

DOCKETED

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PolyJoule, Inc comments on 23-ERDD-08

Additional submitted attachment is included below.

LDES System Demonstration – questions aimed more for technology developers, but open to all respondents:

1. According to the California legislation that authorized the LDES program, all demonstration projects must have a system capacity of a minimum of 1 MW for at least 8 hours¹. Given this requirement and the current state of your non-Li LDES, which of the following system sizes could you deliver in the next 18 months to 2 years? Additionally, which system size would help your technology reach the 200-400 MWh system size in the next 3-6 years?

- System size of 8-10 MWh
- System size of 10-20 MWh
- System size of 20-30 MWh

PolyJoule batteries deploy with round trip efficiencies maximized for energy storage system run times between 6 and 16 hours. A 30 MWh PolyJoule system that is configured for delivery at the end of 2025 would have a power rating between 1.875 MW if operated as a 16-hour battery storage facility and up to 3.75 MW if operated as an 8-hour battery storage facility. By sizing the inverters appropriately, the owner/operator of the system could choose to operate it anywhere within that range based either on system need or economic optimization.

We can comfortably deliver 30 MWh amount by the end of 2025 so could deliver any of the three size options suggested by the RFI. Based on other projects within our project pipeline the incremental 30 MWh provided by the project would provide additional impetus for us to reach 400 MWh sized systems by the end of 2028.

Additional system volumes in close geographic proximity would also allow us to site modular incremental production capacity in close to the incremental system demand reducing transportation costs and creating new local jobs.

2. What would be the range of the estimated project costs in a direct current (DC) configuration for demonstrating each of the three different system sizes listed in question 1 for your non-Li LDES system as a function of the location of deployment? Additionally, what would be the life expectancy of the demonstrated project? Would it be considered pre-commercial or commercial, and have an expected life of 10-20 years or longer? Please explain.

Project costs for our systems in the ranges requested by the RFI would be around \$600/kWh for the Battery Energy Storage System (BESS) itself plus whatever siting, environmental, integration and other project costs are necessary. How much incremental cost is necessary will be a function of whether the project is front of the meter or behind the meter and how and where it is ultimately deployed. We believe those costs would be in the order of \$100/kWh to \$150/kWh.

Our project would be considered commercial.

Our system life operated consistent with 8-16 hour operation protocols would exceed 20 years.

3. For the system sizes listed in question 1, what is the maximum amount of match funding that a technology provider and selected end customer can contribute towards one of the proposed future grants - 20%, 30%, 40%, or higher?

At the BESS cost points we are highlighting we believe it will be possible to get parties interested in our BESS systems with end customer contributions at around the 25 – 50% range. If there is a strong focus on targeting historically underserved or minority communities we would expect that would likely be at the lower end of that range and a rate as low as 10% funding target that has been used in other funding offerings might be necessary.

One of PolyJoule's challenges as a smaller startup is having sufficient resources to find the connections with customers, integrators, cooperatives and utilities at the correct point in time to utilize government funding like this.

4. What type of incentives can be leveraged to make a LDES system demonstration more attractive from a financial standpoint? What will be the maximum amount of incentive that a technology provider and selected end user could obtain for the system sizes listed in question 1?

The demonstration will necessarily have some amount of technology risk associated with it. Incentives that work to reduce other kinds of risks including financing, insurance, siting along with the reduced price tag associated with the grant award funding will make it considerably more attractive.

5. Considering that California is aggressively planning to procure energy storage and has already approved over 8 GWs of Li-ion systems, when do you anticipate your non-Li system will be able to compete with Li-ion systems in terms of price and performance for a future commercial solicitation if the price range is \$350-\$450 per kilowatt-hour (kWh) delivered in a DC configuration? Please explain.

We believe PolyJoule can be within that price range by 2027 at our current growth rates and technology enhancement plan. If we were to receive a significant boost from this project growing production faster, allowing easier fundraising to support growth and R&D we can get there as soon as the beginning of 2026.

6. What demonstration system size would be needed to persuade you to at least partially automate the majority of your LDES system manufacturing capability to deliver a future order in the range of 200-400 MWh in a 12-24-month delivery window?

We would need a project in the 20-30 MWh demonstration system range and likely some kind of semi-firm commitment for additional capacities beyond that. A commitment for a single 200-400 MWh system would be sufficient for us to fully automate all our production and likely expand into local California production as well.

- a. What is the largest system on a kWh basis you have fielded and have been operating to date?

We have a 1 MW/10 kWh system operating – this has operated as both a 4-hour traditional BESS and as a 1MW UPS critical facility backup system.

We will be delivering MWh scale systems in 2024.

- b. What is the largest system on a kWh basis that you have a firm order to deliver in the next 12-18 months?

