PURE ENERGY MINERALS

LITHIUM MARKETS AND MINING

It's Not Just the Metal

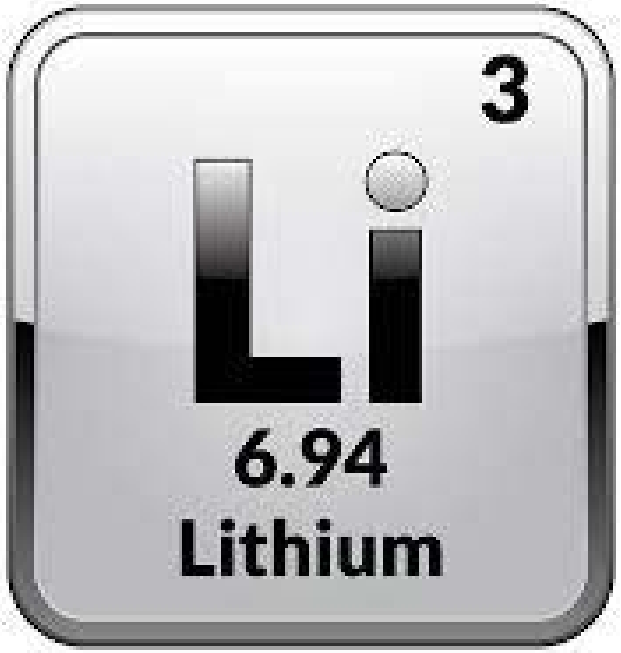
Walter Weinig

SME Colorado Section & CSM Student Section

November 15, 2018

OUTLINE

- Lithium demand dynamics
- Lithium end products
- Sources and exploration
- Extraction and production
- Cost curve



CAUTIONARY STATEMENT

Certain statements contained in this presentation, including all statements that are not historical facts, contain forward-looking statements and forward-looking information within the meaning of applicable securities laws ("forward-looking information"). Such forward-looking information includes, but is not limited to, statements or information with the respect to the overall objectives and strategic plans, work programs, exploration budgets and targets and mineral resource estimates of Pure Energy Minerals Limited ("Pure Energy" or the "Company") . Readers should review all of the Company's public disclosure including its most recent Annual Information Form and the risk factors contained therein, the technical reports on its properties, and its audited financial statements and Management's Discussion and Analysis (MD&A), all as filed on www.sedar.com from time to time.

Forward-looking information includes, but is not limited to, statements related to activities, events or developments that the Company expects or anticipates will or may occur in the future, including, without limitation; statements related to the Company's release of the PEA Technical Report ("PEA") for the Clayton Valley Lithium Project ("Project"); the economic analysis of the Project; the mineral resource estimate for the Project; the estimated annual production of $LiOH\text{-}H_2O$ and LCE; the availability and development of more sustainable technologies for use at the Project; the expected mine life; the estimated NPV of the Project; the estimated IRR of the Project; estimated average operating costs; estimated capital costs; estimated EBITDA; the estimated payback period for the Project; the estimated timeline for construction of the Project; the estimated production schedule at the Project; anticipated chemistry of brines at the Project; expected growth in the market for lithium hydroxide; anticipated changes in battery formulation technologies; estimated market prices for lithium hydroxide; anticipated lithium recovery levels at the Project; expected pilot plant testing at the Project; design work at the Project; and the development of a timeline for completion of a feasibility study for the Project. Forward-looking information is often identified by the use of words such as "plans", "planning", "planned", "expects" or "looking forward", "does not expect", "continues", "scheduled", "estimates", "forecasts", "intends", "potential", "anticipates", "does not anticipate", or "belief", or describes a "goal", or variation of such words and phrases or states that certain actions, events or results "may", "could", "would", "might" or "will" be taken, occur or be achieved. Forward-looking information is based on a number of factors and assumptions made by management and considered reasonable at the time such information is provided. Forward-looking information involves known and unknown risks, uncertainties and other factors that may cause the actual results, performance, or achievements to be materially different from those expressed or implied by the forward-looking information.

A number of other factors may adversely impact Pure Energy and the Project, including: the Company's inability to complete further mineral resource and mineral reserve estimates; the inability to complete a subsequent feasibility study; the inability to anticipate changes in brine volume or grade due a number of factors; changes to the economic analysis; the failure to obtain necessary permits to explore and develop the Project; environmental issues or delays; inability to successfully complete additional drilling at the Project; and inability to obtain financing for future exploration and development work and construction of a plant at the Project. Although Pure Energy has attempted to identify important factors that could cause actual actions, events, or results to differ materially from those described in the forward-looking information, there may be other factors that cause actions, events, or results not to be as anticipated, estimated, or intended. There can be no assurance that forward-looking information will prove to be accurate. The forward-looking information contained herein is presented for the purpose of assisting investors in understanding the Company's plan, objectives, and goals and may not be appropriate for other purposes. Accordingly, readers should not place undue reliance on forward-looking information. Pure Energy does not undertake to update any forward-looking information, except in accordance with applicable securities laws.

Mineral resources which are not mineral reserves do not have demonstrated economic viability. The category of inferred resource is the least reliable resource category and is subject to the most variability. Until mineral reserves and resources are actually mined and processed, the quantity of mineral reserve and resource grades must be considered as estimates only. Patrick Highsmith MSc., CPG., is a qualified person as defined by NI 43-101, and has supervised the preparation of the scientific and technical information that forms the basis for this presentation. Mr. Highsmith is not independent of the Company as he is a director.

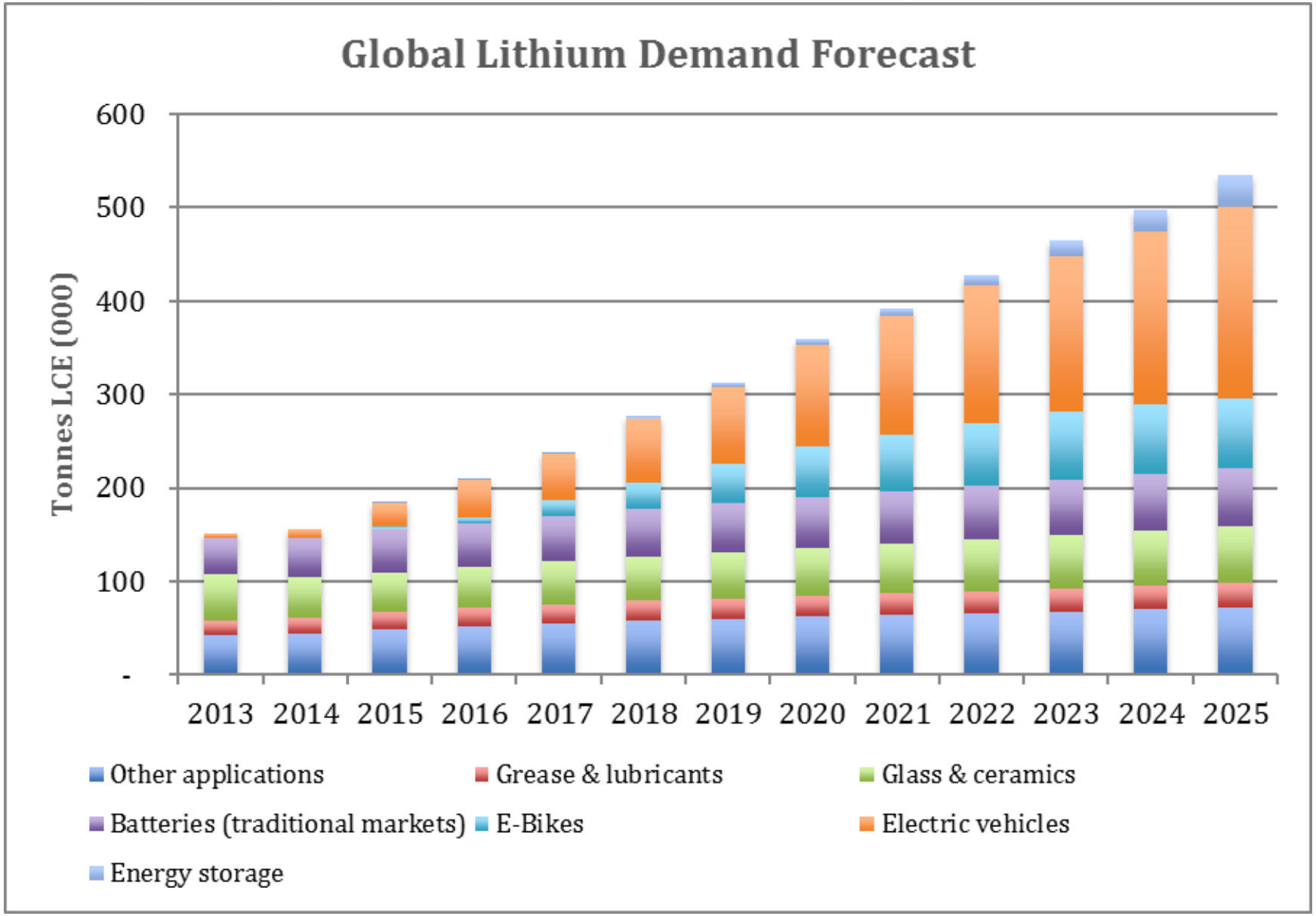
CAUTIONARY STATEMENT (cont.)

The PEA is based upon a process flow sheet that may change, which would impact all costs and estimates. Operating costs for the Project were based upon assumptions including future energy costs, water costs, labor, regulatory costs and other variables that are likely to change. Capital costs were based upon plant equipment and other items thought to be necessary for production. Lithium hydroxide monohydrate price forecasts were based upon third-party estimates and management assumptions that may change due to market dynamics. Changes in estimated costs to acquire, construct, install, or operate the equipment, or changes in projected pricing, may adversely impact Project economics.

The economic analysis included in the PEA is based upon inferred mineral resources only. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The PEA is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the Project envisioned by this PEA will be realized. The mineral resource estimates, upon which the PEA is based, rely upon assumptions outlined in the “Resource Estimate” section of the technical report relating to the PEA. Some figures in the resource estimate may have been calculated using a factor to convert short tons to metric tonnes.

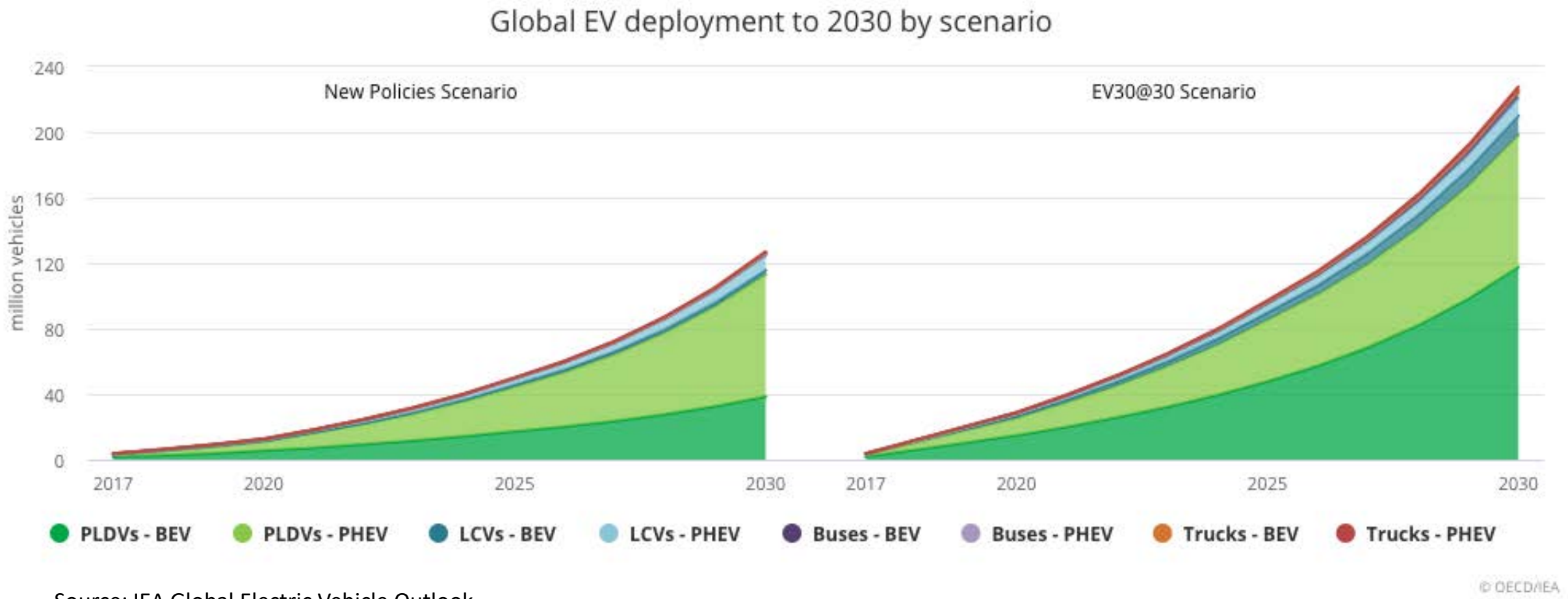
Mineral resources which are not mineral reserves do not have demonstrated economic viability. The category of inferred resource is the least reliable resource category and is subject to the most variability. Until mineral reserves and resources are actually mined and processed, the quantity of mineral reserve and resource grades must be considered as estimates only. Patrick Highsmith MSc., CPG., is a qualified person as defined by NI 43-101, and has supervised the preparation of the scientific and technical information that forms the basis for this presentation. Mr. Highsmith is not independent of the Company as he is a director.

