BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue
Electric Integrated Resource Planning and
Related Procurement Processes.

Rulemaking 20-05-003
(Filed May 7, 2020)

NOTICE OF EX PARTE COMMUNICATION BY
THE LONG DURATION ENERGY STORAGE ASSOCIATION OF CALIFORNIA

May 3, 2021

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NOTICE OF EX PARTE COMMUNICATION BY
THE LONG DURATION ENERGY STORAGE ASSOCIATION OF CALIFORNIA

Pursuant to Rule 8.4 of the Commission’s Rules of Practice and Procedure, the Long Duration Energy Storage Association of California (The LDESAC) timely gives notice of one (1) ex parte communication.

This communication occurred on Wednesday, April 28, 2021. The communication was oral and included two (2) written documents. The first document is entitled “Ex Parte Meetings with Commissioner Advisors” prepared by the LDESAC and attached hereto as Exhibit A. The second document is entitled “The Value of Long Duration Energy Storage” prepared by the LDESAC and attached hereto as Exhibit B. These written documents were provided to Anand Durvasula, Legal and Policy Advisor to Commission President Batjer and Yuliya Shmidt, Advisor to Commissioner Rechtschaffen prior to the meeting.

The oral communication was initiated by Megan M. Myers, Attorney for the LDESAC and occurred telephonically on Wednesday, April 28, 2021 at 1:30 p.m. with Anand Durvasula, Legal and Policy Advisor to Commission President Batjer and Yuliya Shmidt, Advisor to Commissioner Rechtschaffen. The LDESAC timely filed and served a Three Working Days’ Notice of these communications on April 22, 2021. Present at both meetings on behalf of the LDESAC were Julia Prochnik, Executive Director of the LDESAC and Megan M. Myers, Attorney for the LDESAC.
Ms. Myers began the meeting by discussing the LDESAC’s involvement in the integrated resource plan (IRP) proceeding (R.20-05-003). In addition, Ms. Myers expressed the LDESAC’s appreciation for the recent Administrative Law Judge’s Ruling regarding mid-term reliability’s inclusion of a 1,000 MW target for long duration energy storage. Ms. Myers emphasized the importance of this target being a floor and not a ceiling.

Ms. Prochnik provided information on the LDESAC. Ms. Prochnik also stated that procurement is key and that some long duration energy storage technologies are ready to go within the timeframe set forth and others will need a longer lead time. There are multiple technology pathways that are already known and proven and are commercially-ready for delivery in California. Directing procurement now, sending a strong procurement message and building on the long duration energy storage need already identified through the Commission’s IRP docket, allows for economic implementation of these critical resources. Ms. Prochnik also discussed the benefits that long duration energy storage can bring to disadvantaged communities.

In further compliance with Commission rules and instructions included in the Commissioners’ Meeting Request forms, this notice has been served on the R.20-05-003 (IRP) Service List and electronically copied to Batjer.Exparte@cpuc.ca.gov and Rechtschaffen.Exparte@cpuc.ca.gov.

Respectfully submitted,

May 3, 2021

/s/ JULIA PROCHNIK

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Ex Parte Meetings with Commissioner Advisors

Background on Long Duration Energy Storage Association of California (LDESAC)

- LDESAC represents a diverse mix of long-duration energy storage technologies, and its members offer products and services along every stage of the value chain, from invention to design, engineering, manufacturing, project development, and full-scale renewable integration and commercialization.
- LDESAC storage technologies currently include pumped hydro, compressed air, liquid air, zinc-air batteries, flow batteries, flywheels, concentrating solar power and molten salt, electrolytic hydrogen, and repurposed gravity wells.
- These technologies can be deployed in projects ranging from a few hundred kilowatts to several gigawatts and can be behind the meter or in-front of the meter providing local and system wide benefits.
- Long-duration energy storage promotes resource diversity and its accompanying enhanced grid reliability, which, in turn, will support greater penetration of renewables, increase the efficacy of zero emission transportation policies, and accelerate decarbonization all necessary to achieve California’s policy priorities of GHG reduction, air quality improvements, and health risk mitigation.

Summary of LDESAC’s Position on the Administrative Law Judge’s Ruling Seeking Feedback on Mid-Term Reliability Analysis and Proposed Procurement Requirements in R.20-05-003 (IRP)

- LDESAC strongly supports the ALJ Ruling’s recommendation to procure at least 1,000 MW from long-duration energy storage.
- However, this recommendation should be considered as a floor and not a ceiling.
- Load-serving entities (LSEs) should be encouraged to exceed their targets of long-duration energy storage as a least regrets approach.
- Non-investor-owned utility (IOU) LSEs should be allowed to opt-out of their procurement role and assign their share of new capacity procurement to an IOU.
- LSEs should be encouraged to coordinate to procure long-duration energy storage resources that support local reliability and allow for the reduction in fossil fuel generation in disadvantaged and front-line communities.
- The CPUC should authorize LSEs to solicit for post-2026 sufficient long-duration energy storage to put California on a trajectory to meet a 30 MMT carbon target.
EXHIBIT B
The Value of Long Duration Energy Storage
Our Climate, Reliability, Resiliency Obligations

- Decrease Emissions
- Keep the Lights on
- Lower Costs & Interconnected Economy
- Prepare for Climate Emergencies
- Include Equity
Webinar Overview

- What is the Long Duration Energy Storage Association of CA?
- What is Long Duration Energy Storage?
- The Types of Long Duration Energy Storage
- The Value of and Need for Long Duration Energy Storage
- Challenges and Barriers
- Questions / Discussion
- Thank you!!!
About Us

The Long Duration Energy Storage Association of California (LDESAC) is a 501(c)4 organization that serves to promote the development of long duration energy storage to complement short duration storage technologies and enhance California’s ability to achieve its climate goals, while operating a safe and reliable energy grid.

