DOCKETED	
Docket Number:	23-ERDD-01
Project Title:	Electric Program Investment Charge (EPIC)
TN #:	252294
Document Title:	James Blair Comments on 23-ERDD-01 RFI Geothermal Lithium
Description:	N/A
Filer:	System
Organization:	James Blair
Submitter Role:	Public
Submission Date:	9/15/2023 5:07:16 PM
Docketed Date:	9/18/2023

Comment Received From: James Blair
Submitted On: 9/15/2023
Docket Number: 23-ERDD-01

Comment by James Blair on 23-ERDD-01 RFI Geothermal Lithium

Additional submitted attachment is included below.

To: California Energy Commission
From: James J. A. Blair, Associate Professor in Geography and Anthropology
Date: September 15, 2023
Re: Comments on Request for Information – Geothermal Lithium Docket # 23-ERDD-01

Dear Commissioners:

Thank you for the opportunity to comment on the Request for Information regarding Geothermal Power and Lithium Recovery (Docket # 23-ERDD-01). Geothermal direct lithium extraction (DLE) may offer new opportunities to contribute flexible firm or baseload power to the grid from renewable resources, while also avoiding some of the pitfalls associated with conventional open-pit mining or brine evaporation for lithium production [1]. Nonetheless, it is critical to avoid turning renewable energy development sites into "green sacrifice zones"[2]–[5], by perpetuating environmental injustices and Indigenous rights violations. Because geothermal DLE technologies are not yet proven at an industrial scale, it is important to identify technical barriers as well as opportunities to mitigate waste streams. With this concern in mind, I am writing in response to the question on Comprehensive Brine Management:

Question #8. Could a comprehensive new approach to brine management (i.e., one which involves the complete process from start to finish) simultaneously address issues that affect geothermal power production and lithium recovery (such as corrosivity, scaling, and constituents that interfere with the recovery of marketable minerals) while leveraging opportunities to recover profitable co-products? How could a comprehensive approach be implemented in a cost-effective manner?

Scaling limits geothermal power plant operations and must be removed or diluted from brine to avoid clogging reinjection wells if silica becomes colloidal. This may increase the use of freshwater and/or hydrochloric acid (HCl). Moreover, according to a forthcoming report on environmental justice in California's "Lithium Valley" by Comite Civico del Valle and Earthworks [6], when iron and silica are precipitated on filter cakes, the resulting solid waste may include hazardous or harmful elements, including arsenic, barium and lead.

To divert these potentially hazardous solid waste streams away from landfills through a more cradle to cradle approach, it is imperative that we consider second life uses of silica scaling as chemical feedstock for other applications. Scientists have already successfully synthesized from geothermal water mesoporous silica, which is a material that may be used in a variety of industries—including energy and mineral resources—as catalysts, adsorbents, ion exchangers, optic materials, and solar panels [7]. Moreover, geothermal silica waste may also be used to synthesize zeolites [8]. Some zeolites even have the capacity to encapsulate lead through mineral remediation: a process that is currently being tested through community science projects to mitigate soil contamination from lead-acid battery recycling in East LA [9], [10]. Funding is needed to confirm the feasibility of adapting these methods to synthesis of zeolites from silica waste deriving from specific locations like the geothermal brine from the Salton Sea Known Geothermal Resource Area. If measures are taken to prevent contamination, this may not only

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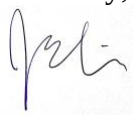
THE CALIFORNIA STATE UNIVERSITY *Bakersfield, Channel Islands, Chico, Dominquez Hills, Fresno, Fullerton, Hayward, Humboldt, Long Beach, Los Angeles, Maritime Academy, Monterey Bay, Northridge, Pomona, Sacramento, San Bernardino, San Diego, San Francisco, San José, San Luis Obispo, San Marcos, Sonoma, Stanislaus*

offer a zero-waste solution to geothermal lithium development, but also a way of healing some of the harmful legacies left along the life cycle of batteries and energy storage.

Thank you again for the opportunity to provide comments on this Request for Information. Please let me know if there is further information that I may provide.

Sincerely,



James J. A. Blair

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