BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program (D.13-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap.	R.15-03-011 Filed March 26, 2015

REPLY COMMENTS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE ON ASSIGNED COMMISSIONER AND ASSIGNED ADMINISTRATIVE LAW JUDGE'S SCOPING MEMO AND RULING

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In accordance with Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), the California Energy Storage Alliance ("CESA")[1] hereby submits these reply comments on the *Assigned Commissioner and Assigned Administrative Law Judge's Scoping Memo and Ruling*, issued by Assigned Commissioner Carla J. Peterman and assigned Administrative Law Judge Julie M. Halligan on January 5, 2016 ("Scoping Memo").

[1] 1 Energy Systems Inc., Advanced Microgrid Solutions, AES Energy Storage, Aquion Energy, Brookfield, CODA Energy, Consolidated Edison Development, Inc., Cumulus Energy Storage, Customized Energy Solutions, Demand Energy, Dynapower Company, LLC, Eagle Crest Energy Company, East Penn Manufacturing Company, Ecoult, ELSYS Inc., Energy Storage Systems, Inc., Enersys, Enphase Energy, EV Grid, GE Energy Storage, Gordon & Rees, Green Charge Networks, Greensmith Energy, Gridtential Energy, Inc., Hitachi Chemical Co., Ice Energy, IMERGY Power Systems, Innovation Core SEI, Inc. (A Sumitomo Electric Company), Invenergy LLC, K&L Gates, LG Chem Power, Inc., LightSail Energy, Lockheed Martin Advanced Energy Storage LLC, LS Power Development, LLC, Mitsubishi Corporation (Americas), NEC Energy Solutions, Inc., NextEra Energy Resources, NRG Solar LLC, OutBack Power Technologies, Panasonic, Parker Hannifin Corporation, Pathfinder, Powertree Services Inc., Primus Power Corporation, Princeton Power Systems, Recurrent Energy, RES Americas Inc., S&C Electric Company, Saft America Inc., Sharp Electronics Corporation, Skylar Capital Management, SolarCity, Sovereign Energy, Stem, SunEdison, SunPower, Toshiba International Corporation, Trimark Associates, Inc., Trina Energy Storage, Tri-Technic, UniEnergy Technologies, Wellhead Electric, Younicos. The views expressed in these Comments are those of CESA, and do not necessarily reflect the views of all of the individual CESA member companies. (http://storagealliance.org).

I. INTRODUCTION.

CESA responds in these reply comments to Opening Comments filed by parties on February 5, 2016. CESA's perspectives have been augmented by just-released studies and reported very germane information.[2] For example, as part of the California Independent System Operator's ("CAISO's") 2015-2016 Transmission Planning Process, several beneficial effects of a bulk storage resource were quantified, noting that the newly assumed "storage resource brought significant benefits to the system, including reduced curtailment and reduced renewable overbuild needed to meet the 40% RPS target; lower greenhouse gas ("GHG") emissions, emission costs, and production costs,; and the flexibility to provide ancillary services and load-following and to help follow the load in the morning and evening ramping processes."[3] In light of these and other critical studies and reports discussed in Opening Comments filed by CESA's and other parties' comments, CESA recommends the Commission consider a workshop on bulk storage to build the record on these findings related to renewables integration needs and benefits of energy storage.

CESA is convinced a growing record shows a demonstrated and urgent need for five gigawatts ("5 GW") of energy storage by 2030 and that increased procurement targets will ensure greater energy storage procurement and market transformation. As one significant part of this transformation, bulk storage procurement should be on a path to deliver storage capacity by 2024. On the other hand, CESA sees insufficient merit in preferences by some parties to expand eligibility for storage procurement to include concepts far removed from California's well established definition of energy storage.

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[2] The Commission should consider information and findings, where applicable, from non-CAISO related matters, such as in New York where consideration of how to meet a 50% RPS as part of New York's Reforming the Energy Vision ("REV") has led some parties call for 4 GW of new energy storage by 2030.

[3] *2015-2016 Transmission Plan*. CAISO, February 1, 2016, p. 258.

Additionally, CESA recognizes and builds on well-substantiated points in these reply comments regarding how double-payment concerns are inapplicable when different energy storage-related services are being satisfactorily provided simultaneously, and how energy storage devices should be subject to the same station power standards and requirements as generators.

