Decision **PROPOSED DECISION OF COMMISSIONER PEEVEY**
(Mailed 7/2/2012)

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.	Rulemaking 10-12-007 (Filed December 16, 2010)

DECISION ADOPTING PROPOSED FRAMEWORK FOR ANALYZING ENERGY STORAGE NEEDS

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ATTACHMENT A – Energy Storage Framework Staff Proposal

DECISION ADOPTING PROPOSED FRAMEWORK FOR ANALYZING ENERGY STORAGE NEEDS

1. Summary

This decision adopts the Final Energy Storage Framework Staff Proposal (Final Proposal) submitted by Staff on March 31, 2012. A second phase of this proceeding shall be initiated to analyze the priority scenarios contained in the Final Proposal. This proceeding remains open.

2. Background

On December 16, 2010, the Commission opened Rulemaking (R.) 10-12-007 to implement the provisions of Assembly Bill (AB) 2514 (Stats. 2010, ch. 469). AB 2514 directs the Commission to determine appropriate targets, if any, for each load-serving entity (LSE) as defined by Pub. Util. Code § 380(j) to procure viable and cost-effective energy storage systems (ESS) and sets dates for any targets deemed appropriate to be achieved.[1] Although AB 2514 directs the Commission to open such a proceeding by March 1, 2012 (§ 2836(a)), the Commission chose to open it sooner, explaining that it "see[s] the enactment of AB 2514 as an important opportunity for this Commission to continue its rational implementation of advanced sustainable energy technologies and the integration of intermittent resources in our electricity grid."[2]

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[1] Unless otherwise stated, all statutory references are to the Public Utilities Code.

[2] OIR at 1.

As stated in the Order Instituting Rulemaking (OIR), the purpose of this proceeding is to:

1. review, analyze and establish, if appropriate, opportunities for the development and deployment of energy storage technologies throughout California's electricity system;
2. remove or lessen any barriers to such development and deployment;
3. review and weigh the associated costs and benefits of such development and deployment; and,
4. establish how those costs and benefits should be distributed.[3]

The OIR, however, did not establish a precise scope. Rather, parties were directed to file initial comments responding to the guidance provided in the OIR and the Commission's Policy and Planning Division's white paper on Electric Energy Storage.[4] These comments, along with an initial workshop, would then serve as the basis for developing a more precise scope of the proceeding.

Pursuant to the OIR, comments were timely filed by: A123, Alliance For Retail Energy Markets (AReM), Beacon Power Corporation (Beacon), Brookfield Renewable Power, Inc. (Brookfield), California Hydropower Reform Coalition, California ISO (CAISO), Calpine Corporation (Calpine), California Energy Storage Alliance (CESA), Consumer Federation of California (CFC), Division of Ratepayer Advocates (DRA), Environmental Defense Fund, Ice Energy, Inc., Marin Energy Authority, Nevada Hydro Company, Pacific Gas & Electric

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[3] OIR at 5.

[4] The white paper is Attachment A of the OIR.

Company (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE), Vote Solar Initiative (VoteSolar), Walmart Stores, Inc. & Sam's West, Inc., Western Power Trading Forum, and Xtreme Power.

An initial workshop was held on March 9, 2011. A duly noticed prehearing conference was held on April 21, 2011. The Assigned Commissioner and Administrative Law Judge's (ALJ) Scoping Memo and Ruling (Scoping Memo) was issued on May 31, 2011. The Scoping Memo determined that the proceeding would be divided into two phases - the first phase would develop the overall policies and guidelines for ESS, while the second phase would develop the costs and benefits for ESS and establish how they should be allocated.[5]

On June 28, 2011, a second workshop was held. The purpose of that workshop was to address ESS currently in use and the barriers and impediments to further widespread use of storage. The workshop presentations were entered into the record on July 21, 2011.[6] Comments on the documents were filed on August 29, 2011; reply comments were filed on September 16, 2011.

On December 12, 2012, Commission Staff (Staff) issued its Initial Energy Storage Framework Staff Proposal (Initial Proposal). Comments on the Initial Proposal were filed on January 31, 2012; reply comments were filed on February

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[5] *Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge* (*Scoping Memo*), filed May 31, 2011, at 3.

[6] See *Administrative Law Judge's Ruling Entering Documents into Record and Seeking Comments*, filed July 21, 2011 (ALJ July 21 Ruling).

21, 2012. Staff issued its Final Energy Storage Framework Staff Proposal (Final Proposal) on April 3, 2012.

3. Scope

The Scoping Memo identified the following eight issues to be considered in the first phase:[7]

1. How are energy storage technologies currently being used?
2. What policies are needed to encourage effective energy storage that would meet the goals of AB 2514?
3. How can energy storage technologies be best integrated into the utilities' existing portfolios?
4. How could energy storage technologies be integrated with the Commission's loading order and other overarching policies?
5. What current state or federal policies impede the more widespread utilization of energy storage or serve as barriers to the development of energy storage systems?
6. Is it possible to develop a single unifying policy for energy storage?
7. Are there certain energy storage applications/attributes that should be encouraged?
8. How should the ownership model of energy storage be considered?

[7] Scoping Memo at 4.