DEMAND BY END USE - 500 KT TOTAL DEMAND BY 2025? SO LAST YEAR…



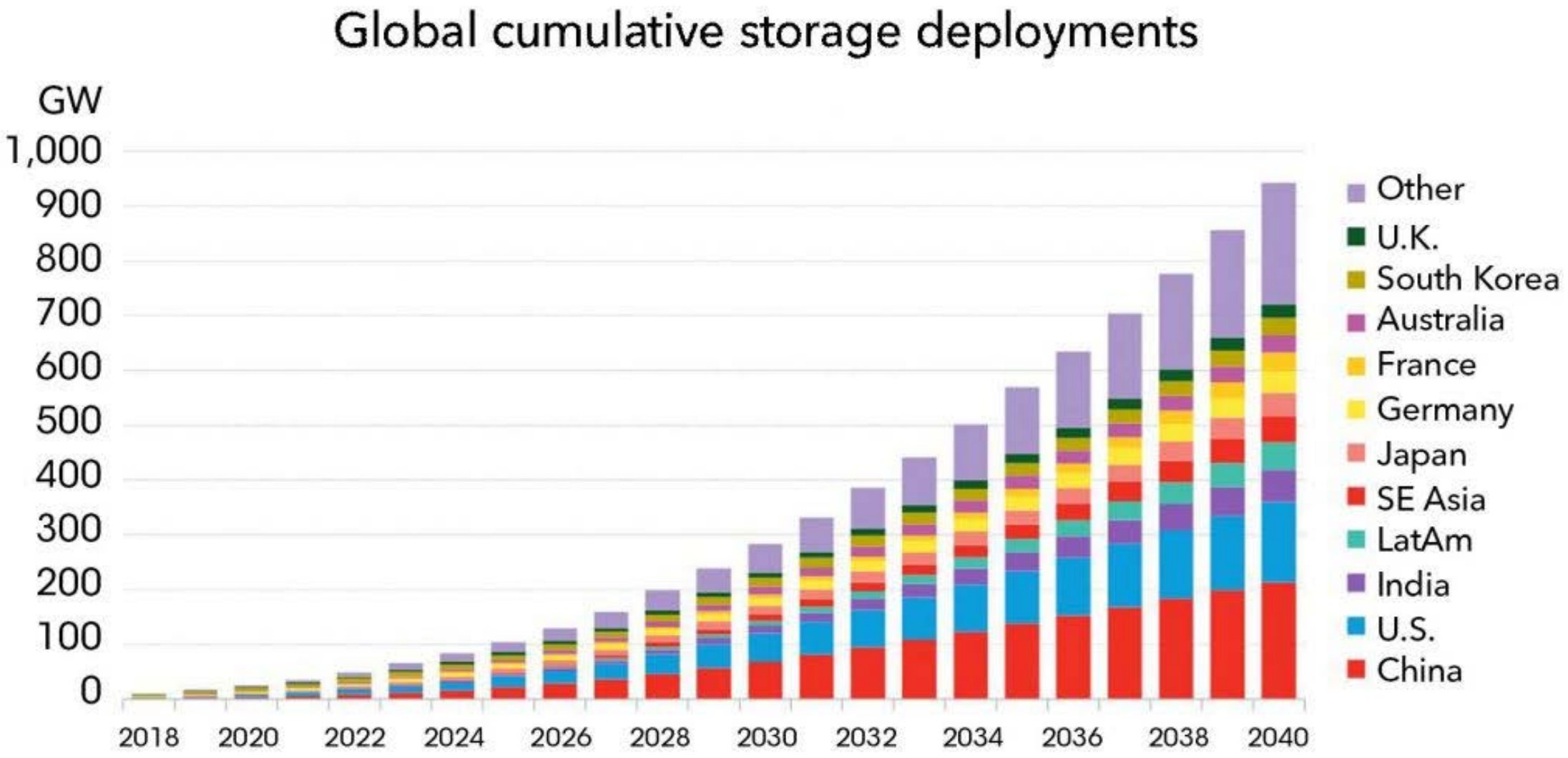
Benchmark Mineral Intelligence, Lithium Hydroxide Market Forecast, April, 2017