II. THERE IS A DEMONSTRATED AND URGENT NEED FOR FIVE GIGAWATTS OF ENERGY STORAGE BY 2030.

Some parties recommended variations on the theme that, before considering revisions to energy storage procurement targets, the Commission should wait for completion of the 2014 Energy Storage Request for Offer ("RFO") process, approval of the 2014 Energy Storage RFO contracts, full evaluation and study of the Energy Storage Procurement ("ESP") framework by the Commission, and operational data from the procured energy storage projects to validate cost effectiveness and performance in providing contracted services and benefits.[4] Other parties argued for holding off on revising ESP targets because the Integrated Resources Plan ("IRP") proceeding is expected to evaluate an "optimal resource [mix]" including energy storage and procurement of these resources as the Commission seeks to comply with the requirements of Senate Bill ("SB") 350.[5]

However, the 50% Renewable Portfolio Standard ("RPS") established by SB 350, the Commission's recent Net Energy Metering ("NEM") decision,[6] and extension of the Investment

[4] Parties filing Comments to this effect include Alliance for Retail Energy Markets and Direct Access Customers, California Large Energy Consumers Association, Pacific Gas and Electric Company ("PG&E"), San Diego Gas & Electric Company, Southern California Edison Company ("SCE"), and The Utility Reform Network ("TURN").

[5] *See*, *Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Demand Side Resources*, R.14-10-003, filed October 2, 2014.

[6] *See*, *Decision Adopting Successor to Net Energy Metering Tariff*, issued on January 28, 2016, D.16-01-044.

Tax Credit ("ITC") by the U.S. Congress[7] all point to an urgency to revise ESP targets upwards to prepare for the high levels of renewables that can reasonably be expected to come online over the next few years and beyond. A significant percentage of the utility-scale renewable generation operating in California may also have contractual provisions that limit curtailment, which poses a renewables integration challenge given California's existing fleet of inflexible conventional generation. The tools for managing this challenge remain limited, assuming California's clean energy goals are also to be met.

Adding to this challenge is the growth in rooftop solar PV due to the recent NEM and ITC developments. In a draft study on SB 350 that did not incorporate the impacts of these decisions, Energy and Environmental Economics ("E3") estimated installation of 14.6 GW of rooftop solar PV by 2030.[8] D.16-01-044 notes that over 11,000 MW of customer-sited distributed generation (primarily rooftop solar PV) would be installed from 2017 to 2025 by maintaining NEM at the full retail rate, even in conservative scenarios, which would be in addition to the more than 3,000 existing NEM installations in California.[9] This substantial growth in rooftop solar PV increases the amount of renewable energy that will be online beyond the 50% RPS as required by SB 350.

Other studies have already demonstrated the urgent need for energy storage by assessing the near-term operational grid issues. Advancing from a 33% RPS – and perhaps not accounting for the effects of the Commission's D.16-01-044 – overgeneration increases to 8.9% of available renewable energy under the 50% RPS scenario in California, with overgeneration in up to 23%

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[7] *See*, *Consolidated Appropriations Act, 2016*.

[8] *Draft Renewable Portfolios for CAISO SB 350 Study*, Presentation by E3 at CAISO Public Workshop, February 8, 2016.

[9] *Decision Adopting Successor to Net Energy Metering Tariff*, issued on January 28, 2016, D.16-01-044. pp. 80-81.

of the hours of the year, according to an earlier study by E3.[10] Another E3 study conducted jointly with the National Renewable Energy Laboratory ("NREL"), shows that curtailments reach 8.7% under a 50% RPS scenario and highlights a phenomenon that is highly nonlinear – *i.e.,* curtailment grows at an increasing rate as renewable penetration climbs.[11] To illustrate this point, E3 and NREL estimated the *marginal* curtailment for new renewable capacity above the 50% RPS to be between 50-60% – much higher than the average curtailment of 9% for all renewables installed under the 50% RPS. Finally, CAISO's modeling affirms a growing benefit and need for energy storage as part of meeting higher RPS levels.[12]

Unless alternatives such as energy storage are supported and developed to be a mainstream resource by the time these overgeneration challenges significantly increase, curtailment will remain the *de facto* reliability tool for the CAISO. Contractual provisions for curtailment can be complicated and lead to sub-optimal avenues to renewables integration in some cases. Some renewables are not under capacity contracts to provide curtailment, so there is not a guarantee of curtailment. In addition, CAISO-directed "reliability curtailments" may create cases where curtailments are unpaid based on contractual designs, potentially destabilizing financing for the resources needed to meet the 50% RPS.

To demonstrate the lack of online flexible generation resources and the potential overreliance on curtailment as a reliability tool in future high-RPS years, the CAISO ran "no curtailments" simulations under a 40% RPS in 2024 scenario and identified significant upward

[10] *Investigating a 50 Percent Renewables Portfolio Standard in California*, Presentation by E3 at Western Systems Power Pool Spring Operating Committee Meeting, March 5, 2014.

[11] *Western Interconnection Flexibility Assessment*, NREL-E3 Executive Summary, December 2015.

[12] *2015-2016 Transmission Plan*. CAISO, February 1, 2016, p. 258.

and downward reserve shortfalls along with unsolved overgeneration for nearly every month.[13] The CAISO observed that unsolved overgeneration was an issue in nearly 10% of the hours of the year and found that there were insufficient online flexible generation resources, which did not have sufficient headroom to provide upward reserves and load following. Having to resort to curtailment to address the overgeneration issue would represent a major lost opportunity for California to meet its RPS goals and reduce GHG emissions. While alternatives such as regional cooperation among grid operators and greater use of time-of-use ("TOU") rates should be pursued, energy storage will surely be needed so that the CAISO can significantly reduce its reliance on curtailment as a possible solution.