Although this decision addresses many of these issues, we find that issues concerning specific storage technologies and how they will be integrated into existing Commission procurement policies will need to be considered as part of the Staff's framework to analyze energy storage going forward. As such, these issues will be incorporated into ongoing analysis and consideration in the second phase of this proceeding.

4. Parties' Comments

Parties' comments can be divided into the following main topics:

1. Proceeding Focus
2. Barriers to Energy Storage Deployment
3. Procurement Targets

Additionally, several parties raised concerns regarding the need to establish funding for pilot and research and development (R&D) projects and the integration with California's renewables portfolio standard (RPS) mandates.

4.1. Proceeding Focus

There is general agreement from parties that the focus of this proceeding should be technology neutral and provide a framework to analyze energy storage and how energy storage integrates with other proceedings and initiatives both at the Commission and at other state and federal agencies. To this end, SCE had presented an applications-based approach at the June 28 workshop. This approach would bundle certain operational benefits as applied to the electric system and match each application to storage technology types.[8] SCE proposes

[8] ALJ July 21 Ruling, Attachment C.

that identification of specific applications and associated uses/value streams of storage would allow the Commission and parties to identify the issues and impediments presented for each application and the responsible regulatory agency (Commission, Federal Energy Regulatory Commission (FERC), CAISO, etc.). This analysis would then allow the Commission to assess and prioritize whether and how it could assist in resolving the application-specific issues. SCE notes that each application has unique issues based on its location and operational uses and the benefits of the application cannot be evaluated without taking this into consideration. "[C]onsidering how storage will actually be used on the electric system, rather than addressing storage as a nebulous concept, is necessary to identify barriers and evaluating costs and benefits as the Commission hopes to do in this proceeding. Considering applications for storage is also technology neutral, both as to whether energy storage is the best solution to solve a particular problem and as to what storage technology is the best fit when storage is the right answer."[9]

Parties' comments suggest that there is general agreement with SCE's application-based approach. DRA agrees with SCE that "opportunities and barriers to energy storage should be evaluated using an application-specific approach, and that this methodology should be a central and common first step for addressing storage related issues."[10] CFC notes "an application specific

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[9] *Reply Comments of Southern California Edison Company on Administrative Law Judge's Ruling Entering Documents into Record and Seeking Comments in R.10-12-007 (SCE Sept. 16 Comments)*, filed September 16, 2011, at 5.

[10] *Comments of Division of Ratepayer Advocates on Administrative Law Judge's Ruling Entering Document into Record and Seeking Comments (DRA August 29 Comments)*, filed August 29, 2011, at 3.

approach can be an important step to avoid unnecessary spending."[11] Similarly, Green Power states "in order to develop fair tariffs the first step has to be to identify applications for specific kinds of installations."[12]

Nonetheless, some parties expressed concern with an application-based approach. Sierra Club believes that an application-based approach would "result in a perpetual undervaluing of the multiple benefits of energy storage, since IOUs [investor-owned utilities] would be limited to looking only at specific applications outside the context of the Commission's power to establish a general value for purposes of rate recovery for energy storage."[13] It further notes: "By matching energy storage to one specific application, the multifunctional role of energy storage is limited to a single or preferred task, and the additional functions may be overlooked or lack a market to monetize the value of the additional function."[14] VoteSolar believes SCE's application-based approach is "overly cautious" and believes that "[a] number of best fit/least regret ESS promoting actions can be taken now, rather than waiting until after the

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[11] *Opening Comments of the Consumer Federation of California to Administrative Law Judge's Ruling Entering Document into Record and Seeking Comments (CFC August 29 Comments)*, filed August 29, 2011, at 5.

[12] *Comments of the Green Power Institute in Response to the ALJ's Ruling on Barriers to Storage (Green Power August 29 Comments)*, filed August 29, 2011, at 2.

[13] *Reply Comments of Sierra Club California on Administrative Law Judge's July 21, 2011 Ruling Entering Documents into Record and Seeking Comments (Sierra Club Sept. 16 Comments)*, filed September 16, 2011, at 7.

[14] *Sierra Club Sept. 16 Comments* at 8.

conclusion of what seems to be an extremely deliberative and time intensive process proposed by SCE."[15]

Several parties also maintain that the focus of the proceeding should not be simply "more storage" as an end result, but rather how storage could be used to address certain problems. SCE asserts that "energy storage may provide means to solve particular challenges, but it is not an end in itself. The focus of any energy storage policy should be the potential of energy storage as a useful tool to address problems or satisfy broader policy goals, thus providing value to customers, not simply to require a specific amount of energy storage."[16] Similarly, SDG&E supports "implementing energy storage in the most efficient and effective manner that allows the State to achieve its desired goals, while minimizing any barriers that could impede the usage and development of ESS, and ultimately increase cost to the customer."[17]

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[15] *Comments of the Vote Solar Initiative (VoteSolar Aug. 29 Comments)*, filed August 29, 2011, at 2.

[16] *SCE Sept. 16 Comments* at 5.

[17] *Comments of the San Diego Gas & Electric Company on Administrative Law Judge's Ruling Entering Document into Record and Seeking Comments (SDG&E Aug. 29 Comments)*, filed August 29, 2011, at 3.

