Date of Hearing: July 1, 2024

ASSEMBLY COMMITTEE ON UTILITIES AND ENERGY
Cottie Petrie-Norris, Chair
SB 1508 (Stern) – As Amended May 16, 2024

SENATE VOTE: 30-8

SUBJECT: Electricity: integrated resource plans: energy storage systems: modeling

SUMMARY: Requires the California Public Utilities Commission (CPUC) to ensure that diverse energy storage duration classes are modeled, including long-duration energy storage and multiday energy storage, if the CPUC determines multiday energy storage is reasonably available. To ensure technology neutrality, energy storage technology that meets an energy storage class's minimum duration requirements may be modeled within that class.

EXISTING LAW:

1) Vests the CPUC with regulatory authority over public utilities, including electrical corporations, while local publicly owned electric utilities (POUs) are under the direction of their governing boards. (Article XII of the California Constitution)

2) Establishes a renewables portfolio standard (RPS) and requires all retail sellers, including investor-owned utilities (IOUs), energy service providers (ESPs), and community choice aggregators (CCAs), to procure a minimum quantity of electricity products from eligible renewables energy resources, as defined, so that total kilowatt hours of those products sold to their retail end-use customers achieves 25% of retail sales by December 31, 2016, 33% by December 31, 2020, 44% by December 31, 2024, 52 percent by December 31, 2027, and 60% by December 31, 2030. (Public Utilities Code §399.15)

3) Defines "load-serving entities" as IOUs, ESPs, and CCAs. (Public Utilities Code § 380 (k))

4) Requires the CPUC to identify a diverse and balanced portfolio of resources needed to ensure a reliable electricity supply that provides optimal integration of renewable energy in a cost-effective manner as part of the integrated resource planning (IRP) process. (Public Utilities Code §454.51)

5) Requires the CPUC to adopt a process for each LSE to file an IRP and a schedule for a periodic updates to the plan to ensure that LSEs accomplish specified objectives. Requires each LSE to prepare and file an IRP consistent with those objectives on a time schedule directed by the CPUC and subject to CPUC review. (Public Utilities Code § 454.52)

6) Establishes the policy of the state that eligible renewable energy resources and zero-carbon resources supply 90% of all retail sales of electricity to California end-use customers by December 31, 2035, 95% of all retail sales of electricity to California end-use customers by December 31, 2040, and 100% of all retail sales of electricity to California end use customers by December 31, 2045. (Public Utilities Code §454.53)

7) Requires that the IRP of each LSE contribute to a diverse and balanced portfolio of resources needed to ensure a reliable electricity supply that provides optimal integration of renewable energy resources in a cost-effective manner, meets the emissions reduction targets for greenhouse gases (GHG) established by the State Air Resources Board (ARB) for the electricity sector, and prevents cost shifting among LSEs. (Public Utilities Code § 454.54)

8) Requires the CPUC to open a proceeding to determine appropriate targets, if any, for each LSE, to procure viable and cost-effective energy storage systems, as defined, to be achieved by specified dates, and authorizes the CPUC to consider a variety of possible policies to encourage the cost-effective deployment of energy storage systems. (Public Utilities Code §2836(a))

9) Requires the governing board of each POU to initiate a process to determine appropriate targets, if any, for the utility to procure viable and cost-effective energy storage systems and authorizes the governing board to consider a variety of possible policies. (Public Utilities Code §2836(b))

10) Requires each IOU's renewable energy procurement plan to require the utility to procure new energy storage systems that are appropriate to allow the utility to comply with the energy storage system procurement targets and policies and to address the acquisition and use of energy storage systems in order to achieve specified purposes. (Public Utilities Code §2837)

11) Requires each LSE to submit, by specified dates, reports to the CPUC demonstrating that it has complied with the energy storage system procurement targets and policies adopted by the CPUC. (Public Utilities Code §2838)

12) Designates the California Air Resources Board (CARB), via the California Global Warming Solutions Act of 2006, as the state agency responsible for monitoring and regulating sources emitting greenhouse gases (GHGs). Requires CARB to prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions and to update the scoping plan at least once every five years. Requires CARB to conduct a series of public workshops to give interested parties an opportunity to comment on the plan and requires a portion of those workshops to be conducted in regions of the state that have the most significant exposure to air pollutants, including communities with minority populations, communities with low-income populations, or both. (Health and Safety Code § 38561)

FISCAL EFFECT: According to the Senate Committee on Appropriations, this bill will result in unknown ongoing annual and one-time costs, each likely in the hundreds of thousands of dollars from ratepayer funds for the CPUC to make a determination on multiday energy storage.