When modeled at the sub-hourly level, operational grid issues become more evident and drive more immediacy to this overgeneration challenge. In models run by Wellhead Electric Company, Inc. ("Wellhead"), and admitted into the record in the Commission's Long-Term Procurement Planning ("LTPP") proceeding,[14] significantly higher levels of overgeneration were identified in intra-hour periods under the 33% RPS scenario by 2019, a time-based granularity often overlooked in hourly modeling simulations. As compared to its hourly simulation using the same RPS and load shape assumptions, the five-minute simulation showed a 37% increase in gigawatt-hours of overgeneration and a 125% increase in the number of hours of overgeneration.[15] Wellhead conducted an additional 5-minute interval analysis of a 37% RPS by

[13] *California Independent System Operator Corporation Deterministic Studies* submitted on May 8, 2015 in the *Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans*, R-13-12-010. p. 6.

[14] *Modeling Submission of Wellhead Electric Company, Inc. in Response to the Administrative Law Judge's Ruling Discontinuing Phase 1A and Setting Forth Issues for Phase 1B*, submitted on May 8, 2015 in the *Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans*, R-13-12-010.

[15] *Ibid*.

2019 scenario that showed overgeneration in as much as 18% of the hours in a single month.[16] This analysis not only points to the need to conduct more granular sub-hourly analyses to replicate the CAISO's real-time operations, but also highlights how the reliability and policy issues related to overgeneration and curtailment will likely occur even before 2019, generally near the 33% RPS goal. The CAISO also addresses this urgency in its comments on the Scoping Memo, saying that "changes to the net load curve in the spring of 2015, for example, outpaced *expectations*, and significant renewable generation additions in 2016 and 2017 will only expedite the need for fast-ramping and flexible resources to balance the grid and mitigate over-generation."[17] With volatile hydro and extreme weather conditions signaling large increases in must-take hydro power, overgeneration challenges will likely be compounded. These numerous data points all highlight how alternatives such as energy storage are not only needed as a reliability tool, but *urgently* needed in the *immediate* future.

Considering curtailments can work against the achievement of the RPS goal, as well as creating other costs and challenges, the Commission should expand its solutions to overgeneration through increased ESP goals. Energy storage resources that charge during curtailment hours in the middle of the day or at night can mitigate overgeneration. As E3 observed, overgeneration decreases from 9% to 4% with 5,000 MW of diurnal energy storage under a 50% RPS scenario,[18] while the E3 and NREL study demonstrated a decrease in curtailment from 8.7% to as low as 5.8% under a 50% RPS scenario.[19] In addition, E3's SB 350

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[16] *Comments of the Wellhead Electric Company, Inc. to the California Independent System Operator Corporation's May 8, 2015 Filing*, submitted on May 29, 2015 in the *Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans*, R-13-12-010.

[17] CAISO Comments, p. 3.

[18] *Investigating a 50 Percent Renewables Portfolio Standard in California*. E3 Presentation at Western Systems Power Pool Spring Operating Committee Meeting, presented on March 5, 2014.

[19] *Western Interconnection Flexibility Assessment*. NREL-E3 Executive Summary, December 2015.

study conducted on behalf of the CAISO assumes the existing mandates is achieved, but still details how a portfolio with more energy storage is necessary and preferred in achieving the 50% RPS target.[20] [21] There are clear benefits to helping California reach both its RPS and its GHG emission reduction goals with the use of energy storage to mitigate grid reliability issues under these high renewable penetration scenarios.

For that to happen, ESP targets must be revised upwards to catalyze the industry and transform energy storage into a mainstream grid reliability tool. The energy storage industry remains nascent and may lack the scale desired to readily compete in all-source solicitations, absent Commission-based energy storage direction.[22] Energy storage procurement must be pushed to advance energy storage technologies to play their fullest role in renewables integration, ramping, and other crucial reliability and planning functions. Upward revisions to the ESP targets are thus an urgent matter of market readiness as well.

Waiting for a "full evaluation" of the ESP framework and for energy storage projects to become operational would likely prevent the state from addressing these imminent grid problems in a timely fashion. Evaluation of the ESP framework is set to occur by 2016 and ESP projects are set to be operational by 2017 at the earliest (although the vast majority of 2014 ESP projects are planned to come online in 2019 or 2020).[23] Assuming for sake of argument that the

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[20] *Draft Renewable Portfolios for CAISO SB 350 Study*. E3 Presentation at CAISO Public Workshop, February 8, 2016, p. 34.