There is also disagreement over whether this proceeding should be proactively assisting in the commercial deployment of operational energy storage projects[18] or considering all storage and non-storage alternatives equally.[19] A similar disagreement exists over whether energy storage should be added to the loading order. In advocating its addition, CESA states "[e]nergy storage is a valuable asset class that can improve overall electric power system efficiency, much in the same way that [demand response] can improve overall system efficiency by reducing super peaks in demand and managing load as a balancing resource."[20] DRA disagrees with CESA's recommendation to add storage to the loading order, as "[storage] benefits must be determined for specific application(s), on a case by case basis."[21]

4.2. Barriers to Energy Storage Deployment

Parties identified a number of perceived impediments or barriers to the deployment of energy storage technologies. While not all of the identified barriers are within the Commission's jurisdiction, the Commission may still assist in resolving them. The barriers identified by parties can be grouped into the following nine categories.

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[18] *Opening Comments of the California Energy Storage Alliance to Administrative Law Judge's Ruling Entering Document into Record and Seeking Comments (CESA Aug. 29 Comments)*, filed August 29, 2011, at 4.

[19] See, e.g., *Comments of Pacific Gas and Electric Company on Presentations Made at the June 28, 2011 Workshop in the Energy Storage OIR (PG&E Aug. 29 Comments)*, filed August 29, 2011, at 4.

[20] *Reply Comments of the California Energy Storage Alliance to Administrative Law Judge's Ruling Entering Document into Record and Seeking Comments (CESA Sept. 16 Comments)*, filed September 16, 2011, at 6.

[21] *DRA August 29 Comments* at 5.

4.2.1. Lack of Definitive Operational Needs

Parties note that operational needs are under consideration in other Commission proceedings (e.g., the long-term procurement planning (LTPP) and the RPS proceedings) and have not yet been determined. While there is general agreement that this uncertainty impacts the development and deployment of ESS, parties differ in how this barrier should be addressed.

Brookfield recommends that operational requirements to maintain California's electric grid system should be analyzed and determined before any ESS products and services can be defined.[22] It believes that this would allow the Commission to better anticipate future needs that would promote the development and deployment of larger-scale ESS. Similarly, Sierra Club proposes that energy storage procurement targets adopted in this proceeding should serve as an input for the LTPP proceeding planning assumptions.[23]

DRA disagrees with this proposition and states that any need for a specific procurement target should be addressed as part of the LTPP or Resource Adequacy (RA) proceedings.[24] PG&E argues that once a resource need is determined, "a competitive procurement process will determine what combination for resource (supply or demand-side), including energy storage, is best able to meet the identified resource need."[25]

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[22] *Comments of Brookfield Renewable Power Inc. on July 21, 2011 Ruling Entering Documents into Record and Seeking Comments (Brookfield Aug. 29 Comments)*, filed Aug. 29, 2011, at 1-2.

[23] *Sierra Club Sept. 16 Comments* at 6.

[24] *DRA Aug. 29 Comments* at 1.

[25] *Reply Comments of Pacific Gas and Electric Company to Comments Submitted on August 29, 2011 for the Energy Storage OIR (PG&E Sept. 16 Comments)*, filed Sept. 16, 2011, at 10.

4.2.2. Lack of Cohesive Regulatory Framework

Parties note that California's electricity markets are under the jurisdiction of various regulatory state and federal agencies. Consequently, there is a risk that the value of utilizing energy storage is not fully recognized.

As noted by SDG&E, "the different functions storage may provide are not mutually exclusive, and may come under different regulatory structures, including CPUC, FERC, CAISO, etc. The existing inadequate markets under these jurisdictions for these projects could impede realizing the value of all the services that or [sic] cost-effective energy storage systems are capable of achieving."[26] Sierra Club echoes this conclusion, noting "the current regulatory framework for energy policy in California does not recognize the benefits of energy storage."[27]

SCE disagree that the overlap of regulatory agencies presents a barrier. "Insofar as [the CAISO and the Commission] continue to coordinate efforts, this [overlap of jurisdiction] should not represent a barrier to energy storage."[28] SCE therefore recommends that the Commission focus on addressing barriers that fall within the Commission's jurisdiction, while supporting coordination with

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[26] *SDG&E Aug. 29 Comments* at 5.

[27] *Comments of Sierra Club California on Administrative Law Judge's July 21, 2011 Ruling Entering Documents into Record and Seeking Comments (Sierra Club Aug. 29 Comments)*, filed August 29, 2011, at 2.

[28] *SCE Aug. 29 Comments* at Appendix B, page 1.

agencies that have jurisdiction over other barriers, rather than prioritizing the order in which barriers should be addressed.[29]

4.2.3. Evolving Markets and Market Production Definitions

Several parties note that the electricity market is currently defined by a variety of products, with each product subject to different rules and, quite often, regulated by different agencies. However, they believe that energy storage often does not fall clearly under the current market product definitions. As a result, parties contend it is not possible to consider energy storage consistently across various proceedings. As PG&E notes, "the types of products and markets that will be available in the future are evolving. … While these potential new products may expand opportunities for participation by energy storage devices, the precise set of products available in the future is uncertain."[30]

4.2.4. Resource Adequacy Accounting

A large number of parties identified the RA accounting rules as a barrier to more widespread energy storage deployment. SCE notes that there are no rules "for determining how to establish [RA] capacity value for a storage device."[31] Brookfield echoes this statement, noting "the current process of procuring only generic capacity through the RA process will not ensure that specialized needs of

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[29] *Comments of Southern California Edison Company to the California Public Utilities Commission on Administrative Law Judge's Ruling Entering Documents into Record and Seeking Comments in R.10-12-007 (SCE Aug. 29 Comments)*, filed August 29, 2011, at 2.

