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on Long-Duration Energy Storage, Considerations for Project Metrics

Letter

Additional submitted attachment is included below.



COUNTY OF LAKE

Administrative Office

Courthouse - 255 North Forbes Street
Lakeport, California 95453
Telephone: (707) 263-2580
Fax: (707) 263-1012
E-mail: Carol.Huchingson@lakecountyca.gov

CAROL J. HUCHINGSON

County Administrative Officer

March 16, 2022

Senate Budget and Fiscal Review Committee
1020 N Street, Room 502
Sacramento, CA 95814

Submitted by email to: SBUD.Committee@senate.ca.gov

RE: Long-Duration Energy Storage, Considerations for Project Metrics to Optimize Stewardship of Public Funds

Dear Chair Skinner and Honorable Members of the Senate Standing Committee on Budget and Fiscal Review:

The County of Lake appreciates the chance to comment on the proposed Long Duration Energy Storage (LDES) elements in the Governor's Budget. We believe these funds can help stimulate development and installation of a broad range of potential technological solutions.

In our County, multiple communities are considering or developing very small scale Closed-Loop Pumped Hydro LDES systems. These multi-benefit systems, typically in the 90-120 MW-hour range, are paired with renewable generation to provide:

- Valuable grid services in normal conditions;
- Reliable long-duration power during even extended outages; and
- Critical water flow during major fires.

Unlike the massive, dam-based Open-Loop pumped storage hydro of years past, these systems rely on large, enclosed tanks on hilltops. This approach requires a higher first cost than the old reservoir approach, but long-term ecological impacts are greatly reduced; for example, water loss through evaporation is essentially eliminated.

While the components of this approach are well-understood, deploying Closed-Loop Pumped Storage on a small scale integrated to local electric and firefighting infrastructure in this manner is quite novel.

Numerous novel issues need to be addressed in the initial deployment of this technology, which seems consistent with the intent of the Governor's proposal; interconnection, how to structure contracts for multi-use assets and how to arrange wildland firefighting assets are among these considerations.

Many California communities in high fire threat areas have nearby high hills, and could benefit from additional water storage. Often, these same communities are regularly beset by loss of electric power. The potential for this approach is tremendous, but the hurdles are real. Uncertainties and a lack of concrete examples hold most potential projects back.

Closed-Loop Pumped storage should not be excluded from eligibility for funding under this proposed measure. There many potential benefits and few down sides. Supporting proof-of-concept examples for this version of Pumped Storage Hydro will bring tremendous opportunity to California, and act on energy reliability and disaster resilience needs while creating jobs and

supporting multiple sectors of the American economy.

Rather than asking for the Legislature to pick winners and losers in advance, we believe the public interest is best served by setting well-reasoned policy goals, and allowing that guidance to inform a competitive selection process. Technology neutrality serves a compelling State interest, in that it allows the best solutions to emerge in the near-term, and leverages California's world leading capabilities in technology innovation, as well. By defining metrics to be considered in the evaluation process, the Legislature can bring important leadership and guidance to program implementers and promote optimization of limited funds, serving multiple societal goals.

While there are many different metrics by which any individual LDES project might be evaluated, the County of Lake believes the following are critical to ensuring optimal stewardship of public funds:

- 1. Expected useful life.** Energy technologies have vastly different expected useful lives. At one end of the spectrum are electrochemical batteries, which, when regularly used, typically have expected useful lives measured in years. Hydro-electric turbines, by contrast, have expected useful lives measured in decades; numerous hydro plants have operated for over 100 years. The long-term value is markedly greater. If two projects are otherwise identical, but one has an expected useful life of 10 years, and the second has an expected useful life ten times as long, the longer-lived project is clearly of greater benefit to both the local community and California, as a whole.
- 2. Round-Trip Efficiency (RTE).** No energy storage system is 100% efficient, but some are better than others. Long duration electro-chemical technologies are low cost and discharge insensitive, but they are plagued with very low round trip efficiency (RTE). Best available technologies in the energy storage space can show efficiencies in the range of 80%-90%, and maintain that efficiency over their entire useful life, whereas some LDES technologies have RTE in the range of 60%-70%. In other cases, a technology may have a relatively high initial RTE, only to see that impressive number quickly degrade with use. It is not in the public interest for the State to incentivize installation of systems that considerably *increase* total energy use. Therefore, it is a reasonable policy goal to direct inclusion of a weighted average lifetime Round Trip Efficiency metric in the evaluation process for LDES applications.
- 3. System power.** In addition to regularity of operation, another variable is system capacity (MW-hours). A system that discharges 25 MW and 100 MW-hour/day is clearly superior to a system that discharges 1 MW and 4 MW-hour a few times per year.

The benefits of a larger, regularly discharging system are many. Additional capacity at peak conditions helps the entire grid meet load demands, limiting need of highly polluting emergency generation. Regular injections of energy during peak conditions are a downward force on overall prices, marginally increasing supply during periods of scarcity; again, benefitting every Californian.

Finally, particularly to the extent that the funded systems are renewably recharged, regular discharge during peak conditions helps to offset the Greenhouse Gas (GHG) emissions of simple cycle combustion turbines and emergency diesel generators (the highest GHG emitting assets in the generating fleet). It is more than reasonable for the Legislature to direct that a process evaluating projects to receive limited state funding should recognize the benefits of larger capacity systems on the overall grid.

