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Comments of the California Energy Storage Alliance on August 4, 2021 EPIC 4 Investment Plan Draft Initiatives

Additional submitted attachment is included below.

August 18, 2021

Email to: docket@energy.ca.gov
Docket Number: 20-EPIC-01
Subject: EPIC 4 Investment Plan

Re: Comments of the California Energy Storage Alliance on August 4, 2021 EPIC 4 Investment Plan Draft Initiatives

Dear Sir or Madam:

The California Energy Storage Alliance (CESA) welcomed the opportunity to present on energy storage advancements at the workshop on July 20, 2021 and appreciates the opportunity to comment on the California Energy Commission (CEC) workshop on August 4, 2021, where CEC staff presented the draft initiatives for the 2021-2025 EPIC 4 Investment Plan.

CESA is a 501(c)(6) organization representing over 100 member companies across the energy storage industry. CESA member companies span the energy storage ecosystem, involving many technology types, sectors, configurations, and services offered. As the definitive voice of energy storage in California, CESA is involved in a number of proceedings and initiatives in which energy storage is positioned to support a more reliable, cleaner, and more efficient electric grid.

I. INTRODUCTION & SUMMARY.

Even after investing over $100 million in energy storage in EPIC funds in 2020, CESA strongly supports the continued focus on energy storage technologies and echoes the CEC staff's sentiments that 2021 is a pivotal year for energy storage research. Overall, CESA is generally pleased with the wide range of proposed draft initiatives, which focuses on a reasonable combination of technology demonstration and scaling, specific high-potential use cases, and market facilitation via standards/protocols development and other "soft infrastructure" needs around permitting, tools, assessment capabilities, etc. Such a focus beyond investments in pre-commercial technologies will support early-stage companies and technologies to bridge the "valley of death" to advance toward commercial opportunities. As an innovation program with scalable opportunities to learn and leverage findings from EPIC-funded projects in other contexts, the broader yet targeted scope of initiatives is generally appropriate.

In these comments, CESA offers our perspective on key areas of support as well as on recommendations to modify or expand the scope or objective of the proposed draft initiatives to align with CESA's understanding of grid need.

- Improving the characteristics of lithium-ion batteries and other shorter-duration technologies represents a smart investment area to advance the long-term role of energy storage.

- Continued investments in a wide range of long-duration technologies will diversify the storage toolkit and address identified long-term planning needs, but the definition for minimum duration should be aligned across agencies.

- Additional use cases for frequency response capabilities and multi-purpose should be demonstrated using energy storage technologies.

- The firm dispatchable decarbonized generation (FDDG) initiative should be broadened to explicitly include seasonal storage solutions.

- Initiatives to focus on virtual power plant (VPP) development, improved forecasting methods for behind-the-meter (BTM) solar and storage, and load flexibility for industrial, agricultural, and water (IAW) sectors should be adopted.

- Development of storage comparison tools and more expanded Storage Permitting Guidebook represent potential gaps in the CEC's innovation portfolio.

- Standardization of battery design and flexible sorting methods are needed, in addition to investments in in-state facilities and capacities to minimize logistical costs.

- Continued funding to close funding gaps and the valley of death is important to bringing technologies to market and helping to scale deployment.

- Certain EPIC contract terms and conditions should be modified to facilitate more robust participation.

II. COMMENTS.

1. Improving the characteristics of lithium-ion batteries and other shorter-duration technologies represents a smart investment area to advance the long-term role of energy storage.

CESA supports the CEC proposed focus on improving the performance characteristics of lithium-ion batteries given that SB 100 modeling identified a need for 48.8 GW of battery storage by 2045. While this points to the present commercial dominance of lithium-ion as a battery storage technology type and their forecasted cost declines, some investments in one initiative to improve its performance characteristics represent a smart investment to insure the state's long-term decarbonized grid future and heavy reliance on this technology type. As the draft initiative has identified, there are known limitations or

tradeoffs of this technology class that could be improved upon (*e.g.*, degradation, lifetime performance, safety). In addition, due to land use limitations or concerns of siting lithium-ion storage projects locally or in building large storage fields, the CEC should also consider advancements in vertical stacking, configuration, and containerization of lithium-ion batteries as part of this initiative.

