BATTERY MINERALS

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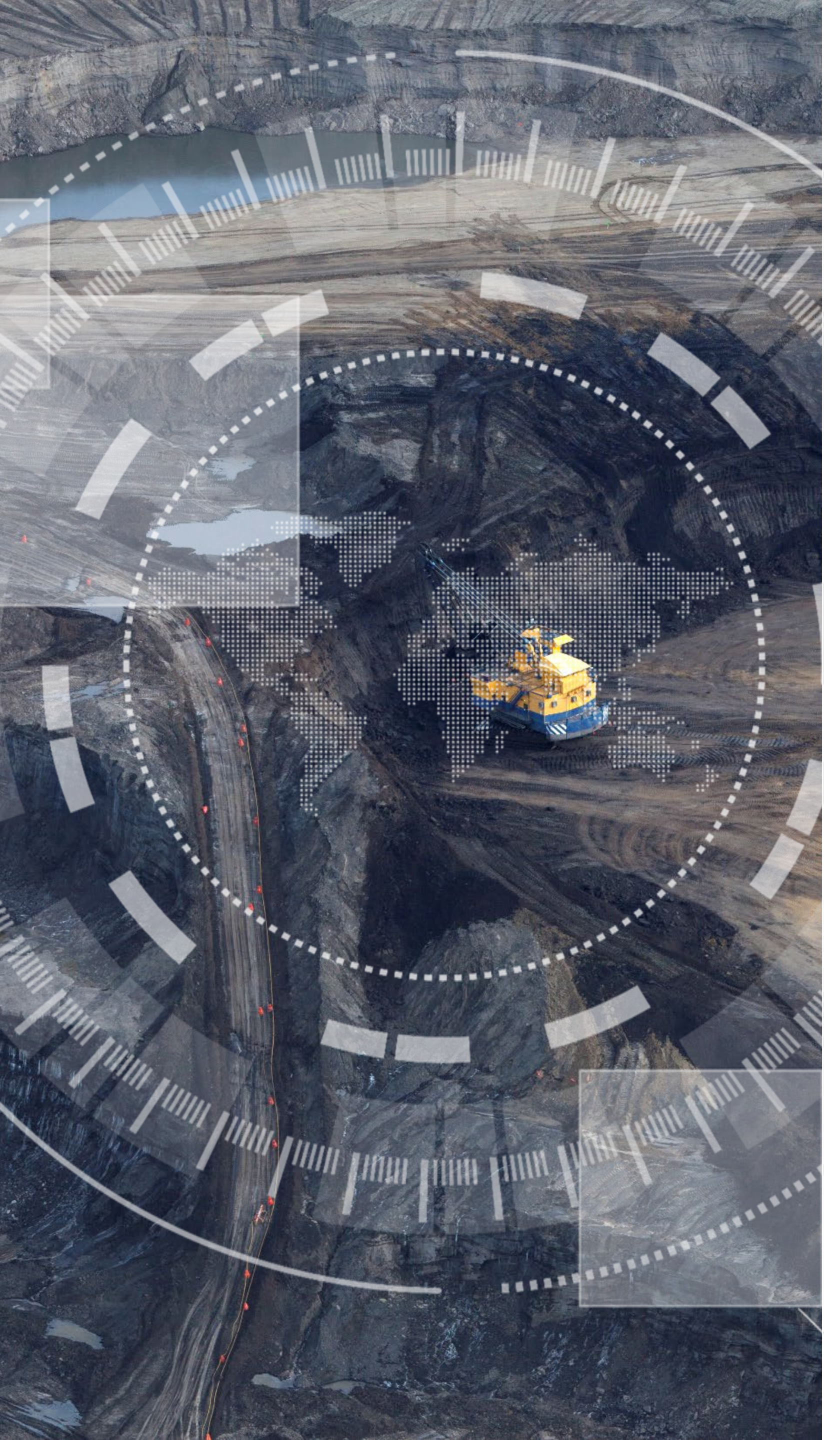

AGENDA

MAY 2019

- Corporate Introduction
- Battery minerals have had an exciting mining investment run in recent years
- Interest has been driven by plans to transition to electric transportation and the proliferation of battery powered devices
- Many elements are involved in this transition;
    - Lithium (Li)
    - Cobalt (Co)
    - Graphite (Cg)
    - Nickel (Ni)
    - Manganese
    - Copper (Cu)
    - Rare Earth Elements (REE)
- RPM will focus on the first three in this presentation

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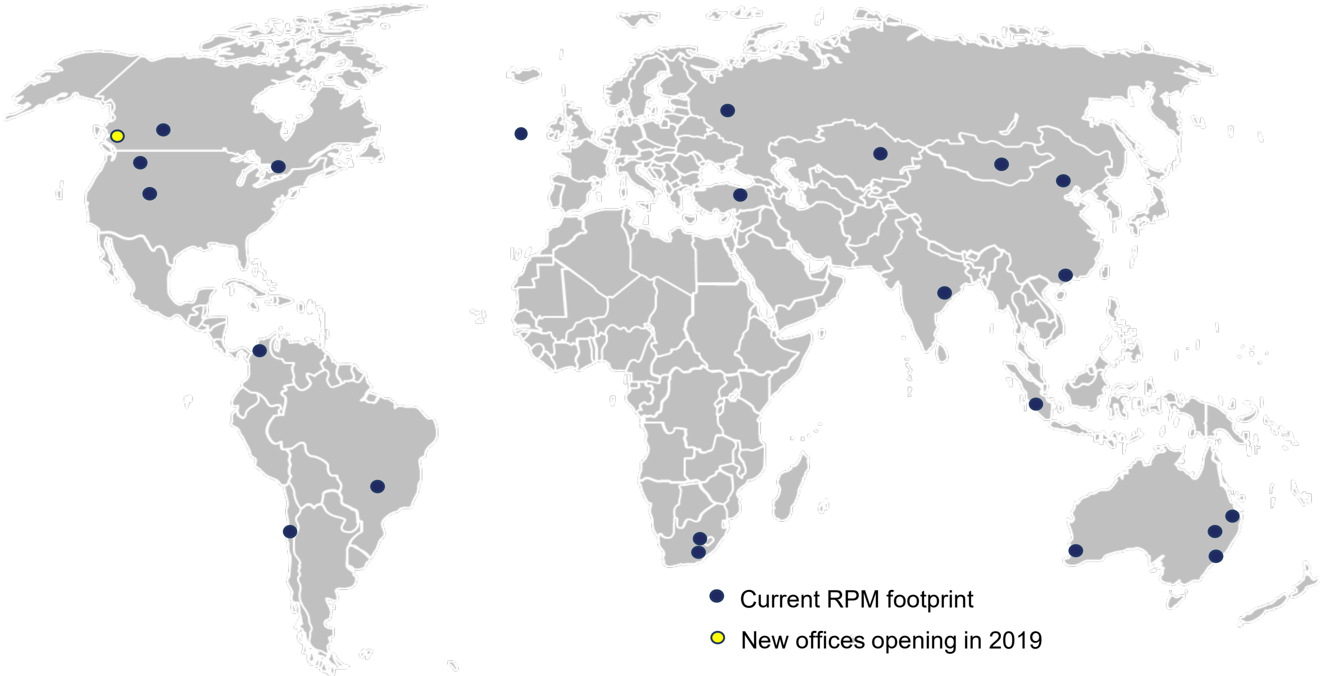
CORPORATE INTRODUCTION

RPMGLOBAL OVERVIEW

We are a global industry leader in the provision of mining technology and consulting & advisory services globally.

- ASX Code: RUL
- 23 Offices Globally
- 400+ Technical Consultants
- 2,000+ Global Associates
- 50 Years Experience
- 125 Countries
- 15,000+ Studies
- Resource and Reserve Estimates.
- Feasibility Studies
- Independent Expert / due diligence



Certified System Quality ISO 9001 SAI GLOBAL

ISA

SAP® Certified
Integration with SAP Applications

RPMGLOBAL OVERVIEW

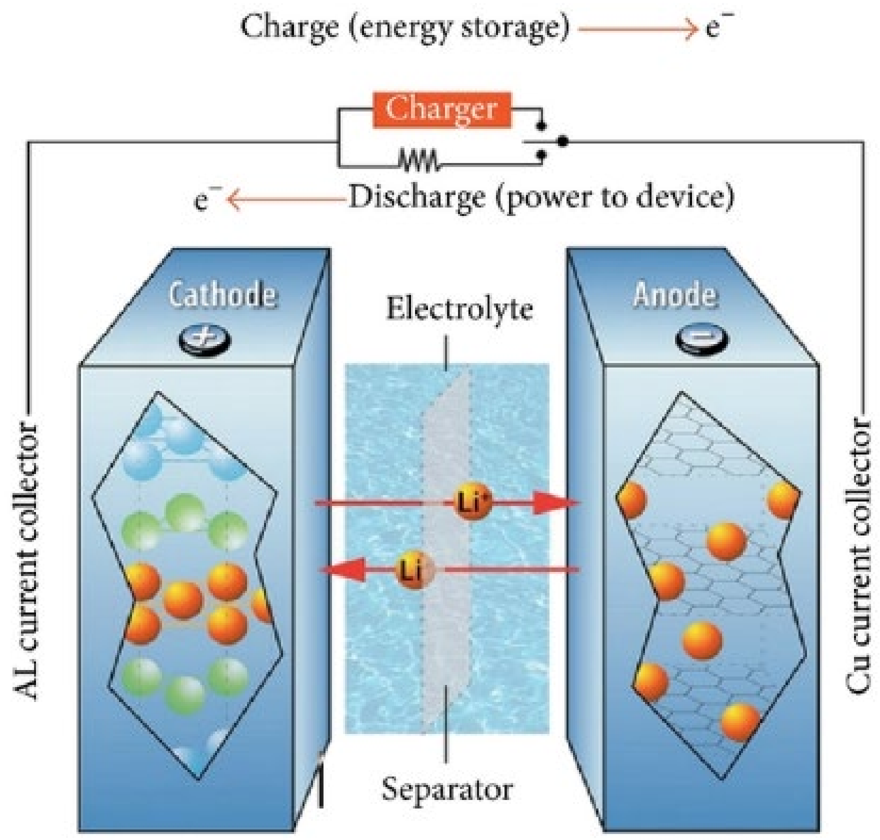
- Due Diligence, Lenders Engineering and Peer Reviews for all of the worlds major banks and their advisors
- Capital raisings worth **60 billion USD**
- 75% of mining IPOs on the Hong Kong Stock Exchange* and Broader International Financial Markets