- 4. Co-located renewables.** Not all LDES systems are co-located with renewable power sources, but those that are deliver additional benefits to both their local community and the grid as a whole. To the local community the co-location of renewables with the LDES means the duration of the system is not limited to the amount of energy that can be

stored. To the grid as a whole, LDES systems exclusively recharged by renewable energy allow offsetting of the most polluting generating assets with entirely clean ones, thereby maximizing the GHG impacts of a system. LDES systems powered exclusively by renewable energy should receive additional consideration when applying for funding.

5. **Local skilled trade labor.** Not all systems are equal in terms of the number of local skilled labor hours required. Some systems are largely prefabricated and employ limited local skilled labor. Micro scale Closed-Loop Pumped Storage Hydro utilizes significant amounts of earthwork, concrete, welding, electrical, and other skilled trades. Good public policy should give preference to project applications that use more local labor, not those that primarily rely on components manufactured out of state, or even overseas.
6. **Additional benefits.** In the case of the system Lake County is considering, the LDES infrastructure, itself, provides additional major benefits to our community, in the forms of water supply for firefighting purposes and new wildland firefighting infrastructure. LDES systems that provide additional benefits should be positively recognized in any eventual scoring system.
7. **Expected Annual operating hours.** Some LDES technologies rapidly degrade with use. Others are effectively discharge insensitive. Technologies that degrade rapidly are typically (*and reasonably*) reserved for emergency use. Discharge insensitive technologies can be used much more frequently without significant degradation, and still fulfill their primary emergency microgrid support role.

While it is true both types of technology are Long Duration Energy Storage, the two types of systems are not of equal value to the public, at large. If a discharge insensitive system were to operate on a daily basis providing late afternoon ramping services, and a comparative system operated only during an emergency, the two systems would have significantly different lifetime grid-facing benefits, even if their emergency power benefits were identical.

8. **Economically Disadvantaged Communities.** Long duration energy storage is needed in many locations; even the hundreds of millions of dollars being discussed is insufficient to meet the need. Economically Disadvantaged Communities should have priority in funding assistance. Not only are these communities less able to pay for needed infrastructure, residents are less economically resilient to the costs of evacuations or loss.

Unfortunately, OEHHA's CalEnviroScreen scoring tool frequently overlooks Economically Disadvantaged Communities that would most benefit from LDES. As just a single example, of the 8,000+ Census Tracts in California, fewer than 40 are also listed as High Fire Threat District (HFTD) classifications 2 or 3, where the vast majority of California's de-energization events occur.

9. **American Made Materials.** Many LDES technologies rely almost entirely on components manufactured outside of California, or even outside of the US. A portion of the scoring system should include recognition of American made materials. Avoiding use of materials from conflict zones must also be prioritized to protect California's interests.
10. **Toxic materials/ End-of-life disposal issues.** Long Duration Energy Storage technologies come with a broad range of potential environmental impacts, from use of relatively inert substances at one end of the spectrum to substances that could produce significant health and environmental impacts if released to the environment. Environmental effects are exacerbated when LDES technologies have relatively short life spans. Use of toxic materials can be partially mitigated through planned recycling options, but the availability of such services years into the future is an assumption that

may or may not come to fruition. This represents a risk factor for those technologies.

Given the tremendous need of energy storage in California, and the wide range of potential applications, it would not serve the public interest to completely *exclude* LDES technologies that contain toxic materials from funding from the LDES program. However, the implementing agency should be directed to include a *preference* for non-toxic materials in the scoring criteria used for disbursement of funds.

11. Individuals served by microgrid capabilities. LDES installations able to feed a microgrid bring additional value to their communities, as well as providing the proof of concept needed to advance the grid to a decentralized future. We must also consider how many customers are being served: a project that assists 8,000 has a greater benefit to society than a project that benefits 80 customers.

12. Overall Economic Activity. Some projects require almost complete State funding to reach viability. Others need only a small portion of the funds to come from an outside source. Each project dollar spent on the LDES projects incentivized or assisted under this funding would be a benefit to the economy and workers of California. It makes great sense, from a policy standpoint, for projects requiring only a small public cost share to be scored higher than projects that where State funding must carry a greater percentage of the burden.

High-leverage projects allow limited funds to go further, and projects with significant private investment are also considered more economically viable by markets, and thus more likely to actually come on line. With this in mind, greater weight should be given to LDES projects that need only a modest amount of additional funding.

Again, the County of Lake wishes to thank the Senate Budget Committee for the opportunity to make these comments. Projects funded in whole or in part by the proposed funds could be transformative for the communities that are awarded grants. By providing guidance for variables to be considered in the scoring system, the Legislature provides a way for all applications to be fairly evaluated while ensuring an optimal balance of public priorities can be met.

Thank you for taking on this detailed, delicate, and highly significant work.

Sincerely,

Carol J. Huchingson
County Administrative Officer

Cc: Honorable State Senator Mike McGuire and Honorable Committee Members, via their respective Chiefs of Staff