LONG DURATION ENERGY STORAGE
ASSOCIATION OF CALIFORNIA

Thank you for the opportunity to provide these February 23, 2021 comments on the California ISO 2020-2021 transmission planning cycle.

The Long Duration Energy Storage Association of California (LDESAC) is a 501(c)4 organization fully focused on promoting the development of long duration energy storage to complement short duration storage technologies and advance California's climate and clean energy goals, while operating a safe and reliable energy grid. Our organization works closely with other renewable, clean energy, storage and allied organizations to advance our shared priorities.

LDESAC storage technologies currently include pumped hydro, compressed air, liquid air, zinc-air batteries, flow batteries, flywheels, molten salt, electrolytic hydrogen, and repurposed gravity wells. These technologies can be deployed in projects ranging from a few hundred kilowatts to several gigawatts. Some involve site-specific applications, while others can be deployed almost anywhere. Some, such as pumped storage, are fully mature and have been deployed around the world for over a century, while others are now becoming commercially available with strong public support to advance their deployment.

In Table A below, LDESAC illustrates these diverse technologies and their grid attributes.

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	Ancillary Services	Resource Attributes	Avg. Deployment Stage	Avg. Life Cycle
Gravity	40kW-8MW	5-24hrs	resource adequacy, spinning reserve, sub-second response time (but not well suited for freqency response)	scableable, distributed, reuse infrastructure, zero self-discharge	pilot	30 yrs
Zinc Batteries	1-10MW	10 hrs	frequency control	high energy density, 2% discharge rate	pilot	30 yrs
Flow Battery	1-20MW	10-24hrs	frequency control	scalable, power sizing	deployed in market	25 yrs
Flywheel	5-25MW	10-24hrs	rotational energy, fast response time	instant start and load following	deployed in market	35 yrs
Green Hydrogen	1-100MW	10-100hrs	discharge time, response time	refuel and recharge	commerical	*20 yrs*
Liquid Air	25-150MW	8 - 24 hrs	synchronous inertia, frequency control, reserves, voltage support, black start capability	no georgraphical constraints, high energy density, no degradtion	commerical	50 yrs
Concentrating Solar Thermal	50-250MW	10-24 hrs	synchronous generation thus provides spinning reserve, frequency regulation, fast ramping and other ancillary services	high conversion efficiencies	commerical, deployed in market	75 yrs
Pumped Hydro	10-2400MW	8 hrs- 36 hours, can be seasonal, and lose no charge over time	black start, frequency regulation, voltage support, spinning reserves and operating reserves	secure power supply, scalable, zero fuel costs	commerical, deployed in market	100 yrs

We appreciate all the work CAISO has done, and its robust process to elicit stakeholder input. LDESAC understands that this process is close to the final stages and would like to add some key points for consideration now and in the future.

First, CAISO views frequency response as a critical grid service, but may not have adequately valued the potential contribution of long duration energy storage technologies that provide primary frequency response. CAISO has noted that “under off-peak spring conditions (weekend afternoon) there is more solar generation on-line, which historically did not participate in primary frequency response.” Long duration energy storage can store the excess solar generation to power the grid when solar or other renewable generation is unavailable or in short supply.

Total installed Inverter-Based Resources (IBR) capacity in the ISO is expected to reach 33 GW by 2030 and long duration energy storage is necessary to ensure grid reliability, as well as meeting California’s climate goals by decreasing emissions throughout the state.

LDESAC supports the next steps in modeling and would stress the importance of updating these efforts to collect and improve modeling data, including new methods to study long duration energy storage (such as effective load carrying capacity and model run times exceeding three days). We agree with CAISO's view that “other contingencies may also need to be studied, as well as other cases that may be critical for frequency response,” including the diverse set of technologies that provide long duration storage.

As highlighted in slide 100, “further evaluation will be conducted in a future planning cycle once there is more clarity in the battery storage development picture in the CAISO controlled grid from the CPUC’s IRP.” LDESAC supports this work and would add other technologies that deliver storage for 10 hours or longer.

Thank you for the opportunity to comment. We look forward to working with the CAISO to improve on existing models, scenarios and planning efforts.

Sincerely,

s/ Julia Prochnik

Julia Prochnik
Executive Director, LDESAC
Long Duration Energy Storage Association of California
julia@storeenergyca.org
O: 916-573-0403
C: 202-246-3025