

DOCKETED

Docket Number:	17-GRDA-01
Project Title:	Geothermal Grant and Loan Program Workshops and Discussions
TN #:	225902
Document Title:	Presentation Re. Lead Commissioner Workshop on Lithium Recovery from Geothermal Brine - BloombergNEF
Description:	November 15, 2018
Filer:	Erica Chac
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/15/2018 10:32:54 AM
Docketed Date:	11/15/2018

Lithium Market Overview

California Energy Commission workshop

Logan Goldie-Scot

November 15, 2018

BloombergNEF



Demand outlook	3
Lithium supply and demand dynamics	10
Lithium pricing dynamics	16

You can no longer view the world in silos



Clean energy

Solar Wind Storage Decentralized energy Frontier power Impact on power & utilities

Advanced transport

Electrified transport Autonomous driving Shared mobility Impact on transport Impact on oil & power

Commodities

Carbon Power LNG & gas Oil & products Metals Chemicals

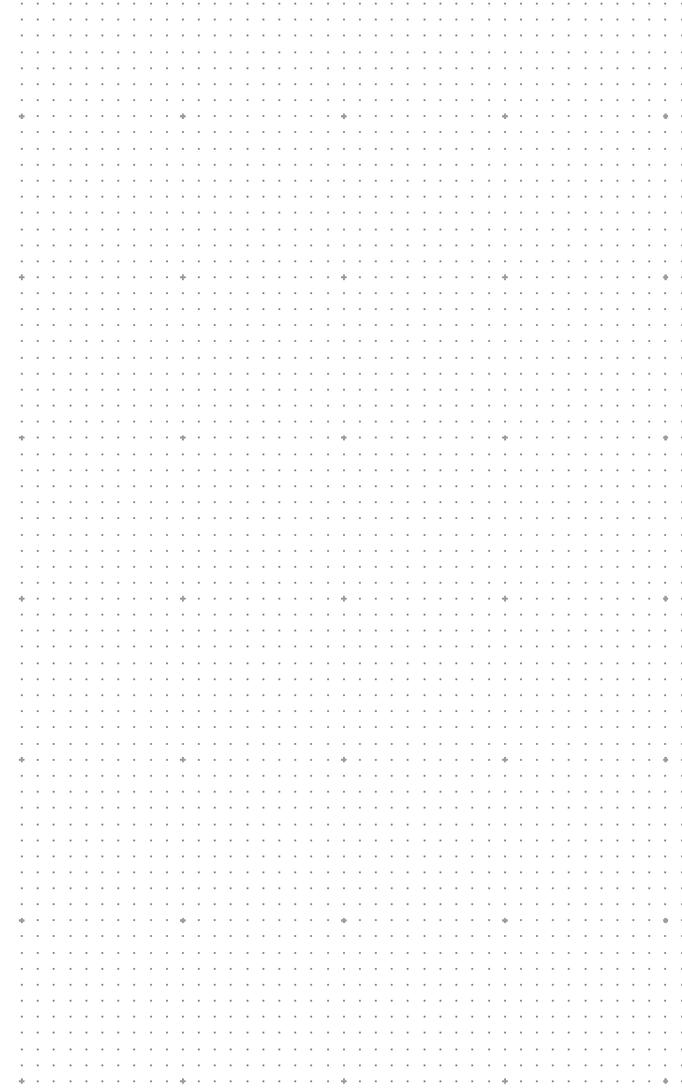
Digital industry

Internet of things Automation & advanced analytics Asset mgt, digital manufacturing, logistics Connected customer, "as a service" business models Impact on industrials, utilities, healthcare

Advanced materials

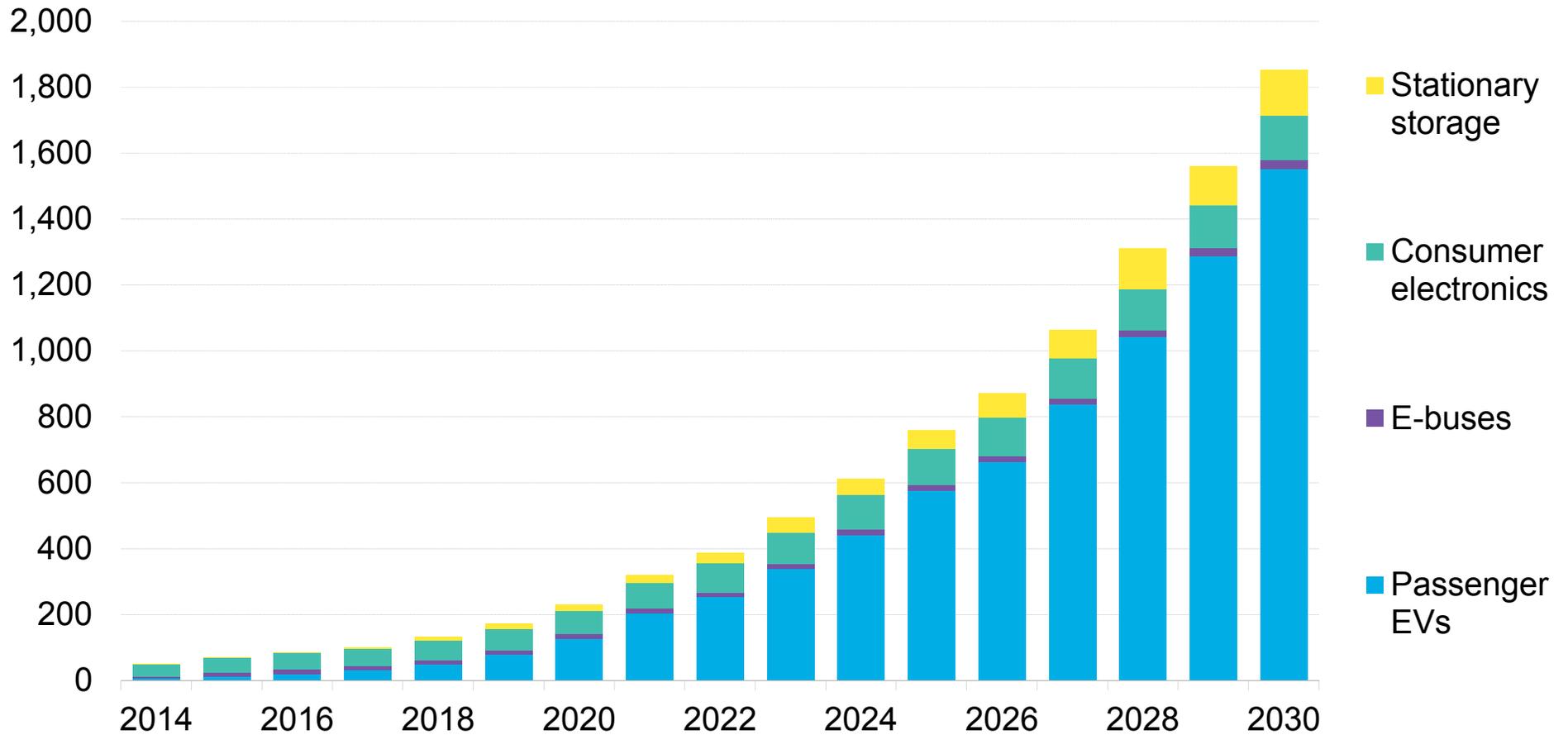
Bioplastics, biomaterials Composites, New Materials 3D Printing, Lightweighting, Recycling, End-of-life Impact on industrials, materials and energy

