BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems.	R.10-12-007 Filed December 16, 2010

REPLY COMMENTS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE ON ASSIGNED COMMISSIONER'S RULING PROPOSING PROCUREMENT TARGETS AND MECHANISMS AND NOTICING ALL-PARTY MEETING

Donald C. Liddell
DOUGLASS & LIDDELL
2928 2nd Avenue
San Diego, California 92103
Telephone: (619) 993-9096
Facsimile: (619) 296-4662
Email: liddell@energyattorney.com

Counsel for the
CALIFORNIA ENERGY STORAGE ALLIANCE

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In accordance with the provisions of the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), the California Energy Storage Alliance ("CESA")[1] hereby submits these reply comments to the *Assigned Commissioner Ruling Proposing Storage Procurement Targets and Mechanisms and Noticing All-Party Meeting,* issued on June 10, 2013 ("ACR").

I. INTRODUCTION.

Appropriately sized and clear utility procurement targets are vital to realizing the benefits of energy storage in California's electric power system. Energy storage will help reduce

[1] The California Energy Storage Alliance consists of 1 Energy Systems, A123 Systems, AES Energy Storage, Alton Energy, American Vanadium, AU Optronics, Beacon Power, Bright Energy Storage, BrightSource Energy, CALMAC, Chevron Energy Solutions, Christenson Electric Inc., Clean Energy Systems Inc., CODA Energy, Deeya Energy, Demand Energy, DN Tanks, Eagle Crest Energy, East Penn Manufacturing Co., Energy Cache, EnerVault, FAFCO Thermal Storage Systems, FIAMM Group, FIAMM Energy Storage Solutions, Flextronics, Foresight Renewable Systems, GE Energy Storage, Green Charge Networks, Greensmith Energy Management Systems, Growing Energy Labs, Gridtential Energy, Halotechnics, Hecate Energy LLC, Hydrogenics, Ice Energy, Innovation Core SEI, Invenergy, KYOCERA Solar, LightSail Energy, NextEra Energy Resources, OCI Company Ltd., Panasonic, Parker Hannifin, PDE Total Energy Solutions, Powertree Services, Primus Power, RedFlow Technologies, RES Americas, S&C Electric Co., Saft America, Samsung SDI, Sharp Labs of America, Silent Power, SolarCity, Stem, Sovereign Energy Storage LLC, Sumitomo Corporation of America, TAS Energy, UniEnergy Technologies, and Xtreme Power. 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

California's dependence on fossil fuel energy resources and help the state achieve the greenhouse gas ("GHG") emission reduction goals it has committed to under AB 32 and Executive Order S-3-05. In short, energy storage is a key enabler to a more efficient, clean, reliable, and affordable electric power system for California ratepayers. A significant number of energy storage companies, including CESA's member companies, have already invested in the state and will invest substantially more with the right market signal; as enabled by energy storage procurement targets.

CESA strongly supports the ACR's straw proposal for establishing energy storage procurement targets. The straw proposal is based on a thorough analysis of the extensive administrative record presented in this proceeding. CESA disagrees with parties to the proceeding that take issue with the recommended targets based on questioning the data and analyses in the record. The ACR appropriately reviews the evidence and arrives at reasoned and well-supported conclusions.

CESA also strongly recommends that there should be limited flexibility in all major aspects of procurement targets moving forward. Timelines around procurement, quantities of energy storage resources procured, use case "bucket" distributions, and ownership models should all be well-outlined in the procurement targets themselves, and should be adhered to throughout the implementation period. Excessive flexibility will generate market uncertainties, have detrimental effects on competition and market diversity, and compromise the ability to achieve stated policy goals. Conversely, predictable adherence to well-defined procurement targets will generate market diversity and stimulate investment, which will have beneficial impacts on resource quality and affordability, with benefits for grid performance and ratepayers. It will also

allow for achievement of stated policy goals, including GHG emissions reductions, and system reliability.

It is imperative for the Commission to support the energy storage procurement targets set forth in the ACR. However, the procurement itself can and should be accomplished through a variety of mechanisms, including energy storage specific solicitations and existing Commission procurement proceedings, including but not limited to: Resource Adequacy ("RA"),[2] Long Term Procurement Planning ("LTPP"),[3] and the Renewables Portfolio Standard ("RPS")[4] proceedings. These other resource procurement-related proceedings are an ideal vehicle, but not the only vehicle, for the Commission to implement the procurement targets levels set in this proceeding. Coordination is necessary between this proceeding and other procurement-related proceedings, including utility general rate cases, and specific utility applications for approval to ensure that procurement targets established in this proceeding are met. This approach will ensure that all energy storage procurement undertaken by load serving entities ("LSE's), even if conducted via focused energy storage procurements or through general rate cases, is well aligned with general grid infrastructure development, resource integration and related resource prioritization.

The EPRI and KEMA studies in the record of this proceeding provide a solid framework for analyzing the uses, costs, and benefits of grid-connected energy storage resources. The results of those two studies should be considered useful evidence for the use cases, costs, and benefits analyzed by them thus far. These studies should also be expanded to incorporate more use cases and benefits (*i.e.*, GHG reductions) so as to recognize the full value provided by energy

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[2] *Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local Procurement Obligations*, R.11-10-023, filed October 20 2011.
[3] *Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long- Term Procurement Plans*, R.12-03-014, filed March 12, 2012.
[4] *Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program*, R.11-05-005, filed May 5, 2011.

storage resources to the grid. CESA advocates that net benefits of energy storage resources will certainly increase if GHG reductions and other yet-unaccounted-for benefits are addressed in further modeling. With this increase in net benefits, such modeling will likewise demonstrate that optimal energy storage procurement levels are greater than those recommended by the ACR. Accordingly, the Commission should direct that the EPRI and KEMA models be expanded to address the full use cases and benefits of energy storage resources, and that procurement target levels be revisited once such further modeling is undertaken.