**Since the introduction of JORC reporting standards.*

LITHIUM BATTERY FUNDAMENTALS

LITHIUM BATTERIES

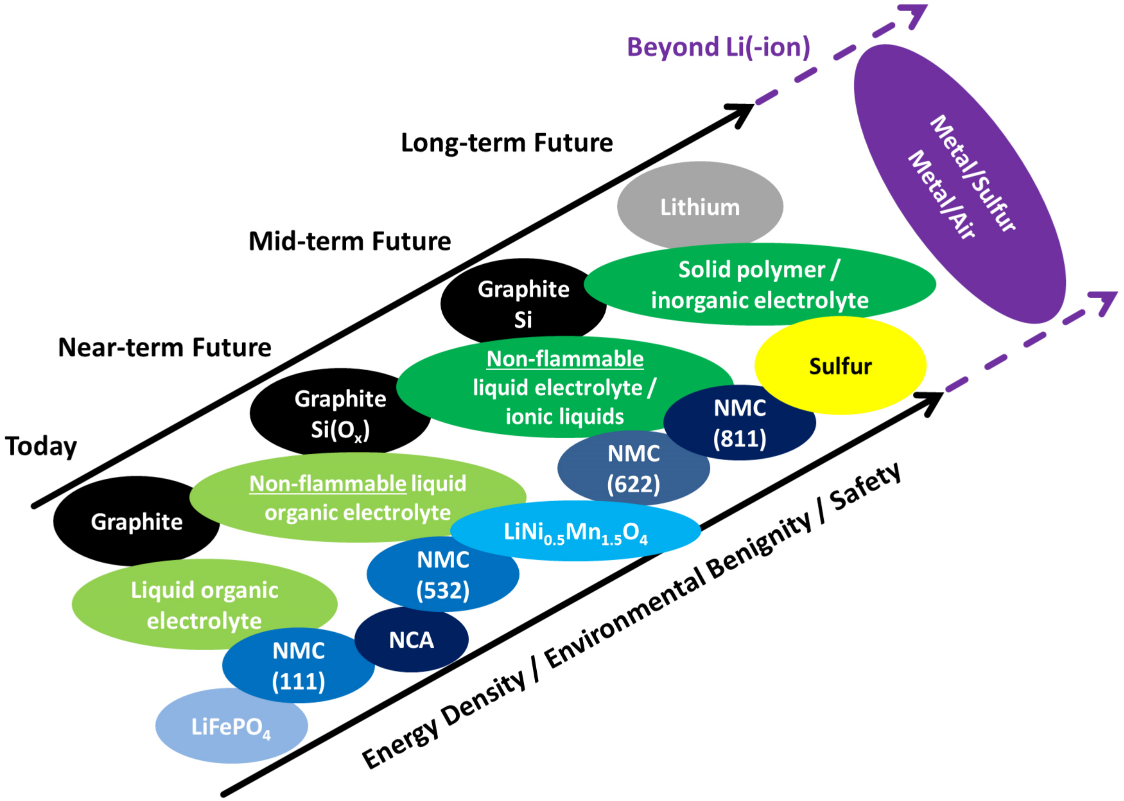
- Important Minerals / Elements Needed
- Anodes
  - Graphite – Li on interlayers and Solid Electrolyte Interface SEI
- Cathodes (Interlayer compounds – up to 60% Li is mobile from structure but structure must be preserved or cell will fail). Elements used include:
  - Cobalt
  - Lithium
  - Nickel
  - Manganese
  - Iron
  - Aluminium
- Electrolytes
  - Lithium



LITHIUM BATTERIES TYPES

			Capacity	Energy
Material	Structur e	Voltage	mAh/g	Energy, Wh/kg
LiCoO2 (LCO)	Layered	3.9	140	546
LiNi0.8Co0.15Al0.05O 2 (NCA - Tesla)	Layered	3.8	180–200	680–760
LiNi1/3Co1/3Mn1/3O2 (NMC)	Layered	3.8	160–170	610–650
LiMn2O4 and variants (LMO)	Spinel	4.1	100–120	410–492
LiFePO4 (LFP)	Olivine	3.45	150–170	518–587

Marca M. Doeff



Helmholtz Institute Dec 2018

MARKET OVERVIEW

Battery Mineral Offtake Dominated by EV Growth

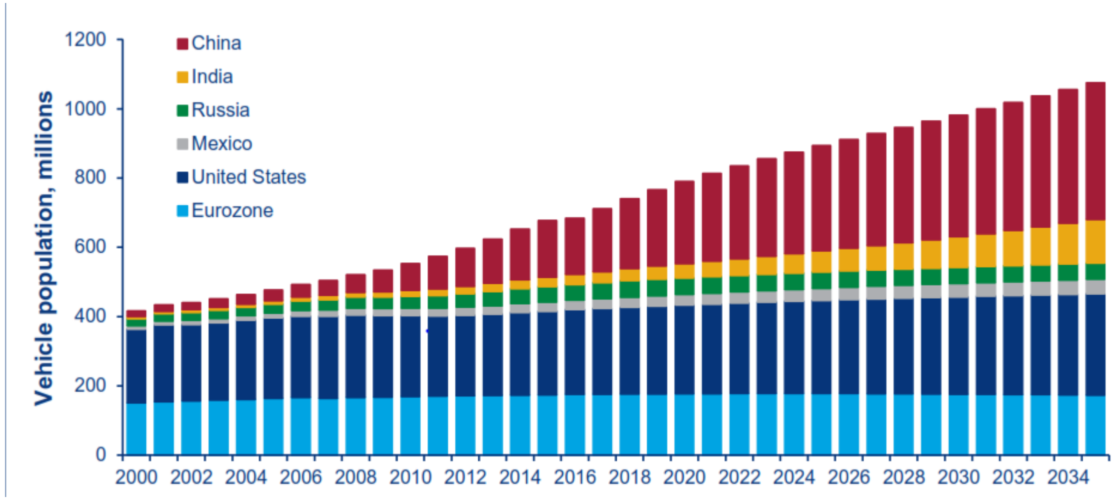
Tidal wave of megafactories drives demand for graphite development

Mr Moore told the US Senate, in February 2019, that the scale and speed of this growth was unprecedented and it would have a profound impact on the raw materials that fuel battery plants.

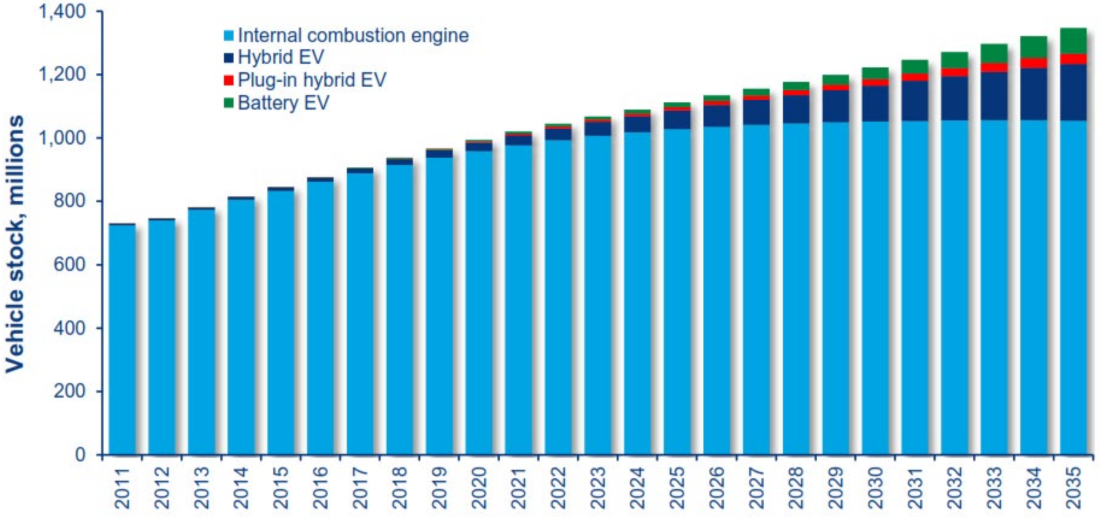
“Since my last testimony only 14 months ago we have gone from 17 lithium ion battery megafactories to 70,” Mr Moore said. “In gigawatt hour-terms, we have gone from 289 GWh to 1,549 GWh – that’s the equivalent of 22 million pure electric vehicles worth of battery capacity in the pipeline.