Demand outlook



Cars (and stationary storage) will drive battery demand

Annual GWh demand



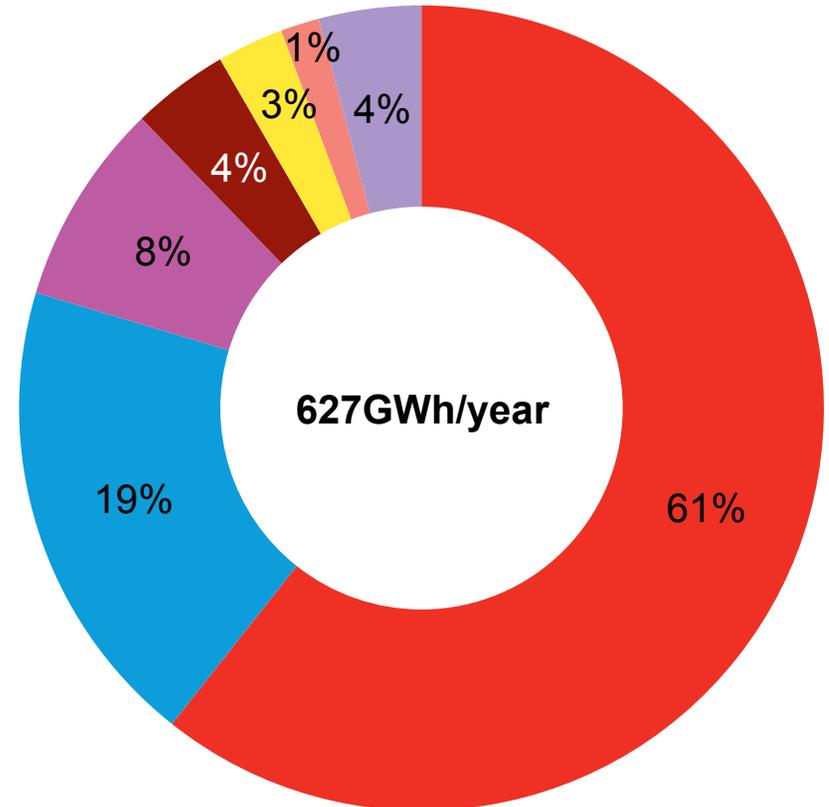
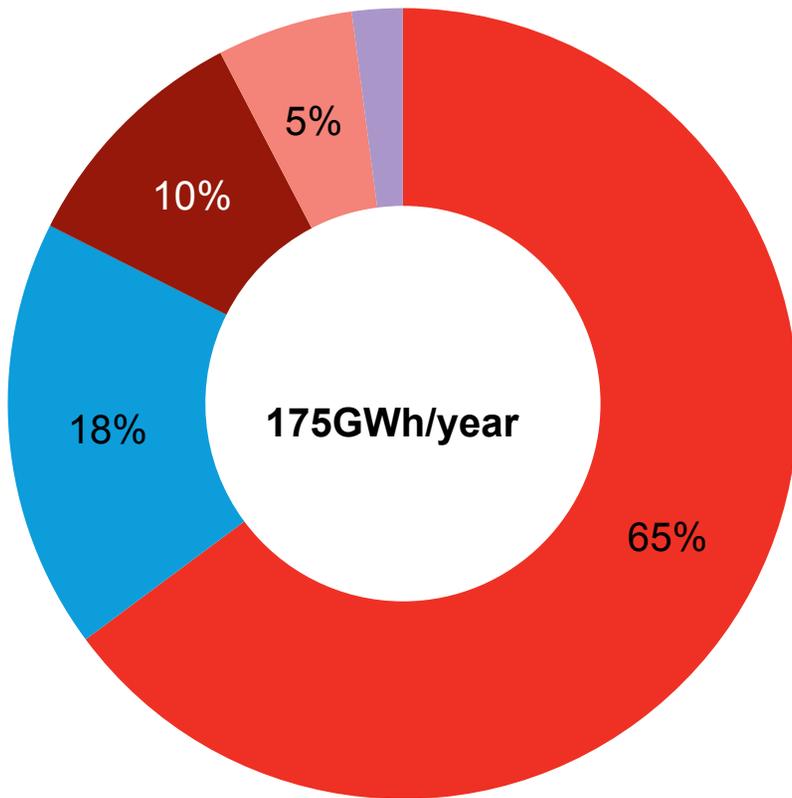
Source: Bloomberg NEF

Cell manufacturing capacity will over triple by end of 2021. Lots in China!



2018 commissioned cell manufacturing capacity

Capacity due to be commissioned by 2021



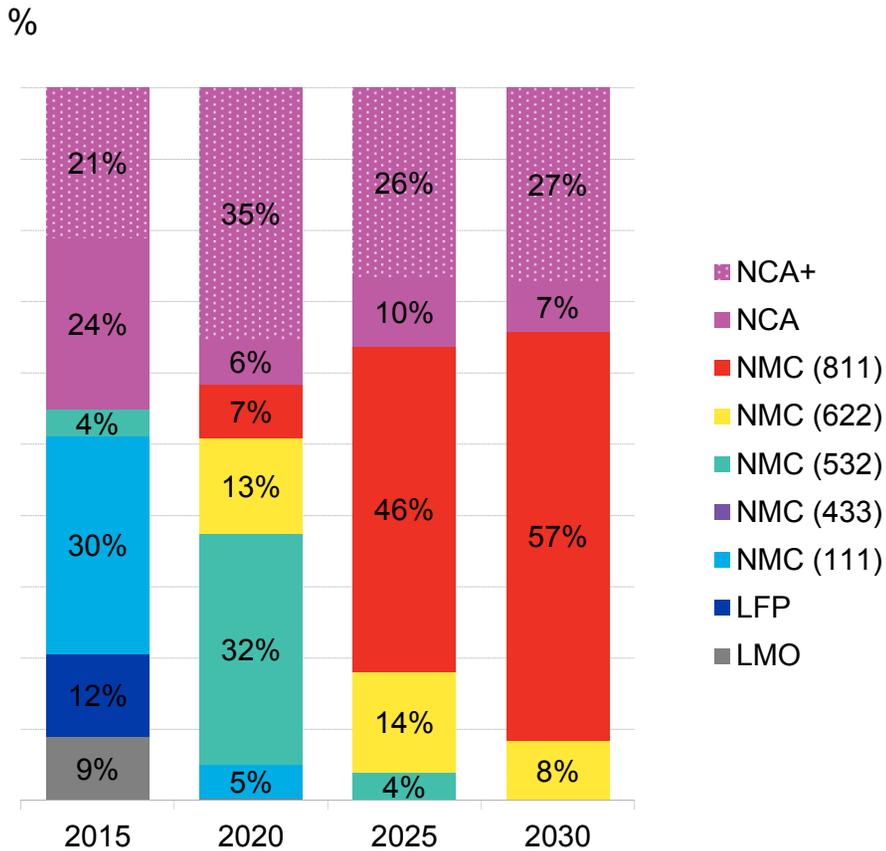
Other Japan Germany South Korea Thailand United States China