The Commission should direct that GHG reductions, commercial viability, and cost-effectiveness should be the principal evaluation factors in all energy resource procurement by LSEs. The California legislature, the Governor's office, and other state entities have identified GHG reductions as a primary and extremely important policy goal moving forward, and both AB 32 and Executive Order S-3-05 identify GHG emission reduction targets for 2020 and 2050, respectively. Without concerted action by the Commission and LSEs, California will not meet these emissions targets and will face the consequences for climate change. Energy resource procurement should therefore prioritize resources that provide for meeting system needs with the lowest possible GHG emissions levels. This should also be a primary consideration for energy storage procurement and resource prioritization, and should be incorporated into energy storage-related procurement proceedings themselves.

Electric vehicles ("EVs") equipped with two-way vehicle-to-grid technology should be allowed to participate as distributed energy storage resources under the procurement targets, provided that they meet the same or similar service-life requirements of stationary storage solutions. Two-way vehicle-to-grid technology is advancing, with pilot projects already deployed, and such technology can allow EVs to essentially act as distributed energy storage. In

its comments, Southern California Edison ("SCE") requested that the Department of Defense ("DoD") vehicle-to-grid electric fleet project at the Los Angeles Air Force Base, located in SCE's service territory, be allowed to contribute to energy storage procurement targets. If the DoD project meets similar service life terms as required of stationary storage projects performing similar services, they should be allowed to be counted as distributed energy storage. Because EVs will not be continuously plugged into the electric grid, the Commission should study and outline a methodology for appropriately valuing vehicle-to-grid EVs as energy storage that counts toward meeting procurement targets. Allowing EVs to count toward procurement targets will expand energy market participation abilities of EV owners, which will lead to an expansion of EV ownership through increased demand and other factors. This will likewise contribute towards meeting the Governor's stated goal of 1,500,000 EVs by 2020 and statewide GHG reduction goals. Finally, it will provide LSEs with increased flexibility in methods of achieving energy storage procurement targets, which will allow for achieving procurement targets using the least-cost, best fit mix of resources.

CESA finally recommends that the Commission encourage and support a diversity of ownership models for energy storage resources, including utility-owned, customer-owned and third-party owned energy storage systems. The primary goal of this proceeding is to ensure deployment of an energy storage resources mix that achieves a set of stated goals in a least-cost, best-fit manner. Co-existence of multiple ownership models will foster competition and innovation in how storage services are procured. CESA supports the 50% utility-owned limitation in all of the proposed use case buckets, because it strikes a balance between allowing all ownership models and supporting competition between, and integration of utility-owned, customer-owned and third-party owned energy storage resources.

CESA applauds all of the diligent and collaborative work undertaken by the Commission and other parties so far in this proceeding. CESA supports energy storage procurement targets and, as stated in CESA's Opening Comments, further recommends that procurement targets expand by 3,000 MW and that pumped hydro resources, and indeed, all forms of energy storage resources, be allowed to contribute towards procurement targets. Ultimately, the continued installation and expansion of energy storage resources in California will contribute towards a more efficient, affordable, reliable, and clean electricity system for years to come.

II. THE ROBUST ADMINISTRATIVE RECORD IN THIS PROCEEDING AMPLY SUPPORTS THE PROPOSAL TO SET STATEWIDE ENERGY STORAGE PROCUREMENT TARGETS FOR LOAD SERVING ENTITIES.

The ACR has come about as a result of a sustained and rational analysis on the part of Commission's Energy Division staff and participating stakeholders. Evidence presented and considered includes modeling analyses, price projections, system needs evaluations, cost-effectiveness analyses, and more. This is evidenced by the breadth and depth of opening comments filed by all parties, including those that support and reject the straw proposal put forward in the ACR.

For example, in their Comments, Sierra Club and CEJA[5] jointly reference: (a) multiple cost-effectiveness evaluations (including those by EPRI,[6] KEMA,[7] and EcoShift[8]), (b)

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[5] *Opening Comments Of Sierra Club California And The California Environmental Justice Alliance On Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms,* filed July 3, 2013.

[6] *B. Kaun, Cost-Effectiveness of Energy Storage in California: Application of the EPRI Energy Storage Valuation Tool to Inform the California Public Utility Commission Proceeding R.10-12-007* ("EPRI Study"), Electric Power Research Institute, June 13, 2013. A copy is available at: http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002001162.

[7] Abrams, Alicia, *Draft – Energy Storage Cost – effectiveness Methodology and Preliminary Results* ("KEMA Study"), California Energy Commission, June 21, 2013. A copy is available at: http://websafe.kemainc.com/CPUC/DNVKEMA-Energy%20Storage%20CostEffectiveness_Report_DRAFT3_June%2021-2013.pdf.

[8] EcoShift Consulting. *Sierra Club Energy-Storage Cost-Effectiveness Prepared by EcoShift Consulting, LLC Rulemaking 10-12-007*, filed July 3, 2013.

environmental benefits of energy storage, (c) procurement targets' alignment with the Governor's Clean Energy Jobs Plan, and (d) existing market barriers to energy storage deployment that will be overcome by procurement targets. In his Comments rejecting procurement targets, Jack Ellis[9] likewise references a number of economic and policy analysis undertaken throughout this proceeding. While CESA disagrees with Mr. Ellis' conclusions, his thorough categorical rejection of procurement targets speaks to the comprehensive nature of the record in this proceeding. Indeed, nearly all of the filed Comments recognize and/or reference the extensive administrative record and evidence to support the procurement targets proposed in the ACR.