[21] CESA plans to work with E3 and the CAISO to reflect forward-looking energy storage resource competitions and costs to ensure energy storage is realistically reflected in their study, likely increasing the preferred procurement of energy storage for achieving the 50% RPS.

[22] "Inside Southern California Edison's Energy Storage Strategy." Utility Dive, September 22, 2015, http://www.utilitydive.com/news/inside-southern-california-edisons-energy-storage-strategy/406044/ where SCE's President, Pedro Pizarro, notes, "I saw a lot written saying clearly this is storage now fully, head-to-head competitive against natural gas-fired resources, [but] I think there is a little misunderstanding, because we have storage mandates, and we were procuring to meet them."

[23] SCE's 2013 Local Capacity Requirements ("LCR") RFO could result in Stem and NRG having some energy storage projects coming online in 2017.

Commission waited for a full evaluation of the ESP framework and some initial operational project data, the Commission would not begin consideration of a revision to the ESP framework until 2020. Accounting for another several years to approve the revised ESP framework, conduct an RFO, and have the Commission approve RFO contracts, these energy storage projects would not be online until much after 2024 when the CAISO, E3, NREL, and Wellhead analyses all indicate the overgeneration situation becomes severe and results in significant curtailment that jeopardizes the 50% RPS by 2030 goal. Delay in revising the ESP targets would also send the wrong market signal to industry stakeholders by creating a "start-and-stop" procurement construct. Investors and project developers need to see that the energy storage industry is continuing to grow with more installations. The sequential, or linear, timing of evaluation of the existing ESP framework and revisions to the new ESP framework could unnecessarily create a gap in energy storage procurement that disrupts the entire energy storage industry.

PG&E commented that revision of ESP targets should be addressed in the IRP proceeding to allow Load Serving Entities ("LSE") to have the flexibility to procure the most cost-effective and reliable resources.[24] Eagle Crest Energy ("ECE"), however, makes a reasonable estimate that a Commission procurement decision would occur in 2020 at the earliest, accounting for the IRP's procedural coordination, study, and solicitation processes, and assuming no regulatory delays in each step along the way.[25] As highlighted above, there are significant near-term grid issues stemming from the rapid growth in renewables penetration coupled with a highly inflexible fleet of conventional generation on California's grid that unfortunately make the IRP proceeding an ill-timed Commission venue to address ESP target revisions. Energy storage provides a real pathway to support the grid and prepare California for an orderly

[24] PG&E Comments, p. 8.

[25] Eagle Crest Energy Comments, pp. 6-7.

consideration of procurement in the IRP, which should compel the Commission to act quickly to expand the ESP targets.

Finally, CESA recommends that this proceeding, and all other Commission proceedings, use the same baseline data set in informing the Commission's decisions. As seen above, policy decisions are presently being made based on a number of different studies and modeling exercises. The Commission should ensure that there is coordination across its proceedings and consistency in decisions acting upon the same identified grid issues, while not slowing down the progress of this proceeding.

III. INCREASED PROCUREMENT TARGETS ARE NEEDED TO ACT AS HIGHER FLOORS AND ENSURE GREATER ENERGY STORAGE PROCUREMENT.

Increased ESP targets and adopting targets for time periods beyond 2020 are needed to act as higher floors for energy storage procurement based on recent success. Calpine commented that energy storage is already fully competitive in all-source solicitations such as SCE's 2013 LCR RFO, where energy storage was selected for an aggregate capacity that was five times above the minimum procurement requirement for energy storage.[26] As referred to above, SCE might not have procured five times above its minimum procurement requirement for energy storage in its 2013 LCR RFO if not for the ESP framework targets, that strongly incented SCE to consider the benefits, costs, and capabilities of energy storage, as well as to satisfy energy storage needs under its local Resource Adequacy ("RA") requirements. It should not be assumed that SCE will continue to procure energy storage in all-source solicitations beyond its ESP requirements, or for California's other two IOUs to begin considering energy storage in all-

[26] *Decision Authorizing Long-Term Procurement for Local Capacity Requirements*, issued on February 13, 2013, D.13-02-015, p. 128.

source solicitations. Without the targets, SCE could well have prudently defaulted to procuring low-risk traditional generation resources to meet its local RA requirements.

While D.13-10-040 found it unnecessary to revise the loading order definition of preferred resources to include energy storage,[27] the Commission did set a minimum procurement targets for SCE because resources such as energy storage can reduce LCR needs in the *future* and support California's policy of GHG emissions reduction, which many would argue would not be adequately considered absent the loading order and preferred resources procurement targets.[28] The Commission also validated its use of minimum procurement targets, noting that energy storage resources are underestimated in current models for their expected industry growth and their capability to meet or reduce LCR needs by 2021.