Source: Bloomberg NEF

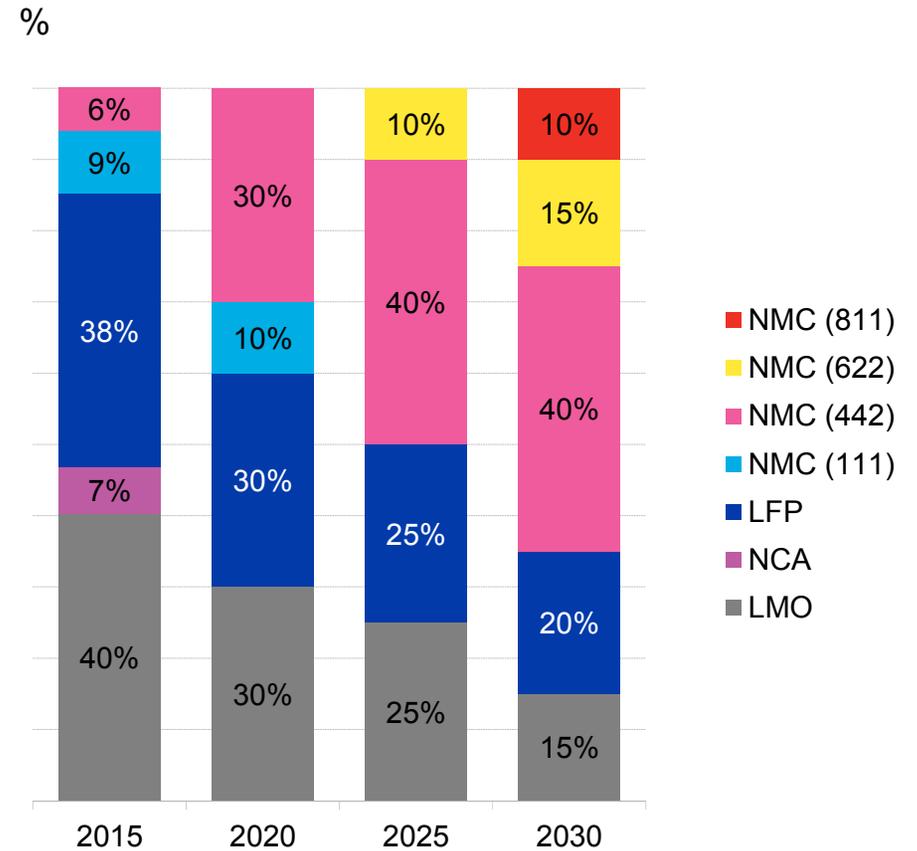
Source: Bloomberg NEF

There will be a range of specifications within each segment

Passenger electric vehicles



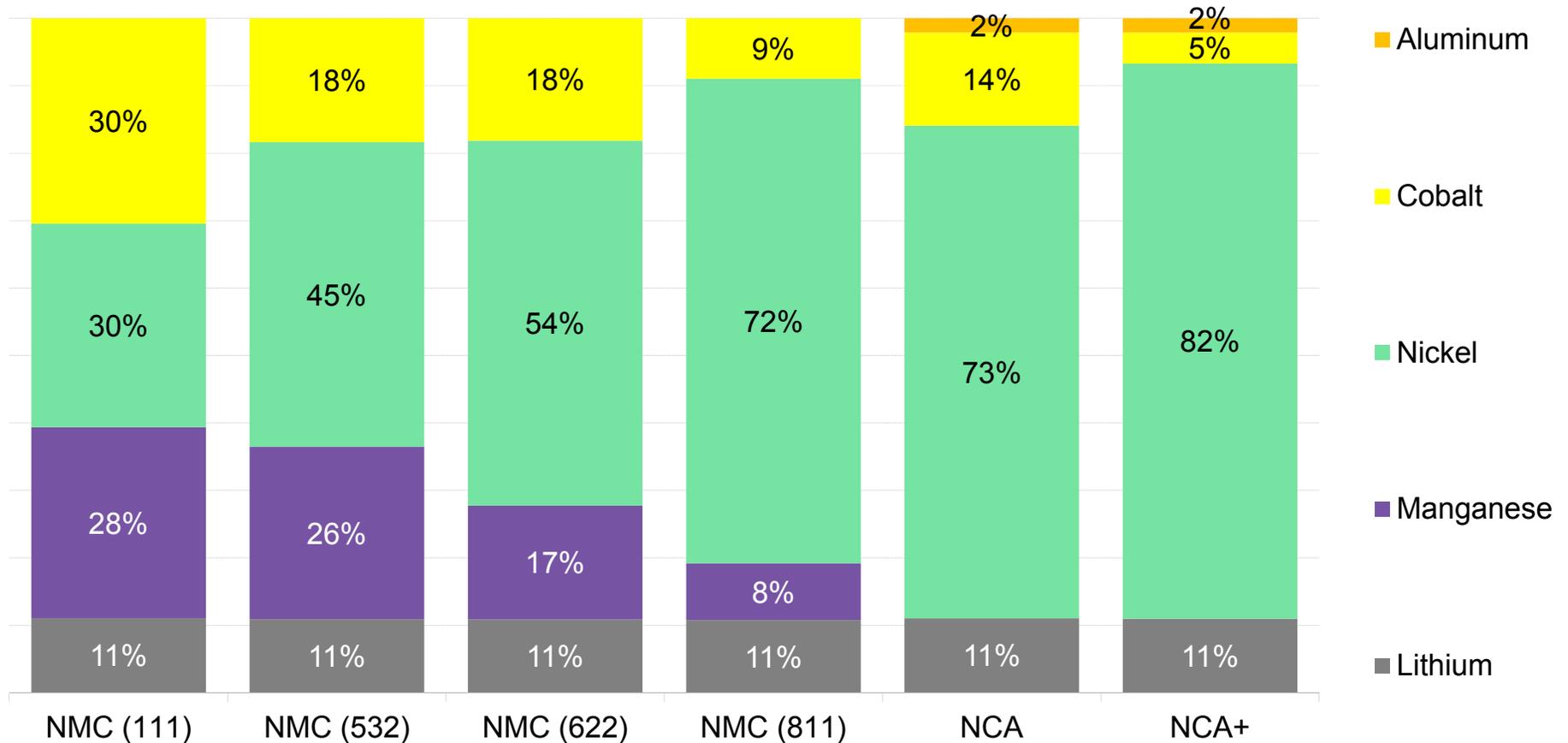
Utility-scale stationary energy storage



Source: Bloomberg NEF. Taken from "2018 New Energy Outlook"

Source: Bloomberg NEF. Taken from "2018 New Energy Outlook"

And different chemistries require different metals



Source: Bloomberg NEF. Taken from "2018 New Energy Outlook"

Demand outlook

Supply is becoming an issue of national importance



“We wanted to set up a stable lithium supply system for domestic battery makers, which so far have had to rely entirely on imports,”