“This adds extra impetus to this mega-trend of battery megafactories and the impact on the demand for critical battery raw materials of lithium, cobalt, nickel and graphite…in the next decade the demand for lithium [used in the battery industry] is set to go up 9-times, cobalt is set to go up 6-times, nickel is set to go up 5 times, and graphite anode is set to go up 9 times.”

Source: Mining News



Wood Mackenzie Sept 2018



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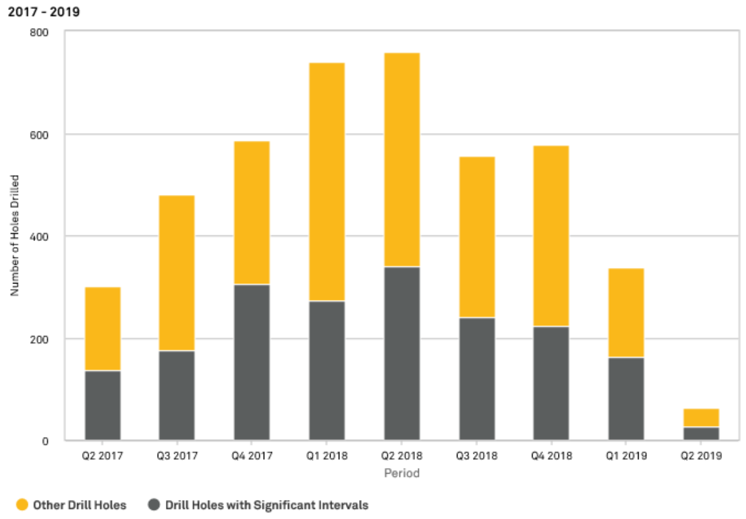
LITHIUM GEOLOGY

LITHIUM

WHAT'S IMPORTANT?

- High performance battery chemistries
- Substitution
- Resources and Reserves are large ~62 Mt of contained Li (USGS 2018)
- Exploration Targets larger
- Projected Li demand growth until 2030's then slowing
- A race to production, competitive pressures in time – maybe already?



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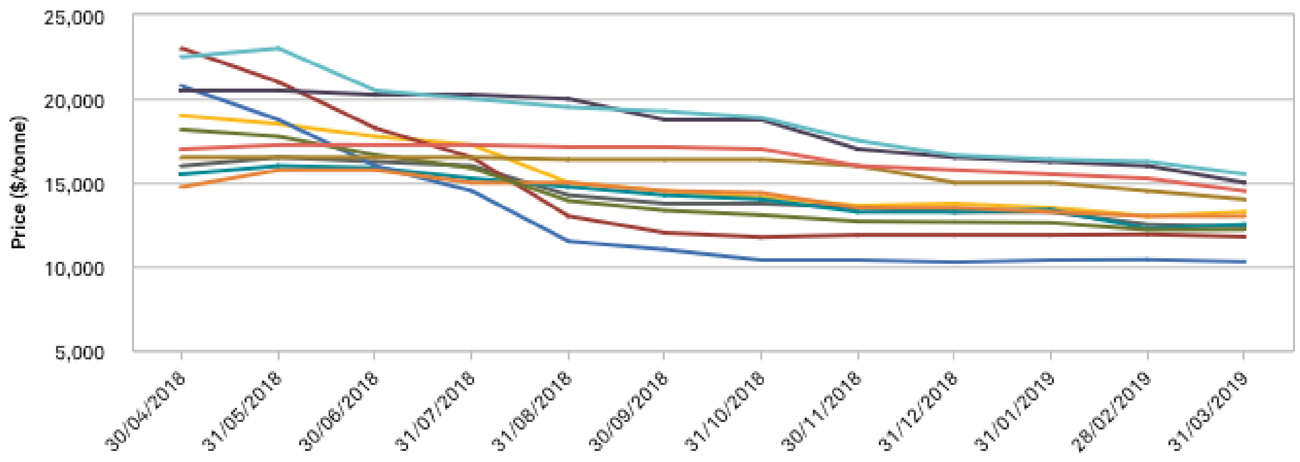

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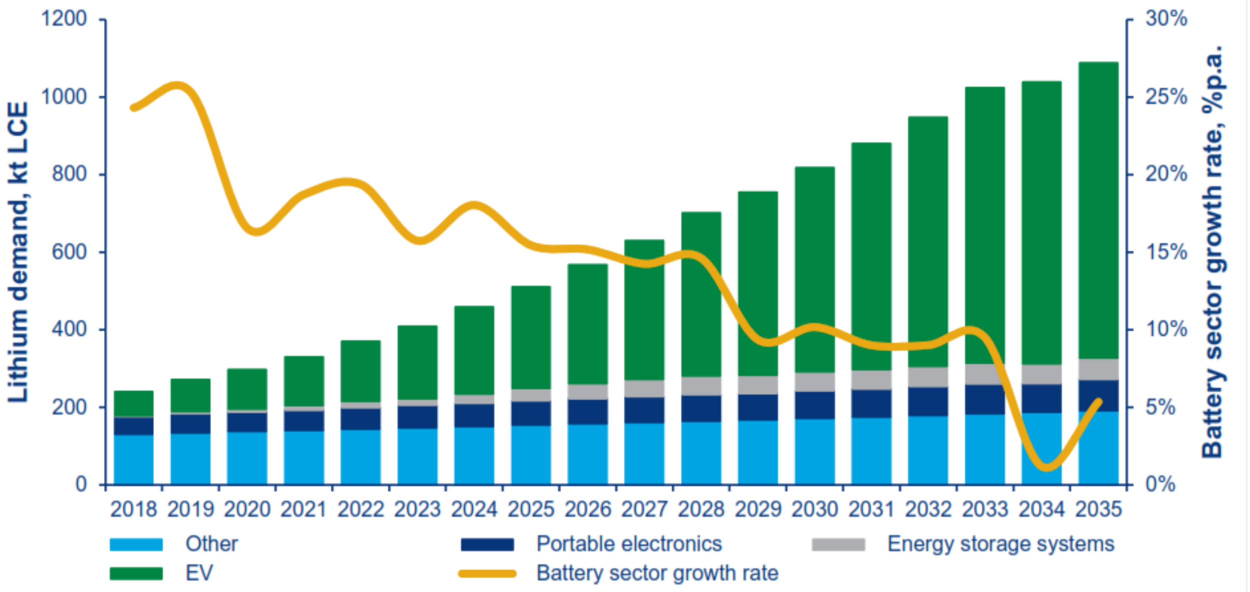

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LITHIUM

DEPOSIT TYPES

PEGMATITES

Typically small but numerous and widely distributed. Higher operating costs, multiple commodities.

- Coarse grained rocks
- Mostly in spodumene and lepidolite
- World wide distribution
- Mostly small deposits (except Greenbushes)
- Valuable byproducts: Cesium, Tin and Tantalum

SALARS

Huge, low operating costs, long time to build to full capacity.

- Brines rich in Li
- Salt evaporitic deposits
- Found in:
  - Arid belts of the Equator.
  - Western S.America and USA,
  - Tibet and Dead Sea
- Li source is surrounding rocks, air-fall tuffs, dust and hydrothermal fluids
- Reliance on evaporative concentration

“FOSSIL” SALARS:

Huge but not currently in production. Economics more attractive when associated with boron.

- Fine grain sedimentary rocks
- Large deposits
- Ioneer’s Rhyolite Ridge, NV - USA
- Khukh Del Project, Mongolia

LITHIUM

Summary

- Resources / Reserves and Exploration possibilities are large.
- Projects could be beached by over production.
- Target early and low cost projects.
- Pegmatites: easily explored, quick to production, low exploration costs, small size and simple mining and primary processing However, downstream processing costs are significant.
- Salars: slow to bring into full production but lower operational cost. Relatively few Salars locations, other producers extracting from the same brine pools.
- Fossil Salars: Wild cards, tip of a mostly unrecognised behemoth. Operating costs will likely be relatively high compared to brine deposits, contribution from borax important.
- Surety of supply, e.g. Ioneer's Rhyolite Ridge project - large supply and in the USA.