LDESAC is fully focused on promoting long duration energy storage technologies that are needed to meet CA’s climate, clean energy and equity goals and. The organization works closely with other renewable, clean energy, storage and allied organizations to advance our shared priorities.
Our Supporter Companies
Long Duration Energy Storage
What is Long Duration Energy Storage?

Long duration storage complements shorter duration storage technologies, by providing large amounts of renewable energy back to the grid for 10 hours or more and for some technologies days, weeks and or seasonal.

- Balancing generation and demand
- Improving transmission and distribution efficiency
- Providing electric grid stability
- Shifting power supply over long periods

- Los Angeles was able to avoid the recent blackouts by relying on the Castaic Pumped Storage Project in Southern California.

- Long duration energy storage can provide local and system wide benefits throughout the state to provide reliability and resiliency.

Without long duration energy storage, CA can not meet its climate and reliability goals.
Long Duration Energy Storage Benefits

• Provides economic, reliable and environmental benefits.
• Provides diverse types of storage to maintain grid reliability, resiliency and decrease emissions.
• Addresses the variability of all types of generation and respond rapidly to large fluctuations in demand, making the grid more responsive and reducing the need to build backup power plants.
• Provides blackstart capability.
• Ensures flexible and efficient use of least-cost renewable energy resources while also providing important ancillary services to the grid.
Types of Long Duration Energy Storage
Long Duration Energy Storage Technologies

**CHEMICAL**
- Batteries
- Zinc
- Sulfur
- Lead Acid
- Lithium-Ion

Chemicals are dissolved in liquids and stored in tanks.

**MECHANICAL**
- Gravity
- Pumped Hydro Storage
- CAES
- Flywheels

PHS is over 90% of the storage in use today.

**THERMAL**
- Heat Transfer
- Liquid Air
- Concentrating solar with thermal energy storage

Heating and cooling methods store and release energy.
Long Duration Energy Storage Technologies
### Table A: Long Duration Energy Storage

All types promote renewable energy generation and manage surplus energy (change loss is less than 1%)

<table>
<thead>
<tr>
<th>Technology Type</th>
<th>Capacity</th>
<th>Avg. Duration</th>
<th>Ancillary Services</th>
<th>Resource Attributes</th>
<th>Avg. Deployment Stage</th>
<th>Avg. Life Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity</td>
<td>40kW-8MW</td>
<td>5-24hrs</td>
<td>resource adequacy, spinning reserve, sub-second response time (but not well suited for frequency response)</td>
<td>scalable, distributed, reuse infrastructure, zero self-discharge</td>
<td>pilot</td>
<td>30 yrs</td>
</tr>
<tr>
<td>Zinc Batteries</td>
<td>1-10MW</td>
<td>10 hrs</td>
<td>frequency control</td>
<td>high energy density, 2% discharge rate</td>
<td>pilot</td>
<td>30 yrs</td>
</tr>
<tr>
<td>Flow Battery</td>
<td>1-20MW</td>
<td>10-24hrs</td>
<td>frequency control</td>
<td>scalable, power sizing</td>
<td>deployed in market</td>
<td>25 yrs</td>
</tr>
<tr>
<td>Flywheel</td>
<td>5-25MW</td>
<td>10-24hrs</td>
<td>rotational energy, fast response time</td>
<td>instant start and load following</td>
<td>deployed in market</td>
<td>35 yrs</td>
</tr>
<tr>
<td>Green Hydrogen</td>
<td>1-100MW</td>
<td>10-100hrs</td>
<td>discharge time, response time</td>
<td>refuel and recharge</td>
<td>commercial</td>
<td>20 yrs</td>
</tr>
<tr>
<td>Liquid Air</td>
<td>25-150MW</td>
<td>8 - 24 hrs</td>
<td>synchronous inertia, frequency control, reserves, voltage support, black start capability</td>
<td>no geographical constraints, high energy density, no degradation</td>
<td>commercial</td>
<td>50 yrs</td>
</tr>
<tr>
<td>Concentrating Solar Thermal</td>
<td>50-250MW</td>
<td>10-24 hrs</td>
<td>synchronous generation thus provides spinning reserve, frequency regulation, fast ramping and other ancillary services</td>
<td>high conversion efficiencies</td>
<td>commercial, deployed in market</td>
<td>75 yrs</td>
</tr>
<tr>
<td>Pumped Hydro</td>
<td>10-2400MW</td>
<td>8 hrs - 36 hours, can be seasonal, and lose no charge over time</td>
<td>black start, frequency regulation, voltage support, spinning reserves and operating reserves</td>
<td>secure power supply, scalable, zero fuel costs</td>
<td>commercial, deployed in market</td>
<td>100 yrs</td>
</tr>
</tbody>
</table>
Needs for Long Duration Energy Storage
CCA’s requested 500MW of Long Duration Energy Storage.