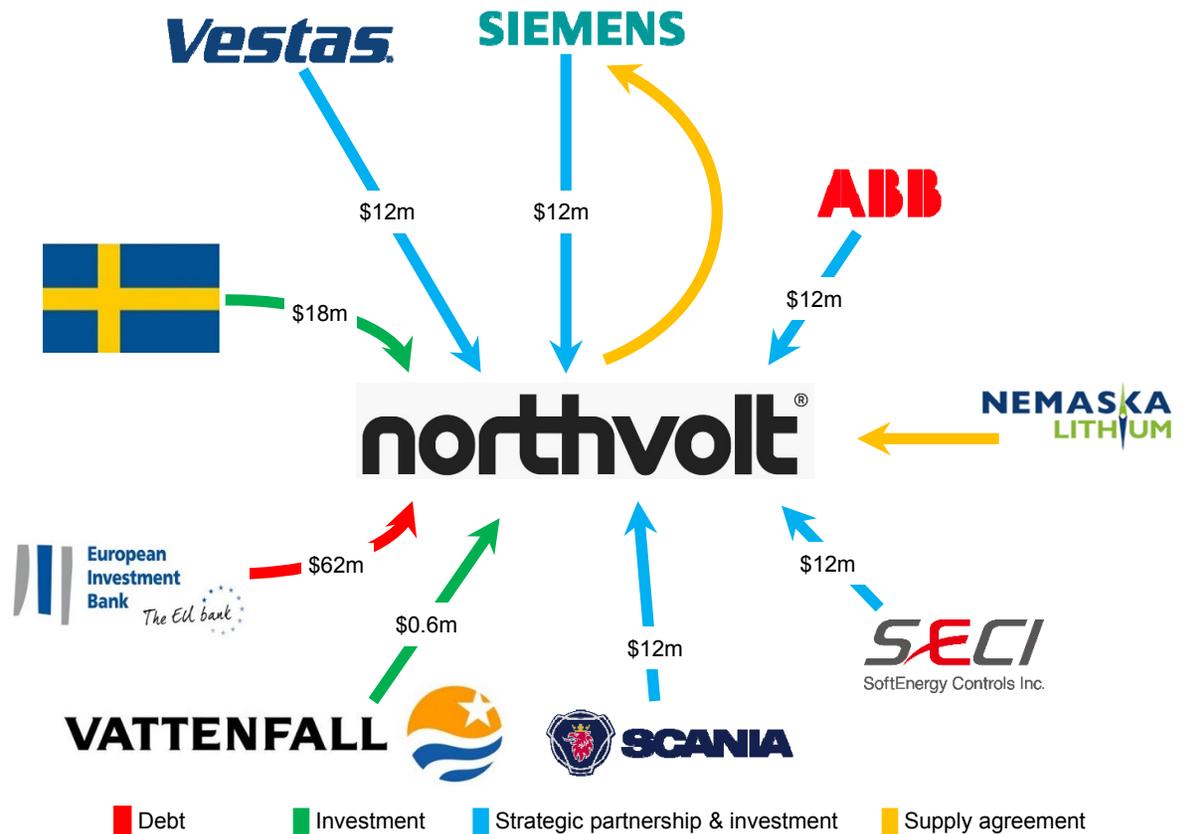
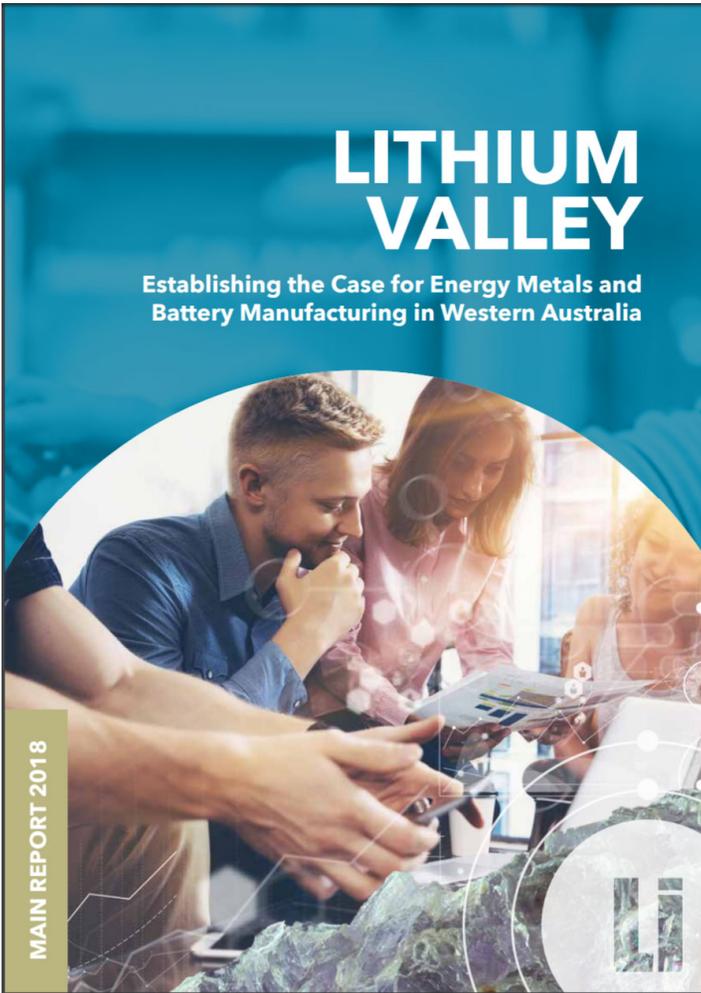
Kwon Oh-joon, chief executive of Posco, April 2018

Source: *Pulse by Mael Business News Korea & mk.co.kr*

Demand outlook

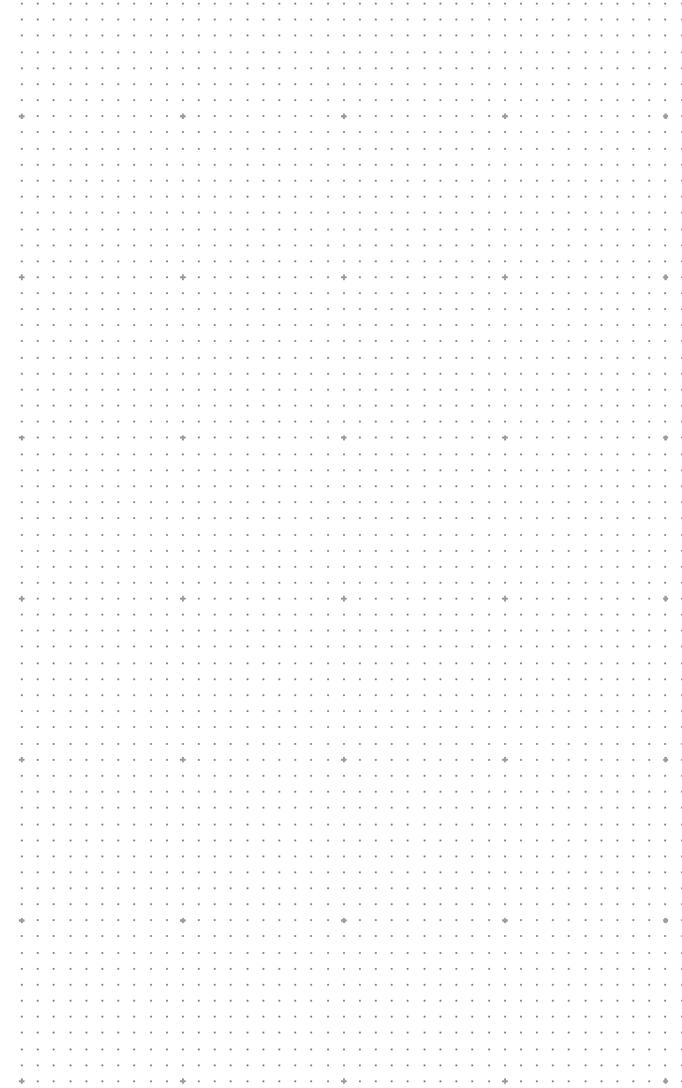
Which could create a role for more local development?

