Policy Memo: Addressing the Environmental and Social Impacts of Lithium Extraction in Imperial Valley

To: State Senator Monique Limón

From: Adrianna Martinez and Paige Thornburg

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Subject: Policy Recommendations for Sustainable Lithium Extraction in Imperial Valley

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1. The rapid expansion of lithium extraction in Imperial Valley, often referred to as "Lithium Valley," presents a significant opportunity for economic growth and the transition to renewable energy storage. However, without appropriate regulatory oversight and mitigation measures, lithium extraction could exacerbate existing environmental and social issues, including air pollution, water scarcity, Salton Sea degradation, hazardous waste accumulation, and threats to Indigenous cultural sites.
2. Current lithium extraction projects rely on direct lithium extraction (DLE) technology, which is more water-efficient than traditional evaporation ponds but still requires substantial freshwater from the already strained Colorado River. Additionally, expanding geothermal energy infrastructure in a seismically active area raises concerns about induced seismicity. Existing policies lack comprehensive cumulative impact assessments and consult Indigenous communities insufficiently regarding cultural site protections.
   Alternative approaches include stricter water usage regulations, enhanced air quality monitoring, mandatory environmental impact assessments (EIA) with cumulative analyses, and increased engagement with local and Indigenous communities to ensure free, prior, and informed consent.
3. To ensure that lithium extraction in Imperial Valley supports the clean energy transition without harming the environment and communities, stronger regulations are needed. Policymakers should enforce strict water usage limits and require water recycling plans to minimize reliance on the depleted Colorado River. A comprehensive environmental impact assessment (EIA) must evaluate the effects of lithium and geothermal projects, particularly on Salton Sea

degradation. Hazardous waste management standards should mandate monitoring and proper disposal of toxic byproducts like arsenic, lead, and cadmium. The framework for Indigenous and community consultation must ensure companies obtain free, prior, and informed consent (FPIC) to protect cultural sites like Obsidian Butte. Finally, stricter engineering standards for infrastructure are necessary to mitigate seismic risks. These measures will help balance economic growth with environmental protection and social equity in Imperial Valley.

Analysis of Environmental & Social Impacts of Lithium Extraction in Imperial Valley

Introduction

Lithium extraction in the Imperial Valley is a key component of the clean energy transition, but it also presents serious environmental and social risks. This analysis examines these challenges and outlines policy recommendations to minimize harm while ensuring sustainable development (Earthworks).

Freshwater Consumption

Lithium extraction relies on geothermal brine, a process that requires significant freshwater for cooling and processing. EnergySource Minerals estimates that its DLE operation will use 3,400 acre-feet of water annually, while CTr estimated that their Hell's Kitchen project will consume 6,700 acre-feet of water per year to produce 25,000 metric tons of lithium hydroxide per year (Chambers Group, Inc., 2021; County of Imperial Planning and Development Services Department, 2022). Thus far, all estimates for water consumption only account for the extraction of minerals and have not considered downstream processes such as the refinement of minerals and the production of batteries. Given the ongoing depletion of the Colorado River due to climate change and overuse, additional industrial consumption threatens regional water security. At the current planned capacity for the project, water consumption will exceed the freshwater allocated for non-agricultural use by the Imperial Irrigation District (Naimark J. 2023). Geothermal energy for electricity generation requires a constant water supply to be converted into steam, which spins a turbine and generates electricity.

Figure 1: Estimated Freshwater Consumption of Imperial Valley Direct Lithium Extraction Projects

TABLE 1: Estimated freshwater consumption of Imperial Valley direct lithium extraction projects.

Project	Metric tons of lithium hydroxide produced / year[1]	Metric tons of LCE produced / year[2]	Acre-feet of water / year	Acre-feet water / metric ton of LCE	Gallons of water / metric ton of LCE	m^3 of water / metric ton of LCE
BHER Minerals[3]	Unknown	Unknown	Unknown	0.15	50,000	189
ES Minerals	19,000	16,720	3,400	0.20	65,170	247
CTR	25,000	22,000	6,700	0.30	97,755	370

[1]Both CTR and ES Minerals estimate their lithium production in terms of metric tons of lithium hydroxide. After extraction and refining, this is the final battery grade compound that will be sold to a buyer.