It's a most interesting space – take your pick ☺

LITHIUM PROCESSING

LITHIUM PROCESSING

SPODUMENE

- **Background**
  - Mineralogy : spodumene ($LiAlSi_2O_6$ ~8% Li_2O), mica, feldspar, quartz and iron bearing minerals
  - Lower start-up costs, rapid ramp-up (mineral processing)
  - High overall operating costs >~USD4,500/t LCE (mineral processing : ~USD2,000-2,500/t LCE)
  - High extraction rates
  - Primary aim is to make a concentrate ≥6% Li_2O; high transport costs (markets in China)
- **Primary Spodumene**
  - Typically very coarse and simple mineral processing techniques employed
  - Crushing, classification and gravity separation (Dense Media Separation, DMS)
  - By-products e.g. tantalite recovered with spirals
  - Fines can be ground and floated (see Secondary Spodumene)
- **Secondary Spodumene**
  - Typically fine and flotation employed for recovery
  - Typical flowsheet : milling, desliming, collector conditioning, flotation with typically two stages of cleaning
  - Magnetic separation applied to final concentrate
- **Mineral Processing Issues**
  - Presence of petalite
  - Presence of mica and iron bearing minerals

geology.com

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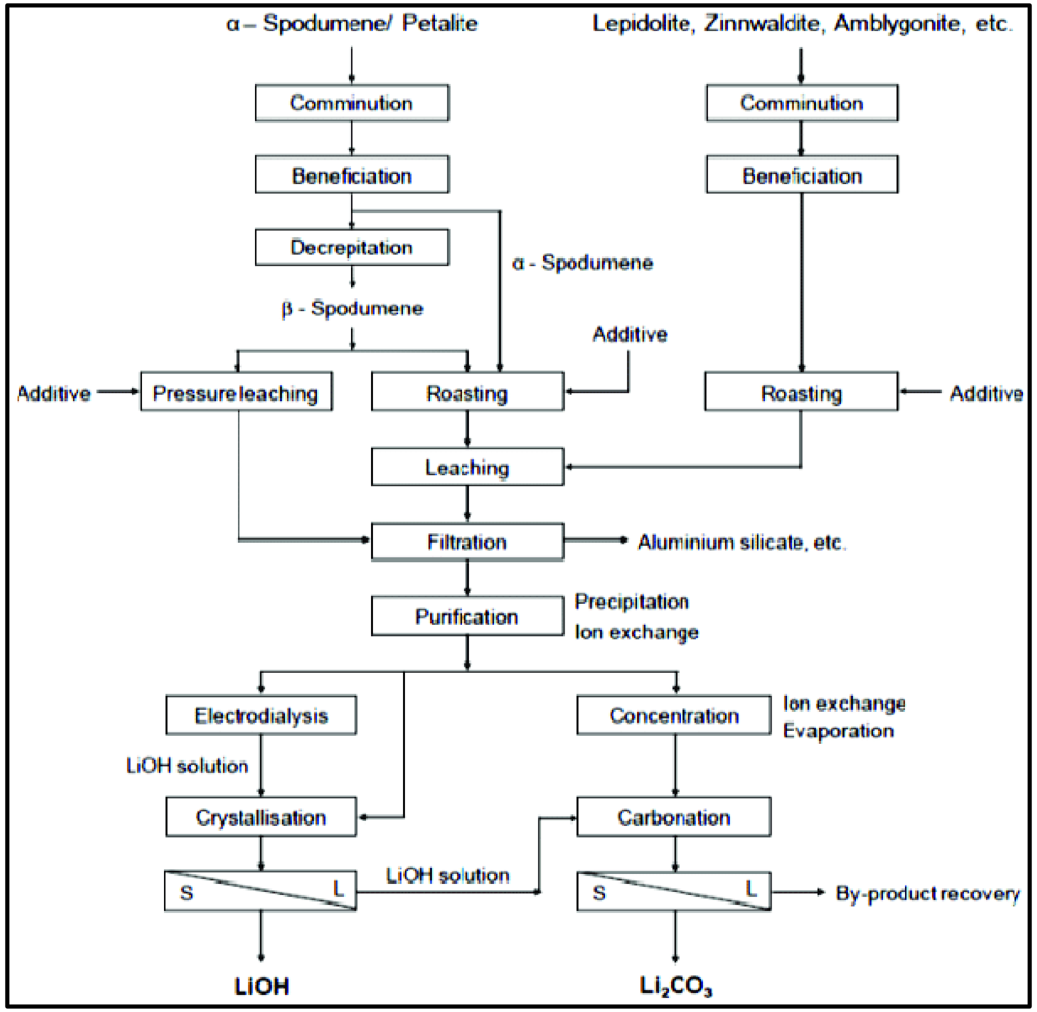
LITHIUM PROCESSING

SPODUMENE – LITHIUM EXTRACTION

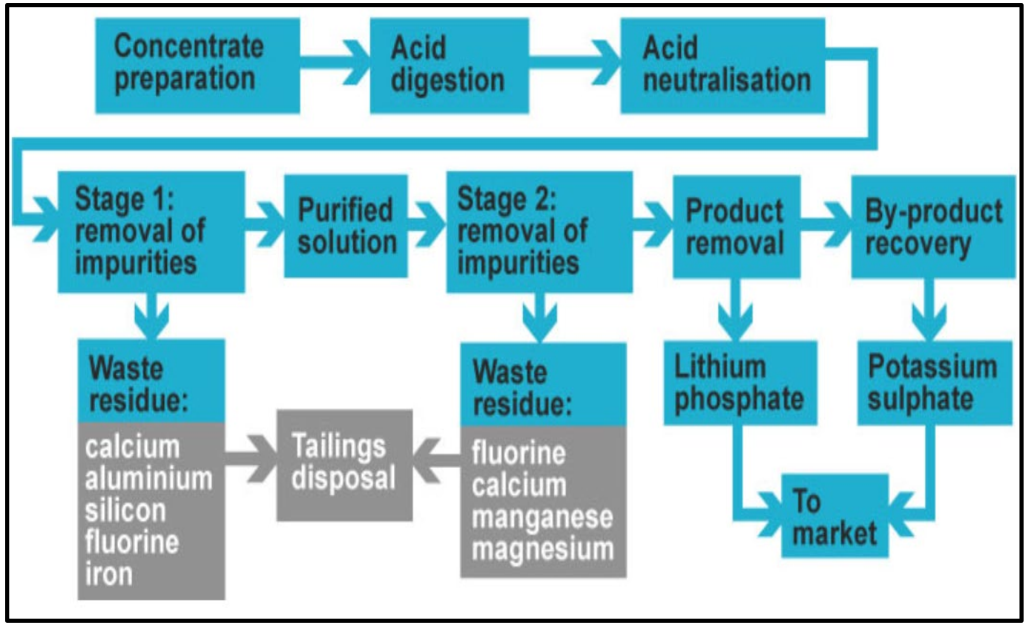
- **Background**
  - Product is typically lithium carbonate, relatively pure >99.5% Li_2O
  - Purification process common to lithium processes
- **Flowsheet**
  - Calcination at 1,050 C (decrepitation) : conversion to beta spodumene – lower density, numerous surface and internal cracks, amenable to leaching
  - Often ground finely, mixed with Sulphuric acid and roasted
    - Solubilizes lithium and many other cations (Al, Na, K, Mg, Fe,…)
  - Product mixed with water, then a solid/liquid separation followed by precipitation to remove calcium and magnesium
  - Precipitation of lithium with sodium carbonate followed by dewatering
- **Processing Issues**
  - Ratio of other alkali metals e.g. sodium
  - Multiple dewatering stages
  - Loss of Li with calcium and magnesium removal (~1.5%)



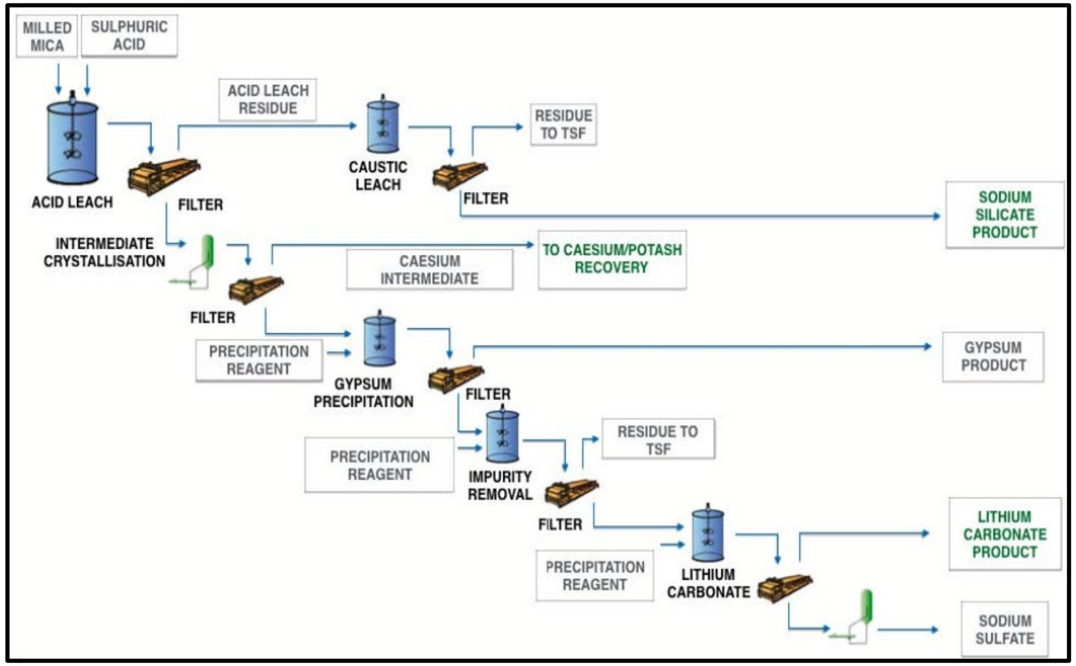
LITHIUM PROCESSING

SPODUMENE – DEVELOPMENTS

- A number of proprietary processes reported
  - Spodumene : direct leaching after fine grinding
  - SiLeach™ : 'halogen' based leach – hydrofluoric acid?
  - Back to the future - Lepidolite and petalite: fine grinding and leaching with sulphuric acid