Selected investments, partnerships and supply agreements for Northvolt



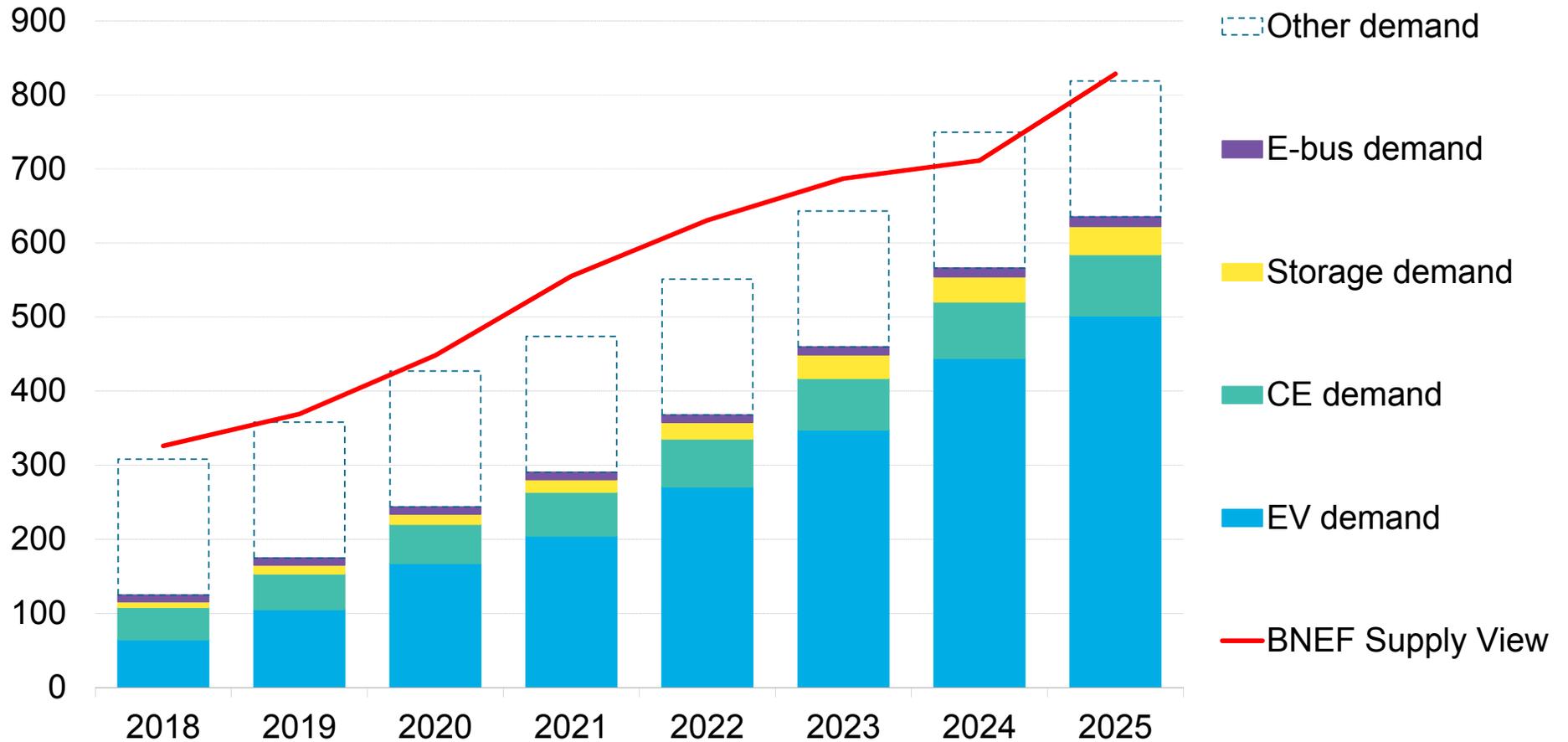
Source: Regional Development Australia

Lithium supply and demand dynamics



The market is currently tight but there should be sufficient supply in near-term

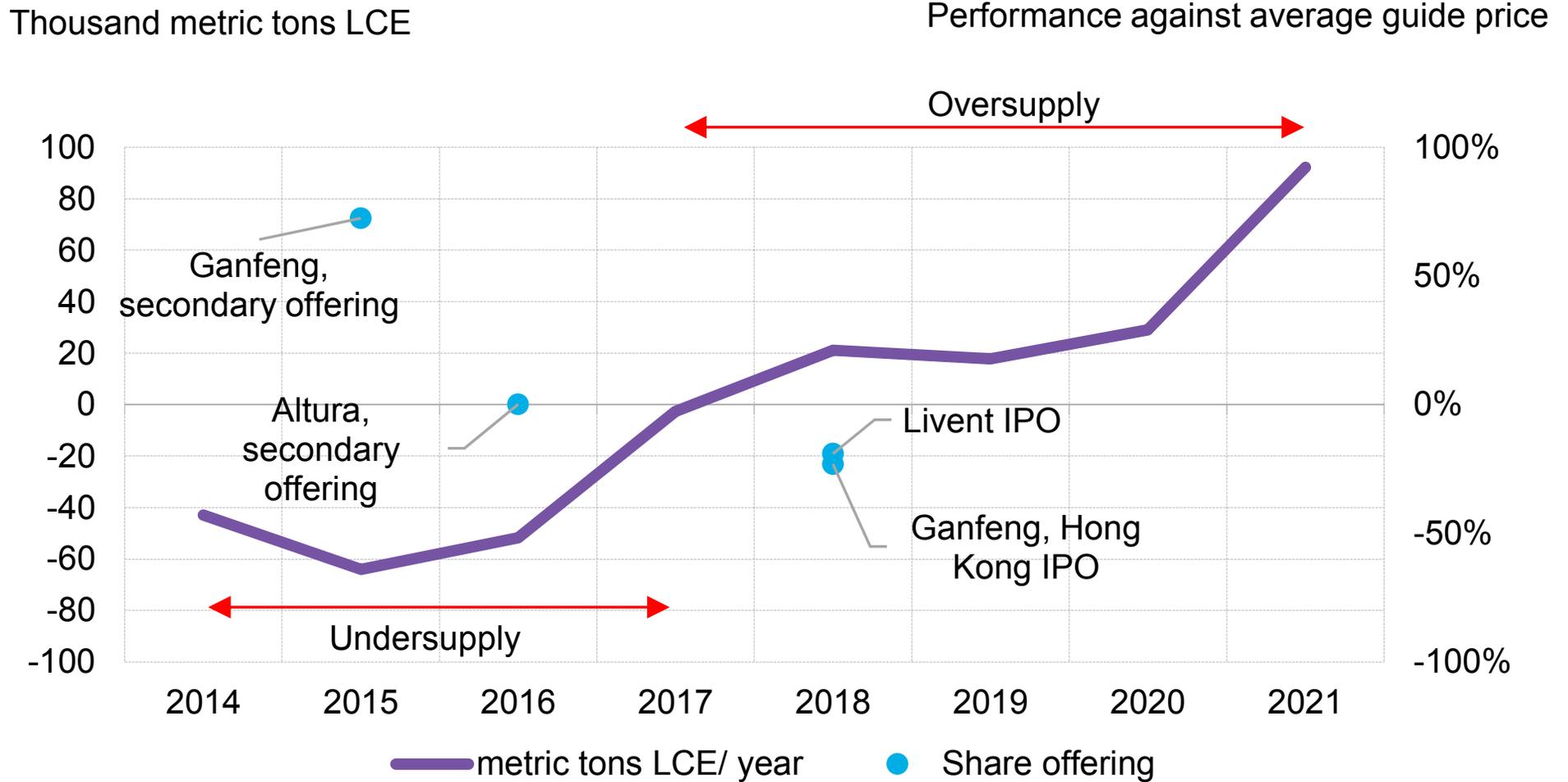
thousand metric tons lithium carbonate equivalent/year



Source: Bloomberg NEF, Avicenne, Deutsche Bank. Note: Lithium demand from batteries will require lithium to be mined 12 months earlier. LCE refers to lithium carbonate equivalent

