Lithium Supply and Market: Past, Present and Future

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Outline

• Why do we care about lithium?
• Lithium Pricing
• Lithium Supply
• Lithium Demand
• Market Balance
• Who will make it?
• What about Nevada?
• Take home message
Why do we care about Lithium?
Lithium Industry Chain

**Upstream**
- Raw material
  - Brine
  - Spodumene
  - Lepidolite

**Middle stream**
- Processed lithium compounds
  - Lithium carbonate
  - Lithium hydroxide
  - Lithium chloride
  - Lithium hexafluorophosphate

**Middle stream**
- Lithium battery components
  - Cathode
    - Cathode precursor
  - Cathode precursor
  - Lithium hexafluorophosphate
  - Electrolyte
  - Anode
  - Separator

**Downstream**
- Battery
  - Battery cell
  - Battery pack
  - End users
    - Consumer electronics
      - EV
      - Storage

Source: Modified from Deutsche Bank, 2016
Li Production

**What for?**

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramics and glass</td>
<td>32%</td>
</tr>
<tr>
<td>Batteries</td>
<td>35%</td>
</tr>
<tr>
<td>Lubricating greases</td>
<td>9%</td>
</tr>
<tr>
<td>Continuous casting</td>
<td>5%</td>
</tr>
<tr>
<td>Air treatment</td>
<td>5%</td>
</tr>
<tr>
<td>Polymers</td>
<td>4%</td>
</tr>
<tr>
<td>Primary aluminium</td>
<td>1%</td>
</tr>
<tr>
<td>Other uses</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: IndMin, 2016, Roskill 2017

**Where?**

- US-Canada: 2%
- Other: 0%
- Chile: 36%
- Australia: 40%
- Argentina: 14%
- China: 8%
- Other mineral: 8%
- China brine: 4%
- FMC: 9%
- SQM: 23%
- Albemarle: 14%
- Tallison: 34%
- Process Minerals: 5%
- Galaxy: 5%
- Other mineral: 3%
- Int. 0.2%

Source: USGS

**Who?**

- Lithium mine production
  - Tallison: 34%
  - Albemarle: 14%
  - SQM: 23%
  - Other mineral: 3%
  - Process Minerals: 5%
  - Galaxy: 5%
  - Other mineral: 3%
  - Int. 0.2%

Source: srk consulting
Geographical Distribution

Source: COCHILCO, 2013
Ok, but seriously why?
Supply
Lithium Supply: Past

Source: Roskill, 2017
Lithium Supply Forecast

Lithium Supply Growth Forecast 2017-2020

Current Supply
- Uyuni Salt Flat: 200
- Rincon: 50
- Cauchari-Olaroz: 50
- Mount Marion: 30
- Pilgangoora (Pilbara): 49
- Whabouchi: 32
- Sal de Vida: 28
- North American Lithium: 25
- Centenario-Ratones: 20
- Mibra: 20
- Mt Cattlin Creek: 17
- Expansion current producers: 50

2020 Supply: 500

Source: srk consulting
Demand
Lithium Demand Distribution

Source: Roskill, 2017

- Other
- Primary battery
- Air treatment
- Polymer
- Metallurgical powders
- Glass
- Greases
- Glass-ceramics
- Ceramics
- Rechargeable battery
Lithium Demand

Source: Modified from Deutsche Bank, 2016
Market Balance

Source: SQM, 2017
Lithium Pricing Forecast

Battery Grade LCE (US$/t CIF Asia)

Source: Roskill, 2017
Who will make it?
Lithium Projects

~450 Lithium Projects and Operations
Lithium Cost Curve

Source: Roskill, 2017
Lithium Rush?
Is there a lithium rush?

• Are we focusing solely on demand and ignoring the supply side of the equation?

• Is there an expanding supply side without substantial barriers to entry?

• Are there technological innovations that could potentially halve costs and boost the reserve base?
Why Nevada? …Why Not?

- Mining friendly state
  - Consistent permitting protocols
  - Variety of existing operations
- Lithium is already present
- Access to public land
- Low Mg/Li
NV Lithium Projects
Take Home Message

- There is a pricing bubble; hang tight
- **Oversupply** may happen in the short term but future demand will balance the lithium market
- Many projects trying to make it happen; *only a few will become a reality*
- Operation Cost/Process is key
- There is room for NV

Additional comments, questions? pcortegoso@srk.com