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21-IEPR-04 and Summer 2021 Electric Reliability - LDESAC

Thank you for the opportunity to comment. Please find the attached document.

Additional submitted attachment is included below.

LONG DURATION ENERGY STORAGE ASSOCIATION OF CALIFORNIA

May 18, 2021

21-IEPR-04 and Summer 2021 Electric Reliability Comments

The Long Duration Energy Storage Association of California (LDESAC) is focused on promoting long duration energy storage technologies that are needed to meet the state's climate and clean energy goals. The LDESAC works closely with other renewable, clean energy, storage, and allied organizations to advance our shared priorities.

The LDESAC seeks 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 and appreciates the leadership of the California Energy Commission (CEC) promoting new projects and demos throughout the state. One of our organizations, H2B2 is a recipient of a grant and we participate on the UC Merced LDES technical advisory group.

The LDESAC applauds the CEC on its IPER work and appreciate the opportunity to comment and support the extension of the 15-year and improve methodologies to better quantify and predict the likelihood, severity, and duration of future extreme heat events. As noted in a recent article, "Electricity is technically easier and less costly to decarbonize than other sectors… a failure to deeply decarbonize the power sector would imperil climate mitigation efforts across the broader economy." [1]

The LDESAC also supports the CEC further development of demand scenario analyses to help address the growing magnitude of uncertainty in long-term energy planning due to economy-wide decarbonization efforts.

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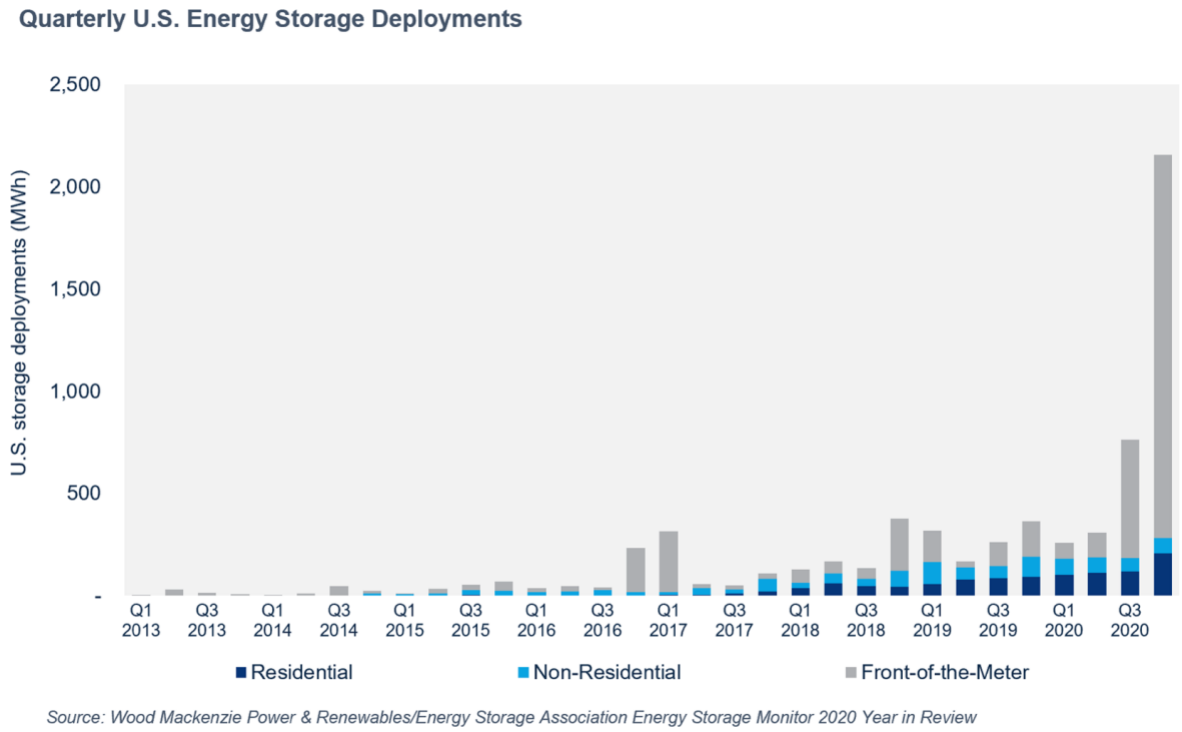
[1] Jessie Jenkins, Max Luke and Samuel Thernstrom https://www.cell.com/joule/fulltext/S2542-4351(18)30562-2?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2542435118305622%3Fshowall%3Dtrue