Lithium Australia, website



Lepdico, website

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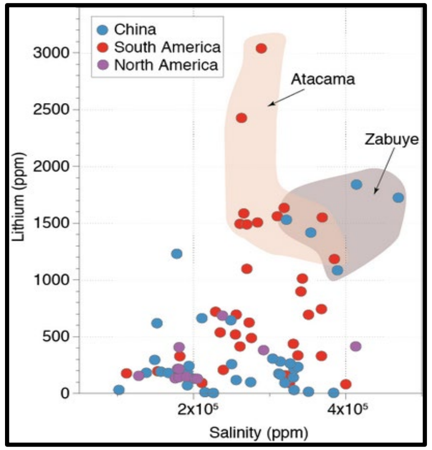
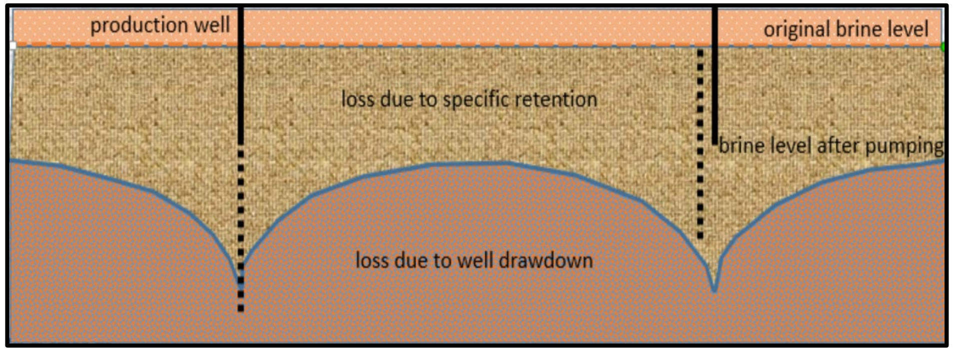
LITHIUM PROCESSING

SALARS

- **Background**
  - Feed source is saturated brines – sodium and potassium chlorides; lithium is present as soluble species (LiCl)
    - Lower tenors : 300-1,500ppm (400ppm cut-off); variable chemistry that changes with time
  - Need to do a considerable amount of developmental testing:
    - Confirm extraction rates (stable flows – takes up to a year)
    - Confirm replenishment
    - Borehole/trench/pattern designs
  - High start-up costs, low operating costs (~USD2,500-2,750/t LCE)
  - Slow ramp-up (18-24 months)
  - Long processing times (up to 24 months)
  - Low extraction rates mainly due to permeability
    - 3-10%; Canadian NI reporting 33% maximum
  - Reliability – weather related issues (evaporation rates)



Warren, Saltworkconsultants website



Welham, 2018

Soil Type	Efective Solution Recovery (%)
Sand dominant	41.0
Silt & sand/clay mix	16.0
Halite dominant	14.0
Clay dominant	4.5

SRK, 2016

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LITHIUM PROCESSING

SALARS – FLOWSHEET

- Series of evaporation ponds, where sodium, magnesium and potassium crystallise and precipitate out as the solubility limit reached
    - Evaporation achieved by wind, altitude and thermal
    - Very large footprint
- When Li concentration reaches around 5,000-7,000ppm (g/L), the solution is ready for harvesting i.e. lithium recovery

Salt	Formula	% Li	Solubility Limit (g/L, 20 ˚C)	Li^+ (g/L)
Sodium Chloride	**NaCl**	-	**359**	
Sodium Sulphate	Na_2SO_4	-	195	-
Magnesium Chloride	**$MgCl_2$**	-	**546**	-
Magnesium Sulphate	MgSO4	-	629	-
Potassium Chloride	**KCl**	-	**342**	-
Potassium Sulphate	K_2SO_4	-	111	-
Lithium Chloride	**$LiCl_2$**	**16.37**	**835**	**136.7**

SQM, Chile

Pond Number	Area (ha)	Volume (m^3)	Lithium Concentration (g/L, ppm)	Precipitates
1	308	757.1	680	-
2	210	454.2	780	sodium chloride
3	36	94.6	930	sodium chloride
4	35	83.3	1,200	sodium chloride
5	19	56.8	1,400	sodium chloride, calcium sulphate, magnesium hydroxide
6	17	20.8	1,900	sodium chloride, calcium carbonate
7	7	5.7	2,400	sodium chloride, sodium/potassium sulphate
8	5	3.8	3,100	sodium chloride, sodium/potassium sulphate, potassium chloride
9	6	11.4	5,000	sodium chloride, sodium/potassium sulphate, potassium chloride

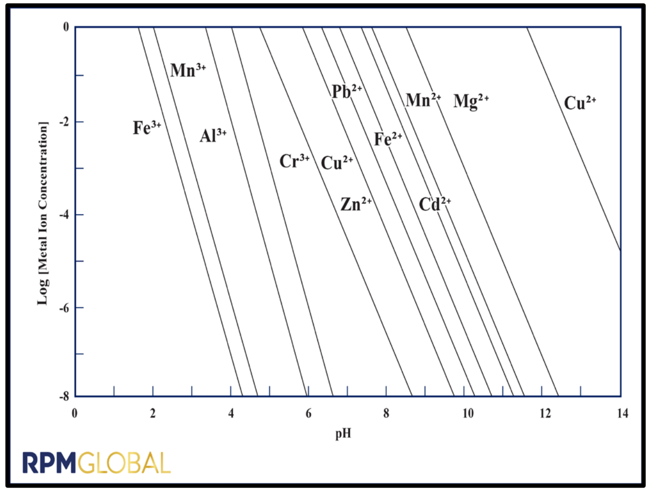
Barrett and O'Neill, 1969

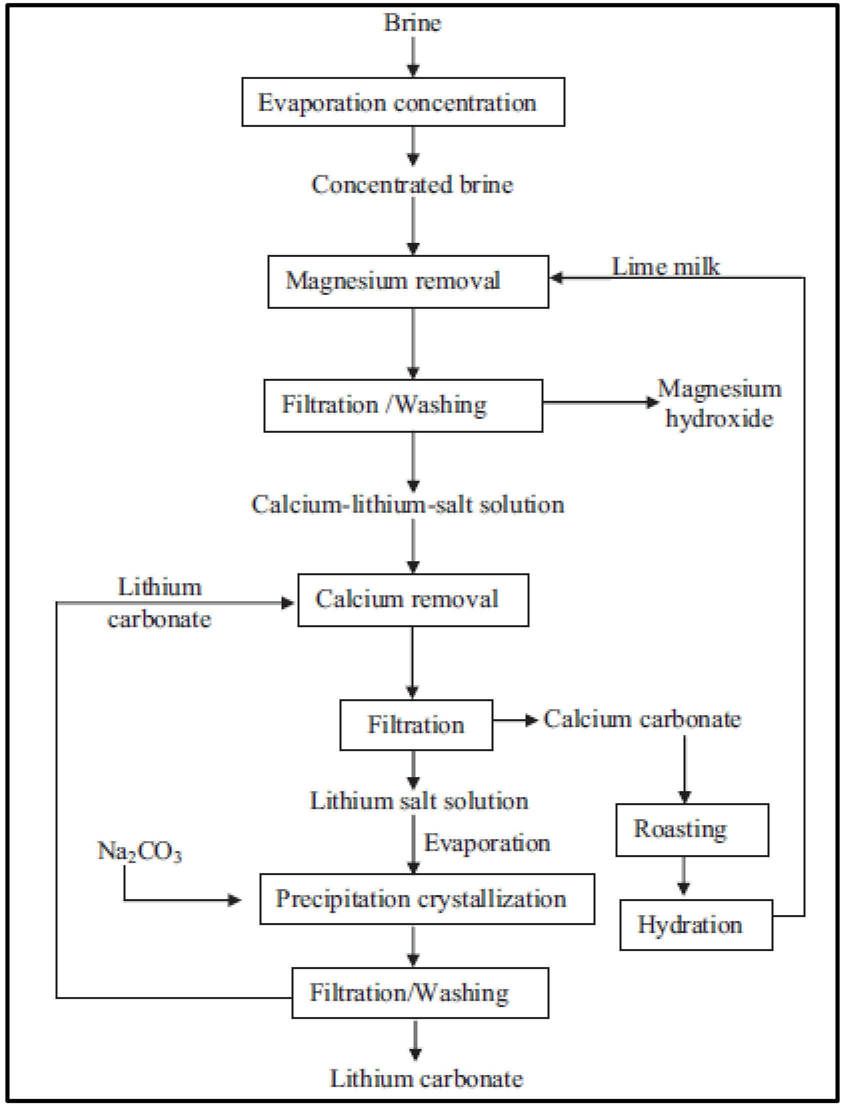
LITHIUM PROCESSING

SALARS – LITHIUM SALT RECOVERY

- Impurity removal by precipitation – depends upon cations present (i.e. lime, sodium carbonate,…)
- Calcium and magnesium (not full extraction)
- Precipitation of lithium with sodium carbonate followed by dewatering (effective if Li^+ >20-25g/L)