[30] *PG&E August 29 Comments* at 5-6.

[31] *SCE Aug. 29 Comments* at 3.

the grid are met under the 33% RPS, including any specific value that can be provided by ESS."[32]

Parties generally agree that this barrier should be addressed in the Commission's RA proceeding, but note that there should be coordination with this proceeding. CESA urges that "protocols be developed and approved through the annual [RA] proceedings to allow storage devices that meet the relevant standards to participate."[33] SCE further advocates that "[a]ny rules that emerge from the annual RA proceeding for energy storage should also vary by energy storage application."

4.2.5. Lack of Cost-Effectiveness Evaluation Method

Many parties believe that the unique operational aspects of energy storage pose a challenge in recognizing all relevant benefits, as many of these benefits are not part of current calculation methods. Parties argue that as a result, the total benefit of energy storage is significantly underestimated.[34] SDG&E further notes that the multi-functionality of energy storage "limits the ability of establishing a single process" for valuing storage. "Establishing a generic approach could mislead the evaluation process or stall the investment on this type of infrastructure."[35]

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[32] *Brookfield Aug. 29 Comments* at 5.

[33] *CESA Sept. 16 Comments* at 4.

[34] See, e.g., *DRA Aug. 29 Comments* at 6; *PG&E Aug 29 Comments* at 4.

[35] *SDG&E Aug 29 Comments* at 5.

There is general consensus that development of an evaluation methodology should be included in the second phase of this proceeding. PG&E notes "the industry needs valuation methodologies that can be used in planning processes that reflect the true operational benefits to the electric system."[36] Sierra Club further notes that developing a methodology to value energy storage's multiple benefits is needed to comply with AB 2514.[37]

SCE disagrees that the lack of a methodology for determining cost effectiveness represents a barrier to the deployment of energy storage. "[C]ost effectiveness is largely a function of technology development and maturity relative to other technologies that can provide comparable services, and as such, it should not be classified as a 'barrier.'"[38] CESA disputes this assertion, arguing that increased grid reliability is a value that needs to b accounted for through a cost-benefit methodology. CESA contends that distribution system planners need to use a valuation methodology to give proper weight to reliability benefits.[39] PG&E argues "[t]he industry needs valuation methodologies that can be used in planning processes that reflect the true operational benefits to the electric system."[40] Sierra Club also notes "[b]y developing a mechanism that values energy storage, the Commission can assess the cost-effectiveness of energy storage."[41]

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[36] *PG&E Sept. 16 Comments* at 6.

[37] *Sierra Club Sept. 16 Comments* at 1.

[38] *SCE Aug. 29 Comments* at Appendix B, page 1.

[39] *CESA Sept. 16 Comments* at 7.

[40] *PG&E Sept. 16 Comments* at 6.

[41] *Sierra Club Sept. 16 Comments* at 1.

4.2.6. Lack of Cost Recovery Policy

The ability for energy storage to meet transmission, generation and distribution needs also means that its services can be recovered under cost-based or market-based rates. Sierra Club maintains that "[w]ithout a mechanism for fitting energy storage into the existing regulatory and cost recovery structure, there will be regulatory barriers and inadequate methods for valuing and paying for energy storage."[42] PG&E contends that this issue does not need to be addressed here, noting "because of the potential for certain storage technologies to provide multiple services, and the possibility that storage could simultaneously recover costs under both cost-based and market-based rates, FERC has asked for comments on whether current accounting and reporting requirements for activities and costs relating to the operation of new electric energy storage resources provide sufficient transparency."[43]

A major concern giving rise to this perceived barrier appears to be the need for energy storage developers to have long-term, financeable revenue streams. Consequently, several parties advocate that the Commission adopt long-term contracts for energy storage. Brookfield states that "without adequate procurement channels and incentives that allow purchases to secure and reflect the value provided by these features, and without the ability of developers to receive sufficient compensation for their development efforts, developers will not commit capital and lenders will not finance these large scale projects."[44] DRA also states "[a]llowing storage to enter into long-term contracts is consistent

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[42] *Sierra Club Aug. 29 Comments* at 3.

[43] *PG&E Aug. 29 Comments* at 7.

[44] *Brookfield Aug. 29 Comments* at 5.

with DRA's position to remove any barriers that prevent storage from competing directly with other resources."[45]

SCE disagrees with adopting a long-term contracting mechanism for energy storage. While long-term contracting is an issue on which the Commission needs to focus, "it does not represent a unique barrier for storage technologies, and to the extent the Commission wishes to address this issue, it should do so in a separate and new Commission proceeding.[46]

4.2.7. Lack of Cost Transparency and Price Signals

Parties identifying this potential barrier believe that more cost transparency and more accurate price signals could "level the playing field" for energy storage to address system needs. SDG&E believes that "[e]nsuring that parties see the actual cost and prices for storage will allow parties to determine the appropriate values for case specific energy storage applications."[47] Due to the ability for energy storage to be utilized at both the generation and customer level, parties note there is a need consider both wholesale and retail price signals.