According to Wood Mackenzie and the U.S. Energy Storage Association's (ESA) latest *'US Energy Storage Monitor'* report, 2,156 megawatt-hours (MWh) of new energy storage systems were brought online in Q4 2020. **This is an increase of 182% from Q3 2020, making Q4 the new record quarter for U.S. storage.**



Source: Wood Mackenzie Power & Renewables/Energy Storage Association Energy Storage Monitor 2020 Year in Review

Storage and LDES continues to be an integral component to our energy grid. As noted by the CEC and in coordination with CPUC, California ISO and other statewide Balancing Authorities (BAAs), the 2021 IEPR will discuss opportunities to improve electric reliability in California ISO territory as well as California as a whole with specific focus over the next five years.

LDES is also part of the solution to fill the gap from the SONGS retirement. We encourage the CEC to study and incorporate the various types of LDES that can help provide grid services and flexibility to the changes.

With the building and transportation sectors also turning to decarbonization infrastructure changes, LDES can also provide stability and resiliency to the new energy demands. Because LDES can provide local and system wide benefits, and exist around the state, there are numerous benefits to the economy that LDES can support and uplift ensuring a clean energy future while maintain a reliable electric backbone. In table A below, we provide additional information from our

companies on the diversity of benefits and services that LDES provides that should be incorporated into the IPER.

Table A: Long Duration Energy Storage

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

Technology Type	Capacity	Avg. Duration	Avg. Life Cycle	Ancillary Services	Resource Attributes	Avg. Deployment Stage
Thermal Battery	200kWe & up	6-20 hrs	30 yrs	Grid stabilization, ESS incl. frequency control, spinning reserves, rate arbitrage	No geographical constraints, scalable, close load following, no degradation	Market technology & market ready
Gravity	40kW-8MW	5-24 hrs	30 yrs	Resource adequacy, spinning reserve, sub-second response time (but not well suited for frequency response)	Scalable, distributed, reuse infrastructure, zero self-discharge	Pilot
Zinc Batteries	1-10MW	10 hrs	30 yrs	Frequency control	High energy density, 2% discharge rate	Pilot
Flow Battery	1-20MW	10-24 hrs	25 yrs	Frequency control	Scalable, power sizing	Deployed in market
Flywheel	5-25MW	10-24 hrs	35 yrs	Rotational energy, fast response time	Instant start and load following	Deployed in market
Green Hydrogen	1-100MW	10-100 hrs	*20 yrs*	Discharge time, response time	Refuel and recharge	Commercial
Liquid Air	25-150MW	8 - 24 hrs	50 yrs	Synchronous inertia, frequency control, reserves, voltage support, black start capability	No geographical constraints, high energy density, no degradation	Commercial
Concentrating Solar Thermal	50-250MW	10-24 hrs	75 yrs	Synchronous generation thus provides spinning reserve, frequency regulation, fast ramping, and other ancillary services	High conversion efficiencies	Commercial, deployed in market