GLOBAL EV MARKET DRIVES GROWTH IN BATTERY DEMAND…



Source: IEA Global Electric Vehicle Outlook

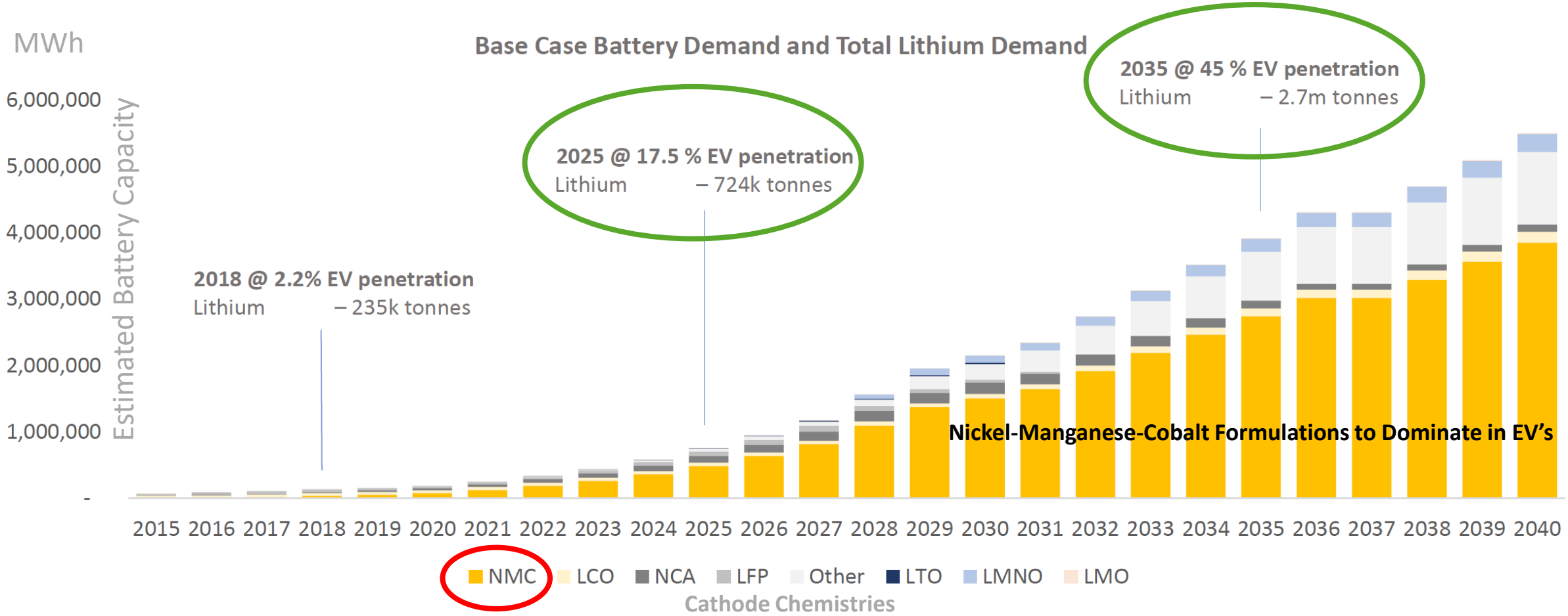
AND GRID STORAGE IS COMING ON STRONG



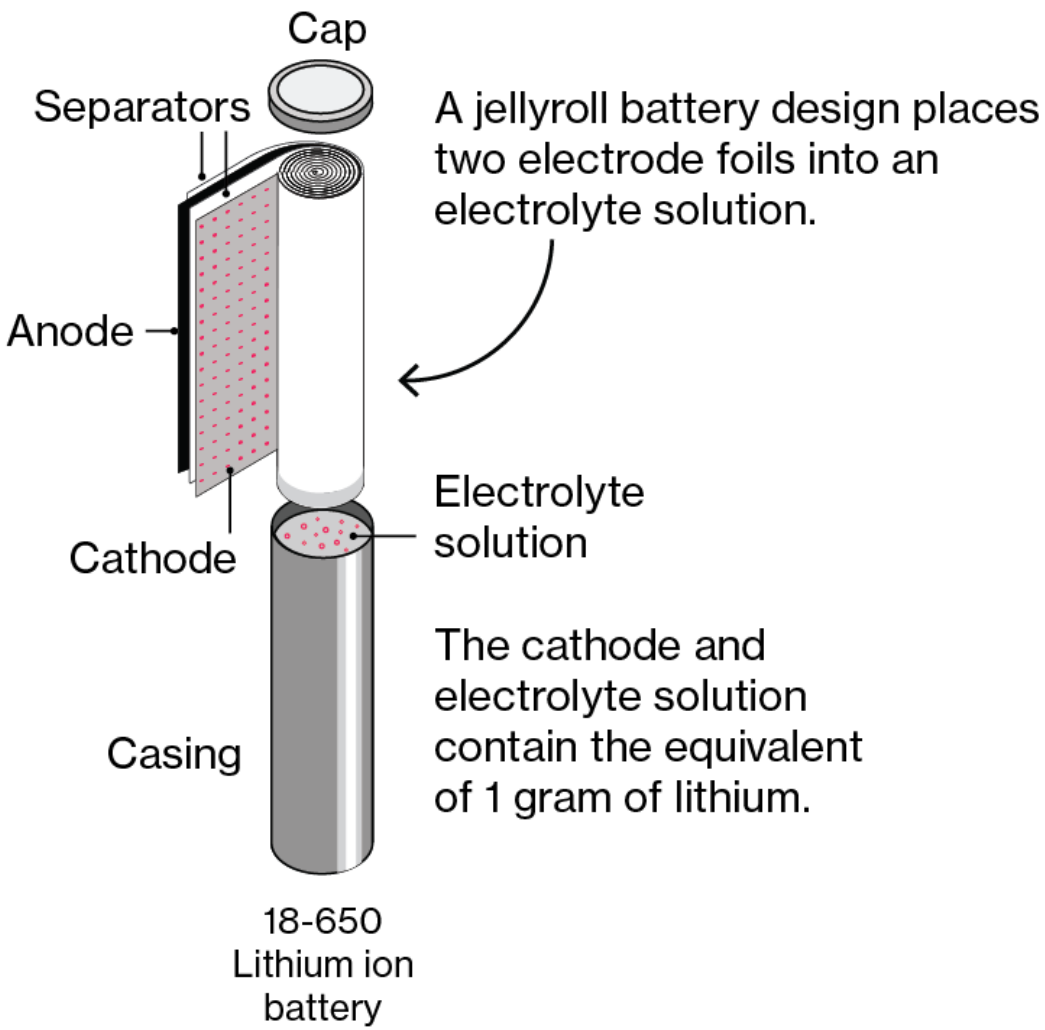
Source: BloombergNEF

THE BATTERY BUSINESS IS **GROWING AND RELYING ON LITHIUM**

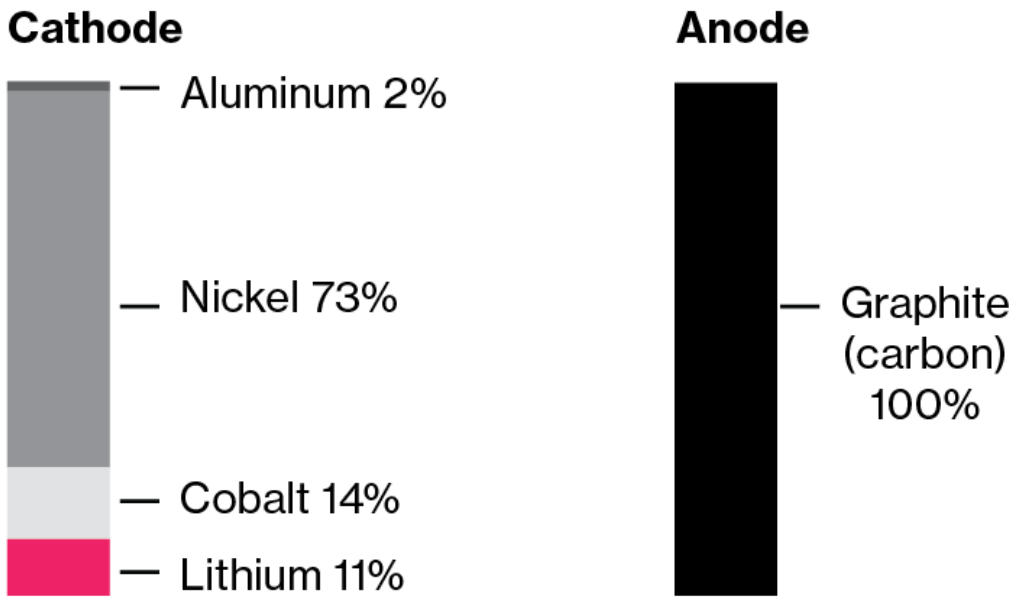
THE SMART FORECASTERS SEE THE MOVE TO NMC CATHODES AND LITHIUM HYDROXIDE



COMPONENTS OF A LITHIUM ION BATTERY

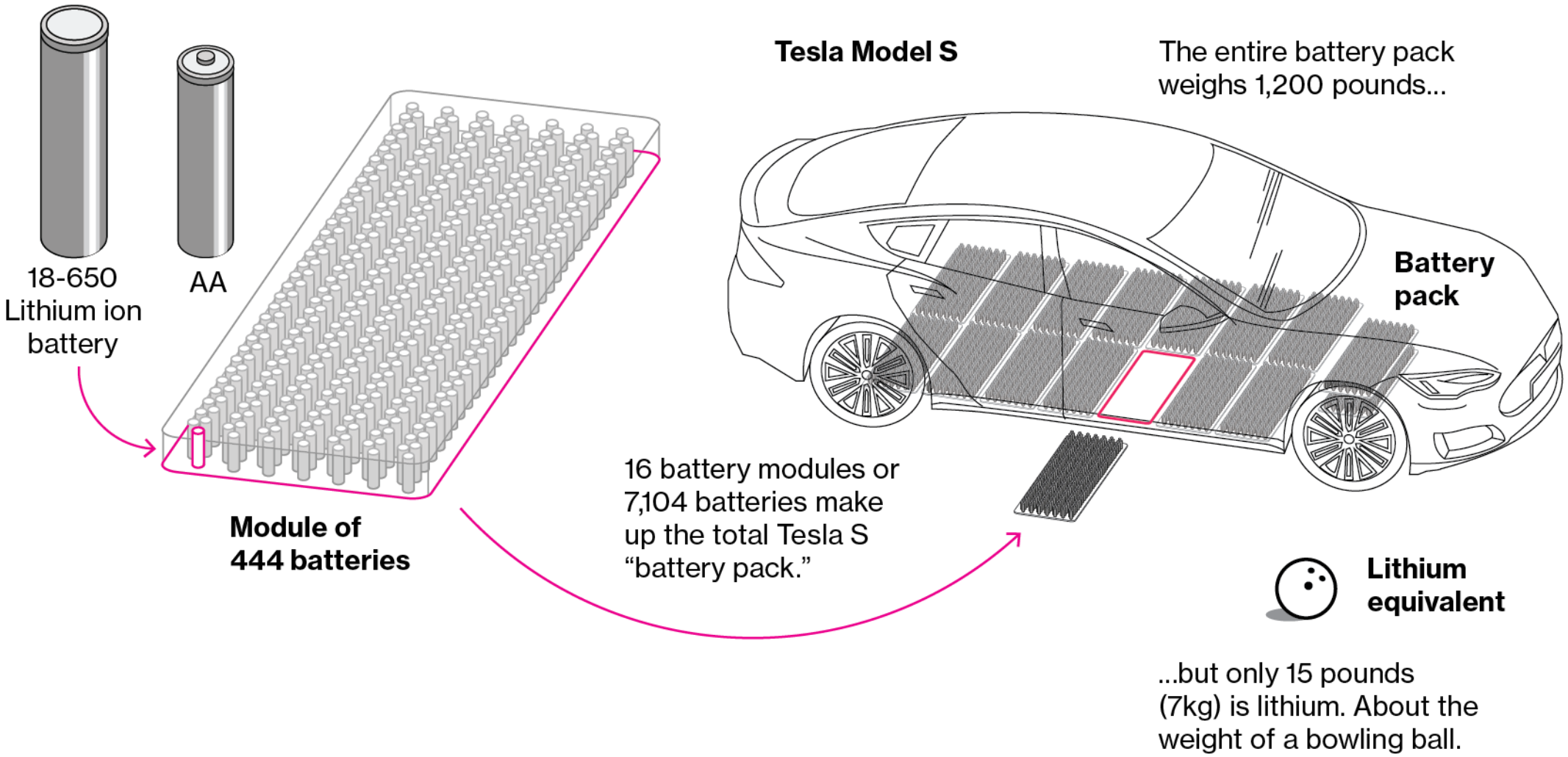


Active materials in a typical Lithium Nickel Cobalt Aluminum Oxide battery



Source: Bloomberg

HOW EV BATTERIES ARE DEPLOYED



Source: Bloomberg

LITHIUM COMPOUNDS ARE THE REAL PRODUCT

PURE ENERGY MINERALS

NEMASKA LITHIUM

Lithium Demand Per Product 2016 - 2031

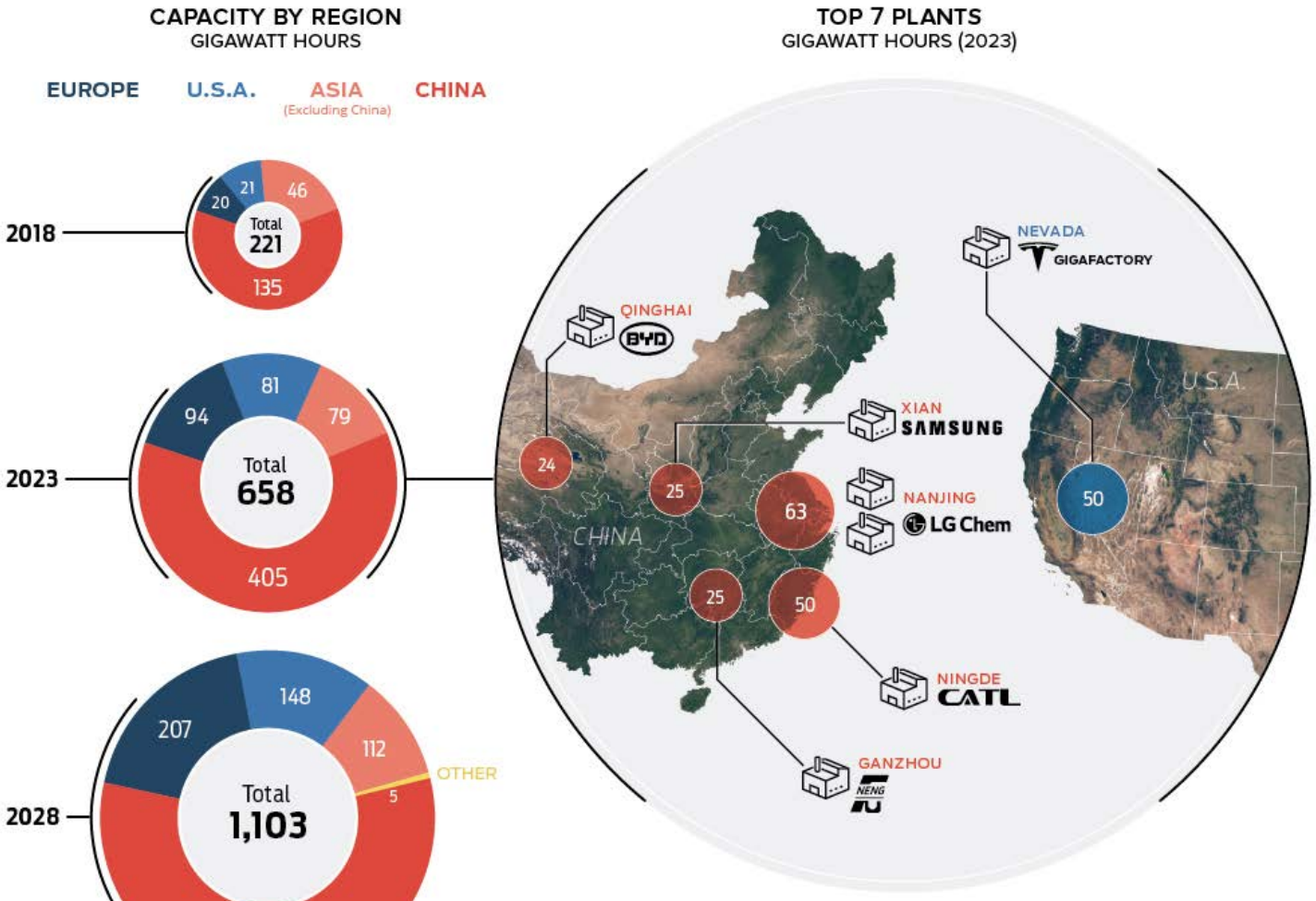
	2016	2021	2023	2026	2031	CAGR '16-'31 (%)
Battery-grade carbonate	**72,200**	**150,600**	**202,100**	**314,200**	**460,100**	**13.1**
Technical-grade mineral conc.	37,500	42,100	44,100	47,300	53,100	2.3
Technical-grade carbonate	**27,000**	**30,400**	**31,900**	**34,200**	**38,600**	**2.4**
Technical-grade hydroxide	**14,100**	**15,200**	**15,700**	**16,400**	**17,700**	**1.5**
Battery-grade hydroxide	**11,700**	**78,600**	**170,800**	**549,900**	**1,605,500**	**38.8**
Butylithium	9,200	10,700	11,300	12,400	14,400	3.0
Battery-grade metal	4,300	6,200	7,200	9,500	14,200	8.3
Bromide	4,200	4,900	5,200	5,700	6,600	3.1
Other[1]	16,900	18,000	18,600	19,300	20,800	1.3
Total	**197,100**	**356,700**	**506,900**	**1,008,900**	**2,231,000**	**17.6**
High	-	**423,900**	**670,343**	**1,633,900**	**4,509,400**	**23.6**
Low	-	**316,500**	**425,423**	**776,900**	**1,583,700**	**14.7**

Source: Roskill estimates

Note: 1 - Includes some of the products above that have not been differentiated from the total

Source: Roskill Marketing Review on Nemaska Lithium, 19th of February 2018

MUCH MORE THAN JUST TESLA! 1.1 TWh ANNOUNCED (SO FAR)



In just a decade, global lithium-ion battery production capacity will increase **399%** to surpass the **1 TWh** mark.

Data by: BENCHMARK MINERAL INTELLIGENCE

visualcapitalist.com

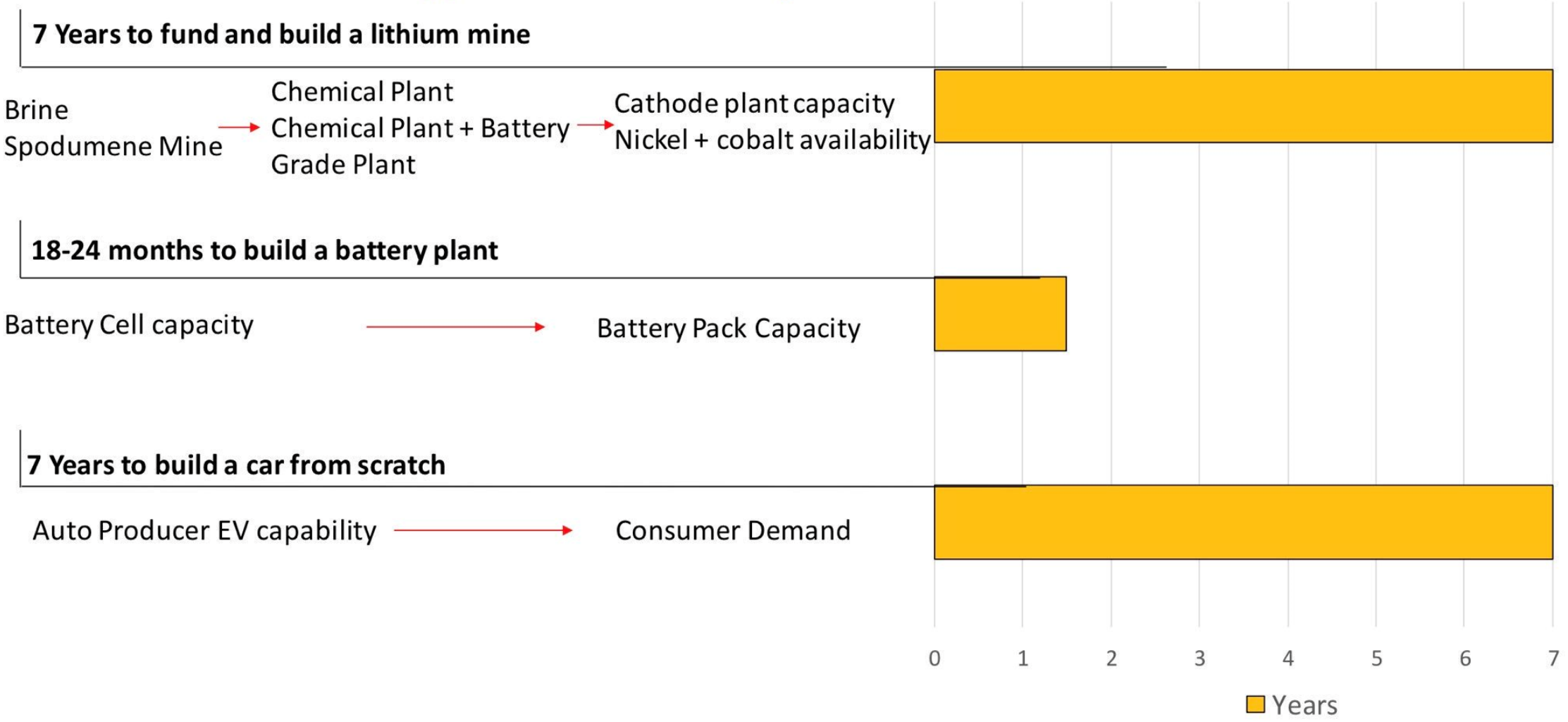
CAN THE SUPPLY CHAIN KEEP UP?