Marin Clean Energy and the City of Lancaster ("CCA Parties") commented that, similar to the RPS, they see the ESP target as a floor for energy storage procurement, not a ceiling.[29] In practice, however, the minimum level of RPS and ESP compliance with energy storage procurement argues in favor of raising targets because IOUs may be treating RPS and ESP targets as ceilings rather than floors, electing not to procure any more renewable or energy storage resources once targets have been met, absent other driving factors. In the case of the RPS, IOUs in most states do not exceed their RPS requirements except to take advantage of expiring federal production or investment tax credits or to procure renewable energy credits to bank for compliance in future years.[30] For the 2014 Energy Storage RFOs, PG&E and SCE both

[27] *Decision Adopting Energy Storage Procurement Framework and Design Program*, issued on October 17, 2013, D.13-10-040. pp. 10-11.

[28] *Decision Authorizing Long-Term Procurement for Local Capacity Requirements*, issued on February 13, 2013, D.13-02-015, p. 66.

[29] CCA Parties Comments, p. 5.

[30] *A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards*. Technical report by Lawrence Berkeley National Laboratory and National Renewable Energy Laboratory, January 2016, p. 6.

procured the minimum 74 MW and 16 MW, respectively. CESA advocates that the RPS and ESP program performance by IOUs demonstrate that ESP targets are still needed for energy storage to be given adequate and fair consideration in all-source solicitations, and how higher ESP targets are needed to transform energy storage to become a mainstream resource to address overgeneration and curtailment of renewables.

PG&E stated in its Comments that the "benefits of incremental megawatts of storage are expected to decline as more storage is added to the system."[31] However, all stakeholders should focus on the *net* incremental benefits of energy storage to determine deployment targets, as demonstrated in a The Brattle Group study on behalf of Oncor, a transmission and distribution ("T&D") service provider in Texas. The Brattle Group estimated that the total incremental value of energy storage would exceed total incremental costs up to 5,000 MW of deployment in the Electric Reliability Council of Texas ("ERCOT") region, which assumed a base forecast of installed electricity storage costs dropping to $350/kWh but also required that value streams could be captured from wholesale market and T&D system services.[32] The 5,000 MW of deployment in ERCOT was shown to provide positive net incremental benefits in a state where renewables (mostly wind) generate just over 10% of electricity in 2014,[33] much lower than California's current 25% level of renewables generation.[34] In another notable development, New York Battery and Energy Storage Technology Consortium ("NY-BEST") recently published its *Energy Storage Roadmap* that established goals of having 2 GW of multi-hour energy storage

[31] Comments by PG&E, pp. 4-5.

[32] *The Value of Distributed Electricity Storage in Texas: Proposed Policy for Enabling Grid-Integrated Storage Investments*. The Brattle Group report prepared for Oncor, November 2014.

[33] "Wind generates more than 10% of Texas electricity in 2014." *Today in Energy*, February 19, 2015. http://www.eia.gov/todayinenergy/detail.cfm?id=20051

[34] *Renewable Energy – Overview*. California Energy Commission, December 22, 2015. http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

capacity on New York's electric grid by 2025 and 4 GW by 2030. In its 2012 *Energy Storage Roadmap*, NY-BEST had originally set a ten-year goal of having 1 GW of energy storage connected to its grid by 2022, but due to "dramatic changes in the energy system that are currently underway and accelerating justify even more ambitious goals going forward."[35] Specifically, NY-BEST referring to New York's own 50% RPS by 2030 goal. While a similar net benefits analysis for energy storage could be conducted specifically for California, the reports from The Brattle Group and NY-BEST, as well as the studies cited here and in CESA's Comments explain how the 5,000 MW target is reasonable and will provide positive net benefits given the near-term grid reliability needs identified in Section I, above.

Some parties supported revision of ESP targets in their Comments. Green Power Institute ("GPI") called for targets to tighten over time but to potentially extend the ESP targets to include 2025 and 2030.[36] The Environmental Defense Fund ("EDF") also supported the idea of energy storage targets as a "just and reasonable step toward a mature market, and acknowledge that increasing mandates may be necessary in the near-term."[37] The Sierra Club endorsed the addition of 3,000 MW of additional energy storage procurement due to the renewables integration challenges stemming from the 50% RPS by 2030 requirement.[38] CESA supports the Comments filed by EDF and the Sierra Club, but as CESA stated in its Opening Comments, the ESP targets should be increased to 5,000 MW consisting of a mix of least-cost, best-fit customer-sited and utility-procured energy storage solutions. Importantly, the increased ESP targets are necessary given the near-term grid reliability needs identified in Section I of

[35] *Energy Storage Roadmap for New York's Electric Grid*. NY-BEST, January 2016. https://www.ny-best.org/sites/default/files/type-page/39090/attachments/NY-BEST%20Roadmap_2016_finalspreads.c.pdf

[36] GPI Comments, p. 4.

[37] EDF Comments, p. 2.

[38] Sierra Club Comments, pp. 2-3.

these comments above and many studies that have shown the significant benefits large levels of energy storage deployment can provide in terms of reduced curtailments, GHG emissions, and production costs.