4.2.7.1. Wholesale Price Signals

Parties note that within the CAISO wholesale market, prices do not reflect the true value of energy storage. According to SCE, "storage systems are not currently rewarded for speed or accuracy under current CAISO ancillary service product definitions."[48]

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[45] *DRA Aug. 29 Comments* at 2.

[46] *SCE Sept. 16 Comments* at 12.

[47] *SDG&E Aug. 29 Comments* at 4.

[48] *SCE Aug. 29 Comments* at 12.

There is further concern that current wholesale markets do not properly value how energy storage addresses the intermittent nature of some renewable resources. For example, CESA notes that the RPS procurement process does not address the differential values between a "firmed, shaped, or dispatched" renewable product with storage and a "pure renewable product" without firming, shaping, and dispatch capability.[49] PG&E believes that existing CAISO market practices mask the value that energy storage can provide toward integrating intermittent renewable generation.[50]

Parties generally recognize that technical and tariff changes are needed to allow energy storage to participate in the CAISO markets.[51] However, these changes lie within the CAISO's jurisdiction. Therefore, parties recommend that the Commission work with the CAISO to provide for greater transparency for integration charges.[52]

4.2.7.2. Retail Price Signals

Similar to their concerns at the wholesale level, parties believe that retail prices do not properly reflect the value of energy storage. As noted by SDG&E: "Energy storage could play different roles in the market place due to its multifunctional characteristics. However, not all of these roles operate in

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[49] *CESA Aug. 29 Comments* at 6.

[50] *PG&E Aug. 29 Comments* at 8.

[51] See, e.g., *DRA Aug. 29 Comments* at 4; *SCE Aug. 29 Comments* at 3; *CESA Aug. 29 Comments* at 5.

[52] See, e.g., *PG&E Aug. 29 Comments* at 8; *CESA Aug. 29 Comments* at 5.

markets that have accurate or efficient price signals."[53] SCE also notes "retail rates do not reflect time-based variations in the market price of electricity."[54]

Some parties advocate changes in retail rate design that would include time-variant rates. Sierra Club identifies rate design as the "biggest and most immediate barrier, since storage will only be built if it is paid for."[55] PG&E and DRA both caution that while time of use (TOU) rates could impact the cost-effectiveness analysis for energy storage, TOU rate design should not be considered within this proceeding.[56]

In an effort to address this barrier, CESA recommends that the Commission and the California Energy Commission work together to "develop load management standards and associated tariffs that incentivize deployment of energy storage."[57]

4.2.8. Lack of Commercial Operating Experience

Parties note that many energy storage technologies are yet to be used on a commercial scale. "The nascent nature of some storage technologies and the lack of detailed information about application-specific costs … present barriers to more widespread understanding of storage systems."[58] There is general consensus that this barrier will diminish over time, as utilities gain more

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[53] *SDG&E Aug. 29 Comments* at 5.

[54] *SCE Aug. 29 Comments* at 11.

[55] *Sierra Club Aug. 29 Comments* at 3.

[56] *DRA Aug. 29 Comments* at 3; *PG&E Sept. 16 Comments* at 3. See also, *SCE Sept. 16 Comments* at 10.

[57] *CESA Aug. 29 Comments* at 5.

[58] *DRA Aug. 29 Comments* at 6.

experience with energy storage. PG&E notes that it "currently has several pilot projects and programs to build experience and incent development of storage."[59]

Some parties have proposed that additional support for the development of emerging technologies, such as ESS, should be through pilot systems and R&D programs. The means by which this would occur, however, is in dispute. CESA contends "the Commission should order the utilities to open an immediate market opportunity to begin incorporating energy storage into its procurement planning by initiating pilot competitive solicitation process."[60] In contrast, PG&E recommends that the Commission continue to support pilot projects and fund feasibility studies for long lead-time storage technologies to enable implementations options if and when future resources needs and cost-effectiveness are determined.[61]

4.2.9. Lack of Well-Defined Interconnection Processes

Parties state that as a result of overlapping tariffs at the Commission (Rule 21) and the FERC (WDAT) and evolving technical standards, there is a lack of a well-defined interconnection process. However, parties further note that issues concerning interconnection should not be addressed in this proceeding. "[I]ssues concerning interconnection to the system are not necessarily unique to the storage applications."[62]

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[59] *PG&E Sept. 16 Comments* at 5.

[60] *CESA Aug. 29 Comments* at 4.

[61] *PG&E Aug. 29 Comments* at 9.

[62] *SCE Aug. 29 Comments* at 11; see also *VoteSolar Aug. 29 Comments* at 3.

4.3. Procurement Targets

AB 2514 directs the Commission "to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems to be achieved by December 31, 2015, and December 31, 2020."[63] Parties in favor of having the Commission establish procurement targets argue that it would assist in the widespread deployment of energy storage. CESA states that "it generally does support procurement targets, as a broad policy tool as the procurement targets imposed on load serving entities by California's Renewables Portfolio Standard program have proven quite effective to date."[64] Sierra Club further notes that these targets do not necessarily need to be based on a certain quantity of energy storage. Rather, it believes other criteria, such as reduced peak load or reduction in certain air pollutants, could be used.[65]

SCE, PG&E, and SDG&E all oppose setting specific procurement targets. SCE argues that a procurement mandate would not address legal and regulatory barriers, but rather would only serve to increase the return on investment of private storage developers. "Procurement mandates and subsidies may have short-term investment impacts, but in the long term are counterproductive by creating a cycle of dependency for storage developers and diverting efforts from technological development to regulatory affairs."[66] SDG&E echoes this statement, arguing that adoption of a procurement mandate "could be a likely

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[63] Pub. Util. Code § 2836, subd. (a)(1).