PURE ENERGY MINERALS

BENCHMARK MINERAL INTELLIGENCE

Building the lithium supply chain

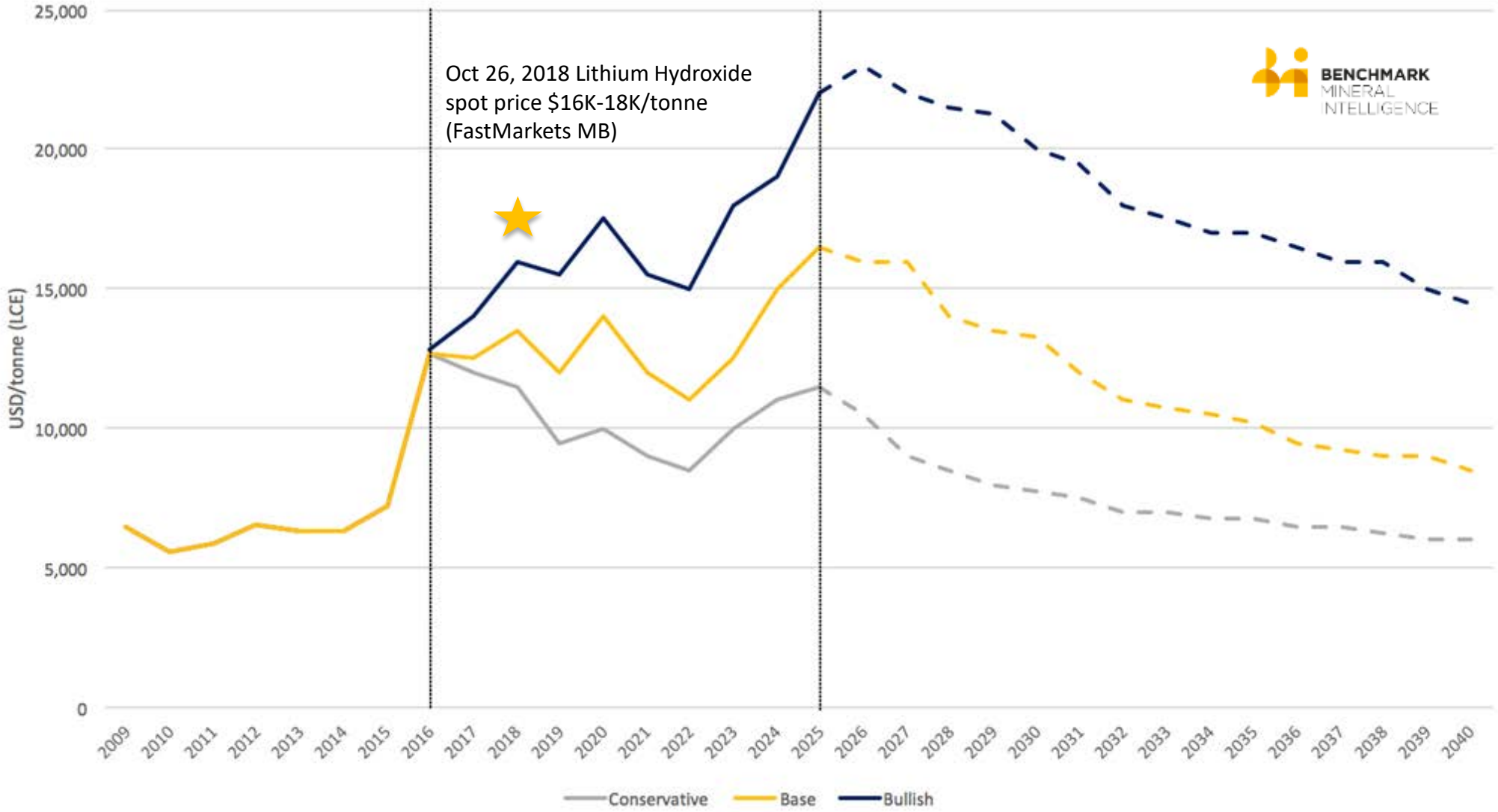
Lithium suppliers need to stay well ahead of the curve



LITHIUM PRICES ARE VOLATILE – BUT THE LONG TERM TRENDS HIGHER

PURE ENERGY MINERALS

Outlook for Lithium Hydroxide Prices, 2017 -2040



Benchmark Mineral Intelligence, Lithium Hydroxide Market Forecast, April, 2017

IN THE BEGINNING, THERE WAS HARD ROCK LITHIUM MINING

Greenbushes, Australia

Highest Grade Lithium Pegmatite in the World:

Drilling, Blasting, Crushing, Grinding…and **exports to China for final processing**