It clearly speaks highly of procurement targets in general that this robust administrative record supports the ACR's recommendation for establishing procurement targets. CESA accordingly strongly agrees with the ACR's appropriate and correct recognition that the extensive evidence in the record supports establishing procurement targets. Finally, under AB 2514 any such procurement targets are required to be cost-effective. Thus, unlike other prior mandates, such as RPS, the storage procurement target must be cost effective – resulting in lower cost for ratepayers than *status quo* solutions. As such, any procurement target developed should be considered a "floor" vs. a "ceiling" so long as any deployments are in fact cost-effective for ratepayers.

[9] *Comments Of Jack Ellis On Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms And Noticing All-Party* Meeting, filed July 3, 2013.

III. THE COMMISSION SHOULD OUTLINE CLEAR PROCUREMENT TARGETS AND METHODOLOGIES THAT ADDRESS STATED GOALS AND ENSURE THAT TARGETS ARE ACHIEVED BY THEIR SPECIFIED DATE.

The outcome of this proceeding must be such that clear energy storage procurement and use case buckets, are defined; that methodologies for achieving the procurement targets are clearly defined; and that effective measures are taken to ensure that targets are achieved on schedule. All of the above should likewise occur with well understood policy goals articulated and pursued (*i.e*. generating a dynamic marketplace for energy storage, and achieving GHG emissions reductions). After the initial energy storage procurement target policy is created, utilities should be afforded fairly limited flexibility in achieving clear procurement targets with regard to timelines, amount of procured capacity, and flexibility between buckets.

With regard to timing and levels of targets, the utilities have requested that the Commission incorporate large amounts of flexibility into procurement targets. For example, all utilities ask for up to 100% relief from required procurement targets in the form of "off-ramps" if they produce sufficient evidence around cost-effectiveness. All have also asked in their opening comments for the ability to push procurement to later years, and Pacific Gas & Electric ("PG&E") has specifically requested that the initial targets be pushed to later dates. Finally, SCE has called revisiting timing and levels of targets after the first round of procurement, and San Diego Gas & Electric ("SDG&E") criticized the procurement timelines and levels as arbitrary.[10] The levels of flexibility requested by the IOUs are excessive and risk compromising the achievement of system goals associated with energy storage procurement. Excessive flexibility will also generate significant uncertainty in the energy storage marketplace, which will damage resource development, competition, and ultimately prices; this will reduce the amount of cost-

[10] In its comments, SCE also asked that higher levels of earlier procurement should count toward later years. CESA supports this flexibility, as it allows for early procurement of energy storage resources.

effective grid services provided by energy storage resources, with detrimental impacts on the grid and ratepayers. Accordingly, the Commission should establish procurement targets and, as CESA recommended in its Comments, establish a "clear standard of proof" for utilities to meet to be afforded an off ramp for non-cost-effectiveness reasons. Additionally, to encourage sustained orderly market development, the Commission could create structures to ensure adherence to the proposed procurement target schedule. For example, if any flexibility is allowed in the timing of procurement, early procurement of a megawatt should reduce future procurement by a declining fraction of a megawatt, and deferred procurement should increase the future year target by an increasing factor. For example, an extra 1 MW in 2014 procurement might only reduce 2016 procurement by 0.75 MW, 2018 procurement by 0.50 MW and 2020 procurement by 0.25 MW. Likewise, deferring 1 MW from 2014 procurement might increase 2016 procurement by 1.25 MW, 2018 by 1.50 MW and 2020 by 2.0 MW.

Flexibility should also be limited with regard to shifting between use cases buckets. Well-defined buckets will ensure energy storage application and market diversity, as well as a diverse resource mix on the grid. Market diversity will help encourage competition and related benefits for technology improvement and affordability. A diverse resource mix on the grid will contribute to overall grid dynamism and achievement of overall system goals as set out in this proceeding (*i.e.* renewables integration, and distribution upgrade deferral).

At the same time, flexibility in resource ownership should likewise be encouraged to ensure a diversity of ownership models, greater competition and ultimately, lowest possible cost for ratepayers. Utility-owned storage ("UOS") should be permitted (including UOS behind the meter), as it increases diversity in resource options with related competitive benefits, and encourages intelligent siting of energy storage resources where there is the greatest benefit to the

system overall. However, a balance must be struck such that other ownership models can co-exist with UOS, including customer-ownership and third-party owned resources. These ownership models must remain a clear part of the resource mix; this will encourage competition, innovation in contracting mechanisms and greater affordability. For example, a customer-owned or third party-owned energy storage resource behind the meter should be allowed to enter into a long term contract with an LSE if that energy storage system is providing services to that LSE. Similarly, certain use cases in the distributed bucket lend themselves well to third-party owned ownership models, such as the "distributed peaker" use case. Allowing UOS to comprise 100% of energy storage resources at any level (*i.e.* transmission or distribution level), as was requested by utilities in their opening comments, should be expressly rejected.

IV. A CLEAR ENERGY STORAGE PROCUREMENT TARGET POLICY BASED ON STATEWIDE SYSTEM NEED FOR ENERGY STORAGE CAN READILY BE IMPLEMENTED WITH THE COMMISSION'S EXISTING SYSTEM PLANNING AND RESOURCE PROCUREMENT POLICIES AND PROCESSES.