Salt	Formula	% Li	Solubility Limit (g/L, 20 ℃)	Li^+ (g/L)
Lithium Sulphate	Li_2SO_4	12.63	348	43.9
Lithium Bicarbonate	$LiHCO_3$	10.21	57	5.8
Lithium Carbonate	**Li_2CO_3**	**18.79**	**13**	**2.5**
Lithium Hydroxide	LiOH	28.98	128	37.1





Meshram et al., 2014, Hydrometallurgy

LITHIUM PROCESSING

SALARS – DEVELOPMENTS

- Primary aim : speed up processing times and indirectly smaller footprint
- Increased capital costs and operating costs as well as power requirements
- The developments are being explored to replace evaporation stages and the separation selectivity :
    - Reverse osmosis
    - Solvent extraction (SX) and ion exchange (IX) processes are being explored to replace evaporation stages
        - Li not very amenable to SX and IX

LITHIUM CONCLUSIONS

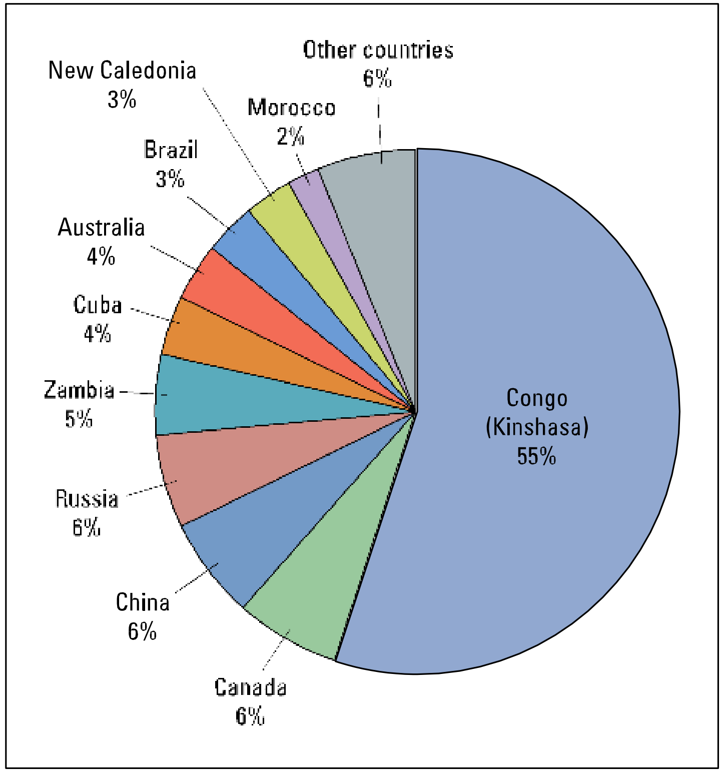
- Demand is driven largely by EV market;
  - Likely to remain the battery type of choice but substitution is possible,
  - Demand predicted to peak by early 2030’s, and
  - Removal of subsidies by China may have depressive effects – but no sign of this at the moment.
- Already a large Resource base and good possibilities of significant exploration finds
- Interesting space with slow to develop but low operating cost Salar deposits, versus “agile” pegmatite Projects
- Agility will win as long as demand outstrips supply but Salar low costs will allow project survival if oversupply happens
- Security of supply factors may allow developments that would be otherwise impossible

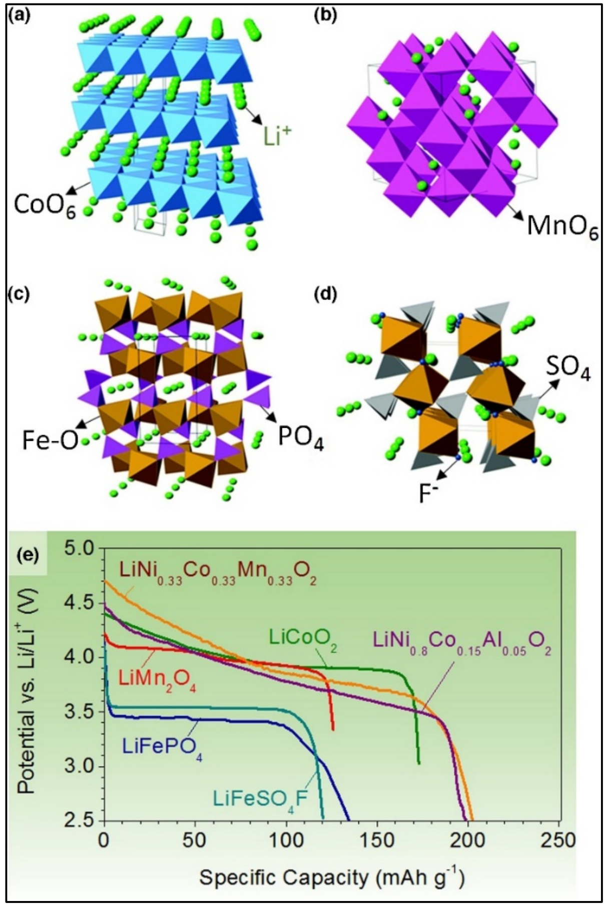
COBALT GEOLOGY

COBALT

WHAT'S IMPORTANT

- Cobalt - cathode stability in high performance batteries.
  - Lithium battery cathodes are intercalation compounds,
  - Lithium atoms in and out - structure does not change,
  - Co changes oxidation state if Li leaves or enters keeping the electrochemical potential cathode neutral,
  - Cheaper elements e.g. Ni can substitute for Co but fires/explosions possible - O_2 generation from cathode O layer,
  - Al and Mn to fix the O_2 - small loss of voltage. Tesla/Panasonic uses NCA chemistry, NCM is common.
- Cobalt has a "bad wrap".
  - Expensive
  - DRC (55% of Production in 2017)
  - Social and Political unrest
- Much Cobalt production is by-product - DRC producers quickly transitioned to higher Co outputs - price response.



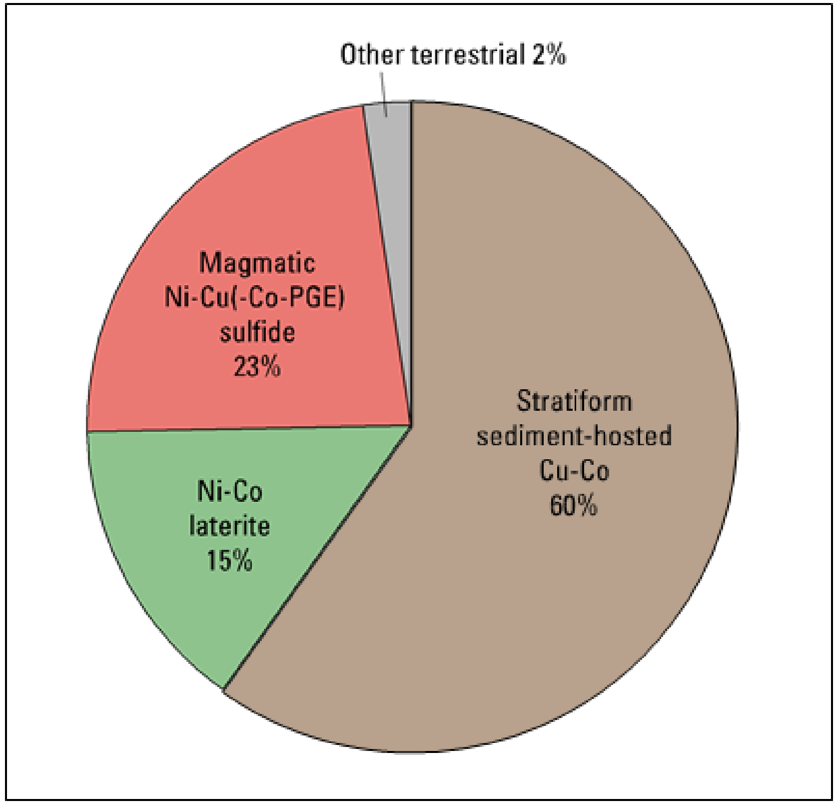


Li-ion battery materials present and future, Materials Today June 2015

COBALT

DEPOSIT TYPES

- Three main deposit types;
  - DRC style copper/cobalt belt deposits,
  - Laterites, and
  - By-product of Ni-Cu-(PGEs) sulphide mining.
- Stratiform sediment-hosted Copper/Cobalt belt deposits;
  - 55% of cobalt production,
  - Meta-sediment hosted veins and disseminations,
  - Variable deposit sizes and grades,
  - Much of the current production from oxidised deposits; less capital (still substantial) to process,
  - Artisanal production part of feed, majority of ore buying by Chinese, a “wild west” situation,
  - Political risk and unreliable infrastructure.
- Ni-Cu-(PGEs) sulphides
  - Production tightly tied to the main output elements
- Laterites
  - Huge potential resource for Cobalt, but
  - Mostly extracted for Fe/Ni for the steel industry.
  - Cobalt from HPAL but Projects - complex materials handling and clarification issues.
- Many other occurrence types
  - Submarine nodules and crusts (the largest accumulation of Co on the planet)
  - Syn-sedimentary and (or) diagenetic (a spectrum of types)
  - Co-Cu-Au deposits in metasedimentary rocks
  - Iron oxide-copper-gold (IOCG) deposits
  - Five-element vein deposits (Ag-Ni-Co-As-Bi) (Kissin, 1992)
  - Hydrothermal deposits associated with ultramafic rocks