CPUC broke new ground in carving out space for the addition of nearly 1 gigawatt of “pumped storage, or other long-duration storage with similar attributes” by 2026.
Long Duration Energy Storage and Inclusive projects for CA SB 535 Disadvantaged Communities and AB 1550 Low-income Communities
CESA’s Long Duration Energy Storage Reliable Grid Study Key Results:

- California needs 11 GW of long duration energy storage deployed by 2030, escalating significantly to 45-55 GW of long duration energy storage by 2045.
- Long duration energy storage has the potential to deliver value to California’s grid by reducing installed capacity costs by $1.5 billion annually by 2045.
- Long duration energy storage can increase renewable utilization by approximately 17% annually.
- Long duration energy storage would reduce reliance on in-state fossil assets by approximately 25%.
- Long duration storage must be enabled through reform of planning, procurement, and compensation mechanisms administered by the California Public Utilities Commission.
By 2030, stationary and transportation energy storage combined markets are estimated to grow approximately three to five times the current 800-gigawatt-hour (GWh) market.

“Stationary energy storage is no longer seen as a barrier, but rather a real opportunity to identify the most cost-effective technologies for increasing grid reliability, resilience, and demand management.”

The International Energy Association (IEA) estimates that, in order to keep global warming below 2 degrees Celsius, the world needs 266 GW of energy storage by 2030, up from 176.5 GW in 2017. Under current trends, Bloomberg New Energy Finance predicts that the global energy storage market will grow quickly to a cumulative 942 GW by 2040 (representing $620 billion in investment over the next two decades).
Values of Long Duration Energy Storage
Value of Long Duration Energy Storage to Grid Reliability and Resiliency

- Improving power quality/reliability and alleviating the variability of renewable source power generation.
- Managing distributed/standby power and meeting remote and vehicle load needs.
- Supporting the realization of smart grids for longer periods of time.
- Meeting peak electrical load demands and providing time varying energy management.
- Providing flexibility to electric energy import during peak demand periods.
Barriers for Long Duration Energy Storage
Long Duration Energy Storage Barriers

Modeling & Access

• Incorporate Effective Load Carrying Capacity and seasonal attributes into models
• Create Resource Adequacy Definition
• Participate in Real time and day ahead markets
• Expand Interconnection queues and hybrid partnerships
Removing Barriers for Long Duration Energy Storage

Removing barriers is essential to meeting decarbonization goals

- Fix Model inaccuracies and policy restrictions (e.g. timing & externalities)
- Increase awareness and coordinate of diverse reliability, economic and public policy benefits
- Design stronger procurement mechanisms to purchase storage both local and system wide benefits
- Expand access to participate in markets
Thank You !!!
<table>
<thead>
<tr>
<th>Company</th>
<th>Logo</th>
<th>Technology Type/Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skyline, LLC</td>
<td>![Skyline Logo]</td>
<td>Energy &amp; Environment Consulting Firm</td>
</tr>
<tr>
<td>Cat Creek Energy, LLC</td>
<td>![Cat Creek Logo]</td>
<td>Pumped Hydro CCE</td>
</tr>
<tr>
<td>Cupertino Electric, Inc.</td>
<td>![Cupertino Logo]</td>
<td>Solar, Storage &amp; Clean Energy</td>
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<tr>
<td>GE Renewables North America, LLC</td>
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<td>Wind, Hydro, Hybrid and Storage Technologies</td>
</tr>
<tr>
<td>GreenGen Storage</td>
<td>![GreenGen Logo]</td>
<td>Pumped Hydro</td>
</tr>
<tr>
<td>Highview Power</td>
<td>![Highview Logo]</td>
<td>Liquid air energy storage</td>
</tr>
<tr>
<td>McMillen Jacobs Associates</td>
<td>![McMillen Logo]</td>
<td>Pumped Hydro &amp; Infrastructure</td>
</tr>
<tr>
<td>Morse Associates, Inc.</td>
<td>![Morse Logo]</td>
<td>Concentrated Solar &amp; Thermal Energy</td>
</tr>
<tr>
<td>Rye Development</td>
<td>![Rye Development Logo]</td>
<td>Hydro Energy &amp; Energy Storage</td>
</tr>
<tr>
<td>Stantec</td>
<td>![Stantec Logo]</td>
<td>Energy Storage (Pumped Hydro, Flywheel, Thermal, etc.)</td>
</tr>
<tr>
<td>Zinc8 Energy Solutions</td>
<td>![Zinc8 Logo]</td>
<td>Zinc-air flow batteries</td>
</tr>
</tbody>
</table>

**NEW MEMBERS**

![247SOLAR Logo]  ![e-ZINC Logo]  ![LONG DURATION ENERGY STORAGE ASSOCIATION OF CALIFORNIA Logo]