It is the role of this proceeding to set comprehensive statewide energy storage procurement targets. At the same time, there are many existing ongoing proceedings and processes that can and should be leveraged to assist with implementation of the larger vision. Statewide procurement targets can readily be implemented through current RA, LTPP and RPS programs based on the target framework in the ACR, together with demonstrated evidence of need for cost-effective energy storage resources on a case-by-case basis. In its Opening Comments, DRA advocates for RFOs as a procurement methodology, and states "…RFOs would be based on need, location and purpose as determined in the Long Term Procurement Planning ("LTPP") and Resource Adequacy ("RA") proceedings." Those proceedings are already equipped to identify system needs addressable by energy storage resources, and can thus collectively manage the overall procurement process for energy storage resources through

established procurement methods such as RFOs and bilateral contracts. Those proceedings will also ensure deployment of the most appropriate and highest-need energy storage locations and resource characteristics, which will lead to the least-cost, best-fit procurement of energy resources. Brookfield cautions in its Comments[11] that LTPP, RA, and RPS proceedings will have to be expanded in order to accommodate energy storage procurement. This is a possibility, but it should not necessarily be an inhibiting factor from a policy perspective; and expanding the scope of other proceedings to accommodate energy storage procurement is overall the most efficient method for meeting procurement targets and incorporating resources consistent with the Commission's least-cost best-fit policy.

Indeed, it is necessary that energy storage procurement be coordinated with RA, LTPP, and RPS proceedings (as stated by Brightsource,[12] Energy Producers and Users Coalition ("EPUC"),[13] and others), but not limited to those proceedings. California must develop its grid in a coordinated and comprehensive manner, and coordination between proceedings is a paramount consideration. Coordination will also allow for consistent identification of energy resource capabilities and associated eligibility for meeting specific grid needs. For example, in its Comments CalWEA[14] highlights that the RA proceeding must identify qualities of energy storage resources required for them to meet flexible-RA needs.[15] CESA agrees that clarification is necessary; however, this point should be used as a direction for other proceedings to clarify

[11] *Comments Of Brookfield Renewable Energy Partners LP On June 10, 2013 Assigned Commissioner Ruling*, filed July 3, 2013.
[12] *Comments Of Brightsource Energy On The Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms And All-Party Noticing*, filed July 3, 2013.
[13] *Comments Of The Energy Producers And Users Coalition On The Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms*, filed July 3, 2013.
[14] *Comments Of The California Wind Energy Association On Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms*, filed July 3, 2013.
[15] In fact energy storage provides two times the amount of flexibility per megawatt that can be provided by fossil resources.

energy storage valuation, and eligibility, rather than removing energy storage from those proceedings entirely. Coordination between proceedings will further accelerate their ability to identify consistent evaluation and procurement methodologies for energy storage resources.

The ACR[16] states that

> "The procurement targets and the schedule for solicitations proposed here are not presently tied to need determinations within the LTPP proceeding. Instead, in the near term, I view this proposal as moving in parallel to the ongoing LTPP evaluations of need – system and local, and with the new consideration of the outage at SONGS. In the longer term, I propose that procurement of energy storage be increasingly tied to need determinations within the LTPP proceeding." (pp. 14-15).

However, this eventual coordination does not replace the need for clear statewide energy storage procurement targets and procurement pursuant to those targets can and should happen as soon as possible. EPUC states it perfectly in its Comments when it says that "[t]he longer these two proceedings operate on parallel tracks, the more difficult it becomes to integrate their respective goals." (p. 5). Very near term procurement can therefore be implemented in a near-term energy storage-focused procurement effort if required to do so by the Commission. Much learning will result from near term procurement that can be leveraged for later years and in other active Commission proceedings.

Regardless of whether a separate procurement proceeding is undertaken specifically for energy storage, energy storage resource procurement and the resulting installed capacity achieved in all proceedings should be eligible to count towards the proposed targets. CESA agrees with and supports SCE's Comments[17] that energy storage procurement can occur in a number of proceedings, and is already being pursued through the RPS proceeding:

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[16] *Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms And Noticing All-Party Meeting*, filed June 10, 2013.

[17] *Opening Comments Of Southern California Edison Company (U 338-E) On The Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms And Noticing All-Party Meeting*, filed July 3, 2013.

> "SCE seeks procurement of storage in its RPS Procurement Plan. To the extent storage bids are competitive with other bids in its solicitations, SCE may procure storage through that process. The RPS is but one program that can facilitate procurement of storage. As discussed above, storage procurement can occur through the LTPP, through GRC applications, and through customer programs such as the SGIP and EPIC. It is unnecessary to tie storage procurement to any particular procurement plan. All storage procured under any of these plans should count towards the storage procurement goals." (pp. 16-17).

Allowing energy storage resources procured under the Commission's other on-going active proceedings to count towards procurement targets is fully appropriate, and it is ultimately possible to coordinate all proceedings in a way that leads to the meeting of energy storage procurement targets.[18]

Finally, it is important to establish a mechanism for tracking and meeting procurement targets in conjunction with other proceedings. Other Commission proceedings are equipped to manage procurement of energy storage resources, but they are not yet equipped to guide procurement in a way that will reliably meet procurement targets. CESA agrees with the Sierra Club and CEJA[19] in their recommendation that:

> "The decision should explicitly make the procurement targets in this proceeding the planning targets in LTPP, since this proceeding is authorizing procurement that will add the specified amount of storage to the grid. The target amounts should be considered a floor in the current LTPP and considered as part of system and local need determinations in LTPP. This would not preclude LTPP from making its own authorization for storage but it would create the mechanism for that proceeding to fully account for the decision in this proceeding." (p. 11).

In the coordination between this and other active procurement-related proceedings, the Commission should pursue this recommendation or otherwise outline a methodology to ensure that energy storage procurement targets are achieved..