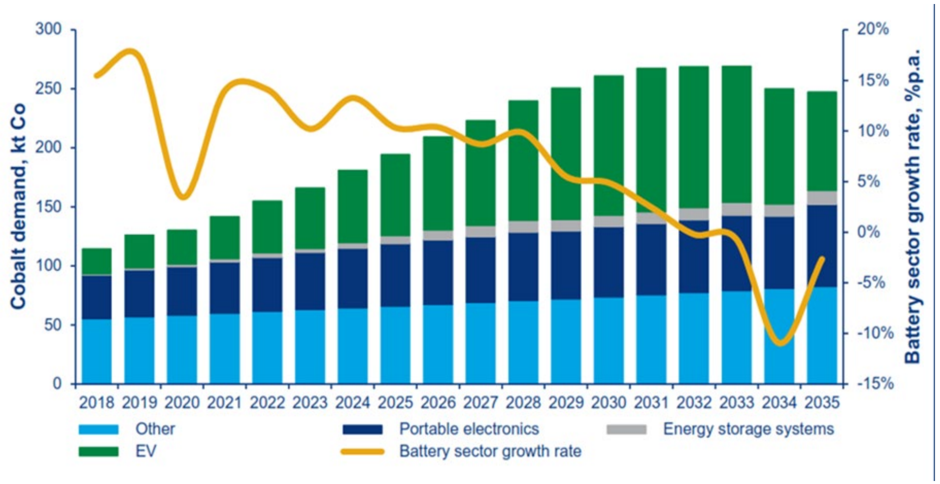


USGS, Report 2017–1155

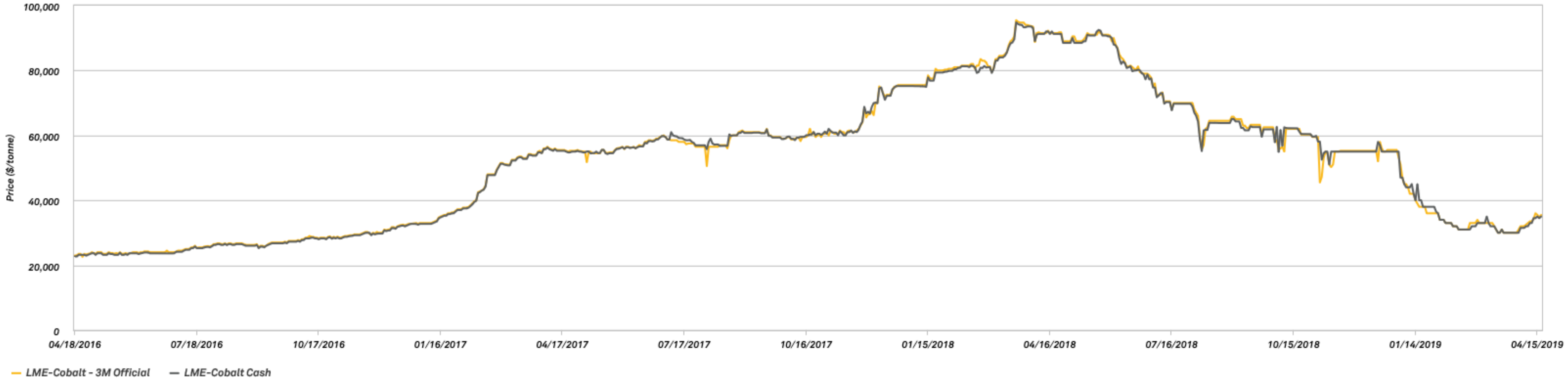
COBALT

WHAT TO MARKET / WHAT TO BUY

- Fast projects. Predicted cobalt offtake peak early 2030's – risks - decreased contents, substitution, alternatives and bad press.
- Has Co already hit its peak?
- Depends on where the EV "revolution" goes??
- China is removing subsidies on EVs;
  - Reduced by 60% in 2018; midsize and large > 400 km range - 10% boost.
  - Another 67% compared with 2018 in 2019
  - Plans to remove subsidies completely after 2020.



Wood Mackenzie



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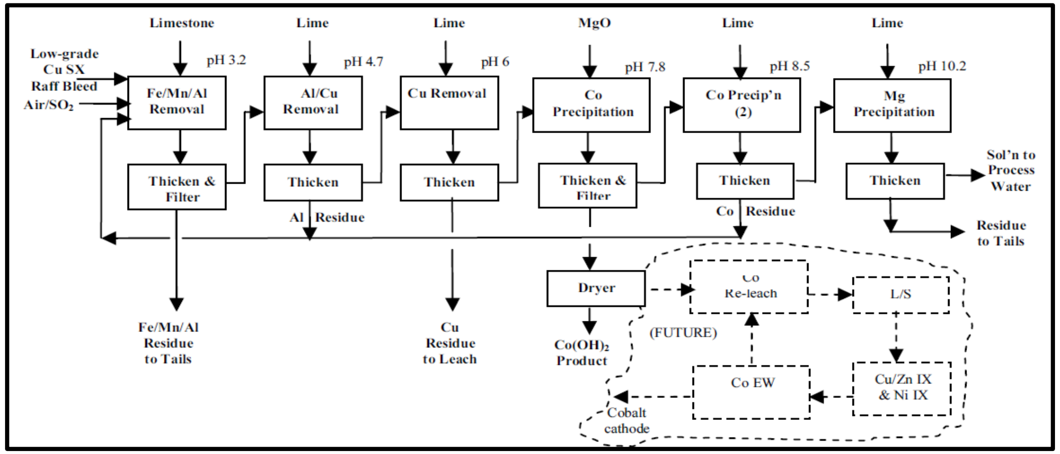
COBALT PROCESSING

COBALT PROCESSING

OXIDE ORES : NICKEL AND COPPER

- **Background**
  - Cobalt typically a by-product of either nickel or copper
  - Either as a nickel-cobalt laterite or as a weathered ‘oxide’ zone of a copper-cobalt deposit
  - Leaching is non-selective
  - Moderate to very high acid consumptions : 20kg-400kg/t
- **Flowsheet**
  - Nickel-cobalt laterite : acid leaching, often needs to be under pressure, viz. HPAL, followed by a refinery where impurities are removed by precipitation (Fe, Al, Si, Mg) and cobalt and nickel are either precipitated as a bulk product (hydroxides or sulphides) for further processing or processed further to separate products e.g. sulphate or metal
  - Copper-cobalt ‘oxide’ ores : acid leaching, Solvent Extraction/Electrowinning (copper cathode) followed by precipitation of the impurities (Fe, Mn, Al) and followed by purification and recovery of the cobalt as a sulphate/hydroxide or electrowon as a metal
  - *Fisher, 2011, SAIMM*



Fisher, 2011, SAIMM

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COBALT PROCESSING

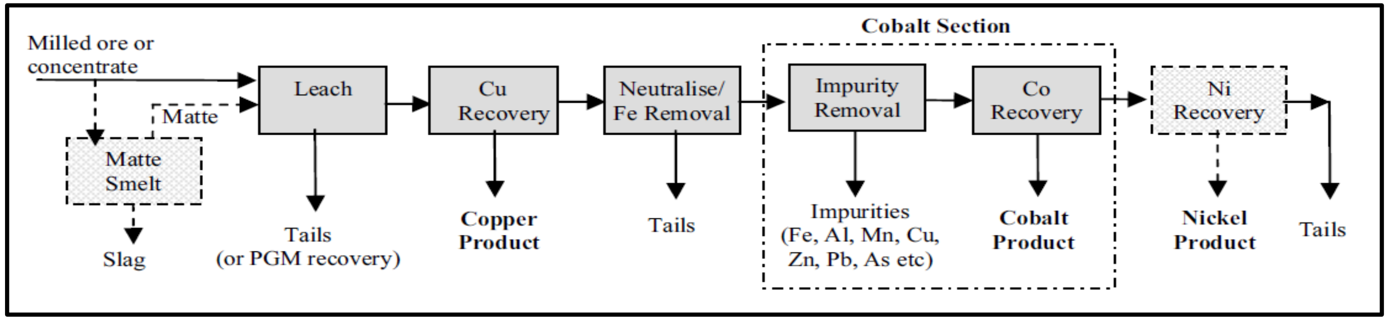
OXIDES ORES : NICKEL AND COPPER

- **Processing Issues**
  - High acid consumption : acid consuming minerals…limestone, dolomite, siderite, apatite,…
    - If an issue, copper-cobalt ores use sulphidisation-flotation flowsheet
  - Significant amounts of manganese: usually cobalt mineralogy (e.g. heterogenite) or pyrolusite (MnO_2) present
  - Copper mineralogy unreactive chrysocolla (copper silicate)
  - Impact of fine materials (e.g. clays) - viscosity and dewatering

