

DOCKETED	
Docket Number:	24-OPT-05
Project Title:	Corby Battery Energy Storage System Project
TN #:	272018
Document Title:	James Rutherford Comments - Corby BESS SA - Alternative Technology Assessment Comment
Description:	N/A
Filer:	System
Organization:	James Rutherford
Submitter Role:	Public
Submission Date:	8/18/2026 7:19:05 AM
Docketed Date:	8/18/2026

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Submitted On: 8/18/2026

Docket Number: 24-OPT-05

Corby BESS SA - Alternative Technology Assessment Comment

To the California Energy Commission,

I am writing this comment in response to the Corby BESS staff assessment published on July 15 and the alternative technology assessment segment therein. The citizens of Vacaville have repeatedly expressed concerns about the safety and impact of the proposed project, and so the possibility of utilizing alternative technologies warrants serious consideration. However, from reading the published document, it appears to me that the assessment by the CEC staff is unfortunately short-sighted, misrepresents or misinterprets the various advantages and disadvantages, and draws erroneous conclusions, thereby eliminating technologies that could provide ideal solutions to both the project developer and the surrounding population.

I would like to draw particular attention to the assessment of vanadium redox flow batteries (VRFBs) starting on page 1119.

When addressing the advantages, the assessment correctly notes the lack of thermal runaway risk, the decoupling of power and energy capacity scaling, and the benign and reversible effects of ion crossover relative to other flow battery technologies. However, it refrains from explicitly acknowledging their exceptionally high (indeed, practically infinite) cycle life, which is possibly their greatest technical advantage. This property is particularly relevant to a 4-hour BESS like the one proposed here, as it is more likely to experience frequent deep discharge cycles compared to longer duration storage.

The assessment also fails to acknowledge other advantages. The broad operating temperature range (10°C – 40°C) and significant thermal mass of the electrolyte mean that VRFBs require less energy-intensive HVAC solutions compared to lithium-ion batteries, which need to be maintained strictly near 25°C to preserve their performance and lifespan. This is particularly advantageous in a hot climate like that of California, where parasitic power consumption of HVAC can significantly reduce the round-trip efficiency. Instead, the assessment chooses to frame the mere need for HVAC (simple cooling fans in many VRFBs) as a disadvantage, even though the natural comparison should be between the assessed alternative and the proposed technology. Less intensive HVAC requirements also mean that VRFBs are less noisy than lithium-ion, thereby addressing another common concern raised with regard to this project.

The assessment also mischaracterizes the disadvantages of VRFBs. While the volumetric energy density of VRFBs is indeed much smaller than that of LFP Li-ion, it is not the metric of relevance when considering an outdoor project like the proposed one; rather it is the areal footprint that should be considered, since the height of the BESS hardly matters. Due to the lack of fire risk, VRFB containers can be (subject to fire

marshal approval) packed directly next to and even on top of each other, as opposed to LFP units which are often mandated by safety standards such as NFPA 855 to be placed 3 ft apart from each other (see California Fire Code, Title 24, Part 9). The result is that the areal footprint of VRFBs is often comparable—and in some cases smaller than—that of LFPs, rendering this supposed disadvantage moot.

The assessment also lists the possible formation of hydrogen gas as a "serious hazard to workers or people near the site." However, the higher overpotential of the hydrogen evolution reaction (HER) with the carbon electrodes of VRFBs means that hydrogen gas is produced only in low quantities even under extreme conditions—a fact that the assessment explicitly acknowledges. It is curious that the assessment does not list HER as a risk factor in all-iron redox flow batteries, even though it occurs to a much greater extent with that technology. Furthermore, since hydrogen gas is light and highly dispersive, the chance that it will accumulate to a volumetric concentration exceeding the 4% flammability threshold in an outdoor installation is negligible. The conclusion that HER in VRFBs can pose a serious hazard is therefore largely unwarranted; certainly it does not justify ruling out the technology as a replacement for lithium-ion.

The assessment also claims that "there have not yet been proven demonstrations at the scale of the proposed project." I am not sure when this claim was written, but as of the current date that is not the case. A 200 MW / 1 GWh VRFB went online in Xinjiang, China at the beginning of the year, and another 175 MW / 700 MWh project has been operational there since 2024. The ability of VRFBs to operate reliably at large scale has demonstrably been accepted by developers worldwide, as additional GWh-scale projects are being planned or constructed in the UK, Europe, Australia, and China.

The more relevant disadvantages of VRFBs—both correctly pointed out in the assessment—are their lower energy efficiency and higher upfront costs. Regarding the latter, it should be mentioned that VRFBs have seen significant cost reductions in recent times as supply chains have matured and scaled up, as opposed to LFPs whose price has actually increased in 2026 as demand caught up to previous oversupply and the prices of lithium and copper rose. The difference can be especially stark here in the US, where even companies that have established domestic cell manufacturing still largely rely on Chinese supply chains, and so must deal with high tariffs and potential tax credit eligibility issues. For example, LG Energy Solution, the proposed cell provider for this project, sources its LFP cathode active material from China's LBM/Liyuan group and from its Indonesian subsidiary, PT LBM Energi Baru Indonesia. Consequently, as of this writing, it will not be eligible for IRS §45X production tax credits for cells sold after January 1, 2027 (cells sold before 2027 could be eligible due to a grandfather rule), which could drastically reduce the gap between its pricing and that of completely domestic non-lithium manufacturers.

At any rate, it is not upfront cost that should be considered when comparing the financial performance of two technologies, but rather the levelized cost of storage (LCOS) over the project's entire lifetime. VRFBs cost more on day one and have a lower efficiency, but they could very well be competitive when it comes to LCOS due to their

infinite cycling capability, longer lifetime, high end-of-life value, and savings in auxiliary expenditures such as fire insurance, suppression systems, and HVAC. Even if the LCOS ends up higher than that of LFP BESS, it could still be a price worth paying if it means alleviating the concerns and ensuring the safety of the thousands of residents who live next to this project.

The question of whether or not VRFBs make for a financially sensible choice could only be answered by a more detailed analysis of the operating profile of the project, the available OEMs, the fire codes it will need to meet, and so on—exactly the kind of analysis that was prevented from being carried forward by the staff assessment. The technology is ostensibly mature enough that I can see no justification for the claim that it does not merit, at the very least, more serious consideration, especially given the level of community concern surrounding this project.

I have focused on VRFBs because this is the alternative technology with which I am most familiar and because its fundamentally different fire-risk profile makes it particularly relevant given the concerns expressed by surrounding residents. Other alternatives may likewise deserve reconsideration.

Given the level of community concern surrounding this project, I believe the Commission should take the opportunity to ensure that potentially feasible alternatives have received a genuinely current and comparative evaluation. A more complete alternatives analysis would provide greater confidence that the technology ultimately selected represents an appropriate balance among grid needs, economics, environmental impacts, and public safety.

Thank you for your time and attention.

James Rutherford