[18] Unlike the RPS program, it must be recognized that energy storage must *by definition* be cost-effective to be counted toward a procurement target.
[19] *Ibid.*

V. THE COMMISSION SHOULD FIND THAT THE EPRI AND KEMA STUDIES LAY A SOLID FOUNDATION FOR DETERMINATION OF COST-EFFECTIVENESS OF ENERGY STORAGE, AND DIRECT FURTHER STUDIES TO EXTEND THEIR ANALYTICAL FRAMEWORK TO ADDRESS ADDITIONAL APPLICATIONS AND BENEFITS OF ENERGY STORAGE.

The Commission should place great weight on the EPRI and KEMA studies that are based on substantial collaborative time and energy invested by the Commission's Energy Division Staff, the utilities, and energy storage industry stakeholders when they are completed. CESA also acknowledges that the services and applications of the targeted, yet-to-be contracted storage capacity need to be specific and comprehensive enough to accurately model projected storage facilities' operations and capabilities, as well as their interactions and implications on the greater grid. Accordingly, the Commission should also direct continuation of this unprecedented degree of collaboration to address cost-effectiveness of additional applications of energy storage identified by the EPRI and KEMA studies, but that have not yet been examined in the cost-effectiveness phase of this proceeding. The Commission should further expand and fully incorporate all benefits provided by energy storage in future cost-effectiveness analyses undertaken by EPRI and KEMA, so as to appropriately capture the system-wide benefits of energy storage resources and value such resources accordingly.

CESA disagrees with Jack Ellis and other parties that reject the Commission's use of EPRI and KEMA studies in establishing proposed procurement targets. The studies themselves are being undertaken with significant collaboration with the Commission's Energy Division Staff, the utilities, and energy storage industry stakeholders. Great emphasis has been placed on the accurate incorporation of costs and benefits of energy storage resources, and on identifying beneficial levels of energy storage resource deployment. If anything, the benefits estimated thus far are conservative as many of the use cases analyzed do not take into account GHG or locational benefits. The Commission's Energy Division staff has decided to pursue these studies

because of the quality of modeling provided by EPRI and KEMA and the thoroughness that will come from the ongoing extensive collaboration between multiple stakeholders. If the Commission rejects incorporating the results from these studies, it would undoubtedly be a major waste of time, energy, and resources for all stakeholders. Rejecting the studies' conclusions would also eliminate from consideration one of the primary resources available to the Commission in identifying appropriate energy storage procurement target levels.

CESA accordingly agrees with Sierra Club and others that the KEMA and EPRI studies should be a significant consideration in establishing final procurement targets. Incorporating those study results will provide useful information for identifying reasonable procurement targets, as well as ongoing evaluation methodology for the cost-effectiveness called for in the ACR. The studies will also provide baseline methodologies for future modeling and system analyses, and future studies on the impact of procurement targets will allow for appropriate modification of these methodologies.

CESA also agrees with the Sierra Club and CEJA that the already-completed EPRI and KEMA analyses may underestimate the value of storage and accordingly lead to lower-than-ideal procurement targets. Specifically, Sierra Club and CEJA state that

> "The EPRI and KEMA studies show that energy storage will be cost-effective under many circumstances. Indeed, these studies underestimate the benefits of energy storage, and therefore provide overly conservative evaluations of cost-effectiveness. As discussed in the attached report by EcoShift, energy storage is even more cost-effective than estimated by EPRI and KEMA when a more complete array of benefits is considered." (Sierra Club and CEJA pp. 1-2).

Sierra Club and CEJA elaborate, on page 13 of their Comments, that distribution- and customer-sited storage provides a number of benefits that were not fully incorporated in EPRI and KEMA analyses, and therefore that the system value of energy storage resources in aggregate – and of

distribution- and customer-sited energy storage resources specifically – is likely higher than what EPRI and KEMA have identified.

CESA thus supports Sierra Club and CEJA's recommendation that the Commission should ensure that cost-benefit analyses used in determining procurement targets fully incorporate all energy storage resource benefits. Ongoing studies should be analyzed to see if they appropriately account for energy storage benefits at all levels, including distribution- and customer-sited resource benefits and GHG emission reduction benefits; and these studies should be modified and expanded as necessary to fully value system benefits of energy storage resources. Although both the EPRI and KEMA studies have laid a solid initial foundation that can be used for future analyses of energy storage costs and benefits. They should be expanded to address the full range of benefits of energy storage resources, and additional use cases, and should likewise be adjusted in an ongoing manner to incorporate developing knowledge and lessons learned over time.

VI. THE COMMISSION SHOULD DIRECT THAT STATEWIDE REDUCTION OF GREENHOUSE GAS EMISSIONS, COMMERCIAL VIABILITY AND COST-EFFECTIVENESS SHOULD BE THE PRINCIPAL EVALUATION FACTORS IN ALL ENERGY RESOURCE PROCUREMENT BY LOAD SERVING ENTITIES.

Achieving GHG emission reductions has been identified as a major state policy goal spanning multiple resource planning and governmental initiatives. One of the most significant benefits provided by energy storage resources is achieving such GHG emission reductions (through peak shaving, renewables integration, etc.). AB 32 directs the state to reach 1990 emissions levels by 2020 and Executive Order S-3-05 set a further goal of 80% emissions reductions by 2050. The California Air Resources Board ("CARB") has also developed plans to meet the Goals and its implementation process is moving forward on a timely pace. GHG emission reductions are integral to stabilizing atmospheric carbon concentrations, and California

has set its targets based on an upper limit goal of 450 ppm - a level widely recognized as necessary for preventing catastrophic climate change. As California is both a large economy and a global policy leader, its success in meeting these goals is imperative to achieving a global low-carbon transformation.