Investors remain apprehensive on lithium stocks

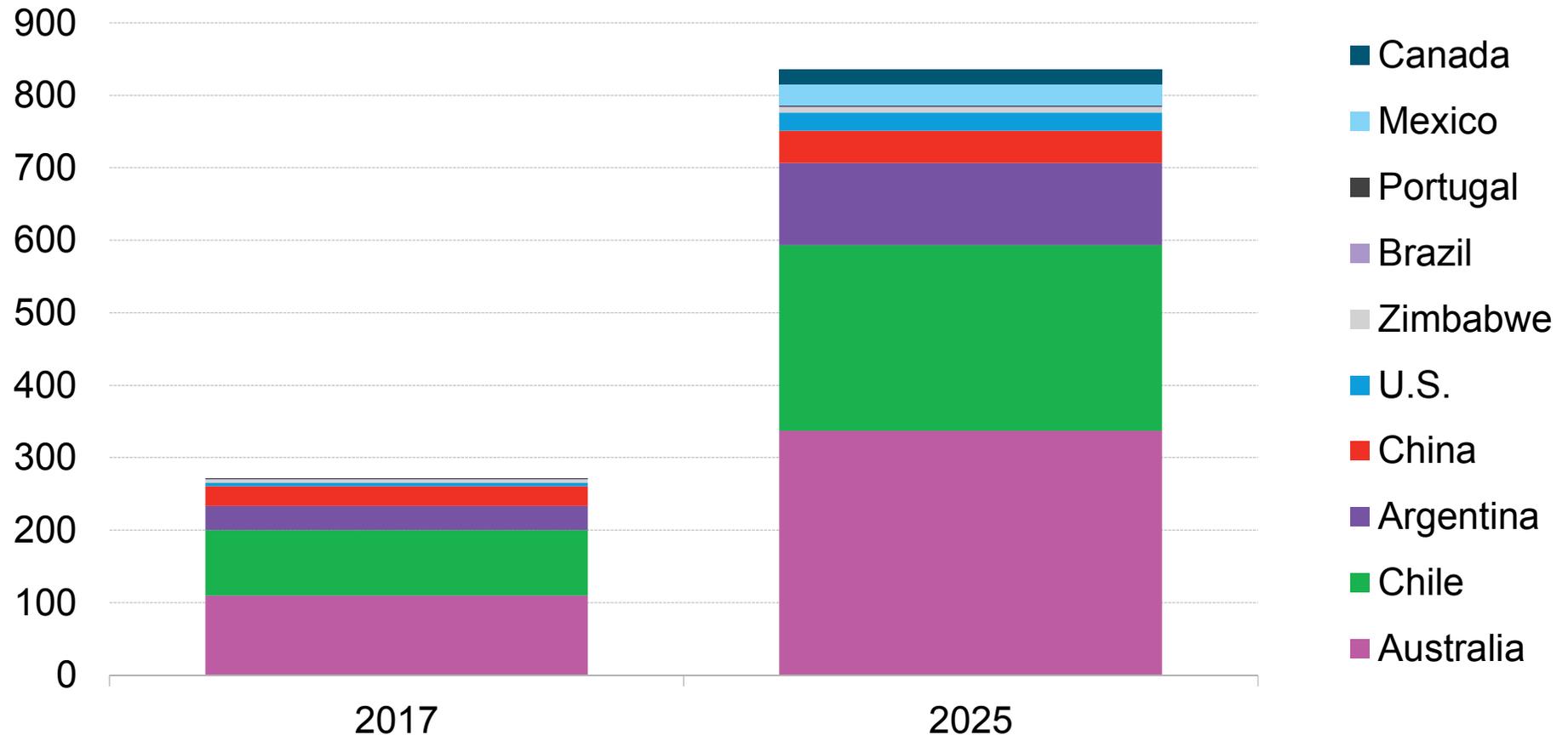
Lithium market supply and demand balance and performance of stock listings



Source: Bloomberg NEF, Bloomberg Terminal. Note: 0% represents the average guide price

A small number of countries dominate current and future supply

Thousand metric tons LCE

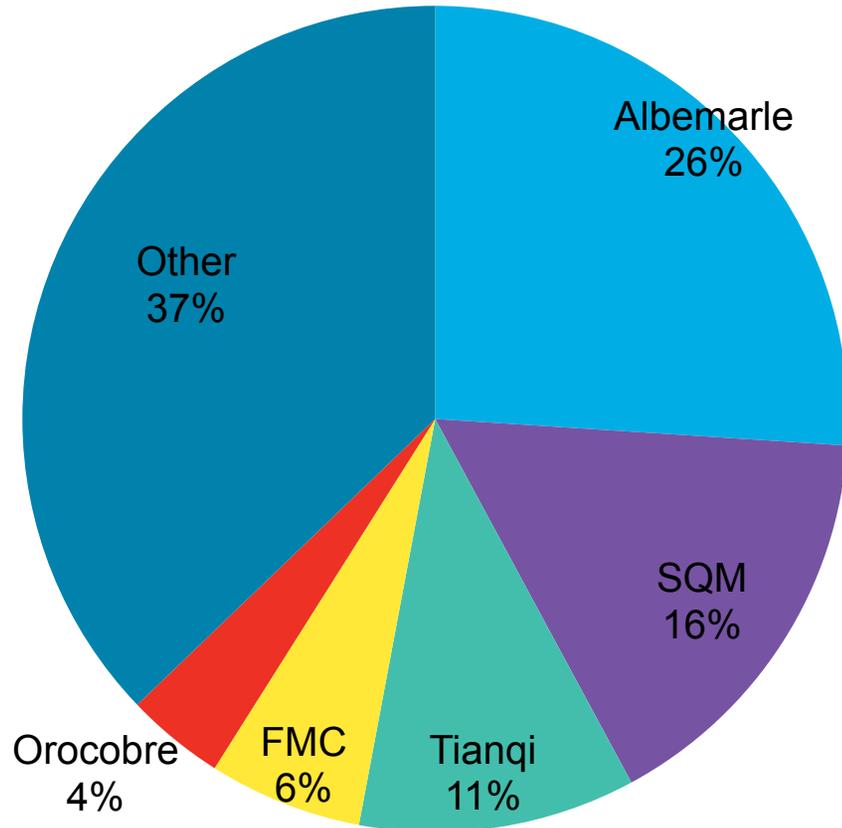


Source: Bloomberg NEF, Company reports

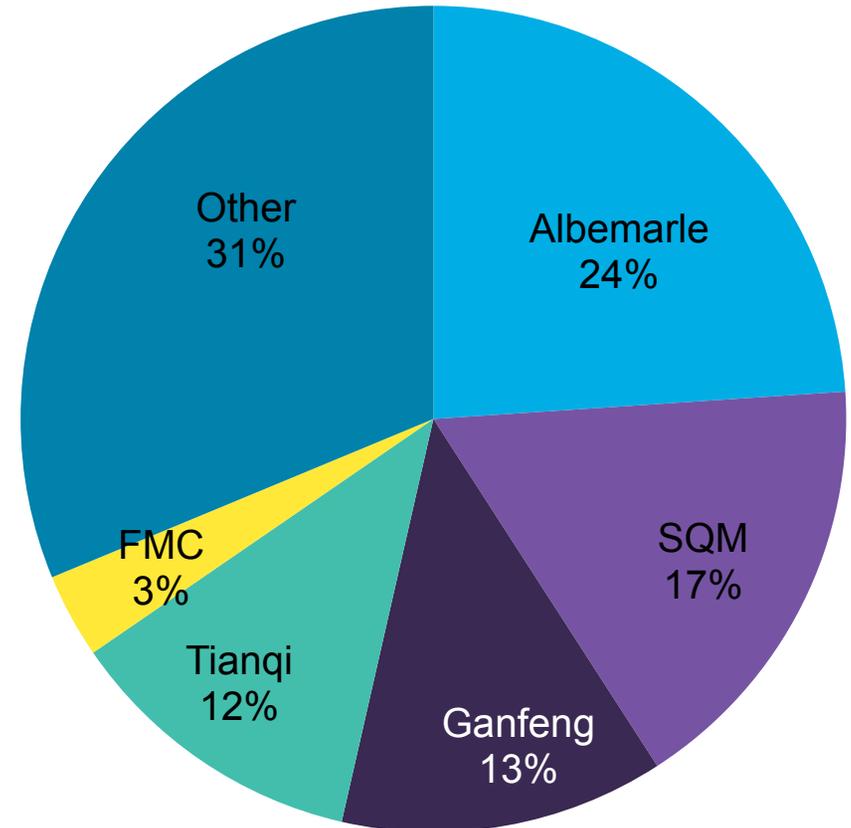
A small number of miners control production