THEN, LITHIUM BRINE CAME ALONG

First primary lithium production from brine in the world - 1967

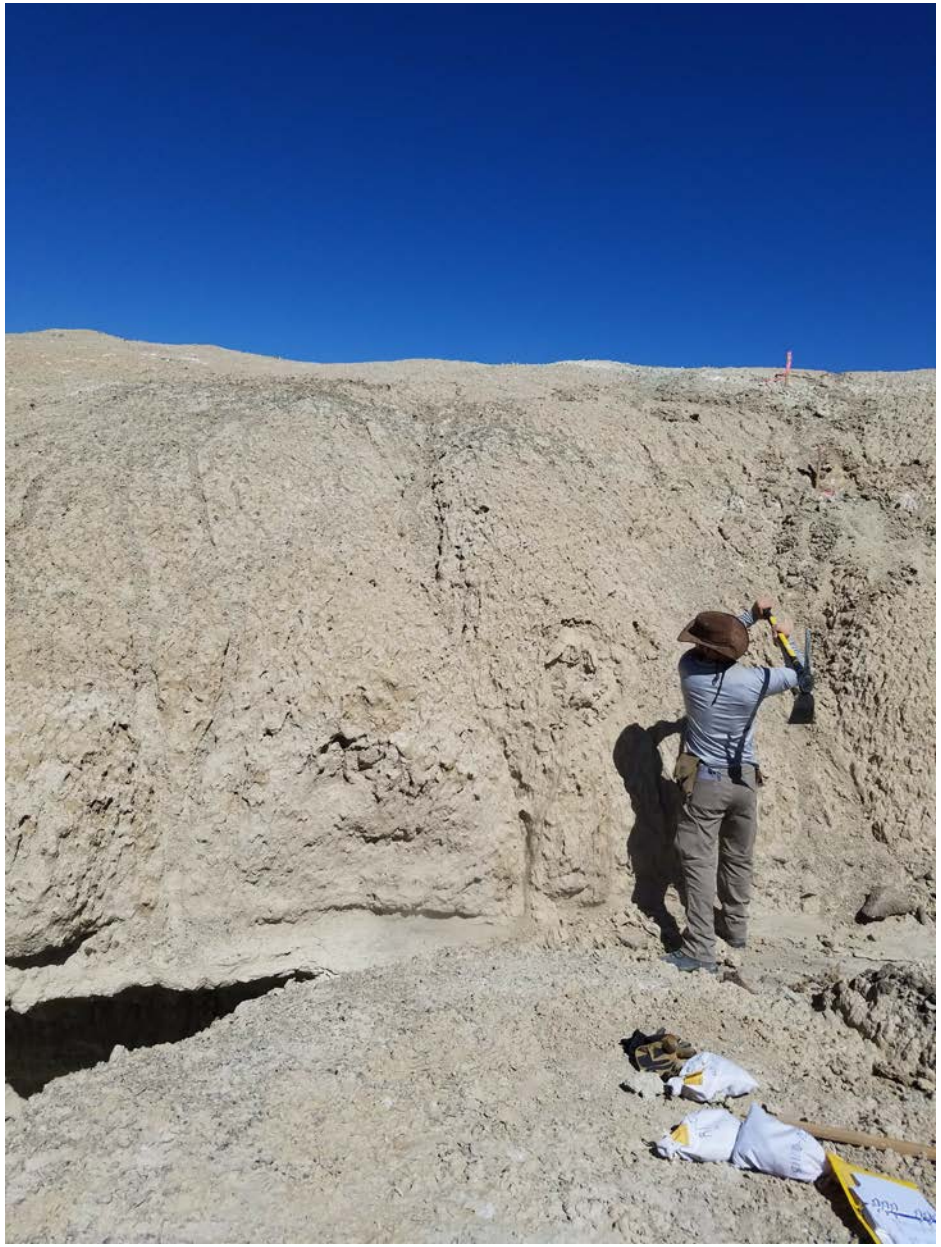
PURE ENERGY MINERALS

CLAYTON VALLEY CLAYSTONE

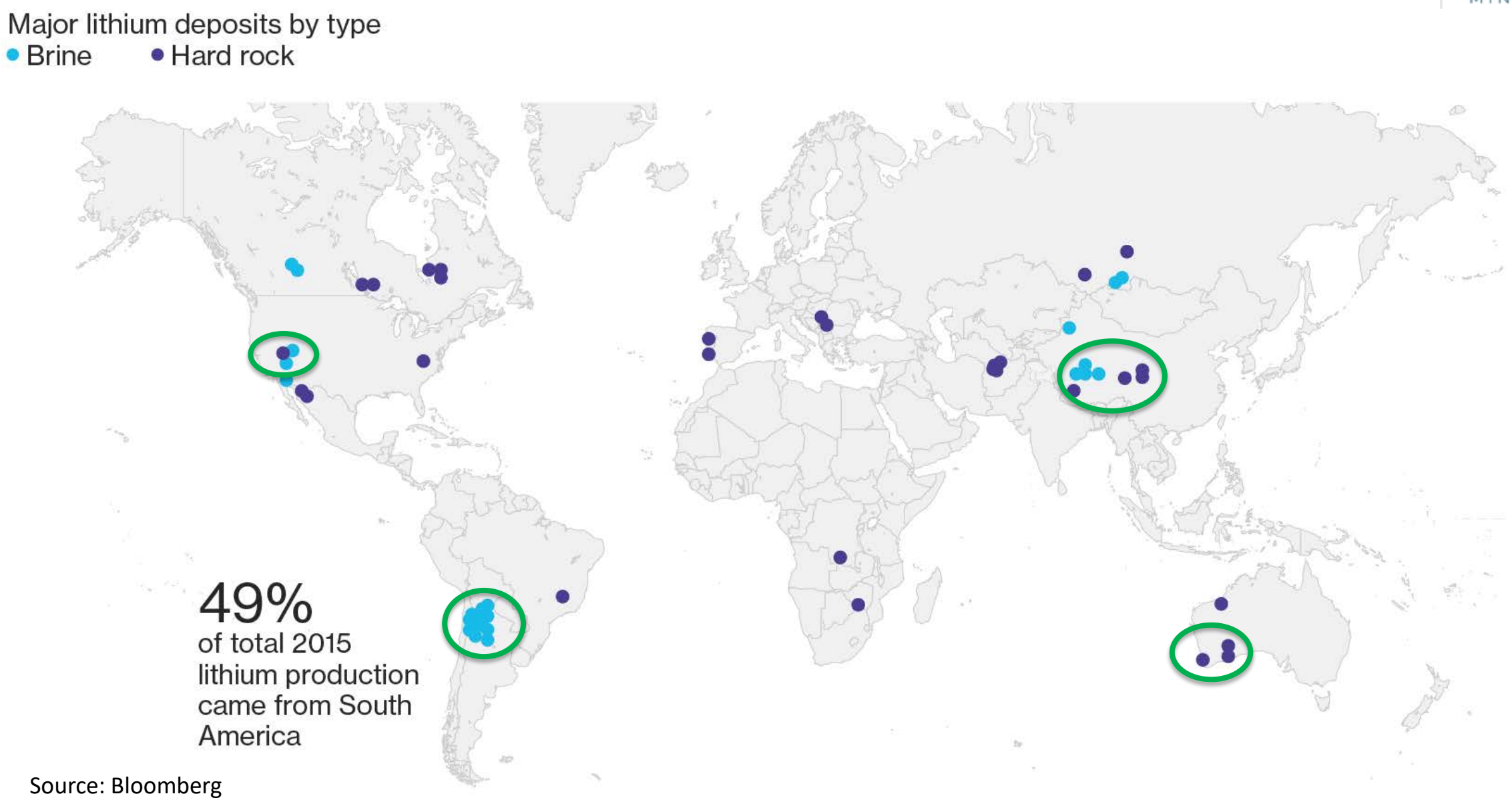
Esmeralda Formation? Not hectorite

At Surface: Extending to >100m

Leachable? Initial results promising

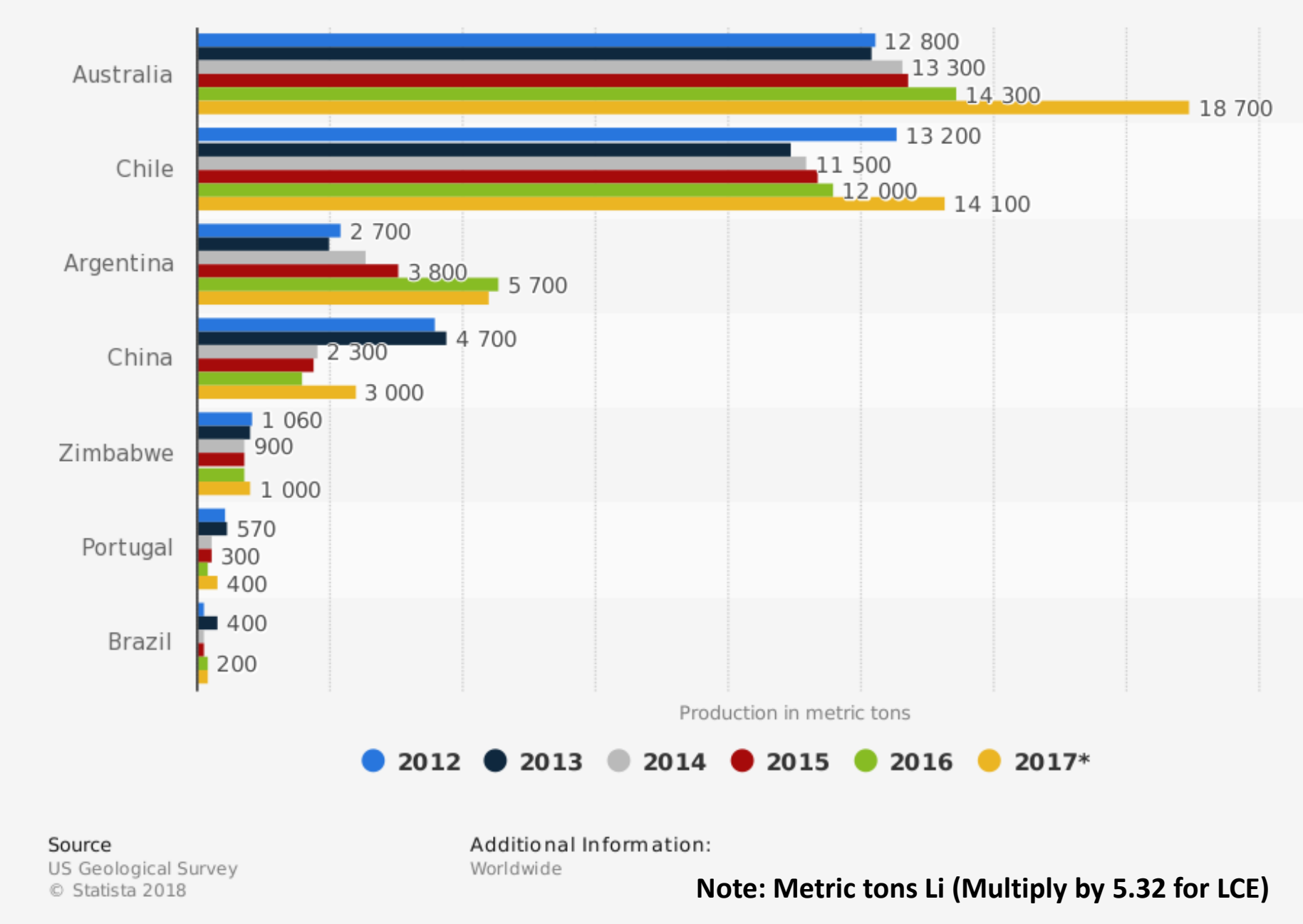


LITHIUM DEPOSITS AROUND THE GLOBE



Source: Bloomberg

MAJOR COUNTRIES IN WORLDWIDE LITHIUM PRODUCTION 2012-2017



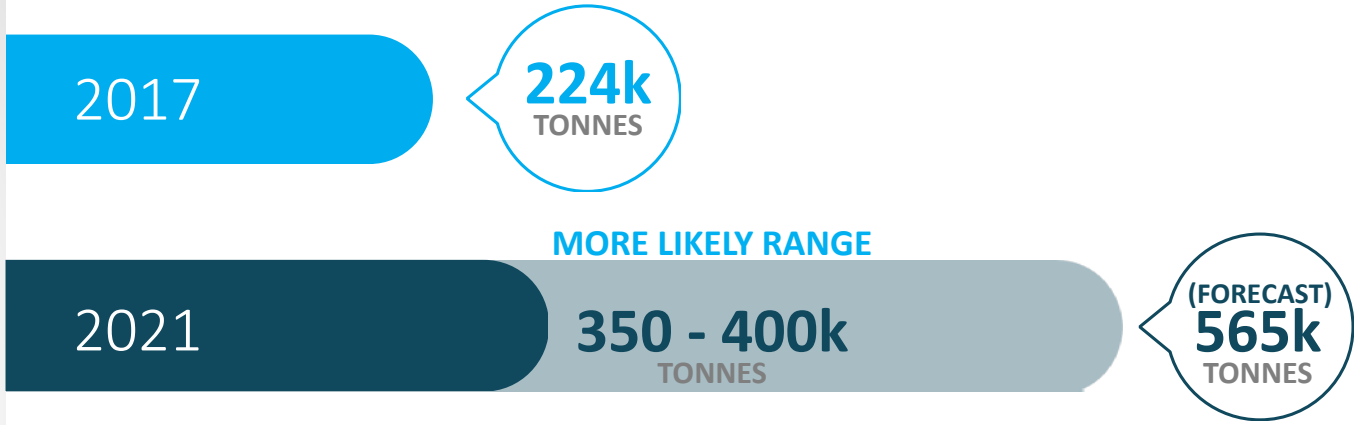
Note: Metric tons Li (Multiply by 5.32 for LCE)

PURE ENERGY MINERALS

MORGAN STANLEY FORECASTS HUGE RAPID GROWTH IN SUPPLY…

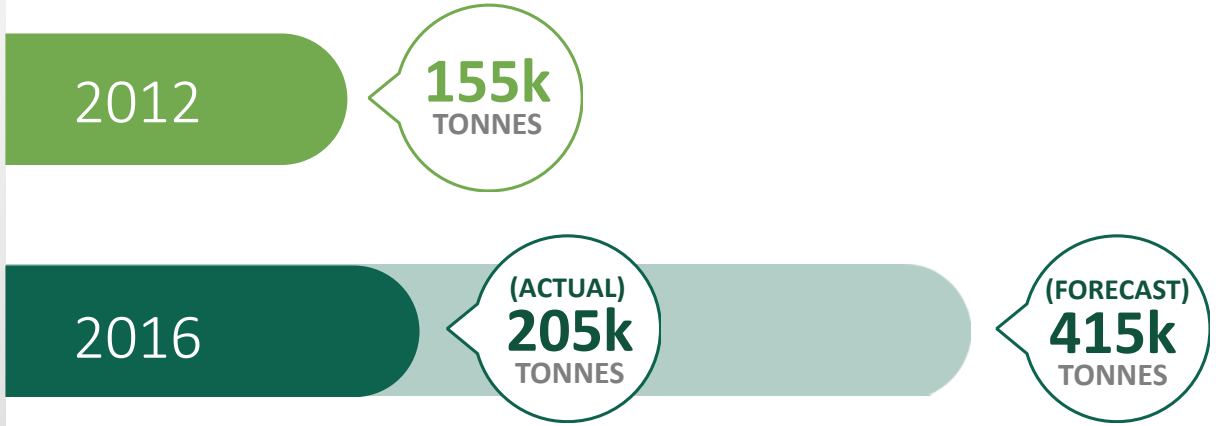
WHAT IF HISTORY REPEATS ITSELF?

Morgan Stanley Forecast Lithium Supply (2017-2021)



ACTUAL SUPPLY IN 2021 AND BEYOND MAY FALL WELL SHORT OF FORECASTS

Historical Lithium Supply Forecast vs. Actual (2012-2016)*



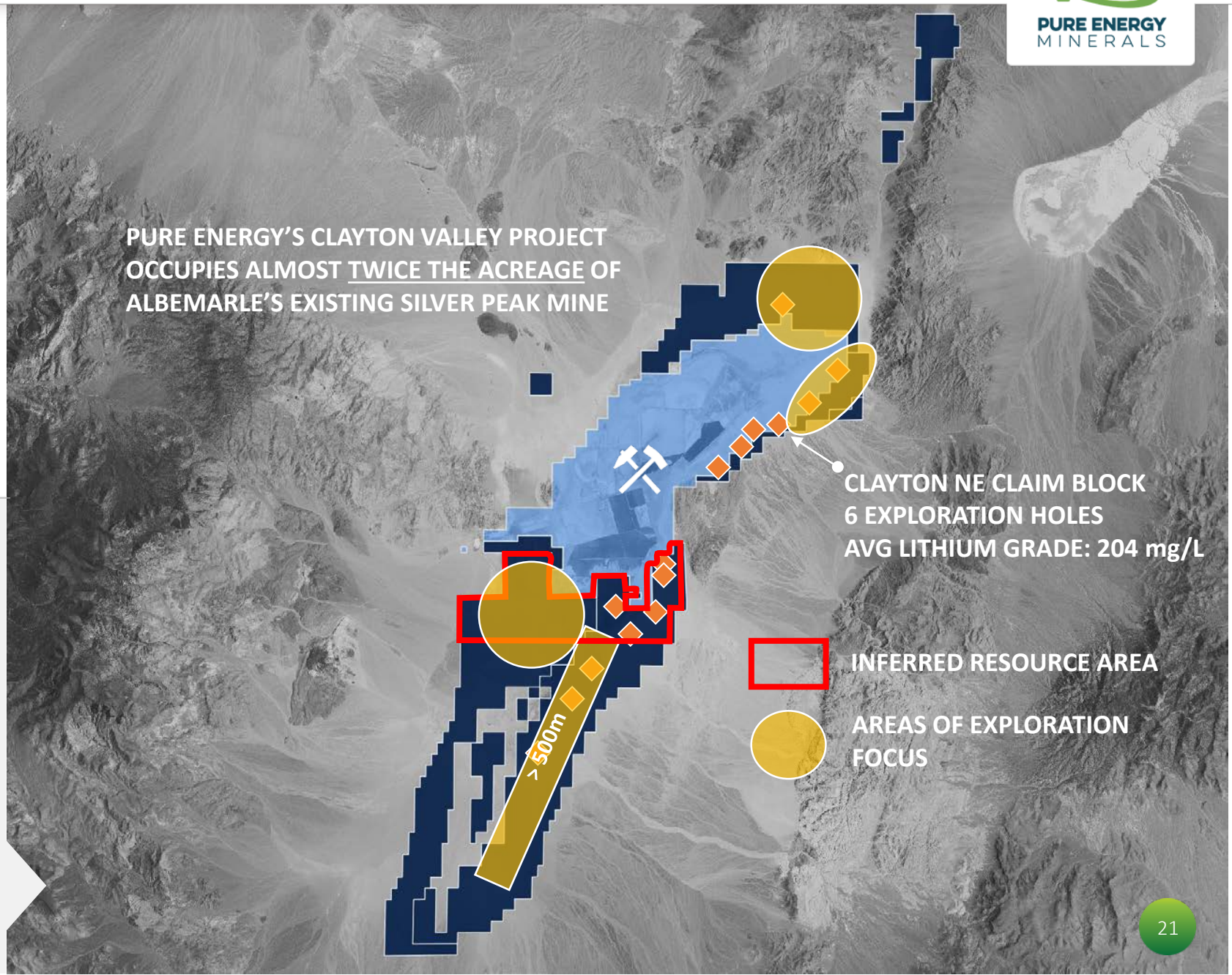
* - Orocobre corporate presentation, May 2017