At the same time, CESA is also supportive of this initiative investing in shorter-duration energy storage technologies that do not involve lithium-ion. There are certain risks in relying on a handful of technologies for the clean energy transition, including reliance on a narrow supply chain. Even if lithium-ion technologies are selected, this proposed initiative should consider diverse lithium-ion chemistries with robust, scalable, and resilient supply chains that can help the state withstand any supply chain disruptions.

2. Continued investments in a wide range of long-duration technologies will diversify the storage toolkit and address identified long-term planning needs, but the definition for minimum duration should be aligned across agencies.

CESA strongly supports the CEC's proposed initiative to continue to make investments in a wide range of non-lithium, long-duration energy storage (LDES) technologies and demonstration projects. The previous round of investments included a number of technologies and demonstration projects supporting LDES technologies of at least 10 hours in duration and with minimum rating above 50 kW to 400 kW, as well as to support tribal and/or low-income communities. However, given the early stage of LDES technologies yet the significant need for LDES as highlighted in the 2030 IRP modeling, 2045 SB 100 modeling, and CESA's own modeling,[1] we should continue to build the suite of technologies and provide commercialization support of LDES, which is a broad asset class of storage capabilities.

While welcoming this continued initiative, CESA offers several comments on modifications or refinements to the initiative. First, CESA recommends that the definition of LDES be modified to align with that adopted by the California Public Utilities Commission (CPUC) in directing procurement, where LDES are defined as resources that are able to deliver at maximum capacity for at least eight hours from a single resource.[2] Aligning innovation investments to those that have been identified in robust grid planning and modeling represents a key means to ensure ratepayer benefit and position the state to address both mid-term and long-term needs. Yet, the description of the initiative defines LDES as four hours or more in some places and then eight hours or more in other places, not to mention the 10 hours or more definition in place in the previous iteration of this

[1] *Long-Duration Energy Storage for California's Clean, Reliable Grid* ("CESA LDES Report") prepared by Strategen Consulting for the California Energy Storage Alliance on December 8, 2020. Access the report here.
[2] *See* Ordering Paragraph (OP) 2 of D.21-06-035.
https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K603/389603637.PDF

initiative. For consistency and alignment with state grid planning and modeling, the initiative should focus on LDES as resources with eight hours or more.

Second, CESA recommends that the CEC maintain the bigger picture in demonstration and commercialization support and advance a portfolio of LDES technologies with different attributes. Broad support for all types of LDES is helpful at this stage, but if particular sub-focus areas are desired, the CEC could consider supporting another round of LDES technologies with distinct attributes, such as around duration (*e.g.*, 8 hours, 10 hours, 12 hours, multi-day) since duration needs grow over time.[3] As this and future initiatives continue to make investments in LDES technologies, the CEC should support a range of durations and capabilities from funded technologies and demonstrations to prepare the state's electric grid for greater minimum duration capabilities from the storage portfolio over time. Other considerations include LDES technologies that decouple maximum charge and discharge rates,[4] and those that have smaller land density footprints.[5]

3. Additional use cases for frequency response capabilities and multi-purpose should be demonstrated using energy storage technologies.

CESA is strongly supportive of this proposed initiative to focus on untested or still-novel use cases and applications involving energy storage that more effectively meet grid reliability needs. The CEC has appropriately framed the initiative as being broad in terms of eligibility (*e.g.*, IFOM or BTM) and potential use cases, so long as they advance grid reliability. Though CESA understands the use case applications listed in the proposed initiative are intended to be illustrative and non-exhaustive, CESA wishes to draw the CEC's attention to a particularly important use case example that could be supported as part of this initiative. In line with the CEC's recognition of power quality issues in an inverter-centric grid, the California electric grid will also see a long-term need for frequency response with the penetration of inverter-based resources,[6] where LDES technologies that have spinning masses and/or can provide inertia may be a valuable investment.

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[3] CESA LDES Report at 52-54.