California utilities, in conjunction with other processes at the CPUC, are undertaking procurement processes that will procure substantial amounts of new generation over the next few years. Given current trends, however, much of that new generation appears destined to be fossil-fueled natural gas turbines. Unfortunately, these new generation procurement processes are not robustly considering near-zero-carbon alternatives to the traditional gas fueled generation to the extent necessary to achieve ARB 2050 emissions reduction goals. A continuation of the trend in recent Commission decisions will create a situation where so much new natural gas generation will be on-line in 2020 and beyond that substantial stranded cost and other serious problems will rise to major proportions by 2030, and will intensify thereafter. This would create a multitude of problems, including placing CARB's Goals at serious risk of failure and burdening Ratepayers with significant stranded costs and reliability issues. Much stronger attention and action is needed to procure and integrate the combination of bulk energy storage, wind, and solar necessary to provide a cost-effective alternative to any new natural gas generation. Due to its time shifting and seasonal shifting capability, bulk energy storage specifically offers significant load following value to integrating a large volume of carbon-free energy – and is thus integral to meeting California's GHG emission reduction goals.

Bulk energy storage, including pumped hydro storage (currently excluded from the ACR), coupled with clean renewable generation should therefore be explicitly considered as a direct substitute for natural gas generation in procurement proceedings, and all bulk energy

storage resources (and all other energy storage resources) should be included in energy storage procurement targets under this proceeding. It should also be recognized that bulk energy storage resources face barriers to development and integration,[20] which collectively are delaying or entirely preventing the grid transformation necessary to meet GHG emission reduction goals. Including all bulk energy storage resources in energy storage procurement targets and raising the procurement targets to 4325 MW by 2020, as recommended by CESA in its Comments, will provide necessary impetus to overcome many of the barriers faced by bulk energy storage resources.

In California, the electric power and transportation sectors are significant contributors to GHG emissions. Reducing emissions from both of those sectors is accordingly necessary for meeting emissions reductions targets. As several systems analyses have shown, achieving such reductions in California will require coordination in transforming both sectors, as vehicle fleet electrification will only lead to decreased emissions if electricity sources supplying EVs are low- or zero-carbon. Decarbonization of electricity generation will also combine with increased EV penetration to create irregular patterns of supply and demand, thus necessitating firming technologies.

A 2011 report by the California Council on Science and Technology, which presented the results of the state's "California's Energy Future project,"[21], recognized that a concerted system wide effort is necessary to achieve California's GHG emission reduction targets. The report identified several necessary factors to reducing emissions to desired levels:

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[20] For example, the 1300MW Eagle Mountain Pumped Storage Project ("Eagle Mountain") faces integration barriers around cost recovery, contracting with LSEs, interconnection processes, and valuation of renewables capacity firming, among others. All of these barriers must be addressed by Eagle Mountain between the time it receives its construction license (estimated to occur in 2013) and when it begins operation.

[21] California Council on Science and Technology. *California's Energy Future - The View to 2050*. May 2011. http://ccst.us/publications/2011/2011energy.pdf.

1. Aggressive efficiency measures for buildings, industry and transportation to dramatically reduce per capita energy demand.
2. Aggressive electrification to avoid fossil fuel use where technically feasible.
3. Decarbonizing electricity supply while doubling electricity production, and developing zero-emissions load balancing approaches to manage load variability and minimize the impact of variable supply for renewables like wind and solar. (p. 3).

Energy storage is integral to all of these factors: it vastly increases demand-side energy efficiency, assists in electrification of transportation and other economic activity, assists in decarbonizing the electricity supply, and represents a zero-emissions load-balancing resource.

The load-balancing aspect of energy storage is especially important. The report goes on to explain:

> "[i]f electric generation is predominantly intermittent renewable power, using natural gas to firm the power would likely result in greenhouse gas emissions that would alone exceed the 2050 target for the entire economy. Thus, development of a high percentage of intermittent resources would require concomitant development of zero-emissions load balancing ("ZELB") to avoid these emissions and maintain system reliability. ZELB might be achieved with a combination of energy storage devices and smart-grid technology." (p. 4).

While the report initially identifies ZELB as necessary for intermittent renewables capacity firming, energy storage and other ZELB technologies can facilitate emissions reductions in a number of ways (*i.e.,* peak load shaving). With all of its GHG emission reductions capabilities, energy storage simply must be an integral part of California's low-carbon future.

The transition to reduced GHG emissions will ultimately take a concerted policy effort - which is why procurement targets for energy storage are paramount. "The state will need aggressive policies," the report continues, "both near term and sustained over time, to catalyze and accelerate energy efficiency and electrification. While innovation can improve the outlook for energy efficiency and electrification by reducing costs, we know how to improve efficiency

or electrify for the majority of end uses." (p. 3). Knowledge of how to improve efficiency has already been demonstrated throughout this proceeding and elsewhere, and strong procurement targets will accelerate emissions-reducing storage resource development and deployment system-wide, so as to realize the *system efficiency* benefits of energy storage deployed widely throughout the electric power system. That deployment has been identified as an essential cornerstone of a low-carbon economy - so policies to ensure its achievement are likewise essential.

CESA also disagrees with Jack Ellis's claims that GHG emission reductions from energy storage are minimal or non-existent. Such reductions were not demonstrated in the EPRI and KEMA models (as is one of Mr. Ellis's main contentions) specifically because EPRI and KEMA chose to not incorporate GHG benefits in their models. CESA is confident that further modeling fully incorporating emissions reductions benefits will demonstrate that energy storage provides GHG benefits, especially with the increased EV and intermittent renewables penetration that California will experience in coming years. Other studies have already demonstrated such benefits – for example, Sierra Club and CEJA reference a 2007 KEMA report that shows emissions benefits from flywheel energy storage:

> "In an emissions comparison, a KEMA study concluded that faster and more flexible energy storage, such as a flywheel system, can lower emissions of base load plants used for frequency regulation and provide even greater reductions for peak load regulating plants.[22] The study found that the flywheel-based regulation system would significantly reduce both CO2 and NOx emissions in the California ISO region. Over a 20 year life cycle, a flywheel system displacing a natural gas peaker plant in California had a projected 59% reduction in CO2 emissions and 46% reduction in NOx emissions." (pp. 5-6).