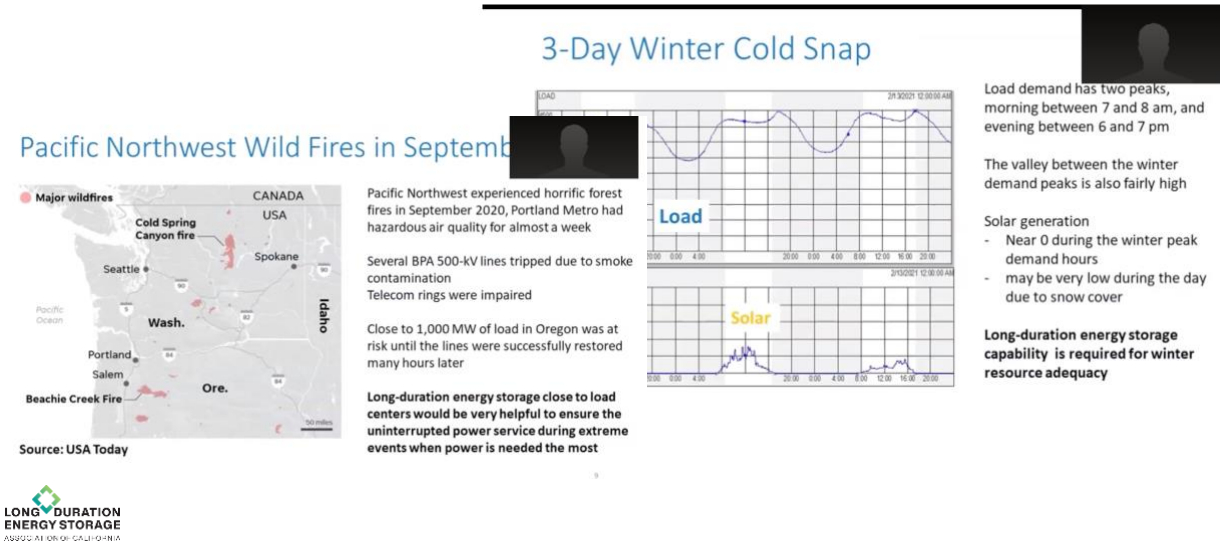
Pumped Hydro	10-2400MW	8 hrs- 36 hours, can be seasonal, and lose no charge over time	100 yrs	Black start, frequency regulation, voltage support, spinning reserves and operating reserves	Secure power supply, scalable, zero fuel costs	Commercial, deployed in market

LDES is a tool in decarbonizing our economy and serves a different role than important four-hour batteries. LDES is also a valuable to both customers and the grid system at large.

Regarding energy demand, the CEC stated it "will reassess the impacts on electricity demand of climate change, behind-the-meter generation, adoption of battery storage, energy efficiency standards, fuel substitution programs, and transportation electrification trends. In developing the peak demand forecast, the CEC will improve methodologies for quantifying the likelihood, severity, and duration of future extreme heat events." Incorporating LDES into the modeling helps reduce average modeled systemwide costs and decreases variability in modeled outcomes. We look forward to working with the CEC on these changes.

The Pacific Northwest is also looking at scenarios concerning wildfires and intense weather patterns and ensuring LDES is part of the modeling and portfolio of solutions.

Pacific NW and LDES



The LDESAC supports this work and encourages the CEC to expand the definitions of storage and duration curves it the models to better inform the methods and scenarios.

2045 is 24 years away and much is to be done, not only do we need to look at next year, but how to ensure we are building and preparing for each year needs to reach our climate goals by 2045 and 2050. Because of the numerous benefits of LDES and the range of scale in technologies, and the timeline to build, we must prepare now by incorporating these parameters into the "What if" analysis.

In closing, LDES provides diverse types of storage to maintain grid reliability, resiliency and decreases emissions while providing economic, reliable, and environmental benefits. LDES also addresses the variability of all types of generation and respond rapidly to large fluctuations in demand, making the grid more responsive including black start capability, and reducing the need to build backup power plants. Lastly, LDES ensures flexible and efficient use of least-cost renewable energy resources while also providing important ancillary services to the grid.

Thank you again for the opportunity to comment and the LDESAC looks forward to working with the CEC on next steps concerning the 2021 IPER plans.

Sincerely,

/S/ Julia Prochnik

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LONG DURATION ENERGY STORAGE
ASSOCIATION OF CALIFORNIA