[4] Depending on the use case, the ability to fully or substantially recharge in time for when the grid needs the discharge is a critical consideration for LDES technologies. Typically, inverter-based storage technologies have symmetrical charge and discharge rates that limit the ability to use them for longer duration needs, but technologies that can decouple these rates may have unique value to the system in charging during limited solar generation periods and discharging over longer periods of time.

[5] The CAISO's annual Local Capacity Technical (LCT) studies have consistently identified larger energy duration needs from storage resources to displace gas in transmission-constrained local load pockets, where land is limited in dense urban areas and can be very expensive. With storage technologies that, for example, maximize energy per square feet, the CEC can support viable storage solutions to address local needs while displacing local gas generation.

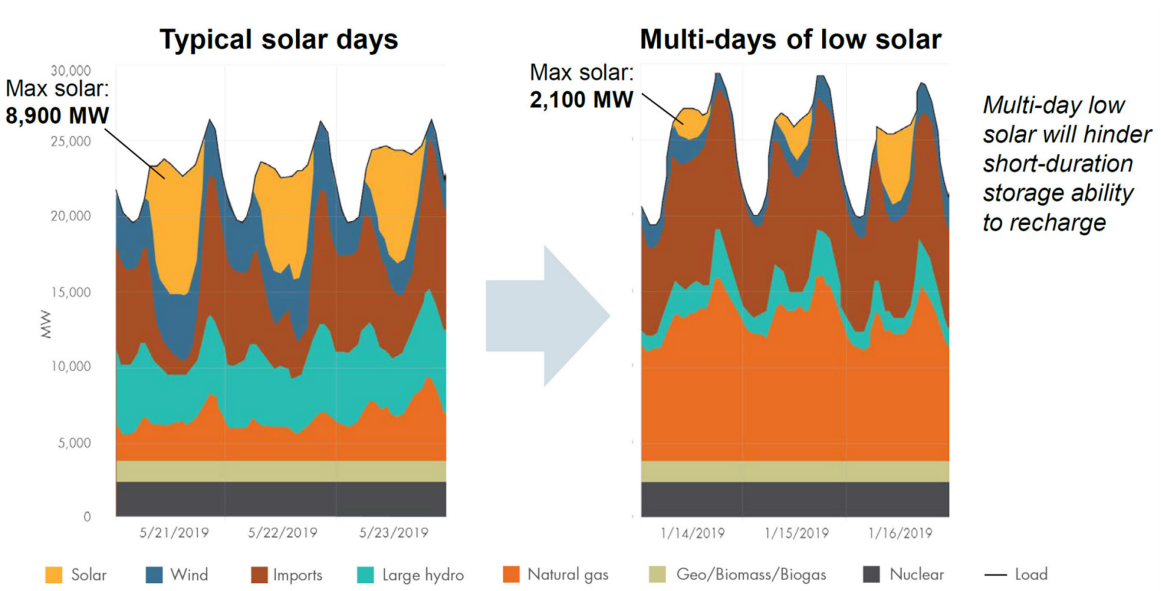
[6] 2020-2021 Transmission Plan at 393-404.
http://www.caiso.com/Documents/BoardApproved2020-2021TransmissionPlan.pdf

Furthermore, CESA recommends that the CEC explore LDES technologies that have multiple off-takers or dual purpose. Several LDES technologies have a primary storage function but may also have another use that can support multiple needs and/or multiple sectors. For example, thermal LDES technologies can provide useful heat for industrial customers, or directly serve customer needs (*e.g.*, military resiliency, wastewater treatment). In contrast to multiple-use applications to serve multiple off-takers for the electrical discharge from LDES technologies, CESA sees an under-explored area of innovation and learning around the useful byproducts of the storage conversion process. Investment in these technologies and demonstrations could serve to decarbonize multiple sectors, maximize the use of LDES technologies, and/or support the scaling of emerging technologies.[7]

4. The firm dispatchable decarbonized generation (FDDG) initiative should be broadened to explicitly include seasonal storage solutions.

