilities is clear.

E. Relative Cost-Effectiveness and Value of the Project

Based on current engineering estimates, Eagle Crest believes the project can be engineered, constructed and financed at a delivered cost between $1,500 and $2,000 per kW of installed generating capacity. The overall project cost is estimated to be between $1.95 and $2.6 billion in 2014 dollars. In terms of installed cost per MWh of storage capacity (a common metric to value energy storage resources), the delivered cost of the project is expected to be between $88 and $118 per MWh in 2014 dollars, assuming an installed storage capacity of 22,000 MWh.

[8] If run in this fashion, the project would require an 18 hour period to pump water back into the upper reservoir.

Consultants to Eagle Crest have forecasted that the sum of net revenues from energy sales and ancillary services, and the value of the project's capacity post-2020, exceed the annual revenue requirement for the project. However, this calculation will also depend on how the CAISO modifies its tariff to accommodate storage connected on the transmission level.

III. QUESTIONS PRESENTED BY ALJ GAMSON

Below, Eagle Crest addresses four of the Key Technical Questions issued by ALJ Gamson concurrent with his December 19 e-mail ruling and respectfully reserves addressing the remaining questions in its Reply Comments.

A. Question 1: Is the current range of scenarios sufficient to cover current policy issues facing the CPUC?

No. As detailed above, the current range of scenarios provided by the Commission is not sufficient to cover current policy issues for two key reasons: (1) there is insufficient consideration of the impact of flexible resources; and (2) the scenarios are not aggressive enough to capture the State's policy-driven trajectory and inappropriately exclude additional bulk storage from consideration.

Additionally, Eagle Crest finds it difficult at this point to comment upon the sufficiency of the scenarios since the RPS portfolio assumptions do not use the expected updated version of the RPS calculator which includes many substantive changes. We understand that the new RPS calculator will not be released until after this comment period, but assume that the critical 2014 LTPP and TPP planning processes will use the updated portfolios created with this new tool. Eagle Crest requests that an additional comment period be available to discuss these renewable scenario assumptions as they will be a large driver for the future need.

1. Impact of Flexible Capacity is Not Appropriately Considered

Buying flexible capacity is akin to purchasing insurance against future market volatility and reliability problems. As such, it is important to stress the system to explore those scenarios in which flexible capacity may prevent significant future costs. Example scenarios include:

(1) *Higher renewable penetration cases*: 33% should be considered a conservative lower bound in the study of flexible generators with a 20+ year operational life.

(2) *No export case*: California's neighbors have over-generation at the same time as California, leading to regional over-generation, and reducing or eliminating the availability of export to resolve the project.

(3) *High retirement case*: Older generators retire early due to decreased market revenues.

(4) *Hydro stress case*: High or low water conditions reduce the capability for (non-closed loop) hydroelectric generation resources to provide flexibility. The current dry weather conditions in California illustrate the need to plan for the long term assuming the drier conditions expected with continued global climate change.

(5) *Higher levels of behind-the-meter generation*: Solar industry predictions for behind the meter installations are significantly higher than has been modeled to date. Modeling sensitivities with no incremental distributed PV between now and 2022, as was done in the 2012 LTPP proceeding, is not plausible or useful.

2. The Policy-Driven Scenarios are Not Aggressive Enough

The Commission's draft Assumptions and Scenarios document states that:

> [T]he LTPP planning period is established as twenty years in order to consider the major impacts of infrastructure decisions now under consideration. While detailed planning assumptions are used to create an annual assessment in the first period (2014-2024), more generic long-term assumptions in the second period (2025-2034) are utilized to reflect heightened uncertainties around future conditions. The second period is designed to inform resource choices made today as well as shape policy discussions….[9]

Taken together, the suite of scenarios presented by the Commission do not go nearly far enough to inform resource choices made today or to shape policy discussions, especially when considering the State's long-term climate change objectives. As noted, none of the scenarios contemplates the impact of additional bulk storage beyond the 700 MW authorized pursuant to D.13-10-040. Accordingly, none of the scenarios includes *any* pumped hydroelectric resources over 50 MW, which were excluded from the procurement targets in that decision. As explained above, new bulk energy storage resources such as pumped hydro will be critical in meeting the State's long-term environmental and climate change policy objectives and should therefore be included in at least some of the planning scenarios.

With regard to three of the scenarios in particular:

Trajectory Scenario - The Trajectory Scenario basically assumes that renewables and other generation development will proceed in the same manner as it has occurred (or been contracted) to date. Almost by definition, it does not accommodate introduction of large-scale storage resources that are significantly different from development in the past.

40% RPS by 2030 Scenario - Eagle Crest appreciates that the joint parties have looked at a 2030 scenario with 40% renewables. This scenario is a step in the right direction to meet the Commission's objectives of "inform[ing] resource choices made today [and] shap[ing] policy

[9] "Planning Assumptions and Scenarios for use in the CPUC 2014 Long-Term Procurement Plan Proceeding and CAISO 2014-15 Transmission Planning Process" at p. 7 (December 11, 2013).

discussions." However, the 40% renewable target is likely to be achieved far earlier than 2030 due to behind-the-meter solar and over-procurement for the utilities' 2020 RPS goal of 33%. Thus, the 40% RPS scenario does not represent the most aggressive policy case that the Commission should be considering. Moreover, reaching a 40% renewables target will likely require considerable development of large-scale storage resources in order to avoid either: (1) procurement of large amounts of gas-fired resources that will impair the State's ability to meet environmental goals; or (2) operational issues (including curtailment of renewable generation) that could jeopardize the attainment of those RPS goals and/or the financial viability of new and existing renewable generation.