[22] Enslin, J. & Fioravanti, R. (May 2007). *Emissions Comparison for a 20MW Flywheel-based Frequency Regulation Power Plant. KEMA-Inc.* Project: BPCC.003.001, p. 17. Retrieved July 2, 2013, from: http://www.beaconpower.com/files/KEMA_Report_Emissions_Comparisons_July_%202007.pdf.

In this proceeding as well, energy storage has been shown to provide such GHG emission reductions: Alton Energy[23] in its Comments has submitted significant analysis into the record demonstrating the emissions reduction potential of energy storage, even when it uses grid energy for charging. Bulk energy storage resources coupled with renewable energy provides even further significant HG emissions reductions. Alton Energy has also submitted analyses into the record showing the near impossibility of reaching the CARB's 2050 80% emissions reduction goals without the entrance of large-scale bulk energy storage, such as pumped hydro, to integrate substantial volumes of firmed and shaped near-zero carbon energy. Energy storage is therefore key to achieving California's GHG emission reduction goals, and should be recognized and utilized accordingly.

Given the critical importance of GHG emissions reductions, CESA joins DRA in "[supporting] the ACR's requirement that energy storage resources optimize the grid, integrate renewable energy, and reduce GHG emissions." (p. 2). CESA further recommends that energy storage procurement should prioritize resources that facilitate statewide GHG emission reduction targets. While cost-effectiveness and commercial viability will undoubtedly be primary consideration factors in energy storage resource procurement, CESA advocates that GHG emissions reductions capabilities of energy storage resources be explicitly outlined as a primary consideration factor in resource procurement. Auction-based procurement methods are not dynamic enough to allow for GHG impact analysis of bidding energy storage resources; so CESA reiterates its previous statements that other procurement methods, such as RFOs and bilateral contracts, should be used to procure energy storage resources. RFOs or other dynamic procurement proceedings could then analyze and prioritize GHG emission reduction impacts of

[23] *Comments Of Alton Energy, Inc. On Assigned Commissioner's Ruling Proposing Procurement Targets And Mechanisms And Noticing All-Party Meeting*, filed July 3, 2013.

potential energy storage resources, and further facilitate California's move towards its GHG emissions reductions targets.

VII. THE COMMISSION SHOULD DIRECT THAT ELECTRIC ENERGY VEHICLES SHOULD BE INCLUDED AS ELIGIBLE APPLICATIONS OF ENERGY STORAGE TO MEET THE COMMISSION'S STATEWIDE ENERGY PROCUREMENT TARGETS.

When properly integrated with vehicle-to-grid technology, EVs can provide many of the same benefits as other energy storage resources. Vehicle-to-grid technology is advancing, becoming cost-effective, and will become more widely integrated in the coming years; EVs will accordingly be able to act as grid-connected energy storage resources within the timeframe of the proposed procurement targets. Expressly allowing EVs to contribute to procurement targets will appropriately recognize additional energy storage resources, accelerate development and deployment of vehicle-to-grid technologies, and provide EV owners with new revenue streams from energy markets. Because of these benefits and more, the Commission should allow EVs to contribute to energy storage procurement targets, provided that the grid services they provide match the same contract terms as other stationary storage solutions (*e.g.*, 10 years or more).

Pike Research has projected that over 400,000 EVs will be sold on an annual basis by 2020, and that roughly one in four EVs sales nationwide from 2012 to 2020 will occur in California.[24] Current sales figures already indicate that approximately one third of all EVs sold nationwide are in California. The San Francisco and Los Angeles metropolitan areas combined account for an impressive 25% of national EV sales.[25] EVs will thus be an extremely important

[24] *Nearly 1 in 4 Plug-In Electric Vehicles Sold in the United States From 2012 to 2020 Will be Sold in California*. Richard Martin. September 18, 2012. http://www.navigantresearch.com/newsroom/nearly-1-in-4-plug-in-electric-vehicles-sold-in-the-united-states-from-2012-to-2020-will-be-sold-in-california.

[25] *Large Variation in Hybrid and Electric Vehicle Mixes Across Different Metropolitan Areas* Tom Libby. December 21, 2012. http://blog.polk.com/blog/blog-posts-by-tom-libby/large-variation-in-hybrid-and-electric-vehicle-mixes-across-different-metropolitan-areas.

part of California's energy future, and will represent both a new source of demand and a new provider of services to the electric grid. Effective integration of vehicle-to-grid systems will allow for EVs to provide a number of valuable grid services and essentially act as distributed energy storage when plugged in. EVs can contribute to capacity, regulation, and various other ancillary services markets, as well as provide other valuable system benefits such as distribution upgrade deferral.

In its opening comments, SDG&E[26] recognizes the system benefit of demand response from plug-in EVs - specifically, having controlled locational and temporal demand from charging vehicles best fit supply and load profiles across the grid. SDG&E further states

> "[t]hese benefits can be realized today, without any major incremental cost to purchase this storage, by implementing appropriate rate design. In the future, when the stored energy in the vehicle can be accessed (i.e., when auto manufacturers enable two way energy features in the vehicles) the energy storage benefits of the EV will be even greater." (Pg. 7).