CESA generally supports the concept of this proposed initiative to support development of FDDG for grid reliability in a future with highly intermittent renewables penetration, which could include the formulation of a framework to evaluate the cost and performance of various forms of FDDG and LDES, as well as for different use cases (*e.g.*, transmission capacity). However, as CESA understands it, the proposed initiative plans to focus on demonstrating optimal FDDG technologies, which seems to preclude multi-day or seasonal storage solutions, except to serve as a comparison to potential generation technologies. Instead, to support such comparisons, this initiative should explicitly consider both FDDG, as well as seasonal LDES technologies and generation coupled with storage to provide FDDG-like attributes, which better supports portfolio-level comparisons. Given low solar irradiance risk that has been previously highlighted by the California Independent System Operator (CAISO) during a joint-agency workshop on February 24, 2020, held to discuss inputs and assumptions for the SB 100 study.

[7] Similar to how lithium-ion batteries have benefited from multiple downstream sectors from consumer electronics, electric vehicles, and grid-connected storage solutions, a cross-sectoral or multi-off-taker focus for other emerging energy storage technologies can support its scale in production, cost declines, and/or decarbonization.



Especially as the state looks at a future dependent on intermittent renewable generation, having an initiative focus on multi-day or seasonal energy storage solutions would smartly invest in the innovations that are likely needed to decarbonize the grid and ensure reliability in all types of weather and grid conditions. Additionally, to be able to make a fair comparison of FDDG and LDES resources, CESA believes that investment is needed in a multi-day or seasonal storage solution. To our knowledge, the CEC has yet to make an investment in such technologies in past EPIC initiatives.

5. Initiatives to focus on virtual power plant (VPP) development, improved forecasting methods for behind-the-meter (BTM) solar and storage, and load flexibility for industrial, agricultural, and water (IAW) sectors should be adopted.

CESA supports these three initiatives since they will enable a greater realization and utilization of distributed energy resources (DERs) for not only customer value but also for broader system and grid value. With the CPUC recently issuing a draft DER Action Plan 2.0, CESA strongly supports these focus areas. Regarding the proposed establishment of the California Industrial, Agricultural, and Water Flexible Load Research Hub, CESA recommends the initiative build upon the adopted dynamic baseline evaluation methodology for functional thermal storage resources (TES), which will play a major role in advancing load flexibility from the IAW sectors and in recognizing the full capacity contribution of TES as a load-shift resource in extreme weather conditions and on a real-time basis.[8]

[8] *See, e.g.*, Resolution E-5106: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M350/K762/350762070.PDF

6. Development of storage comparison tools and more expanded Storage Permitting Guidebook represent potential gaps in the CEC's innovation portfolio.

As California diversifies the energy storage toolkit, buyers of energy storage technologies can benefit from standardized or consistent measurement tools to assess performance across different conditions or use cases, as well as to provide environmental evaluations. In conducting solicitations, buyers will increasingly face challenges in being able to make apples-to-apples comparisons of various storage technology types with different performance and operating characteristics. To support expedited procurement evaluations in line with the record storage buildout needed to reach our various reliability and decarbonization goals, such a tool can be helpful in streamlining solicitation processes and expedite contract review for stakeholders to assess storage contracts, projects, and technology types. As the CAISO adapts its market participation rules to accommodate these different characteristics, a storage comparison tool will provide significant value not only from the procurement and contracting side but also in the market operation elements of various storage technologies. This was a topic that was initially raised as part of the development of the Storage Equipment List and pushed off to a later phase. However, this type of tool warrants renewed attention and further development via EPIC-funded projects if such a tool is not commercially available today.

Furthermore, CESA is supportive of the development of the Storage Permitting Guidebook pursuant to AB 546, which is currently underway through a contract with the Center for Sustainable Energy (CSE). CESA plans on being an active stakeholder in those efforts, but upon participating in the kickoff meetings on August 3, the scope of the work is limited to BTM storage systems sized less than 1 MW in capacity. Despite understanding that the scope of the guidebook development was always scoped to be more limited in nature, permitting is a known and critical barrier to achieving the storage deployment levels required to meet mid-term reliability procurement needs, DER action plan objectives, and longer-term SB 350 and SB 100 decarbonization goals. Unlike for solar, both IFOM and BTM lithium-ion storage projects are subject to permitting processes that are inefficient and inconsistent, with different authorities having jurisdiction (AHJs) having different requirements and/or processes. City by city and county by county rules result in challenges to timely deployment of projects and development risks that may filter into higher project and contract costs. Furthermore, for non-lithium-ion storage technologies, permitting is becoming a potential issue for storage technologies that may trigger CEQA and/or CEC permitting requirements for the use of thermal combustion in its electric-to-thermal conversion and storage processes.