Expanded Preferred Resources Scenario - This is the only scenario to address a 20+ year planning horizon. Although it aims to address the 2050 climate change objective, the scenario is far too conservative to tackle the scale of changes in the State's electric sector that will be needed to reduce GHG emissions to 80% below 1990 levels by mid-century. It underestimates renewable penetration; the current amount of utility renewable procurement combined with the rate of behind-the-meter adoption suggests that renewable resources will expand far beyond that contemplated by this scenario.

Additionally, this scenario should add in reasonable assumptions for bulk energy storage that go well beyond the 700 MW of transmission-side storage already included in the assumptions. The level of bulk energy storage assumed should be determined by system operational, environmental, and economic factors and not arbitrarily fixed at the level decided in one Commission decision which was restricted to small-scale procurement of experimental technologies. Such large storage solutions will be critical in achieving 2050 climate objectives.

B. Question 4: Is the treatment of energy storage for capacity value reasonable?

No. The capacity value of storage is essentially treated in current modeling like that of generation, e.g., for its resource adequacy ("RA") value in serving load. While storage can provide such benefits as well as or better than generation, the additional capacity-related attributes of energy storage to resolve anticipated over-generation are not treated reasonably. The enormous additional value provided by storage to function as load and transmission – storing renewable energy that would otherwise be curtailed during over-generation or congestion conditions and enabling that energy to be used later -- will be critical to the system.

C. Question 6: How should the capacity value of energy storage . . . be allocated to small geographic regions and/or busbars and how should the capacity value be adjusted to account for locational and operational characteristics uncertainty?

With regard to bulk storage,[10] to maximize the value of such resources in avoiding curtailment of high-value renewable resources, the storage should be located in areas with high potential renewable-energy curtailments for over-generation or congestion issues. Such areas include: (1) those with high expected renewable energy penetration; and/or (2) those connected to transmission paths with high flows of renewable energy towards load pockets.

The specific location of future pumped storage projects is fairly well understood. As noted, the Eagle Mountain Project will be interconnected to Devers - Colorado River line at Red Bluff. As the Commission and the CAISO prepares the Assumptions and Scenarios, it should build into its analytical model projects like Eagle Mountain that are well along in development at their known or expected locations so that not only the Commission's LTPP but also the CAISO's TPP can find solutions that optimize integrating such facilities into the overall system.

D. Question 7: Decision (D.13-10-040) established storage goals for each of three categories – transmission, distribution, and customer-side of the meter, but does not specify the function(s) to be provided. Should storage modeling be focused on deep multi-hour cycling to support operational flexibility or rapid cycling for ancillary services? How should the production profile of each category of storage identified in the CPUC Storage Target Decision be modeled – as a fixed profile or as a dispatchable resource?

The nature of this question highlights the, as yet, still too narrow scope of the Commission's action with regard to storage. By its own acknowledgment, the energy storage procurement set out in the Commission's storage decision in D. 13-10-040 is only one piece of the puzzle and does not capture the full bandwidth of storage. As detailed, the Commission needs to expand the scope of its consideration to large pumped hydro resources, including in the Assumptions and Scenarios.

Bulk storage resources such as pumped hydro will provide very high levels of flexibility and multiple types of service, depending on the needs of the system at any particular time. They could be used to provide "deep multi-hour cycling" but also "rapid cycling" or other operational services, or simple storage of renewable energy in periods of over-generation or congestion (and, hence, curtailment avoidance), for ancillary services, or any other purpose, when needed.

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[10] Eagle Crest declines to comment on Question 6 with regard to small-scale (under 50 MW) energy storage, demand response, and demand side resources.

Accordingly, Eagle Crest encourages the Commission not to adopt rigid modeling of storage resources that assume one profile or dispatch strategy and exclude others that would also advance operational reliability and/or environmental or economic goals. Instead, storage should be modeled in order to maximize its value to the grid at different times and under different conditions.[11] Concerning dispatch, the Commission should assume that the project owners would bid the project's energy and ancillary services into the appropriate markets and would recover capacity costs either through one or more bilateral contracts, or potentially through rate base if one or more utilities is an owner.

IV. CONCLUSION

California is at a crossroads, one where it must continue to make hard decisions about how to advance its GHG and renewable policy objectives. It has made remarkable advances in both regards to date, but the efficient integration of renewable resources (and realizing the benefit of the enormous associated investment) requires very dramatic investments in storage, including pump storage projects like the Eagle Mountain project. To "get it right," the Commission needs to ensure this LTPP cycle begins with the correct planning assumptions, which perforce must include dramatically higher assumptions about storage than is currently the case. We urge the Commission to revise the Assumptions and Scenarios accordingly.

Respectfully submitted,

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[11] Eagle Crest notes that the Commission would not need to start entirely from scratch in developing models to study the impact of pumped hydro used as a renewable integration resource. Models and studies have been conducted in other jurisdictions that already use considerable amounts of pumped hydro storage. *See, e.g.,* S. Richards & H. Perez-Blanco, "Mitigating the Variability of Wind and Solar Energy Through Pumped Hydroelectric Storage," a 2012 study employing a model of pumped hydro on the PJM Grid, *available at:* http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=1694742. Eagle Crest could provide this study, and numerous other case studies and reports regarding pumped hydro to the Commission upon request.