2018 expected market share of mined production



Refined lithium market shares, 2017

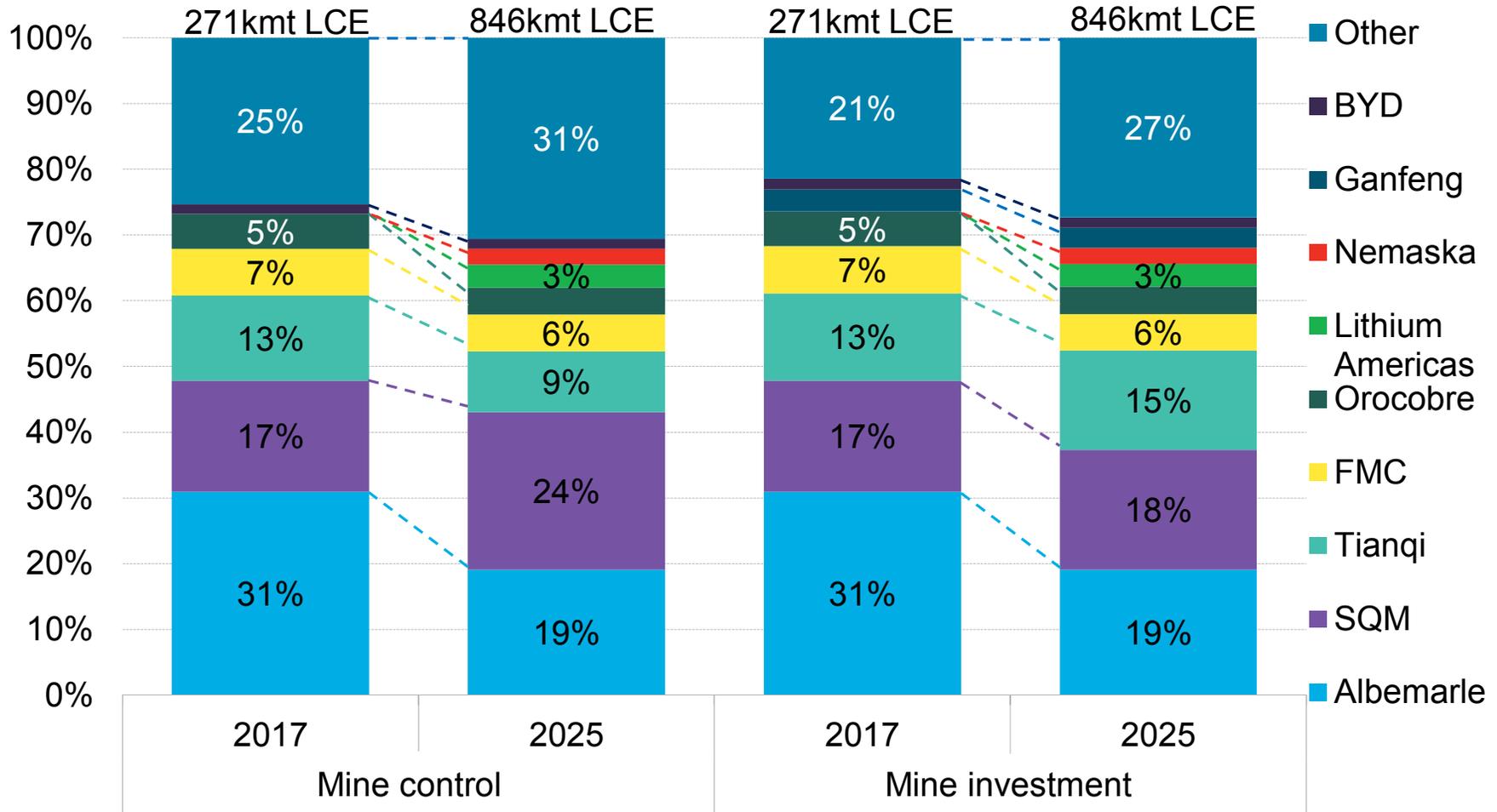


Source: BloombergNEF

Source: BloombergNEF

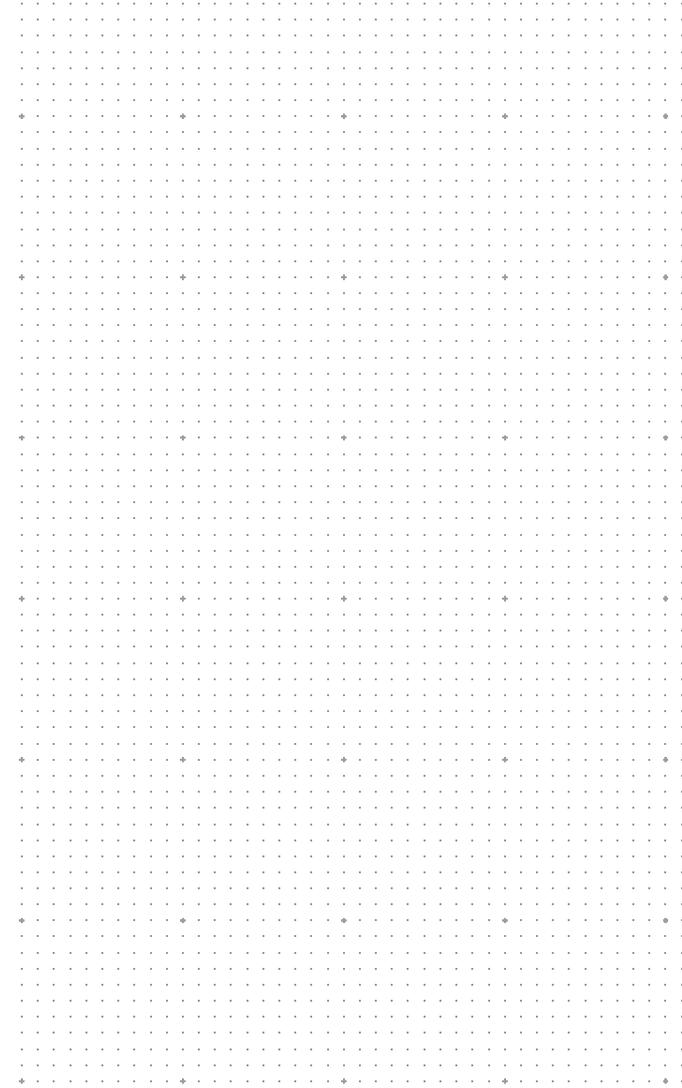
Financial control over assets is more consolidated