To this end, further and expanded development and implementation of the Storage Permitting Guidebook will play an important role in fostering standardization of the key documentation and standards requirements to secure construction and electrical permits. Where possible, online submissions instead of hard-copy paper submissions as well as

virtual inspections and online checklists can improve the permitting process.[9] Where applicable, such standardized guidebooks and best practices will aid permitting authorities to meet any deadlines set out in statute or regulation. A guidebook will support the development of fast-track, use-by-right, and prioritized permitting pathways for energy storage projects with all AHJs in California.

Since the current Storage Permitting Guidebook development is contracted with CSE with a limited scope, CESA recommends that this initiative provide supplemental and additional funding to allow the guidebook development efforts to be expanded beyond small, BTM storage systems to one that covers all storage technologies (not just lithium-ion batteries), both IFOM and BTM systems, and both paired and standalone storage systems. The limited scope and pace of the current efforts are insufficient to address the challenges ahead, where additional budget to broaden the scope and accelerate the efforts is a critical means by which the CEC can support SB 100 goals.

7. Standardization of battery design and flexible sorting methods are needed, in addition to investments in in-state facilities and capacities to minimize logistical costs.

With the volume of lithium-ion storage and battery electric vehicle (BEV) deployment over the past few years and in the years to come, the end-of-life (EOL) considerations for lithium-ion batteries will confront California at a large scale as early as the mid to late 2020s. CESA is thus supportive of the draft initiative proposed by the CEC and generally agrees with the list of potential technological advancements that could support such a "circular economy" for lithium-ion batteries, including innovations in battery design, demonstration of the performance of recovered materials in new batteries, and development of flexible methods for efficient battery collection, sorting, and diagnostic testing.

However, in some ways, in the way that the CEC has provided the list of technological advancements, CESA is concerned that the most effective use of the funds dedicated to the initiative be in developing in-state capacity and capabilities to dismantle and segregate materials and to reduce the transportation costs between the storage project site and decommissioning facility. In a white paper, the Energy Storage Association (ESA) found that most batteries used in grid-connected energy storage applications are considered hazardous material and regulated by the US Department of Transportation Hazardous Material Regulation (HMR) under Title 49 of the Code of Federal Regulations, Subchapter C as "Class 9" miscellaneous hazardous material, leading to specialized transportation considerations.[10] Among the various cost components for recycling lithium-ion storage

[9] *See, e.g.*, https://www.sonomacity.org/expedited-permitting-for-battery-energy-storage-systems-ess/ and https://storage.googleapis.com/proudcity/sonomaca/uploads/2019/12/Submittal-Requirements-Checklist-for-Expedited-EVCS-Permits.pdf

[10] *End-of-Life Management of Lithium-ion Energy Storage Systems* white paper published by ESA on April 22, 2020. https://energystorage.org/wp/wp-content/uploads/2020/04/ESA-End-of-Life-White-Paper-CRI.pdf

systems, EPRI estimated that roughly 40% of costs accrue to on-site dismantling and packaging, 30% to transportation costs, and 30% to recycling costs. According to EPRI, battery energy density is estimated to have a large impact on total decommissioning costs as a result of manual labor in dismantling and packaging as well as increased transportation and recycling costs.[11]

Recognizing these cost drivers, CESA recommends a targeted and strategic approach in this initiative to advance the battery recycling economy by building in-state dismantling, packaging, and recycling facilities. A narrow focus on technological advancements may not support the economics of recycling batteries if the ecosystem is not developed within the state, where transportation costs alone are a major contributing cost driver. Furthermore, while battery design could benefit from innovation, CESA believes that this may be a role for national laboratories or manufacturers to establish a common standard by which battery cells are packed and configured to make it recycle-ready and easier to dismantle.[12]

8. Continued funding to close funding gaps and the valley of death is important to bringing technologies to market and helping to scale deployment.