IV. BULK STORAGE MUST BE ON A PATH TO BE ABLE TO DELIVER STORAGE CAPACITY BY 2024.

There was support in the Opening Comments for bulk storage from multiple parties due to new energy and environmental policies establishing a need for large-scale, long-duration storage and studies showing that bulk storage provides the capabilities such as fast ramping to meet those identified needs.[39] *No party argued against the eligibility of bulk storage*, while CAISO and multiple other parties argued for earmarked capacity under higher targets and/or a separate procurement framework for bulk storage. CESA supports those parties' Comments on bulk storage eligibility and the need for a separate procurement framework, and advocates for Commission acknowledgement of the unique procurement challenges faced by bulk storage, which has the potential to provide substantial amounts of valuable renewables integration and ramping capabilities under a 50% RPS scenario. Due to these procurement challenges, CESA recommended a fourth "bulk storage" bucket for large-scale, long-duration energy storage technologies representing a portion of the 5 GW by 2030 procurement goal.

A firmer understanding of the benefits of bulk storage on renewables integration should inform the Commission in this proceeding. CESA accordingly recommends the Commission host a workshop that considers how storage in bulk can be modeled at the grid level and can provide key curtailment, GHG emission reduction, and other benefits, including lower system dispatch and balancing costs.

[39] These parties are: Association of California Water Agencies, Bison Peak Pumped Storage, Brookfield, CAISO, Eagle Crest Energy, EDF Renewable Energy Inc., Nevada Hydro, San Diego County Water Authority, and Shell Energy.

CESA draws attention to Comments filed by EDF Renewable Energy Inc. ("EDF-RE") regarding the timing of bulk storage procurement policy direction. EDF-RE notes the need for procurement decisions to bring solutions online by approximately 2024 due to significant renewable curtailments. The long development lead time of bulk storage dictates that procurement authorization begin *this year* in order to be able to deliver needed flexible capacity by 2024.[40] Pushing the issue of bulk storage procurement to the LTPP proceeding would risk being unable to have valuable bulk storage on the system when it will be critically needed in 2024, while deferring this issue to the IRP proceeding, according to ECE and others, would lead to procurement approval by 2024 but no commercial operations until years after that,[41] thereby effectively foreclosing the opportunity for bulk storage to help the state integrate renewables under a 50% RPS by 2030 scenario.

V. CONTROLLED CHARGING AND POWER-TO-GAS ENERGY STORAGE SHOULD NOT BE ELIGIBLE ENERGY STORAGE SYSTEMS.

Along with SCE and EDF, the Alliance of Automobile Manufacturers and American Honda Company ("Joint Auto Parties") advocate for eligibility of controlled electric vehicle charging ("V1G") in the new ESP framework. EDF underscores the changing energy and electric vehicle ("EV") policy goals of California as a reason to consider V1G.[42] The Joint Auto Parties and SCE also point to the capabilities of controlled charging resources to provide ancillary and flexibility services similar to stationary storage resources,[43] but argue that these resources are in a slower development cycle as compared to energy storage technologies.[44]

[40] EDF-RE Comments, p. 6.
[41] ECE Comments, pp. 6-7.
[42] EDF Comments, p. 5.
[43] Joint Auto Parties Comments, p. 5.
[44] SCE Comments, p. 8.

While V1G has important merit, CESA does not support eligibility of V1G to qualify for the revised ESP framework. Allowing V1G to be eligible would represent a slippery slope on which a broad range of other uni-directional, load-modifying devices such as building loads or conventional demand response resources would seek to qualify under the ESP framework. The ESP framework is appropriately focused on more traditional (yet still nascent) energy storage resources and projects, as required by AB 2514 and D.14-10-045. An overly broad categorization of energy storage could yield no market transformation in any of the technology sub-categories or surrounding business infrastructures.

EDF also argued for how IOUs may use V1G to the exclusion of energy storage technologies that meet the requirements of AB 2514 and sound Commission policy implementing the statute.[45] This appears plausible based on SCE's Comments that "because EV drivers have already purchased the battery and charging stations, [and] securing grid services from EVs may be an economically attractive storage option."[46] In part for these reasons, V1G should not be included in the revised ESP framework.

Hydrogen-based power-to-gas ("P2G") was determined to be ineligible in the Track 1 Decision in this proceeding because a "natural gas pipeline" does not qualify as the storage component of stored hydrogen, according to precedent set by D.14-10-045. Despite this, the California Hydrogen Business Council ("CHBC") and Southern California Gas Company ("SCG") again comment on the Track 2 Scoping Memo asserting with no support whatsoever that D.14-10-045 applies strictly to biogas projects and does not apply to P2G projects.[47] These statements do not address the more important and fundamental reasoning of D.14-10-045, which

[45] EDF Comments, p. 6.
[46] SCE Comments, p. 8.
[47] SCG Comments, p. 5.

very clearly states the basis for its ineligibility determination for P2G. In both biogas and P2G projects, the stored energy is converted from another energy source (electrical in one case, bio-waste in the other case) and the converted energy is "stored" in natural gas pipelines.

