The views, estimates, and opinions expressed in this presentation are those of the author and do not necessarily reflect the position of Lithium Americas Corp.
WHY ARE WE HERE?
WHAT IS THE OPPORTUNITY?
THE EV: A BETTER USER EXPERIENCE
LITHIUM: COST PARITY

Source: McKinsey, EIA
## Lithium: It's Light

Lithium, with atomic number 3, is a light metal found in the periodic table. It is known for its reactivity and is a key component in the production of lithium-ion batteries.

The periodic table is a chart that organizes the elements based on their atomic numbers. Lithium is located in the first column of the periodic table, under the heading of Group 1A (or Group 1). Its neighbors are beryllium (Be) and sodium (Na).

In the context of the periodic table, the terms **Anode** and **Cathode** refer to the electrodes in an electrochemical reaction. Lithium, as a cathode material, is used in lithium-ion batteries, where its lightweight and high energy density make it an ideal choice.

The light green boxes indicate the positions of lithium in the periodic table. The light green boxes also highlight the area relevant to the context of the image, which is likely discussing the properties and uses of lithium.

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**Note:** The image contains a periodic table with lithium highlighted, and a note about lithium's lightness and its significance in battery technology.
LITHIUM: IT’S HIGH ENERGY

Electrochemical series

Lithium

3 Li

F₂ + 2e⁻ ⇄ 2F + 2.87
Pb⁴⁺ + 2e⁻ ⇄ Pb²⁺ + 1.67
Cl₂ + 2e⁻ ⇄ 2Cl⁻ + 1.36
O₂ = 4H⁺ + 4e⁻ ⇄ 2H₂O + 1.23
Ag⁺ + e⁻ ⇄ Ag + 0.80
Fe³⁺ + e⁻ ⇄ Fe²⁺ + 0.77
Cu²⁺ + 2e⁻ ⇄ Cu + 0.34
H₂ + 2e⁻ ⇄ 2H⁺ + 0.00
Pb²⁺ + 2e⁻ ⇄ Pb - 0.13
Fe²⁺ + 2e⁻ ⇄ Fe - 0.44
Zn²⁺ + 2e⁻ ⇄ Zn - 0.76
Mg²⁺ + 2e⁻ ⇄ Mg - 1.66
Li⁺ + e⁻ ⇄ Li - 3.05
LITHIUM MARKET: TODAY

Lithium carbonate equivalent (LCE)

- $1.5 billion in sales
- 182 kt LCE market
- 40% Li-ion
- 60% other
- 3-4 gigafactories

Source: USGS
GIGAFACTORY MATHEMATICS

To meet some oncoming demand (e.g. Tesla, VW) in 5 years:

1 GIGAFACTORY

70 GWh / year
x 0.7 kg LCE per kWh

~ 50,000 t of LCE per year

70 GWh
/ 70 kWh per EV

~ 1 million EVs per year

= 25% of today’s Li market

4 GIGAFACTORIES

~ 200,000 t of LCE per year

~ 4 million EVs per year

= 100% of today’s Li market

To meet some oncoming demand (e.g. Tesla, VW) in 5 years:
GIGAFACTORY MATHEMATICS (CONT.)

To electrify the world's fleet of vehicles:

1 GIGAFACTORY

70 GWh
× 0.7 kg LCE per kWh
≈ 50,000 t of LCE per year

70 GWh
/ 70 kWh per EV
≈ 1 million EVs per year

Over 20 years:
= 1 million tonnes LCE
= 20 million EVs

62 GIGAFACTORIES

≈ 3.1 million tonnes of LCE per year

≈ 62 million EVs per year

Over 20 years:
= 62 million tonnes LCE
= 1.25 billion EVs
RAPID TECHNOLOGY ADOPTION

Source: BlackRock, Interpreting Innovation, September 2014
LITHIUM MARKET: TOMORROW

The Rise and Fall of Lithium
(MMt LCE)

To electrify the world’s fleet of vehicles, production needs to average 3.1 million tonnes LCE for 20 years.

3.1 million tonnes

Today’s lithium market is only 182 k tonnes.

Once global fleet of electric vehicles are built, recycling should see LCE demand fall.
LITHIUM MARKET: TOMORROW

- EV market needs 20x growth
- 3.1 million tpa LCE
- Over 60 gigafactories

Excludes:
- Utility storage
- Semi trucks

Lithium carbonate equivalent (LCE)

- Aluminum (58.3 MMt)
- Copper (18.7 MMt)
- Zinc (13.4 MMt)
- Nickel (2.5 MMt)
- Lead (4.7 MMt)
- Graphite (1.2 MMt)
WHERE ARE THE OPPORTUNITIES?
LITHIUM SOURCES

BRINE

HARD ROCK

CLAY
LITHIUM PRODUCTION COSTS

Difficult to escape physics

Plenty of room for optimization

Innovate to lower cost
INNOVATE: STREAMLINE PROCESS

ore/brine $\rightarrow$ Li$_2$CO $\rightarrow$ LiOH$\cdot$H$_2$O

Cost of production ($/t$ LCE)

Grade of resource (Li ppm)

Clay

Brine

Hardrock
INNOVATE: REVAMP ENERGY SYSTEMS

Build on first principles

$0.35/kWh → <$0.05/kWh

Vertical integration

Cost of production ($/t LCE)

Grade of resource (Li ppm)

Clay

Brine

LithiumAmericas | TSX: LAC
INNOVATE: ALTERNATIVE BRINE TECH

- Increase yield recovery
- Process for all circumstances
- Optimize water management

Cost of production ($/t LCE) vs. Grade of resource (Li ppm)
INNOVATE: ALTERNATIVE ROCK TECH

Vertical integration

$0.35/kWh → <$0.05/kWh

Recycle consumables

Cost of production ($/t LCE)

Grade of resource (Li ppm)

Hardrock

LithiumAmericas | TSX: LAC
INNOVATE: CLAY OPPORTUNITY

- Robust process exists*
- Favorable thermodynamics
- Goal: optimizing mass-energy balance

*Not yet commercialized

Graph showing cost of production ($/t LCE) vs. grade of resource (Li ppm) for clay.
HOW TO BEST INVEST IN LITHIUM?

$40 BILLION
TAKE-AWAYS

1. **Electrification of transport is a reality**
   - Better user experience
   - Cost parity today

2. **Lithium market must grow by a factor of +20**
   - For EV market needs
   - More for utilities, semi-trucks et al.

3. **Investable projects are:**
   - Scalable and risk-manageable
   - Built on collaborative talent

4. **Unprecedented high-impact investment opportunity**
   - Enabler of sustainable future
   - Legacy of clean air and planet
THE FUTURE IS CLEAR

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