CESA strongly supports the CEC's planned continued investments in market facilitation. In addition to technology research and demonstration, the CEC will play a key role in building the manufacturing capabilities (*e.g.*, RAMP) and bridging the gap between public and private investment (*e.g.*, BRIDGE). These solicitations and sub-initiatives should continue as certain LDES technologies have been demonstrated and would benefit from scaling production and/or supporting "commercial-like" deployment.

9. Certain EPIC contract terms and conditions should be modified to facilitate more robust participation.

Many CESA members have gone through the process of submitting grant applications and/or reviewing the terms and conditions for participation. However, for all initiatives, member companies have highlighted several key challenges in participating in the program. While beyond the scope of any particular draft initiative, CESA offers our recommendations to address said challenges in order to invite greater participation from the energy storage community in these important initiatives:

[11] Recycling and Disposal of Battery-Based Grid Energy Storage Systems: A Preliminary Investigation published by EPRI on December 11, 2017. https://www.epri.com/research/products/000000003002006911

[12] Rather than welding battery cell components, CESA understands that a consortium of national labs, including Argonne National Lab, are working to develop common standards to facilitate battery recycling, such as by assembling them through belts and screws instead.

- **Introduce limitation of liability provision in standard grant contracts:** Currently, in EPIC standard contracts,[13] there are no limitations of liability, nor exclusion for consequential damages, which is a problem because it asks companies to indemnify with no limitations. This is not common commercial practice and could limit commercial participation. With limitation of liability provision, exposure is capped in an agreement that is more balanced between parties. Liability should be capped at contract level or at aggregate amount of payments received and should exclude consequential, incidental, punitive, exemplary, special, indirect or other business interruption damages, including damages for loss of use, revenue or profit or loss of data or diminution in value.

- **Amend indemnification clause such that it excludes any and all claims and losses, stemming from errors, omissions, or misconduct on the part of the CEC:** As currently written in Section 17, the contractor could be liable even if the claims or losses were attributable to CEC fault. Several companies have reported that this term presents excessive risk that deters their participation in the program.

- **Remove royalty payments clause in Section 21 for projects that are deploying already-developed technology:** Since cost share is already required, additional compensation of royalty payment is excessive and could potentially limit industry participation. Royalty payments may be more standard for R&D-level projects, but it should not be necessary for technologies that are already developed.

- **Remove "Time is of the Essence" language:** The inclusion of the 'Time is of the Essence' clause in Section 22(d) means that the parties agree that all performance dates, including interim milestones, are materially important. Thus, the contract could be terminated for cause if the contractor is late on an interim milestone. Generally, the contractor is unable to recoup all costs incurred upon terminations for cause. Contract termination as a result of schedule slippage can present excessive risk to certain interested grant applicants and deter participation from promising technologies or project use cases despite offering potential learning opportunities.

- **Allow companies to retain intellectual property for later-stage technologies:** Storage technology companies have expressed that they want to ensure that all IP remains the property of the companies responsible for creating it, particularly as it relates to later-stage technologies that have been designed and developed by the companies themselves. Considering the CEC

[13] *Exhibit C: Electric Program Investment Charge (EPIC) Standard Grant Terms and Conditions*.

is not funding the R&D of new technologies, this is an important issue to the industry that could have the potential to limit industry participation.

- **Allow for some flexibility in negotiating the terms and conditions in certain cases:** Currently, there are no exceptions to the EPIC standard contract. While this practice supports timely and efficient contracting in most cases, there may be instances where some flexibility in the EPIC standard contract is necessary and warranted to ensure fair and balanced agreements for all parties.

III. CONCLUSION.

CESA appreciates the opportunity to provide these comments and feedback on the EPIC 4 draft initiatives and look forward to collaborating with the CEC and other stakeholders in this docket.

Respectfully submitted,

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