[64] *CESA Sept. 16 Comments* at 3.

[65] *Sierra Club Sept. 16 Comments* at 12.

[66] *SCE Aug. 29 Comments* at 16.

barrier for cost-effective development of energy storage systems."[67] DRA also cautions against setting a procurement target. "Picking arbitrary procurement levels, such as a MW [megawatt] level or a percentage level would most likely result in sub-optimal market solutions and increase costs to ratepayers without yielding commensurate benefits."[68]

5. Staff Proposal

As directed by the Scoping Memo, Staff reviewed parties' comments and submitted its Initial Proposal on December 2, 2011. Based on input from parties,[69] Staff submitted the Final Proposal on April 3, 2012.[70] The Final Proposal includes a Storage Barriers Regulatory Matrix, with summarizes the various barriers and policies faced by energy storage developers.[71] Based on this matrix, Staff proposed a framework to analyze energy storage.

This proposed framework identifies 20 "end uses" for energy storage and where in the value chain storage is being used. The identified Energy Storage "End Uses" is presented in Table 1 below:

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[67] *SDG&E Aug. 29 Comments* at 3.

[68] *DRA Aug. 29 Comments* at 3.

[69] Comments on the initial proposal were filed by Brookfield, CESA, CAISO, Calpine, CFC, DRA, Jack Ellis, MegaWatt Storage Farms, PG&E, SDG&E, Sierra Club, SCE and VoteSolar. Reply comments were filed by CESA, CFC, DRA, Mark B. Lively, Longview Energy Exchange, NGK Insulators (NGK), PG&E, SCE, SDG&E, Sierra Club, and VoteSolar.

[70] The Final Proposal is Attachment A of this decision.

[71] Staff notes that this matrix is not static, but rather will be refined and updated to reflect additional information and new developments. Therefore, it is anticipated that the Storage Barriers Regulatory Matrix will be continuously revised to consider new proceedings impacting the various barriers, such as the new LTPP proceeding A.12-05-014.

TABLE 1

Energy Storage "End Uses"

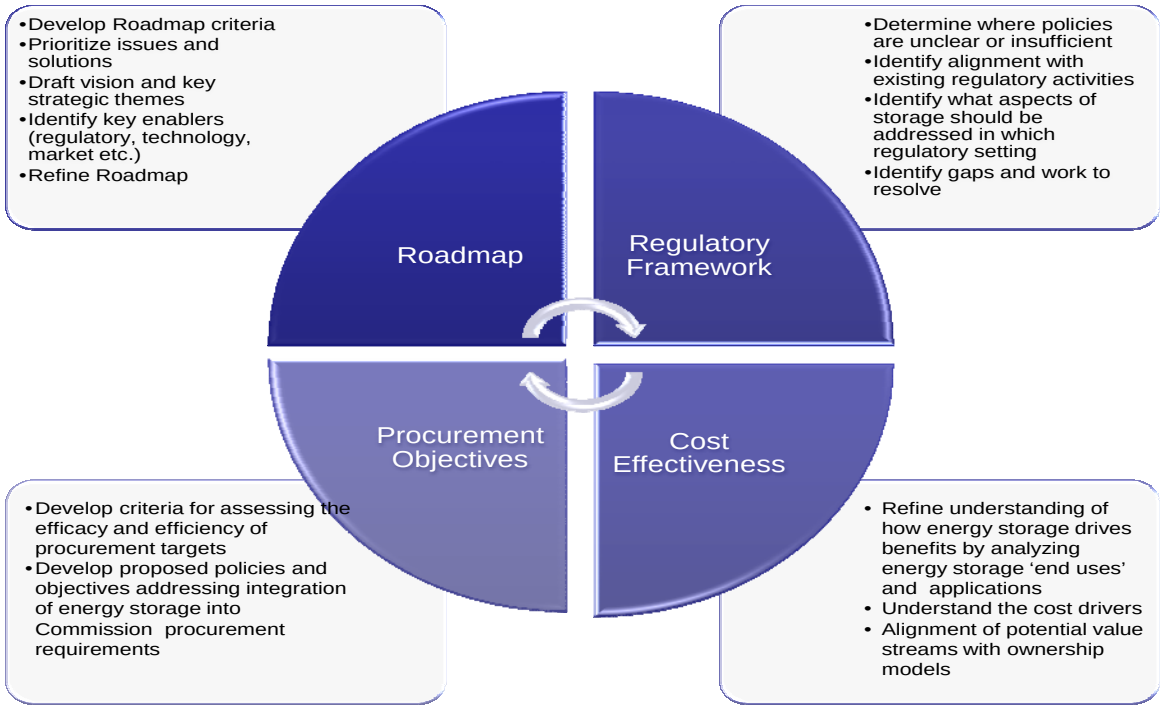
Category		Storage 'End Use'
Describes at what point in the value chain storage is being used		Describes what storage is being used for, i.e. its application.
ISO/Market	1	Ancillary services: frequency regulation
	2	Ancillary services: spin/ non-spin/ replacement reserves
	3	Ancillary services: ramp
	4	Black start
	5	Real time energy balancing
	6	Energy price arbitrage
	7	Resource Adequacy
Generation	8	Intermittent resource integration: wind (ramp/voltage support)
	9	Intermittent resource integration: photovoltaic (time shift, voltage sag, rapid demand support)
	10	Supply firming
Transmission/ Distribution	11	Peak shaving
	12	Transmission peak capacity support (upgrade deferral)
	13	Transmission operation (short duration performance, inertia, system reliability)
	14	Transmission congestion relief
	15	Distribution peak capacity support (upgrade deferral)
	16	Distribution operation (voltage / VAR support)
Customer	17	Outage mitigation: micro-grid
	18	Time-of-use (TOU) energy cost management
	19	Power quality
	20	Back-up power