EXPLORATION AND RESOURCE DEFINITION AT CLAYTON VALLEY

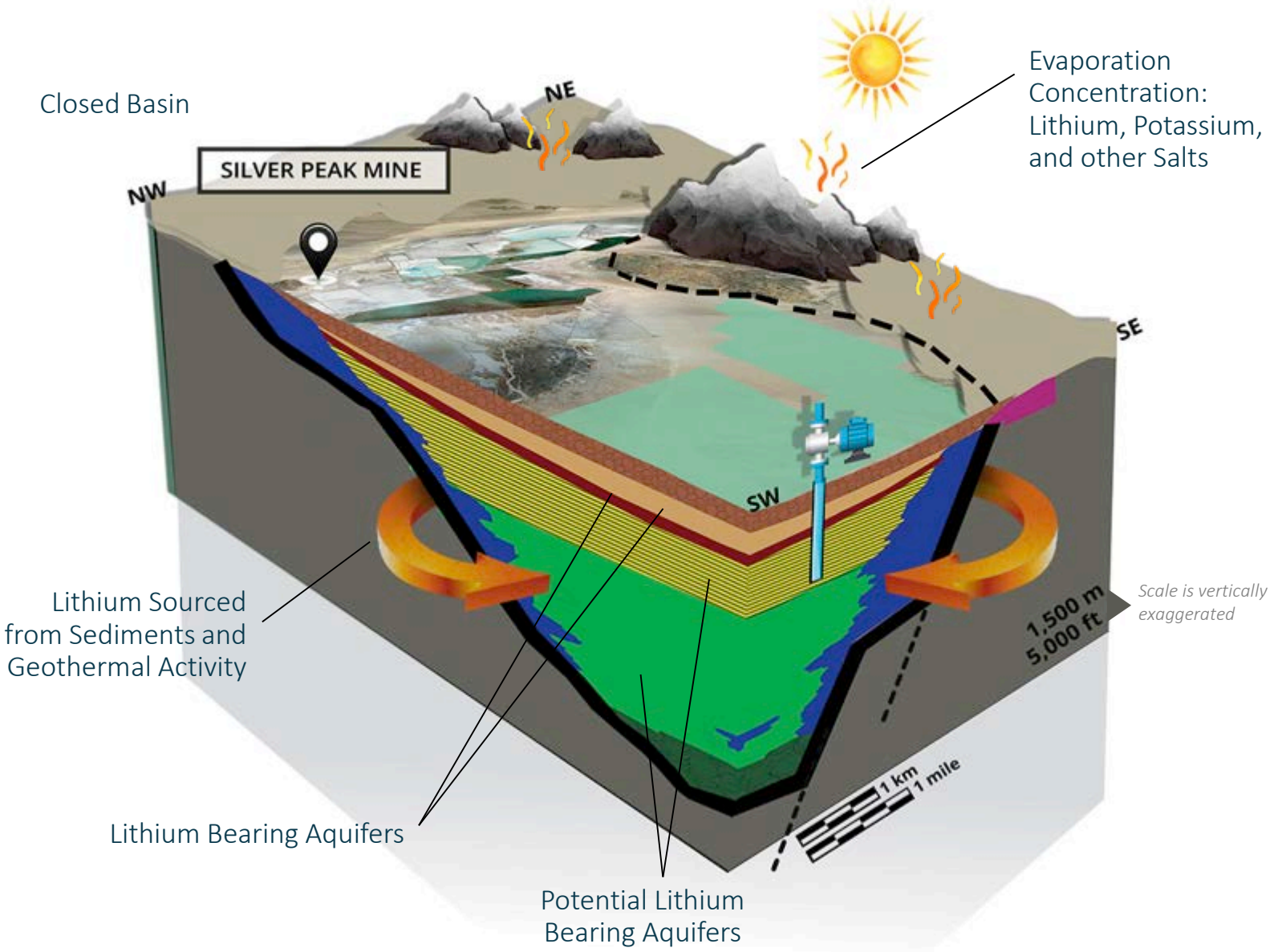
EXPANDED PURE ENERGY CLAIMS:

TOTAL: 23,360 ACRES (9,450 HECTARES)

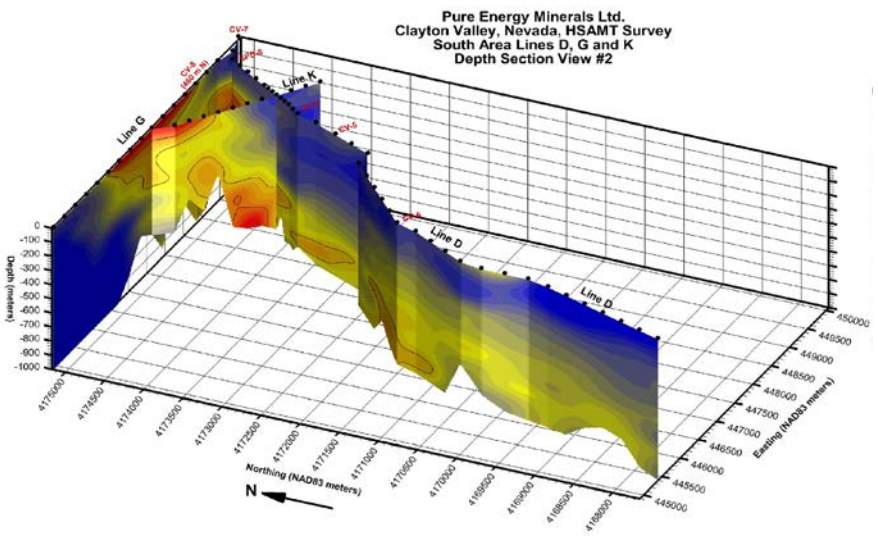
- Pure Energy Claims
- Albemarle Silver Peak Mine (~13,000 Acres)
- Exploration Holes & Wells

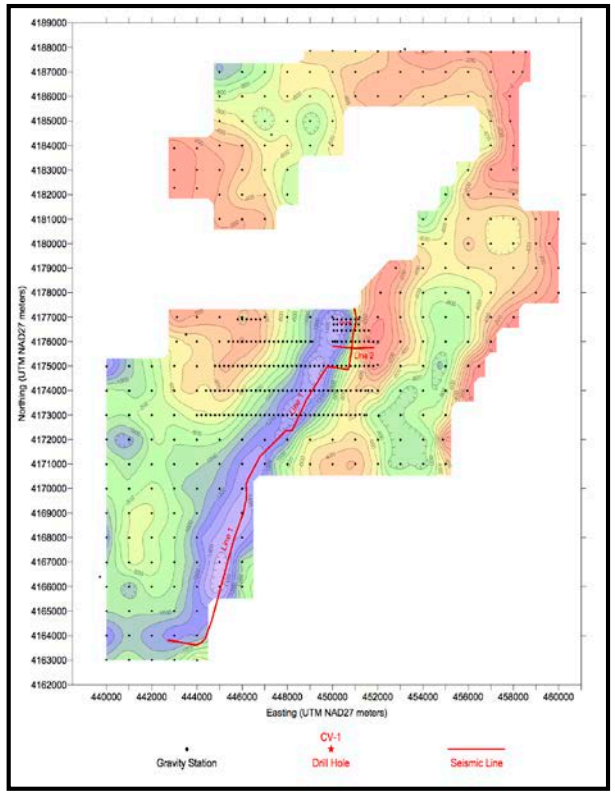


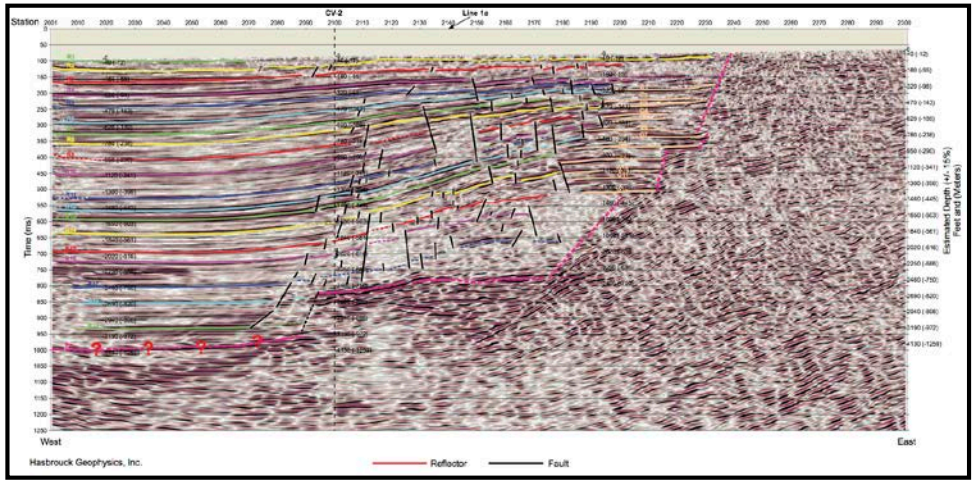
LITHIUM FROM BRINE HAS VERY DIFFERENT BEGINNINGS



EXPLORATION TAKES MANY FORMS

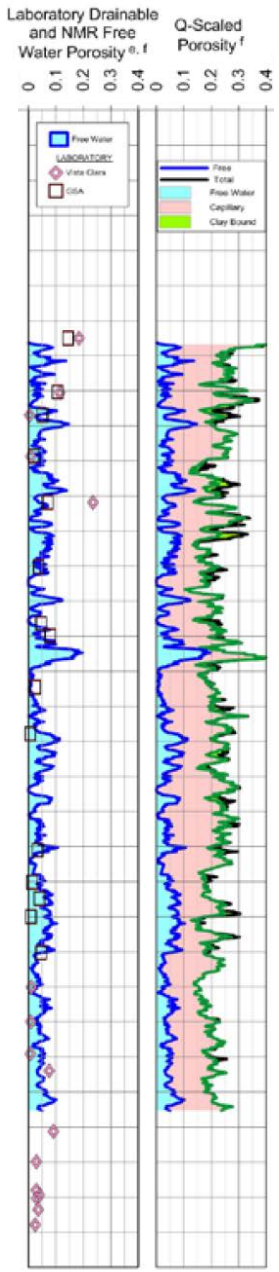






KEY PARAMETER: SPECIFIC YIELD/DRAINABLE POROSITY

PURE ENERGY MINERALS



Downhole NMR and laboratory porosity measurements on CV-8 well

NEW TECHNOLOGY FOR POROSITY LOGGING IN LITHIUM EXPLORATION

Downhole NMR – 4,500 linear feet in 3 wells

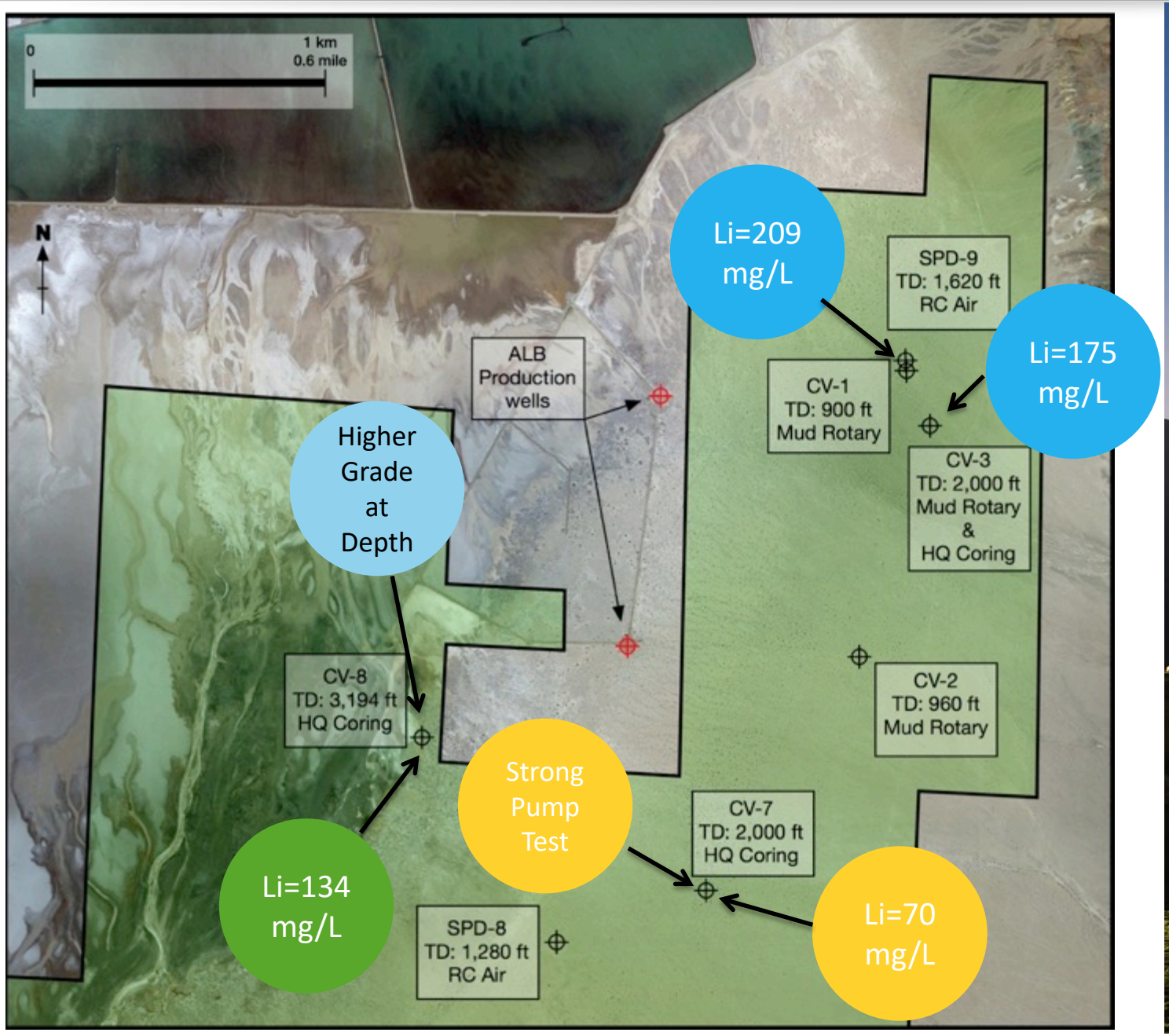
- Nuclear Magnetic Resonance (NMR) measures total and drainable porosity
- Pure Energy leads the way in NMR application to lithium brine
- Takes advantage of water's electromagnetic properties
- High resolution, continuous measurements to depth
- Average measurement 7%

Laboratory Measurement – 73 Samples

- Relative Brine Release Curve (RBRC), two laboratories
- Laboratory NMR
- Physical core samples
- Average measurement 6%