[2]To convert lithium hydroxide to lithium carbonate equivalent (LCE), the industry standard, you multiply by a factor of .880 (see https://casetext.com/statute/california-codes/california-revenue-and-taxation-code/division-2-other-taxes/part-25-lithium-extraction-tax-law/chapter-2-the-lithium-extraction-excise-tax/section-47015-conversion-to-to-lithium-carbonate-equivalent).

[3]BHER's estimate of freshwater consumption is from testimony to the Lithium Valley Commission, not from environmental analysis of a DLE project. This estimate may change in the future. As of 2023, BHER is demonstrating lithium extraction at one-tenth scale, and has not proposed commercial-scale extraction. No information is available on how much lithium BHER would produce per year at commercial scales in the future.

Air Quality and Salton Sea Degradation

Imperial Valley already suffers from poor air quality, frequently exceeding Clean Air Act standards for ozone, PM2.5, and PM10. The expansion of lithium extraction will contribute additional emissions from construction dust, vehicle traffic, and geothermal plant operations, inducing the shrinking of the Sea and increasing the threat to air quality by exposing dry lake beds. Shifting water allocations from agriculture to lithium extraction could accelerate the Salton Sea's decline, exposing pesticide-laden playa dust and worsening respiratory issues for local communities (Salton Sea Management Program, 2022; Frie et al., 2017).

Hazardous Waste Management

DLE technology concentrates dissolved brine elements, generating solid waste that can contain hazardous heavy metals. While some waste is classified as non-hazardous and disposed of locally, up to 10% is hazardous and must be transported to Arizona (Lewis, 2023). Past regional geothermal projects have faced penalties for improper hazardous waste disposal, underscoring the need for stricter monitoring and

enforcement. Without proper regulation, these hazardous byproducts can contaminate soil and groundwater, posing long-term health risks to nearby communities. Moreover, the storage and transportation of hazardous waste introduce additional risks, including accidental spills and leaks (Naimark, J. 2023). Requiring companies to implement strict waste tracking systems, conduct regular third-party audits, and explore safer disposal alternatives, such as advanced infiltration and on-site neutralization technologies, will be crucial in reducing environmental contamination.

Indigenous Rights and Cultural Site Protections

Proposed lithium extraction sites overlap with the ancestral lands of the Cahuilla, Kamia, Quechan, and Kumeyaay peoples, putting sacred sites such as Obsidian Butte at risk (Arrow-Weed, 2022). Indigenous leaders have voiced concerns over the lack of government-to-government consultation and the potential destruction of cultural heritage. The UN Declaration on the Rights of Indigenous Peoples mandates FPIC, yet current lithium development processes do not fully uphold this requirement. Indigenous communities are also at a significant disadvantage without the technical resources to understand the potential risks, vulnerabilities, and impacts of lithium projects (Martinez, 2022). Strengthening legal protections, mandating independent Indigenous-led impact assessments, and ensuring that Indigenous communities play a central role in decision-making processes will be necessary to prevent further erasure of cultural heritage.

Seismic Risk Considerations

While lithium extraction itself is unlikely to trigger earthquakes, expanding geothermal development in a tectonically active region introduces risks. Research on geothermal-induced seismicity remains inconclusive, highlighting the need for further study and stricter engineering requirements for new infrastructure (Naimark J., 2023). The Imperial Valley sits on the San Andreas Fault system, making it one of California's most seismically active areas. Past geothermal projects have already triggered small tremors, raising concerns about potential damage to existing infrastructure. To minimize risks, companies should be required to conduct seismic risk assessments before beginning operations, implement real-time seismic monitoring systems, and use reinforced well designs to reduce the likelihood of triggering larger earthquakes.

Conclusion

Given the environmental and social risks of lithium extraction in Imperial Valley, strong regulatory measures are essential. The proposed policies—including stricter freshwater conservation, comprehensive cumulative impact assessments, enhanced hazardous waste oversight, Indigenous consultation requirements, and seismic risk mitigation—will help ensure that lithium extraction supports the clean energy transition without harming communities or ecosystems.

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