BACKGROUND:

California's Ambitious Goals – SB 100 (De León, Chapter 312, Statutes of 2018) established the state policy that renewable and zero-carbon resources supply 100% of retail sales and electricity procured to serve all state agencies by 2045.[1] This policy was recently updated under SB 1020 (Laird, Chapter 361, Statutes of 2022), which accelerated the requirement to 100% by 2035 for state agencies, and established interim targets to meet the sector-wide 100% goal. The updated 2022 Scoping Plan[2] released by CARB in December 2022 calls for targets of 38 million metric tons of carbon dioxide equivalent (MMTCO2e) in 2030 and 30 MMTCO2e in 2035 in the electricity sector.[3] These sector-wide targets have shifted the manner in which California's utilities procure their resources and plan their infrastructure deployment. While California has made some strides towards a clean energy future, meeting these ambitious goals over the next two decades will require focused, strategic, and deliberate actions.

SB 100 Report – In March 2021, the California Energy Commission (CEC), CPUC, and CARB released the joint SB 100 report which includes an initial assessment of the additional energy resources and the resource building rates needed to achieve 100% clean electricity, along with the associated costs. The first report identified preliminarily that the state may need, on average, six gigawatts (GW) of new renewable and energy storage annually to meet the SB 100 goals.[4] The report is required to be updated every four years. The second SB 100 report cycle is intended to pick up the analytical threads left open from the first report, and a final report is scheduled to be issued by the end of 2024.

Integrated Resource Planning (mid- to long-term procurement) – The CPUC developed the IRP process pursuant to SB 350 (De León, Chapter 547, Statutes of 2015). IRP provides the umbrella process by which the CPUC oversees long-term procurement for its regulated LSEs, which serve approximately 75% of the state.[5] This process ensures that California's electric sector meets its GHG reduction goals while maintaining reliability at the lowest possible costs. During the IRP process, the CPUC develops an estimate for what those LSEs should be procuring (the Reference System Plan), requires the LSEs to file their individual procurement plans, and then approves those plans based on their consistency with collective system needs – these plans are aggregated into a portfolio called the Preferred System Plan. The Preferred System Plan serves as the basis for a number of additional planning processes, including the SB 100 report and the Transmission Planning Process by the CAISO. Existing law, within the IRP framework, also allows the CPUC to order additional resource procurement outside of individual LSEs' IRPs in order to meet decarbonization goals.

The IRP operates on a 2-year planning cycle, and forecasts system need over a decade into the future. The most recent IRP analysis identified almost 56 GW of new resources needed by 2035,[6]

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[1] Public Utilities Code §454.53
[2] In its previous draft plan, CARB set the electric sector targets at 38 million metric tons of carbon dioxide equivalent (MMCEC, "TCO2e) in 2030 and 30 MMTCO2e in 2045
[3] Pg.75, CARB, "DRAFT 2022 Scoping Plan Update," May 10, 2022
[4] CEC, "California Releases Report Charting Path to 100 Percent Clean Electricity;" https://www.energy.ca.gov/news/2021-03/california-releases-report-charting-path-100-percent-clean-electricity
[5] Public Utilities Code § 454.51-454.53
[6] 25 MMT scenario resource stack; CPUC, *Decision Adopting 2023 Preferred System Plan and Related Matters, and Addressing Two Petitions for Modification,* D. 24-02-047; https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M525/K918/525918033.PDF

arising from a mix of geothermal, biomass, land-based wind, offshore wind, solar battery storage, pumped storage, and long duration storage.[7] This portfolio represents a more than 66% increase over a span of 10 years of the current nameplate capacity on the system; an enormous goal.

Renewables Portfolio Standard (RPS) – The California RPS program began with a mandate to all retail sellers to provide 20% RPS-eligible generation by the end of 2017.[8] The initial RPS statute sought to establish a market for renewables, by financially incentivizing long-term contracting between electricity provider and above-market renewable generators. This mandate sought market stimulation, creation of a local economy, and a modicum of environmental benefits. As California has codified more and more clean energy and climate goals, the Legislature has modified the goals and details of the RPS program to urge progress. Compliance with the RPS program occurs separately, but in concert with, the resource mixes selected by LSEs' IRP filings. Amended most recently by SB 100, the program requires LSEs to deliver 60% of their retail electricity from clean, renewable resources by 2030. Beyond 2030, LSEs must continue increasing the remaining balance of their portfolios that is zero-carbon to meet the final 2045 100% zero-carbon electricity requirement.