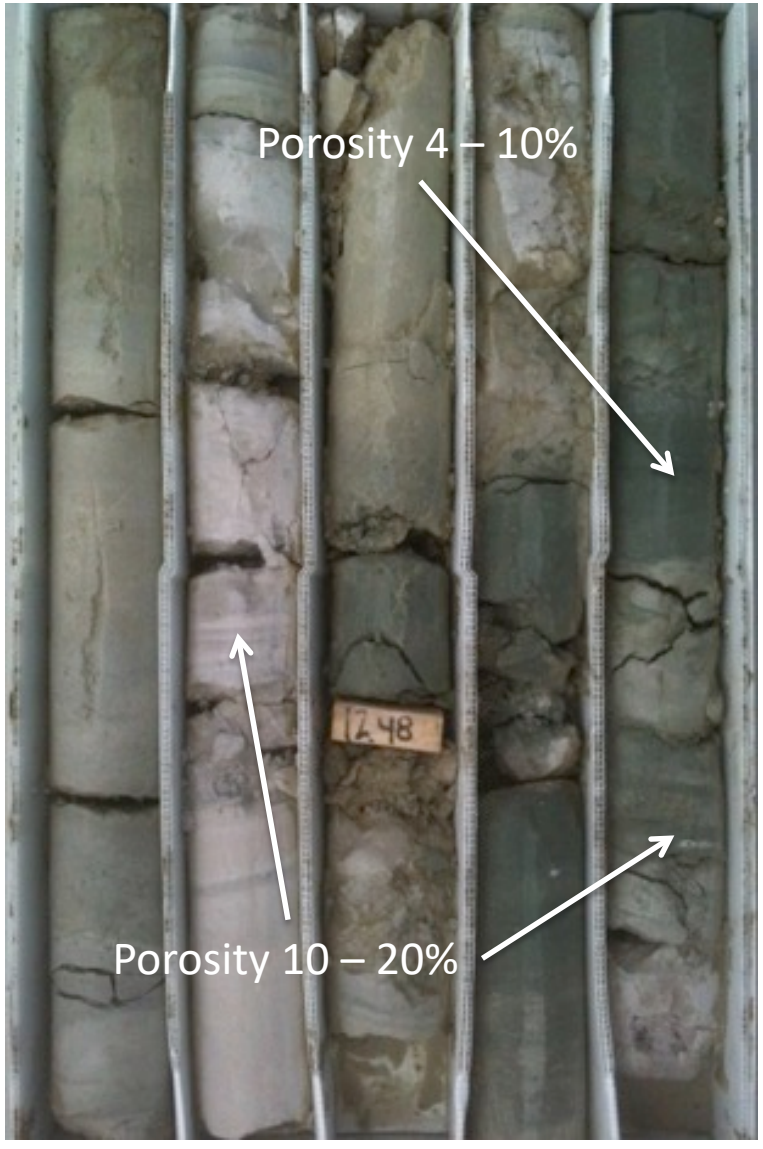
Core sample inserted in 1-inch brass liner prior to RBRC testing

BUT DRILLING AND SAMPLING IS WHERE THE RUBBER HITS THE ROAD

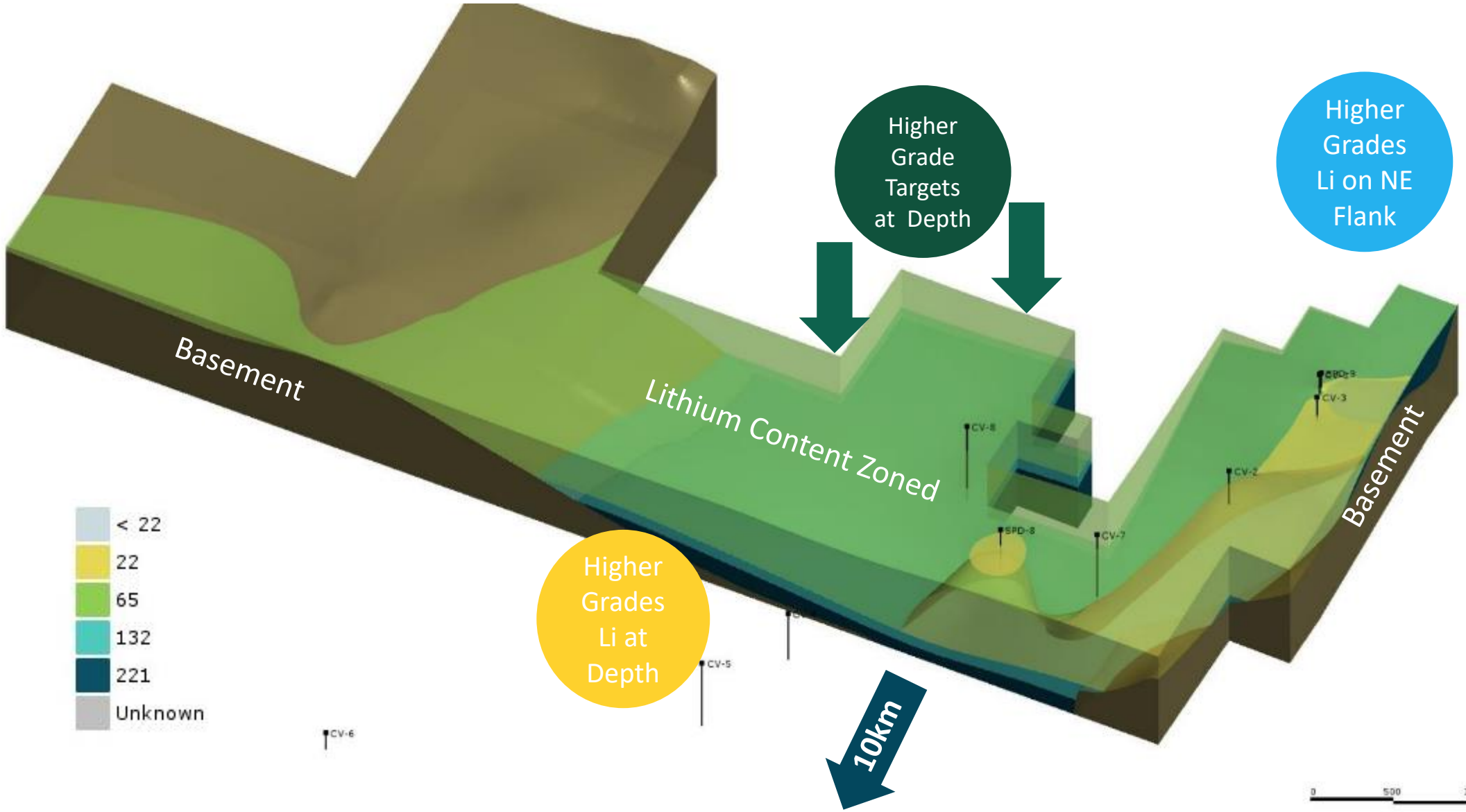


CLAYTON VALLEY PROJECT: HOST AQUIFERS

Variable drainable porosity with geology and depth; assigned a conservative 6% to the model



3D PERSPECTIVE VIEW OF CLAYTON VALLEY RESOURCE MODEL



INFERRED MINERAL RESOURCE

PURE ENERGY MINERALS

RESOURCES & KEY TECHNICAL PARAMETERS

Lithium Resource LCE
(metric tonnes)

218,000

Average Lithium Grade
(mg/L)

123

TOTAL INFERRED RESOURCES

WORLD-CLASS CHEMISTRY

*Magnesium** to Lithium Ratio: **2.9**

Avg Calcium Content (mg/L):* ***1,536***

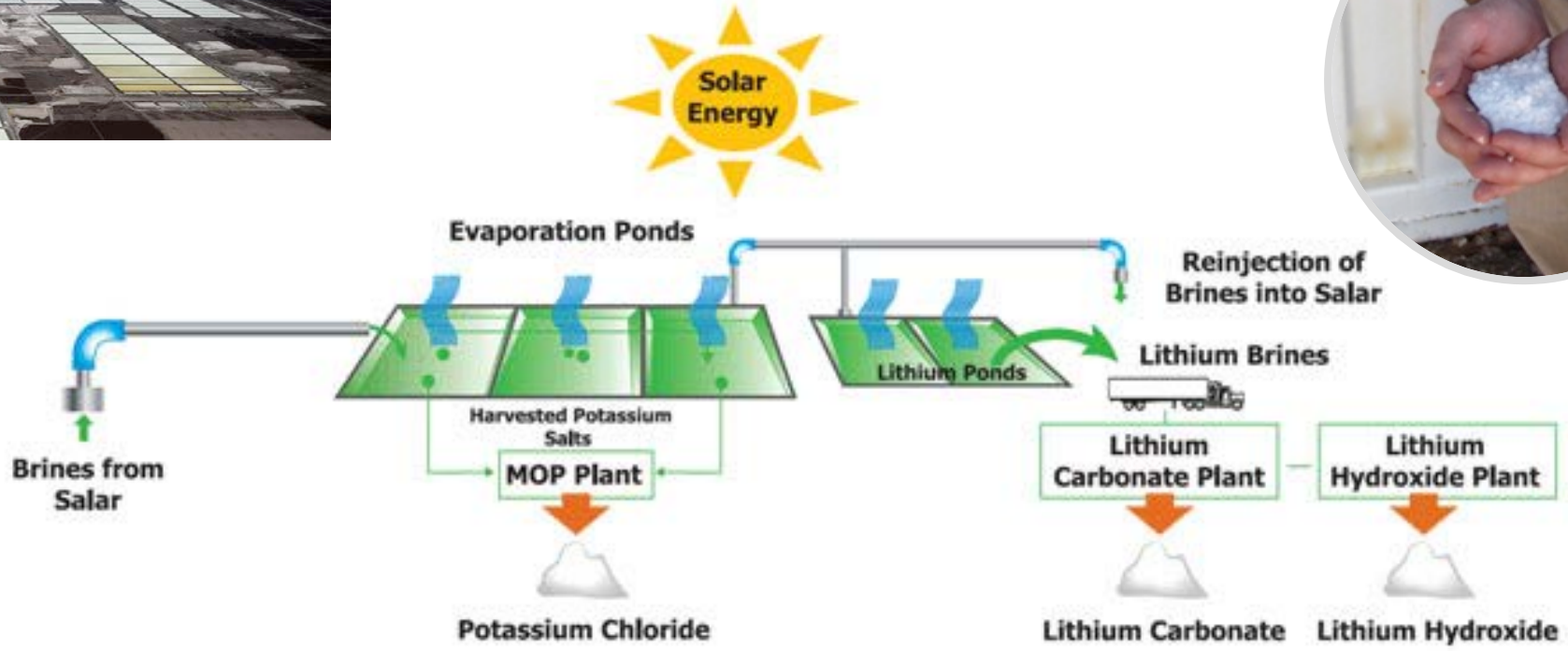
*Sulfate** to Lithium Ratio: **18.2**

** Chemistry derived from global average calculations from database, June 2017*

NOTE: Mineral resources that are not mineral reserves do not have any demonstrated economic viability. Inferred resources are the least reliable resource category and are subject to the most variability. Please see the Company's full technical report at www.sedar.com or www.pureenergyminerals.com for details on how the resource was derived and for the reporting details in terms of lithium metal (Li) and lithium hydroxide monohydrate ($LiOH \cdot H_2O$).

20th CENTURY STANDARD - CONVENTIONAL EVAPORATION TECHNOLOGY

Salar de Atacama, Chile



SOURCE: www.chem230.wikia.com

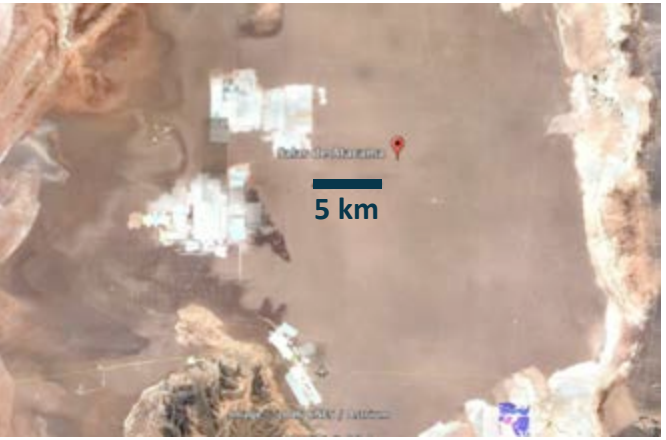
A Generalized Model for Evaporation Pond Processing

Most Lithium Brine Mines in the World Currently using Some Variation of this Process

