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Resources on Lithium Market Opportunities for the September 30, 2021 Lithium Valley Commission Meeting

This document provides a list of selected resources to inform discussion of lithium market opportunities during the September 30, 2021, Lithium Valley Commission meeting.

Overview

The [2021 SB 100 Joint Agency Report](https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity) (<https://www.energy.ca.gov/publications/2021/2021-sb-100-joint-agency-report-achieving-100-percent-clean-electricity>) projects the annual build rate of battery storage in California will need to increase nearly eightfold compared to 2020. The Report states, "Nearly all newly procured storage by the California utilities, as required by AB 2514, has been four-hour lithium-ion batteries, driven by rapid declines in battery costs."

In September 2020, California Governor Newsom issued an [executive order](https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf) (<https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>) setting the following goals:

- 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035.
- 100 percent of medium- and heavy-duty vehicles in California will be zero-emission by 2045 for all operations where feasible and by 2035 for drayage trucks.
- California will transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible.

In June 2021, the Federal Consortium for Advanced Batteries (FCAB) provided, in an [Executive Summary of the National Blueprint for Lithium Batteries 2021-2030](https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf) (https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf), an overview of the importance of lithium batteries to the clean energy economy, expected growth in the global lithium-battery market, and key actions to develop lithium-battery manufacturing in the United States. The vision and goals outlined in the report include securing access to raw and refined materials for lithium batteries. The FCAB report recommends holding new or expanded mineral production to modern standards for environmental protection, best-practice labor conditions, and rigorous community and tribal government consultation, while recognizing economic costs of waste treatment and processing.

Market Opportunities in California

Benchmark Mineral Intelligence provides market information on the global lithium supply chain (see the company's [Lithium webpage](https://www.benchmarkminerals.com/lithium/) (https://www.benchmarkminerals.com/lithium/).) In August 2021, Daisy Jennings-Gray with Benchmark Mineral Intelligence posted a [video overview of the lithium market](https://twitter.com/daisy_benchmark/status/1428480528945139714) on Twitter (https://twitter.com/daisy_benchmark/status/1428480528945139714).

In September 2020, New Energy Nexus published a report titled *Building Lithium Valley Opportunities and Challenges Ahead for Developing California's Battery Manufacturing Ecosystem* that summarizes the market opportunities and challenges for developing lithium recovery from geothermal brine in the Salton Sea KGRA. The report also discusses opportunities and challenges for developing a lithium battery supply chain in California, which has the world's second largest automobile market. The report is included in the [Lithium Valley Commission docket](https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=20-LITHIUM-01) (https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=20-LITHIUM-01).

Lithium Battery Ecosystem

In 2016, National Renewable Energy Laboratory (NREL) published a report summarizing the manufacturing process and supply chain considerations for lithium-ion batteries used in electric vehicles. In the report, [Automotive Lithium-ion Cell Manufacturing: Regional Cost Structures and Supply Chain Considerations](https://www.nrel.gov/docs/fy16osti/66086.pdf) (https://www.nrel.gov/docs/fy16osti/66086.pdf), NREL highlights the importance of reducing material costs and establishing a domestic supply chain.

In March 2020, the Los Angeles County Economic Development Corporation published [Energizing an Ecosystem: The Electric Mobility Revolution in Southern California](https://laedc.org/2020/03/01/laedc-ev-industry-report/) (https://laedc.org/2020/03/01/laedc-ev-industry-report/). This report provides an overview of the range of businesses and supply chains associated with electric vehicle research and development in California. For Ventura County and the four counties in the South Coast Air Quality Management District (Los Angeles County, Orange County, Riverside County, and San Bernardino County), the report includes analyses of electric vehicle deployment, as well as regional electric vehicle industry employment statistics and projections.

In March 2021, NREL published [A Circular Economy for Lithium-Ion Batteries Used in Mobile and Stationary Energy Storage: Drivers, Barriers, Enablers, and U.S. Policy Considerations](https://www.nrel.gov/docs/fy21osti/77035.pdf) (https://www.nrel.gov/docs/fy21osti/77035.pdf). The report summarizes opportunities and challenges for reuse and recycling of lithium-ion batteries and provides an overview of applicable waste handling, storage, and transport requirements in the United States.

In March 2021, Enovix, a startup company developing a silicon lithium-ion battery, published a paper summarizing its business development strategy: *A Strategy for U.S. Leadership in Advanced Lithium-ion Battery Development and Production* (available from the [Enovix webpage](https://www.enovix.com/about-us), https://www.enovix.com/about-us). The strategy includes plans to begin producing batteries in Fremont, California for commercial customers in 2022. Starting with portable electronics, the company plans to establish partnerships to scale-up production and enter the electric vehicle battery market and stationary energy storage market in the mid-2020s.

In June 2021, Automotive from Ultima Media published [Electric Vehicle Battery Supply Chain Analysis: How Battery Demand and Production are Reshaping the Automotive Industry](https://www.automotivelogistics.media/electric-vehicles/electric-vehicle-battery-supply-chain-analysis-2021-how-lithium-ion-battery-demand-and-production-are-reshaping-the-automotive-industry/41924.article) (<https://www.automotivelogistics.media/electric-vehicles/electric-vehicle-battery-supply-chain-analysis-2021-how-lithium-ion-battery-demand-and-production-are-reshaping-the-automotive-industry/41924.article>; this is a free paper requiring registration to access) by Daniel Harrison and Christopher Ludwig. This analysis highlights the importance of lithium and other minerals for battery production and original equipment manufacturers (OEMs) in the electric vehicle market. The report also notes the importance of environmental and social considerations in sourcing minerals for batteries: “corporate social responsibility (CSR) for electric vehicles is moving well beyond a tick-box exercise to become a business-critical issue to protect huge capital investment into electrification. OEMs are thus forging alliances with raw material suppliers partly to secure supply – but also to improve visibility of working conditions under which raw materials such as lithium, cobalt, nickel and manganese are mined and refined.”

As required by Assembly Bill 2832 (Dahle, Chapter 822, Statutes of 2018), CalEPA appointed a [Lithium-Ion Car Battery Recycling Advisory Group](https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/) in 2019 (<https://calepa.ca.gov/lithium-ion-car-battery-recycling-advisory-group/>). On or before April 1, 2022, this advisory group shall submit policy recommendations to the Legislature aimed at ensuring that as close to 100 percent as possible of lithium-ion vehicle batteries in the state are reused or recycled at end-of-life in a safe and cost-effective manner.