Benefits of Energy Storage – Energy storage systems, as defined in statute, are commercially available technologies that absorb energy, store it for a specified period, and then dispatch the energy when needed. As California strives to meet its clean energy and climate goals, storage systems provide several benefits for energy producers and consumers alike:

- Helps meet energy demand: When supply is high and demand is low, storage can store excess energy for later use. When demand is high and supply is low, storage can discharge stored energy to the electric grid for use, avoiding shortages or outages.[9]
- Strengthens the electric grid: Due to its ability to discharge energy quickly when needed, energy storage can rapidly respond to changes on the electricity grid. As such, energy storage can help add flexibility and resilience to the electric grid.[10]
- Supports the integration of renewable energy: While some renewable energy technologies—such as wind and solar—experience intermittent periods of "down-time" during which energy cannot be produced, electricity demand must still be met. Storage helps plug these gaps by providing energy during these periods of variable output and therefore stabilizing the electricity supply.[11]

Energy storage comes in many forms, including pumped hydroelectricity, lithium-ion batteries, flow batteries, and other technologies. Long-duration storage can store energy for eight hours and more, and is expected to provide even greater capacity as technological advancements continue to evolve.

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[7] Table 4, pg. 68; CPUC, D. 24-02-047; *Ibid.*
[8] SB 1078 (Sher, Chapter 516, Statutes of 2002)
[9] Union of Concerned Scientists; "Energy Storage: How it Works and Its Role in an Equitable Clean Energy Future;" https://www.ucsusa.org/resources/how-energy-storage-works
[10] Union of Concerned Scientists; "Energy Storage in California"; https://ucs-documents.s3.amazonaws.com/clean-energy/energy-storage-in-california-explainer.pdf
[11] Ibid

Energy Storage in California – AB 2514 (Skinner, Chapter 469, Statutes of 2010) required the CPUC to determine appropriate targets for LSEs to procure energy storage. The CPUC was required to develop the targets by October 1, 2013. The bill also required POUs to establish their own targets for procurement of energy storage systems by October 1, 2014. This legislation was the first of its kind in the United States. By that, the CPUC issued a decision establishing the state's first energy storage procurement target of 1,325 megawatts (MW) by 2020.[12] According to the CEC, California currently has over 3.3 GW of installed energy storage, with roughly 15 GW needed by 2032 (per the CPUC), of which 1 GW is needed from long-duration storage.

CEC's Long Duration Energy Storage Program – As the electrical grid continues to face reliability challenges in its transition to clean energy generating resources, driven by an increasing number of retired resources and more climate related weather events, there will be a greater need for long duration storage of these intermittent clean energy resources that can extend from just one evening to multiple days. With a $330 million fund set aside at the CEC, the state has invested $140 million so far into the demonstration of non-Lithium-ion energy storage technologies and projects to implement long duration energy storage systems across California.[13] A major focus of the program is to foster diversity and competition in the market. One of the most recently awarded projects is a $30 million project with PG&E for a first-of-its-kind 5 MW/100-hour iron-air technology.[14] The project is expected to begin operation by the end of 2025.

Central Procurement Entity – AB 1373 (E. Garcia, Chapter 367, Statutes of 2023) authorized the CPUC to request the Department of Water Resources (DWR) to act as a central procurement entity (CPE) to conduct procurement of certain eligible long lead-time resources until January 1, 2035. This legislation is specifically intended to stimulate development of resources such as offshore wind, long-duration energy storage and other large-scale, long lead-time resources that are difficult for individual or smaller load-serving entities to procure. Per statute, the CPUC is required to make an initial need determination for procurement by DWR by September 1, 2024. If a need is identified, the CPUC must make a request to DWR to exercise its CPE mechanism within six months. The CPUC must then allocate the costs and benefits of any procurement conducted by DWR. The CPUC has been seeking comments on the central procurement mechanism from parties to the CPUC's integrated resource planning proceeding. The comment period ended in May 24, 2024**.**

COMMENTS:

1) *Author's Statement.* According to the author, "California has made remarkable progress in deploying solar and short-duration, lithium-ion battery storage on its way to transitioning to 100 percent clean energy. It was recently reported that clean energy resources like solar, wind, hydro, and batteries, have exceeded grid demand at some point during the day for 34 days straight in April and May. However, in order to build on this progress and utilize this excess clean power for use overnight or during peak summer

[12] D. 13-10-040
[13] CEC, "Long Duration Energy Storage Program"; https://www.energy.ca.gov/programs-and-topics/programs/long-duration-energy-storage-program#:~:text=The%20Long%20Duration%20Energy%20Storage%20program%20invests%20up%20to%20%24330,energy%20storage%20systems%20across%20California.

demand months, we have to ensure our state energy agencies are including long duration and multi-day energy storage in their energy planning. By incorporating a wider range of energy storage technologies, we can enhance grid resiliency and support the state's transition away from fossil fuels."