We will be delivering a 2000 kWh system in NYC in 2024 and have a 6 MWh contract in Hungary that requires 2 MWh to be delivered within the 18-month window and 4 MWh after that.

Demonstration Sites – questions targeting site hosts and adopters, but open to all respondents:

7. How can funded LDES projects better prioritize benefits for under-resourced (low-income and disadvantaged) communities and Tribes? Should benefits to under-resourced communities and Tribes be strict requirements in the solicitation or incentivized through solicitation scoring criteria bonus points? Should match fund requirements be reduced or potentially eliminated? What are the potential barriers to the funding and

development of successful LDES projects in under-resourced and tribal communities? Please explain. Specific examples are welcomed.

PolyJoule believes there should be significant flexibility in the funding requirement to allow for a wide range of potential customer and siting opportunities. If the matching fund requirements are set to high or with too narrow tolerances it can potentially eliminate a lot of potential customers and siting opportunities.

We also believe that a centralized outreach by CEC, CPUC or some other state entity, to identify customers and sites to specifically target under-resourced communities and Tribes would significantly benefit the process.

8. Should demonstration projects be required to be located in Tier 2 or 3 High Fire-Threat District areas (as defined by the CPUC)? Or should these siting locations be incentivized through solicitation scoring criteria bonus points? Please explain.

Siting projects in Tier 2 or 3 High Fire-Threat Districts should not be required however similar to our response regarding targeting under-resourced communities and Tribes, a centralized outreach by CEC, CPUC or some other state entity, to identify customers and sites with specific urgent need within these Fire-Threat districts would make a lot of sense.

PolyJoule systems cannot go into thermal runaway and provide an ultra-safe chemistry to support critical infrastructure and islanded grid solutions within high-risk fire districts.

As previously mentioned, PolyJoule's challenge as a small entity is finding those customers at the right time to fit within the parameters of the grant funding as well as any other constraints created by the utilities, local governments, CAISO or any number of other regulatory or legal limitations.

9. Do demonstration projects provide more value in certain service territories (i.e. investor-owned utilities, publicly-owned utilities, community choice aggregators, rural electric cooperatives, and electric service providers)? If so, why?

PolyJoule believes they do have more value if associated with well-known market participants. Purely from the name recognition standpoint and their access to a broader segment of the market.

10. Is there any preference for behind-the-meter or front-of-the-meter demonstrations for the system size ranges listed in question 1? If so, why?

Front of the meter is definitely preferable from the standpoint of accessing additional revenue streams and proving the technology on a more extensive set of use cases. The downside is obviously the CAISO interconnection process and the additional time, regulatory and administrative requirements that entails.

Realistically we would be targeting a behind the meter installation because it is easier and faster

a. For a behind-the-meter installation, does your LDES technology have any advantages to the utility regarding the utility interconnection agreement?

PolyJoule systems are operable across the full 100 percent depth of discharge and can quickly change from charging to discharging at any level of storage. There is no requirement for the batteries to be fully charged before they are discharged or fully discharged before they are charged. The batteries can be changed from charging to discharging as often as is needed for the use case. The batteries can be operated flexibly from a rate of discharge standpoint so that they could be utilized as a fast-response resources, a demand response resource or a price volatility reduction resource on days where that functionality has great value and then operate a normal long duration resource on normal market days.

b. If you are considering a front-of-the-meter configuration, have you applied for a CAISO reservation? If so, when would that reservation become effective?

No we don't have a transmission interconnection reservation

11. Are you considering a project for which the interconnection agreement is already approved?

No, one of biggest issues we face as a small startup is accessing the regulatory, political and structural frameworks in a way that effectively coordinates customers and siting opportunities with funding offerings like this.

The winners are tending to be the large entities that are already well funded and well capitalized. A focus on developing smaller entities would definitely help companies like PolyJoule.

California Environmental Quality Act (CEQA):

12. What would be the typical footprint range needed to deploy certain LDES systems for the three system size ranges listed in question 1?

A 10 MWh system delivered at the end of 2025 would require around 20 twenty-foot containers. These containers would require approximately 8000 square feet (750 square meters) of land if they are single stacked or around 4000 square feet (375 square meters). The footprints for 20 MWh and 30 MWh systems would be fairly close to double and triple those required for the 10 MWh system.

13. When a GFO is posted, proposals are generally due to the CEC within 8 to 12 weeks, and the CEQA process is generally required for the CEC to award grant funding to a project. The CEC has learned from the initial LDES projects that the LDES systems have a greater footprint than systems exempted from CEQA. Therefore, an environmental impact report or negative declaration is normally required for the potential projects, as are other actions required by CEQA. For the system size ranges listed in question 1, how long would it take to complete the CEQA process (and the National Environmental Policy Act (NEPA) if applicable) for your LDES system, and approximately how much would these processes cost?