The Final Proposal states that decomposing energy storage into various end uses will allow for more manageable analysis. Staff further stresses that analyzing each individual end use is not intended to eliminate analysis of energy storage comprehensively. "[By] focusing on the specific 'end uses' it will become apparent which aspects of energy storage are unique to specific applications and which aspects of storage are common across all uses."[72]

The analysis approach would consist of four major categories – regulatory framework, cost effectiveness, procurement objectives and energy storage roadmap – as pictured in Table 2 below:

Table 2

Energy Storage Analysis Approach



[72] Final Proposal at 15.

Staff states that its proposed analysis process will assist in framing energy storage policy. Notably, Staff states that the outcomes of the analysis "will be used to evaluate whether or not to adopt a procurement target or if other policy options are better suited to meet the objectives of AB 2514."[73]

Staff requests that the Final Proposal be adopted. Staff further recommends that as part of Phase 2 of this proceeding, the end uses identified in Table 1 above be prioritized and that those considered higher priority be analyzed first. To that end, the Final Proposal includes four basic "scenarios" for defining ESS, including different combinations of end uses. These scenarios are intended to align with existing state and Commission policy objectives particularly those related to increasing renewables and distributed generation, reducing greenhouse gas emissions, limiting peak growth and modernizing the grid. The four scenarios proposed by further analysis are:

1. Renewables Support/Dispatchability – Focus on how energy storage can be used to support renewable generation, both at the transmission level and at the distribution level to improve the dispatchability and value of the renewable resource.

2. Distributed Storage – Focus on distribution-level storage, particularly to support grid operation, and whether storage can be utilized as a distribution-level generation resource.

[73] Final Proposal at 17.

3. Demand-Side Management – Focus on energy storage at the customer level (behind-the-meter storage).[74]

4. Ancillary Services – Focus on energy storage systems at the transmission level to provide generator-like services for ancillary markets.[75]

6. Discussion

We find that the Final Proposal is a significant step forward in establishing policies for the procurement of viable and cost-effective energy storage. As highlighted in many of the comments, the multi-functional capabilities of energy storage mean that this resource cannot be evaluated and considered on a "one size fits all" basis. As such, we believe that there is a need to divide energy storage applications into separate, discrete functions. At the same time however, we agree with Staff and parties that energy storage attributes must be considered in a comprehensive manner to identify opportunities where storage could provide value to the electric system. Consequently, it is imperative that we develop a process that will allow this to occur. We believe that the Final Proposal does just that.

We commend Staff for their efforts in developing a framework that will allow us to analyze energy storage in a comprehensive manner and determine how this important resource can be integrated with our existing policies and properly valued. The Final Proposal outlines major policy issues for the Storage

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[74] Some aspects of this scenario are already being evaluated in other Commission proceedings.

[75] The Final Proposal notes that although this is primarily within the CAISO's jurisdiction, the Commission could collaborate with the CAISO to explore how distribution-level storage can participate in ancillary services through a utility tariff.

Proceeding, including establishing a framework for understanding existing policies and barriers facing storage in California.

The Final Proposal has identified a number of significant barriers, including the lack of a cohesive regulatory framework and the difficulty in adopting a comprehensive policy across all regulatory agencies. Some policy barriers that have been identified include the current flux state of policies at both FERC and the CAISO that could provide opportunities for storage in frequency regulation markets, as well as the continuing processes for dealing with renewable energy integration. An important first step in addressing the lack of a cohesive policy has been to identify the major proceedings, both at the Commission and at other agencies, which impact energy storage. This summary, which is found on page 12 of the Staff Proposal, will allow us to ensure consistency within our own proceedings, and identify areas where we should actively participate to influence policy determinations at other agencies.

While parties had been critical of various aspects of staff's initial proposal, the Final Proposal now addresses their main concerns. One of these is including a definition of "energy storage" which will be used as a common starting point for all parties. This definition is the language contained in Pub. Util. Code § 2835(a), which states:

> (1) "Energy storage system" means commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy. An "energy storage system" may have any of the characteristics in paragraph (2), shall accomplish one of the purposes in paragraph (3), and shall meet at least one of the characteristics in paragraph (4).