2) *Purpose of the Bill.* As discussed earlier, California established the first energy storage target in the nation in 2010 with the passage of AB 2514 (Skinner). According to the author and supporters of this bill, lithium-ion batteries, which had a 4-hour storage capacity, were the first grid-scale battery technology that was commercially available at the time; as a result of timing, these short-duration, lithium-ion batteries have been the primary technology installed as a means to achieving those state targets. They write, "Since AB 2514 was passed, energy markets, technologies and state goals have evolved significantly. To meet these goals and maintain electric reliability most cost-effectively, with the least land use, a broader set of energy storage technologies are needed, including long-duration and multi-day energy storage."

3) *Matter of Definitions*. Many promising long-duration energy storage technologies are still emerging and maturing and are not yet commercially available. This bill requires the CPUC to ensure that diverse energy storage duration classes are modeled, including long-duration energy storage. There is no single definition of "long duration", but according to the National Renewable Energy Laboratory (NREL), the most commonly cited number is 10+ hours. NREL also states that the context regarding application matters when discussing what is meant by "long duration." For instance, a 6-hour battery might be able to provide firm capacity–the ability to meet peak demand and cover any other adverse conditions like blackouts–in some situations, whereas in others, a storage system with 100 hours of duration might be more necessary. As such, without standardized definitions, it may be challenging for regulatory agencies to proactively consider these technologies in their planning processes.

4) *Cost-Effectiveness*. Facilitated by stimulus funding for demonstration projects, energy storage technology is rapidly advancing. However, the cost-effectiveness of energy storage varies depending on numerous factors, including: the technology used, the expected life of the system, the expected cost and frequency of ongoing maintenance, the dispatchability of the technology, the location of the system, and how much can be incorporated into the electrical grid. As eluded earlier, long-duration energy storage systems are still nascent technologies, so the valuation of their benefits relative to their costs is yet to be fully grasped. Since the cost to procure these technologies will be borne by ratepayers, it may be worthwhile for energy planners to understand these costs first which will likely influence the pace and scale of the adoption of energy storage in general.

5) *Prior Legislation*

SB 1020 (Laird) established interim targets to reach SB 100 clean energy goals and required state agencies to purchase 100 percent zero carbon electricity by 2035 to serve their load, including obligations on State Water Project. Status: Chapter 361, Statutes of 2022

SB 423 (Stern) required the CEC to submit to the Legislature an assessment by December 31, 2023, of firm zero-carbon resources that support a clean, reliable, and resilient electrical grid and will help achieve the existing statutory goal of ensuring renewable energy and zero-carbon resources supply 100 percent of all retail sales of electricity to California customers by December 31, 2045. Status: Chapter 243, Statutes of 2021

SB 100 (De León) established the 100 Percent Clean Energy Act of 2017 which increases the RPS requirement from 50 percent by 2030 to 60 percent, and created the policy of planning to meet all of the state's retail electricity supply with a mix of RPS-eligible and zero-carbon resources by December 31, 2045, for a total of 100 percent clean energy. Status: Chapter 312, Statutes of 2018

SB 350 (De León) enacted the "Clean Energy and Pollution Reduction Act of 2015," which established targets to increase retail sales of renewable electricity to 50 percent by 2030 and double the energy efficiency savings in electricity and natural gas end uses by 2030 and also required the CPUC to develop an integrated resource planning process. Chapter 547, Statutes of 2016

AB 2227 (Bradford) deleted provisions from AB 2514 on POUs and clarified the CEC's role as not having authority to enforce the requirements in AB 2514. Status: Chapter 606, Statutes of 2012

AB 2514 (Skinner) required the CPUC to determine appropriate targets, if any, for load serving entities to procure energy storage systems. This bill required LSEs to meet any targets adopted by the CPUC by 2015 and 2020. The bill required POUs to set their own targets for the procurement of energy storage and then meet those targets by 2016 and 2021. Status: Chapter 469, Statutes of 2010

REGISTERED SUPPORT / OPPOSITION:

Support

Advanced Energy United
California Environmental Voters (formerly Clcv)
Cleanearth4kids.org
Environmental Defense Fund
Form Energy
Greengenstorage LLC
Hydrostor, INC.
Union of Concerned Scientists

Opposition

None on file.

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