This would be our first CEQA process so it is difficult for us to estimate time and costs. However even though our technology is new there are strong reasons to believe that our CEQA process would run at least as smoothly as any other technology.

PolyJoule system are very quiet – there are none of the noise issues that can be associated with certain other battery technologies. PolyJoule systems are simple – there are no heating or cooling requirements and no fire suppression systems so there is no chance for any ancillary systems to leak fluids or chemicals. PolyJoule

systems are non-toxic, inert, safe to the touch and will not leak, leach or contaminate the environment in any way.

Thus the CEQA process would be focused on the specific environmental impacts of siting concrete pads, 20 foot shipping containers and necessary transformers and system connection wiring something that would be necessary independent of the choice of technology.

14. Is it reasonable to require that all GFO applicants complete discretionary permitting and CEQA through their local public agency before submitting a proposal for a project in the sizes defined in question 1? Please explain.

PolyJoule does not believe it is reasonable to require this. In fact, forcing that to occur will likely eliminate many of the entities you are trying to help. Non-lithium entities are fighting an 800-pound gorilla in the market and struggling to do so. We should be providing as much assistance as possible to these entities to help them.

Navigating CEQA and all other legal and regulatory requirements is a real and significant barrier for smaller entities to overcome. Recognizing this and determining opportunities to help or simplify the navigation of these many barriers would be tremendously helpful.

15. If the timeline and costs are not feasible, what preliminary CEQA studies or information would you recommend be completed before proposals are submitted to the CEC? Additionally, how long would it take to complete the preliminary CEQA studies or information for your proposed LDES technology for the system size ranges listed in question 1?

Please refer to our answer to number 13 above.

16. What environmental process would be required if your project were not subject to CEQA? Additionally, how long would it take to complete the environmental process for your proposed LDES technology for the system size ranges listed in question 1?

Greenhouse Gas (GHG) Reductions:

PolyJoule systems are simple, safe, inert and non-toxic thus any environmental process would be focused on the specific environmental impacts of siting concrete pads, 20-foot shipping containers and necessary transformers and system connection wiring something that would be necessary independent of the choice of technology.

17. As stated in the "Background" section of this RFI, the funds are provided by GGFR, and therefore, CEC is required to track GHG reductions provided by the installed systems.

a. What combination of LDES and renewables is needed to maximize the GHG reductions from a project?

PolyJoule systems are going to behave similarly to any other BESS system. GHG reductions are maximized when partnered with an appropriately sized solar facility. PolyJoule's flexible capability to operate anywhere from 8 to 16 hours allows for it to be partnered with a variety of solar farm sizes or to charge directly from the grid as needed. We also believe it is possible to mount the solar panels around and on top of our containerized battery enclosures.

One of the less talked about aspects of battery technologies are the energy and water footprints associated with producing the batteries. PolyJoule uses less than 50% of the energy and less than 10% of the water of a typical lithium battery production process.

b. Is there a difference in what your technology can provide in GHG reductions if installed in a behind-the-meter or front-of-the-meter configuration?

There is little to no difference in the GHG reductions possible dependent on whether the system is installed in front of or behind the meter. At the margin there may be a slight change in use case based on access to additional revenue streams associated with faster response reserves and regulation but those are much less relevant for the kinds of long-duration storage systems that are part of this opportunity.

Behind the meter applications, where a microgrid is allowed and enabled, can sometimes improve GHG reductions. As an example, facilities that run backup operations using generators or other GHG-emitting equipment to operate in an isolated fashion when the grid is down could otherwise avoid such practices.

Others

18. What lessons have you learned from the LDES projects you have demonstrated, deployed, or operated to date? What major technical, economic, or policy barriers have affected the demonstration, deployment, or operation of LDES systems in the last two to four years? What are some potential solutions to these barriers? How can future funding from this GFO help solve these barriers?

What we have learned is that it is very difficult to justify the economics of Long Duration storage projects without significant funding support particularly as a startup enterprise with near-term premium prices. The market rules and revenue streams available to storage are still developing and until the need for storage creates the necessary short-term price volatility to drive profitability under existing market rules it is a difficult barrier to overcome. Unfortunately, by the time the volatility reaches those levels it will already be too late to solve the problem.

Focusing on market rules and streamlining resource consent, grid interconnection, permitting and any other administrative approvals required are all things that should be prioritized to help reduce barriers.

19. Are there any additional comments or input you want the CEC to consider as they develop this future GFO?

The CEC's directives should focus on testing a plurality of solutions during the interim phase between now and 2030 targets. Most LDES technologies (and the purpose of future GFO's) is to derisk the market acceptance and economics. As such, breaking the GFO into operational, granted previous funding, and new technologies would be helpful to derisk the possibility that current and previous grants do not limit the scope of trailed technologies in the California ecosystem.