A number of automakers are already beginning to integrate two-way energy features into vehicle pilot projects, and commercial deployment of those systems is virtually certain to happen before 2020. Any vehicles that enable two-way provision of grid services in a manner equivalent to stationery energy storage resources should clearly be counted towards procurement targets.

SCE mentions in its Comments that it is already exploring vehicle-to-grid applications and associated provision of grid services from EVs. (Pg. 18) SCE also states in response to question (b) of the ACR that "SCE supports the ACR in allowing SCE's current energy storage procurement and projects (the 50 MW of LCR procurement, the 8 MW in the Tehachapi Wind Energy Storage Project, and the DoD vehicle-to-grid electric fleet project at the Los Angeles Air Force Base) to be counted toward its targets." (Pg. 12) If existing vehicle-to-grid electric fleet

[26] *Comments Of San Diego Gas & Electric Company (U 902-E) On Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms*, filed July 3, 2013.

projects are deemed eligible for counting towards procurement targets, then ongoing electric vehicle grid integration should be counted as well.

It is important to note, as did the US Army in its Comments, that for EVs to be successfully integrated as energy storage resources, grid-connected vehicles must be allowed to have "Dual Use" operation; grid-connected vehicles must also be able to interconnect to both CAISO and the local LSE, either with separate interconnects or with energy use balancing, to account for different pricing in these markets.

CESA agrees with MegaWatt Storage Farms[27] that clarity is needed regarding accounting for EVs and other unconventional energy storage resources in procurement targets. (p. 3). For example, several MW-equivalent of EV storage capacity may potentially be on California's roads, but only a certain percentage of that capacity will be providing grid services at any point in time (through a combination of percentage of vehicles plugged in, and the percentage of those having access to dispatchable one- or two-way vehicle-to-grid resources). If the Commission chooses to include EVs in procurement targets, it should outline a clear methodology for quantifying MW-equivalents for associated levels of EV deployment statewide.

Ultimately, there are many benefits from including EVs in energy storage procurement targets. Allowing EVs to meet grid needs identified in this proceeding will enable meeting of targets highly cost-effectively, as it will utilize already-deployed resources to provide energy storage services. It will also accelerate development and deployment of two-way vehicle-to-grid technologies: utilities will support a growing market for EVs providing grid services (i.e. capacity, ancillary services, etc.), as it will enable them to meet targets in a highly cost-effective manner, and vehicle manufacturers will accelerate technology development to provide their

[27] *Comments Of Megawatt Storage Farms, Inc. On The June 10, 2013 Assigned Commissioner's Ruling Proposing Storage Procurement Targets And Mechanisms And Noticing All-Party Meeting*, filed July 3, 2013.

customers with revenue opportunities associated with their products. Two-way vehicle-to-grid integration will in turn generate revenue opportunities for EV owners, who will be able to participate in energy markets and receive payment accordingly. Finally, this new revenue opportunity will likely incentivize more Californians to purchase EVs, which will further accelerate the achievement of the Governor's stated EV goal of 1,500,000 EVs by 2020, energy storage procurement targets, and other related benefits, including vehicle-related GHG emission reductions).

VIII. UTILITY-OWNED ENERGY STORAGE RESOURCES SHOULD BE ELIGIBLE TO COUNT TOWARDS PROCUREMENT TARGETS AND MAY COMPRISE UP TO, BUT NOT MORE THAN, 50% OF THE DISTRIBUTED USE CASE BUCKET RESOURCES

CESA agrees with Comments by SCE[28] that, "…the Commission should allow greater flexibility in ownership models for energy storage and consider proposals for UOS. UOS proposals should supplement, not replace, solicitations for third-party projects. UOS projects can fill opportunities that may be less feasible for third-party ownership, including energy storage systems integrated with existing utility assets such as utility substations or utility-owned generation facilities." (p. 8). Utility ownership of energy storage assets, particularly energy storage added to existing utility-owned generation, is essential to ensuring California is able to take full advantage of energy storage opportunities. As TAS Energy stated in its Comments, every gas turbine in California has the potential to augment their existing system for a fraction of the cost of ratepayers financing entirely new plants, while also lowering system-wide emissions and offering other services provided by storage systems. CESA urges the Commission to make

[28] *Ibid.*

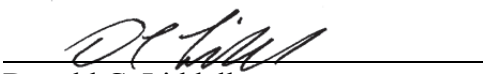
clear that utility owned storage on existing utility owned assets is encouraged to ensure California rate payers get the most out of assets they have already financed.

CESA supports the ACR's allowance for utility-owned energy storage resources to represent up to 50% of resources procured under the all use case buckets, not just the distributed use case bucket. The competition provided by permitting multiple ownership models for energy storage resources will further support developing a least-cost best-fit resource mix, and in some cases utility ownership of behind-the-meter resources may be the best option. Conversely, the distributed use case especially lends itself well to third-party ownership in many circumstances. For example, distributed peaker energy storage resources can often fit least-cost best-fit criteria under third-party ownership, and the competition provided by multiple third-party bids will further advance meeting said criteria. Similarly, the transmission use-case bucket would similarly benefit from the competition and diversity afforded by multiple ownership models. Because of this, the ACR's recommendation of a 50% limit on utility owned energy storage under the distributed use case bucket strikes a good balance between facilitating competition and meeting least-cost best-fit goals, and should be applied to all other use case buckets as well.

IX. CONCLUSION.

CESA appreciates this opportunity to provide these reply comments, and looks forward to continuing to work with the Commission and parties to achieve the goals of this proceeding.

Respectfully submitted,



Donald C. Liddell
DOUGLASS & LIDDELL

Counsel for the
CALIFORNIA ENERGY STORAGE ALLIANCE

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