> (2) An "energy storage system" may have any of the following characteristics:
>
> (A) Be either centralized or distributed.
>
> (B) Be either owned by a load-serving entity or local publicly owned electric utility, a customer of a load-serving entity or local publicly owned electric utility, or a third party, or is jointly owned by two or more of the above.
>
> (3) An "energy storage system" shall be cost effective and either reduce emissions of greenhouse gases, reduce demand for peak electrical generation, defer or substitute for an investment in generation, transmission, or distribution assets, or improve the reliable operation of the electrical transmission or distribution grid.
>
> (4) An "energy storage system" shall do one or more of the following:
>
> (A) Use mechanical, chemical, or thermal processes to store energy that was generated at one time for use at a later time.
>
> (B) Store thermal energy for direct use for heating or cooling at a later time in a manner that avoids the need to use electricity at that later time.
>
> (C) Use mechanical, chemical, or thermal processes to store energy generated from renewable resources for use at a later time.
>
> (D) Use mechanical, chemical, or thermal processes to store energy generated from mechanical processes that would otherwise be wasted for delivery at a later time.

We agree with Staff that this is the appropriate definition to be used. As with the objectives in the proceeding, this definition is technology-neutral and focuses on the attributes of energy storage and potential applications throughout the electric system.

We realize that several parties are concerned that the proposed framework and iterative nature of the analysis approach could delay the implementation of energy storage systems. However, we believe that this concern has been addressed thorough the prioritization of end-uses. This prioritization would allow us to evaluate energy storage opportunities in a manageable manner. We believe that focusing on the end uses, and applying them to specific scenarios will reduce the risk that this potential resource will be undervalued. More importantly, this approach will allow us to identify those relevant situations where storage could be utilized and whether it would be appropriate to set targets to encourage the cost-effective deployment of energy storage systems. Identification of relevant situations will facilitate the inclusion of energy storage as needs are identified in other proceedings, such as RA, RPS and LTPP. Therefore, the proposed framework should not prevent progress in policies for individual end-uses or applications, as analyses and results become available, while the larger evaluation continues.

Due to the variety of applications for storage and the lack of a cohesive regulatory framework, it would be difficult if not impossible to develop a single unifying policy for energy storage. However, the proposed scenarios in the Final Proposal would allow focused analysis of barriers and policy options. This approach will also allow us to consider whether one ownership model (i.e., ownership of the ESS by utility, end-use customer, third-party entity or some combination via joint ownership) is more beneficial in certain situations than others. Moreover, this approach would allow for the development of a cost-effectiveness methodology that properly addresses the unique characteristics of energy storage.

We agree that the recommended scenarios contained in the Final Proposal represent the appropriate starting point for Phase 2 of this proceeding. This determination is based in part on Staff's willingness to revisit and revise priorities as they gain additional information on the end-uses. Further, the priority scenarios identified in the Staff Proposal may need to be revised and/or re-prioritized in response to changing needs or new developments.

For these reasons, we adopt the Final Proposal. A second phase of this proceeding shall be initiated to analyze the priority scenarios contained in the Staff Proposal.

7. Comments on Proposed Decision

The proposed decision of the assigned Commissioner in this matter was mailed to the parties in accordance with Section 311 of the Public Utilities Code and comments were allowed under Rule 14.3 of the Commission's Rules of Practice and Procedure. Comments were filed by DRA, SDG&E, PG&E, SCE, Green Power Institute, CESA, Sierra Club, CFC, VoteSolar, and Beacon. Reply comments were filed by Sierra Club and SCE. The decision has been revised, as necessary, in response to comments.

Some comments have included proposals on the scope and procedures for Phase 2 of this proceeding. While we recognize parties' desire to proceed with Phase 2, we decline to prescribe in this decision the scope or schedule for analyzing the priority scenarios. Rather, parties shall be provided an opportunity to present their proposals before a scoping memo for Phase 2 is issued.

8. Assignment of Proceeding

Michael R. Peevey is the assigned Commissioner and Amy C. Yip-Kikugawa is the assigned Administrative Law Judge in this proceeding.

Findings of Fact

1. Assembly Bill 2514 directs the Commission to open a proceeding to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems.

2. Energy storage is multi-functional and can be used at the transmission, generation, and distribution levels.

3. The multi-functional nature of energy storage means that it is subject to regulation from various state and federal agencies.

4. It is not possible to adopt a single, comprehensive energy storage policy that would apply across all storage functions and regulatory agencies.

5. Parties generally agree that any adopted energy storage policy should be technology neutral.

6. Parties identified nine perceived barriers to the more widespread deployment of energy storage systems.

7. The Final Proposal includes a proposed framework to analyze energy storage based on "end uses" for storage and where in the value chain storage is being used.

8. The Final Proposal's analysis approach would consist of four major categories – regulatory framework, cost effectiveness, procurement objectives and energy storage roadmap.

9. The Final Proposal recommends four basic "scenarios" for analyzing energy storage based on existing state and Commission policy objectives.

Conclusions of Law

1. The Final Proposal should be adopted.

2. A second phase of this proceeding should commence as soon as possible to analyze the priority scenarios identified in the Final Proposal.

O R D E R

IT IS ORDERED that:

1. The Energy Storage Framework Staff Proposal (Attachment A of this decision) is adopted.

2. Rulemaking 10-12-007 remains open.

This order is effective today.

Dated _____, at San Francisco, California.