IMPACTS OF OLD TECHNOLOGY…

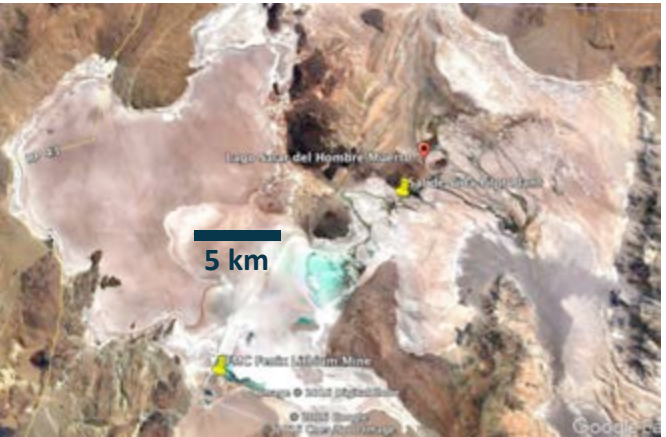
CLAYTON VALLEY, USA

Albemarle
Evaporation Ponds
25 km^2, 6,000 acres



SALAR DE ATACAMA, CHILE

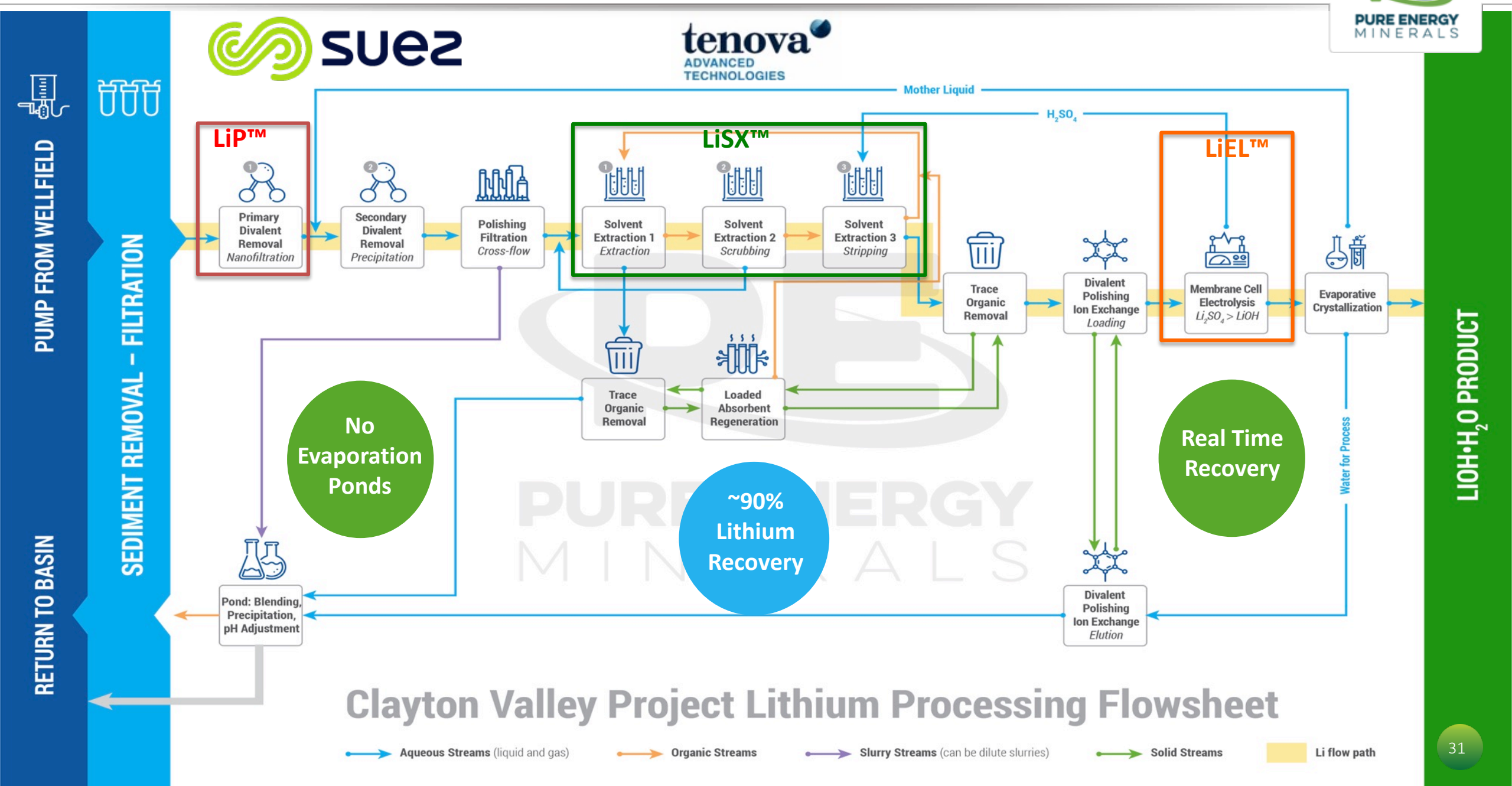
SQM, Albemarle
Evaporation Ponds
53 km^2, 13,000 acres



SALAR DEL HOMBRE MUERTO, ARGENTINA

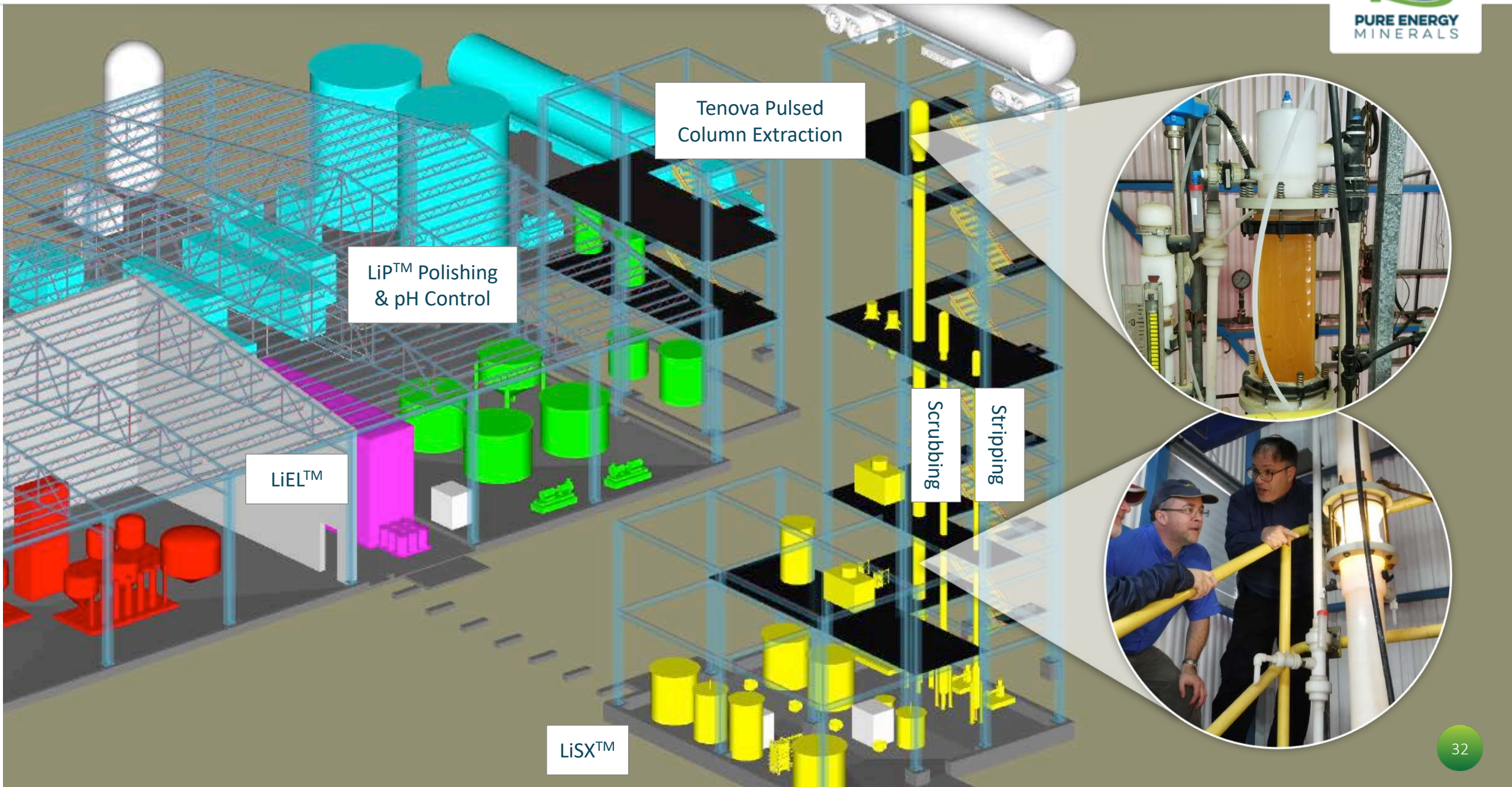
FMC
Evaporation and Resin
3.2 km^2, 800 acres

THERE IS A BETTER WAY: BETTER, FASTER, AND GREENER LITHIUM RECOVERY!



CLAYTON VALLEY PILOT PLANT DESIGN – **NEVADA IS WORLD CLASS LOCATION FOR INITIAL PILOTING**

PURE ENERGY MINERALS



HIGH EFFICIENCY LITHIUM EXTRACTION: BETTER, FASTER, AND GREENER THAN EVAPORATION

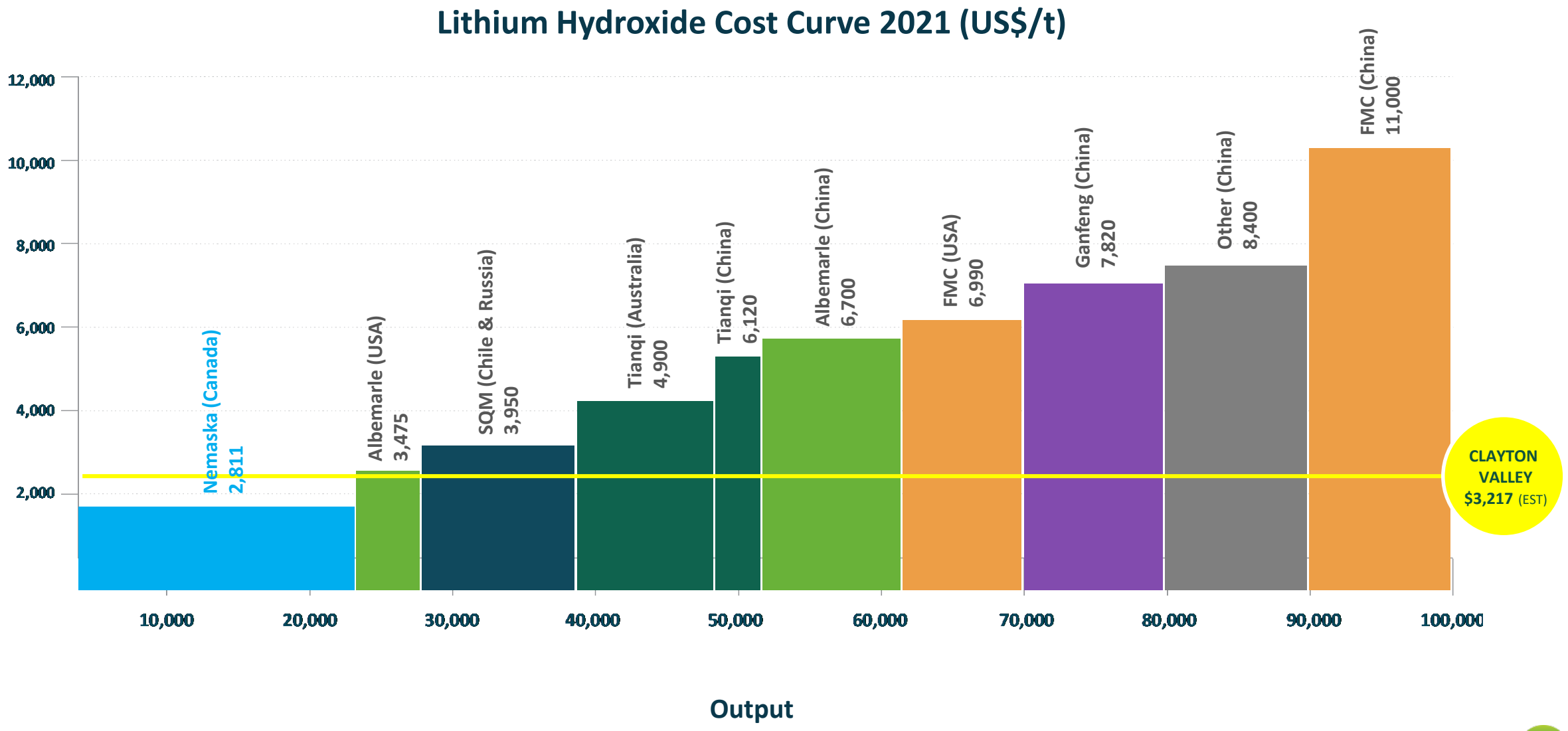
PURE ENERGY MINERALS

BETTER: 90% lithium recovery vs. ~50% from conventional process.
Direct production of battery-grade lithium hydroxide.

FASTER: 18-24 hours vs. 12-24 months.
Unaffected by weather.

GREENER: No evaporation ponds, minimizes ecological impacts.
90% of brine volume returned to the aquifer

CLAYTON VALLEY: A POTENTIAL **LOW COST PRODUCER**



SOURCE: *Roskill 2018, Nemaska Lithium 2018*

SUMMARY

- **Lithium demand driven by EV market growth**
- High-purity lithium salts are the product – specialty chemicals
- Hard rock and brines are current sources
- Production racing to catch up with demand
- Modern processing methods are coming!

TSXV:PE

OTCQB:PEMIF

PURE ENERGY MINERALS

Walter Weinig, *VP Projects & Permitting*
w.weinig@pureenergyminerals.com
303.515.7112

www.PureEnergyMinerals.com