Lithium mining control, 2017 & 2025

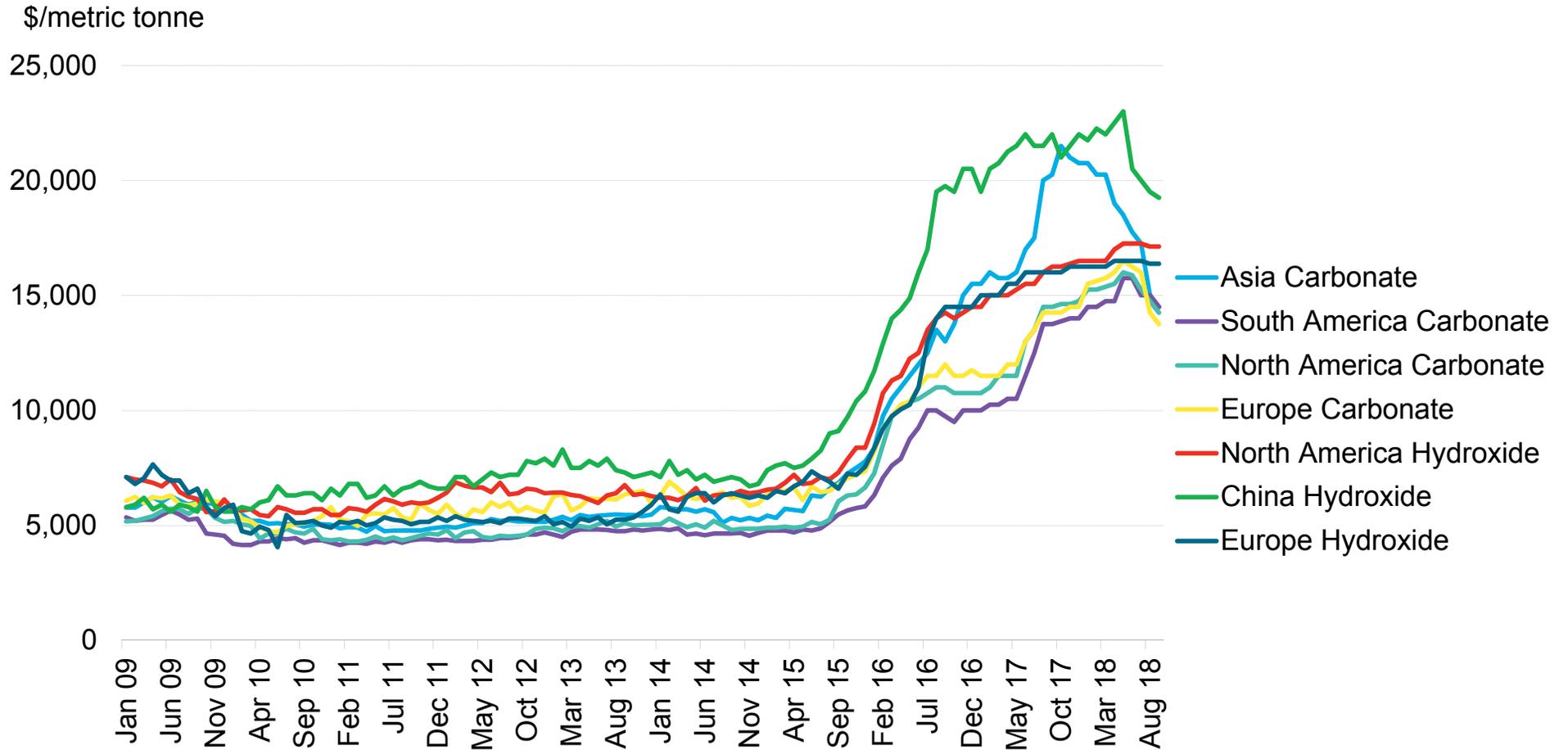


Source: Bloomberg NEF, Company reports Note: Mine investment in 2025 assumes Tianqi's 24% investment in SQM is approved. Mine investment excludes investments from non-miners.

Lithium pricing dynamics



The lithium price spike has begun to level off



Source: Benchmark Mineral Intelligence, Bloomberg NEF

Lithium pricing dynamics

Where does that leave geothermal brines?



John L. Featherstone Geothermal Power Plant on the Salton Sea in California's Imperial Valley



Source: [PowerMag](#), [EnergySource](#)

Copyright and disclaimer

The Bloomberg NEF ("BNEF"), service/information is derived from selected public sources. Bloomberg Finance L.P. and its affiliates, in providing the service/information, believe that the information it uses comes from reliable sources, but do not guarantee the accuracy or completeness of this information, which is subject to change without notice, and nothing in this document shall be construed as such a guarantee. The statements in this service/document reflect the current judgment of the authors of the relevant articles or features, and do not necessarily reflect the opinion of Bloomberg Finance L.P., Bloomberg L.P. or any of their affiliates ("Bloomberg"). Bloomberg disclaims any liability arising from use of this document, its contents and/or this service. Nothing herein shall constitute or be construed as an offering of financial instruments or as investment advice or recommendations by Bloomberg of an investment or other strategy (e.g., whether or not to "buy", "sell", or "hold" an investment). The information available through this service is not based on consideration of a subscriber's individual circumstances and should not be considered as information sufficient upon which to base an investment decision. You should determine on your own whether you agree with the content. This service should not be construed as tax or accounting advice or as a service designed to facilitate any subscriber's compliance with its tax, accounting or other legal obligations. Employees involved in this service may hold positions in the companies mentioned in the services/information.

The data included in these materials are for illustrative purposes only. The BLOOMBERG TERMINAL service and Bloomberg data products (the "Services") are owned and distributed by Bloomberg Finance L.P. ("BFLP") except that Bloomberg L.P. and its subsidiaries ("BLP") distribute these products in Argentina, Australia and certain jurisdictions in the Pacific islands, Bermuda, China, India, Japan, Korea and New Zealand. BLP provides BFLP with global marketing and operational support. Certain features, functions, products and services are available only to sophisticated investors and only where permitted. BFLP, BLP and their affiliates do not guarantee the accuracy of prices or other information in the Services. Nothing in the Services shall constitute or be construed as an offering of financial instruments by BFLP, BLP or their affiliates, or as investment advice or recommendations by BFLP, BLP or their affiliates of an investment strategy or whether or not to "buy", "sell" or "hold" an investment. Information available via the Services should not be considered as information sufficient upon which to base an investment decision. The following are trademarks and service marks of BFLP, a Delaware limited partnership, or its subsidiaries: BLOOMBERG, BLOOMBERG ANYWHERE, BLOOMBERG MARKETS, BLOOMBERG NEWS, BLOOMBERG PROFESSIONAL, BLOOMBERG TERMINAL and BLOOMBERG.COM. Absence of any trademark or service mark from this list does not waive Bloomberg's intellectual property rights in that that name, mark or logo. All rights reserved. © 2018 Bloomberg.

Bloomberg NEF (BNEF) is a leading provider of primary research on clean energy, advanced transport, digital industry, innovative materials, and commodities.

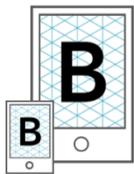
BNEF's global team leverages the world's most sophisticated data sets to create clear perspectives and in-depth forecasts that frame the financial, economic and policy implications of industry-transforming trends and technologies.

BNEF research and analysis is accessible via web and mobile platforms, as well as on the Bloomberg Terminal.

Coverage.

- Clean energy
- Advanced transport
- Commodities
- Digital industry

Get the app



On IOS + Android
about.bnef.com/mobile

BloombergNEF

Client enquiries:

Bloomberg Terminal: press <Help> key twice
Email: support.bnef@bloomberg.net

Learn more:

about.bnef.com | [@BloombergNEF](https://twitter.com/BloombergNEF)