If existing natural gas pipelines are used as a component of a proposed hydrogen-based P2G system, then such a "storage system" would not be "new" or "installed" and not be consistent with Public Utilities ("P.U.") Code Section 2835(c). SCG again makes a fallacious comparison of hydrogen-based P2G that stores energy in natural gas pipelines to "storage tanks in a flow battery, the storage vessels in a compressed air system, or the ice in an electricity-to-ice system."[48] These analogies are clearly inapt considering the referenced components for flow batteries, compressed air systems, and electricity-to-ice systems are comparable to the "man-made mechanisms" cited in D.14-10-045 and represent separate, special-purpose containers that qualify as "new" or "installed" as defined by P.U. Code Section 2835(c).

Finally, SCG requests that the "hydrogen or methane derived from hydrogen created using electricity as the energy feedstock and used by a distributed generator or a central power plant to generate electricity" be eligible to meet ESP targets.[49] CESA finds this matter to be well outside the intent of AB 2514 and recommends the Commission continue to refrain from taking up this spurious "issue." The scenario described by SCG still fails to qualify as energy storage based on P.U. Code Section 2835(a)(1) where energy storage is statutorily defined to involve three functions: "absorbing," "storing," and "dispatching." While not stated explicitly, it is certainly the case that the statute and the Commission contemplated that all three functions would be performed by a single system belonging to a single entity under a single contract with an IOU. This is consistent with all eligible storage technologies considered to date. In the P2G

[48] *id*., pp. 5-6.
[49] *id*, p.10.

case, however, the three functions are generally understood to be performed by different systems potentially belonging to different entities under different contracts and thus should be deemed ineligible under the ESP framework established by D.10-12-007.

VI. EXISTING AND EMERGING ENERGY STORAGE MULTIPLE-USE CASES SHOULD BE PRIORITIZED.

Many parties commented on the need to evaluate and refine the list of energy and capacity service combinations in order to better prioritize multi-use applications ("MUA") for addressing various policy, compensation, metering, and interconnection issues. These parties all advocated for some variation of which MUA use cases to prioritize for consideration in Track 2 of this proceeding. In its Opening Comments, CESA highlighted cross-jurisdictional MUAs as key priorities for Track 2 of this proceeding, but did not comment on priorities within MUA use cases. Based on the number of contracts currently in effect, such as the energy storage contracts resulting from SCE's 2013 LCR RFO and the recently awarded contracts in the first Demand Response Auction Mechanism ("DRAM") procurement,[50] CESA advocates that the MUAs in which customer-sited energy storage provides wholesale demand response ("DR") be considered immediately along with the MUA use case in which customer-sited energy storage provides non-DR services to the CAISO market. Based on the current momentum, progress, and trajectory of the Energy Storage and Distributed Energy Resources Stakeholder Initiative and the first DRAM, both of these MUAs should be immediately considered and prioritized.

SCE's proposed priority list for MUAs closely matches that of CESA. SCE cites the MUAs in which customer-sited energy storage provides retail services (*e.g.*, demand charge reduction) while also providing DR to the CAISO market as the highest priority, followed by the

[50] "The Details Behind California's Demand Response Auction Mechanism." Greentech Media, October 23, 2015. http://www.greentechmedia.com/articles/read/The-Details-Behinds-Californias-Demand-Response-Auction-Mechanism

MUAs in which distribution reliability services is provided while also participating in the CAISO market.[51] PG&E's proposal also closely resembles CESA's proposed priority of MUAs in which customer-sited energy storage provides retail services while also participating in the wholesale market to provide non-DR services. PG&E justifies this prioritization based on this MUA use case being closely evaluated in the CAISO's Expanded Metering and Telemetry Options Stakeholder Initiative and Energy Storage and Distributed Energy Resources Stakeholder Initiative, which involve distributed energy resource aggregations and non-generator resource models, respectively. PG&E's second priority MUA use case involves customer-sited energy storage providing retail services while also participating in the CAISO market through DR-enabled energy storage.[52] CESA supports both of the MUA use cases identified by PG&E and believes they should be prioritized immediately.

VII. DOUBLE PAYMENT SHOULD NOT BE AN ISSUE IF DIFFERENT ENERGY STORAGE-RELATED SERVICES ARE BEING PROVIDED AT THE SAME TIME.

CESA strongly supports comments made by SCE and Ice Energy regarding why an energy storage system providing two different services at the same time should be eligible for payments for both services. SCE states that, "If the two services represent two distinct system needs for which procurement would otherwise need to occur, it would be logical to compensate the storage device for both services. One would expect the combined payment for the single device to offer some savings compared to the *status quo* payments (to multiple devices)."[53] Ice

[51] SCE Comments, p.10.
[52] PG&E Comments, p.13.
[53] SCE Comments, p.11.

Energy makes the same case but also adds that generators would have also been compensated for simultaneously providing multiple products and services.[54]

CESA also does not view the provision of two different services at the same time as a "double payment" issue. Double payment should instead be more clearly defined as receiving payment for the same service twice. Consider an energy storage project sited and operated to defer or avoid procurement of conventional substation upgrades at the distribution level, while, without sacrificing its ability to deliver on its distribution deferral roles, also bidding energy or ancillary services in the CAISO market. These two services are distinct and valued independently and therefore should be compensated independently.

Not all of the IOUs have a shared understanding of the double payment issue. PG&E cautioned the Commission in its Comments to "be careful to not give a storage provider additional compensation for an action it would have taken regardless of receiving that additional compensation (avoid double compensation)."[55] PG&E's point focuses on redundant actions in the wholesale market, but may not apply in cases where services germane to other regulatory jurisdictions are taken, *e.g.*, fulfilling a distribution deferral need. This highlights the need for specificity and detail in defining double payment concerns. Even if provided from the same source, a separate but simultaneous grid service should also be compensated. This concept is fundamentally central to the one of the valuable benefits of energy storage, *i.e.*, the ability to provide multiple services in real time based on grid need.

Finally, Calpine commented on the provision of RA capacity in MUAs, to the effect that RA-eligible energy storage should be held to the same performance requirements as traditional

[54] Ice Energy Comments, p. 6.
[55] PG&E Comments, p. 18.

RA resources.[56] CESA agrees that energy storage resources should be held to the same standard as generators and should face appropriate consequences for not meeting their must-offer obligations. RA rules should promote a minimum level of behavior and performance. For RA rules to effectively direct energy storage resources to provide superior service with flexible responsiveness, and other factors, the Commission will need to design its RA products accordingly. Energy storage resources can often provide higher performing (*e.g.*, faster responding flexible RA capacity), so by that same logic, RA-eligible energy storage should be receive greater compensation.

VIII. ENERGY STORAGE DEVICES SHOULD BE SUBJECT TO THE SAME STATION POWER STANDARDS AND REQUIREMENTS AS GENERATORS.

CESA agrees with the comments filed by Calpine, LS Power, and the Western Power Trading Forum ("WPTF") that any power requirements that are necessary for the functioning of an energy storage device, regardless of whether the device is charging or discharging, should be considered auxiliary loads that are netted from the project's output and are settled at wholesale energy rates. This is consistent with station power standards and requirements for generation. CESA agrees with LS Power's Comments stating that auxiliary load that is contemporaneous with the operation of the energy storage device should be netted – *i.e.*, treated as wholesale.[57] However, SCE and SDG&E commented that power drawn from the grid that is not directly integrated with charging or discharging of the energy storage device should be considered end-use or station load subject to retail rates. To the extent that their definition would promote retail treatment for auxiliary loads related to the direct operation of an energy storage project, CESA opposes these views. Under this analysis, certain loads, such as for thermal management

[56] Calpine Comments, p. 4.

[57] LS Power Comments, p. 3.

systems, battery management pumps, pumps for flow batteries, etc. that are essential to the optimal operation of the energy storage device, would be subject to retail rate treatment under the IOUs' proposals, which is unfair and discriminatory to energy storage systems compared to conventional generation. In conventional generation, loads that are required for operation (*e.g.*, emissions controls or water treatment at a combined cycle plant) can be netted against the output of the generators and settled at wholesale levels. CESA urges the Commission clarify that energy storage be treated the same as generators on the subject of station power.

In particular, CESA disagrees with SCE's comment that load loss from inverters and transformers when the storage device is in its steady state (*i.e.,* neither charging nor discharging) should be treated as station power and billed at retail rates during all hours of the day. Because transformer and inverter loads are often not separately metered from the energy storage device, SCE proposes to have an engineering study determine the amount of this specific type of end-use load and to have this load be added to a retail service charge for all hours and all days, even when the unit is operating.[58] Having inverter and transformer load losses for energy storage devices treated as station load would not be just and reasonable because conventional generation and solar generation do not have these same loads treated this way, and would add an unreasonable cost to loads that are essential to an energy storage device's operation. From an engineering perspective, inverter and transformer losses during operation should be counted toward roundtrip efficiency losses. The Commission should therefore reject SCE's proposal to have load loss from inverters and transformers for energy storage devices to be subject to treatment as station power. Once fair and reasonable rules are in place, the Commission should

[58] SCE Comments, p. 17.

ensure that IOU best practices and contract language reflects this Commission determination, potentially even for energy storage projects contracted in the 2014 Energy Storage RFOs.

IX. CONCLUSION.

CESA appreciates the opportunity to submit these reply comments and looks forward to working with the Commission and parties on Track 2 issues.

Respectfully submitted,

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