COBALT PROCESSING

SULPHIDE/ARSENIDE ORES : COBALT, NICKEL AND COPPER

- **Background**
  - Cobalt arsenide ores specific to North America
  - Nickel-copper-cobalt ores exist in Australia, Canada and Russia
  - Copper-cobalt ores mainly occur in the DRC (underlie copper-cobalt oxide ores)
  - Pyrite (solid solution)
- **Flowsheet**
  - Cobalt arsenide flowsheets :
    - Historically, roasting of flotation concentrates followed by leaching, with purification (i.e. impurity precipitation) and recovery of the cobalt as a sulphate/hydroxide or electrowon as a metal;
    - More acceptably, ferric leaching of a flotation concentrate (forms scorodite), followed by purification and recovery of the cobalt as a sulphate/hydroxide or electrowon as a metal;
  - Nickel-copper-cobalt ores : flotation concentrates are smelted to produce a nickel-copper-cobalt matte, which is typically leached with ammonia (Sherritt Gordon process) followed by precipitation to remove impurities and recovery of the cobalt as a sulphate/hydroxide or electrowon as a metal



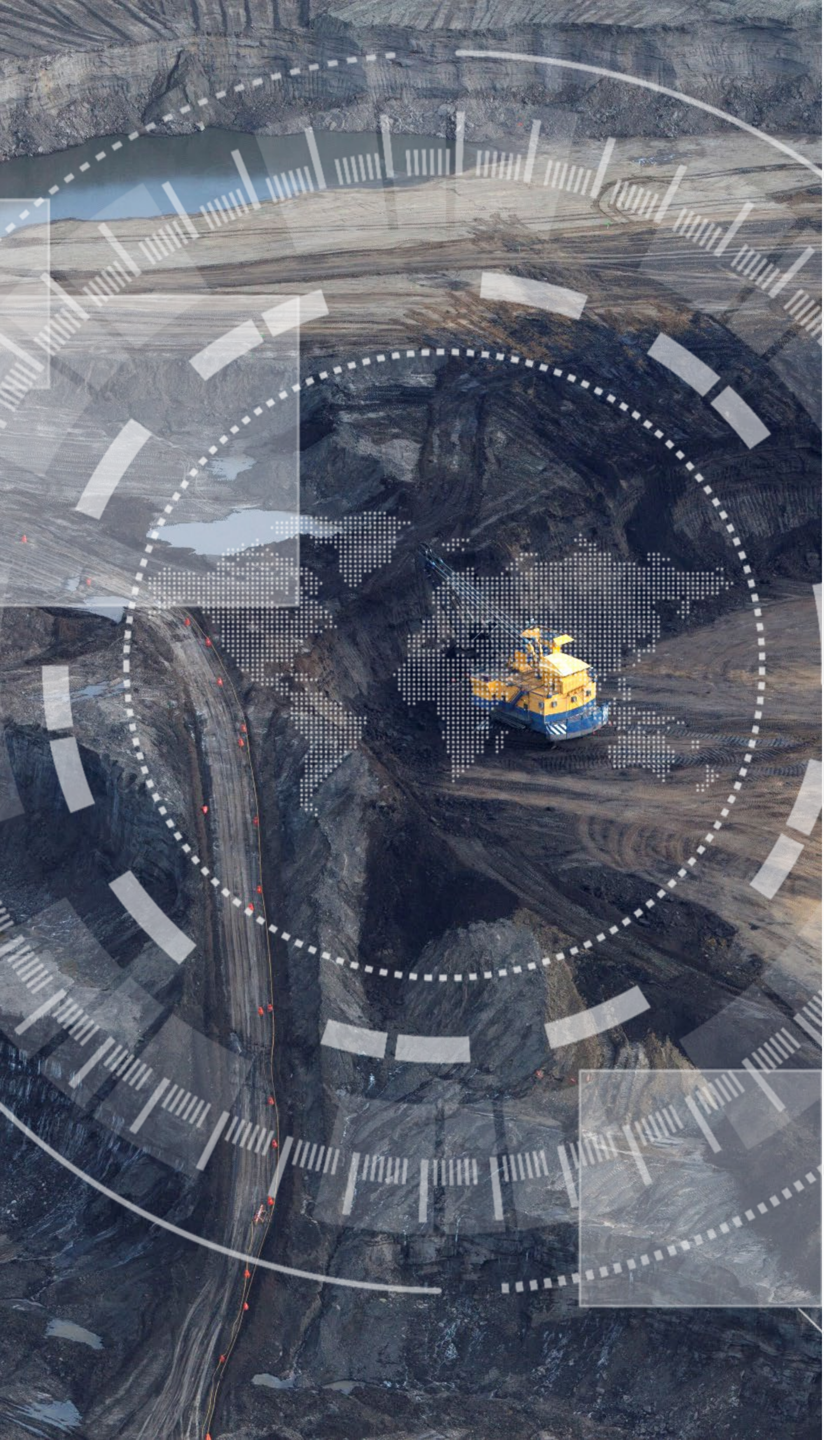
Fisher, 2011, SAIMM

COBALT PROCESSING

SULPHIDE/ARSENIDE ORES : COBALT, NICKEL AND COPPER

- ***Flowsheet cont'd***
  - Copper-cobalt ores : flotation concentrates are turned into sulphates by roasting then processed in a typical copper-cobalt oxide flowsheet i.e. SX/EW for the copper with precipitation of the impurities (Fe, Mn, Al) and followed by purification and recovery of the cobalt as a sulphate/hydroxide or electrowon as a metal
  - Pyrite ores : recovery of pyrite by gravity and flotation; oxidation (e.g. roasting or bacterial leaching) of the concentrate followed by leaching, solvent extraction and precipitation of cobalt sulphate/hydroxide

- **Developments**
  - Mn is general problem
  - Resin in Pulp : promising – selective over Mn, Mg
  - Solvent Extraction (pH control issues)
  - Ion Exchange (Molecular Recognition Technology – MRT) : requires more development, perhaps specific element removal



COBALT CONCLUSIONS

- Global Cobalt supply is dominated by production from the DRC. This has geopolitical risks and does not consistently meet current “ethically sourced” guidelines for some consumers
- Substitution, decreased contents and subsidy removal are likely to impact on offtakes and price
- Potential for large laterite sources but requires large capital investment into a volatile market

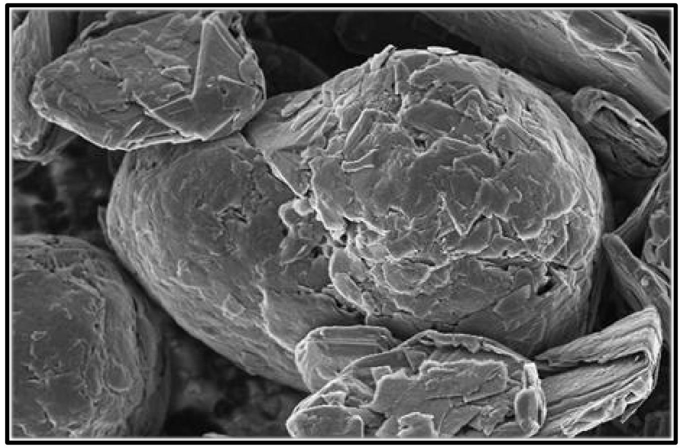
GRAPHITE GEOLOGY

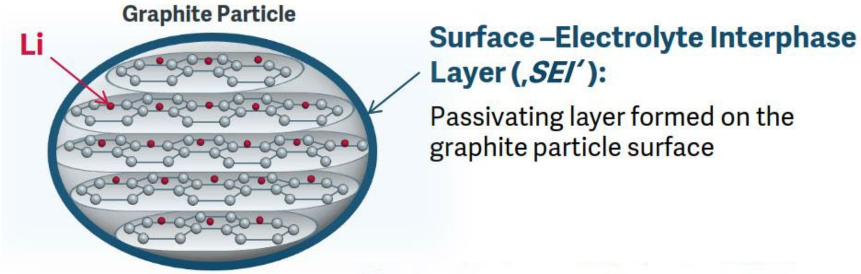
GRAPHITE

Basics

- Natural or synthetic graphite for battery anodes?
- Large flakes are not necessarily a guarantee of good battery properties; relevant properties include;
    - Product purity (low Fe, Ca, S, Si, Ni, Zn, Cr, Al, Cu, V are very important)
    - Tap density (density of tapped powdered graphite indicates how much can be packed into an anode, shape important, target approx. 1g/cc)
    - BET surface area (the surface area of the graphite powder lower the better <5 m^2/g is good)
    - Reversible capacity (the charge that can be taken and reversed for the graphite, mAh/g, theoretical maximum of 372)
    - Irreversible capacity (the charge taken on the first cycle but never reversed, mAh/g, as low as possible , 5 is relatively good)
    - D002 (degree of graphitisation and interlayer spacing, ideal is 0.3354nm)

Spherical Graphite





Graphite Powder Processing, SGL Group, Nov 2014

GRAPHITE

Deposit Characteristics

- Natural battery graphite occurs in flake graphite deposits
- High grade metasedimentary rocks - thermal metamorphism of organic material in the original sedimentary rocks
- Typical graphite grades range from 4% to 20% Cg
- Sizes range from a few to 100's of million tonnes
- World Resource and Reserves > 800Mt of recoverable! (USGS 2017)
- Planar to folded and faulted - great impact on the mineability of the deposit
- Flake size, grade and impurities can vary significantly across a deposit

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GRAPHITE

Good Battery Graphite

- Some projects are being characterised only by flake size and grade, but are being promoted for battery usage
- Investors : if a graphite property is promoted as a battery mineral feed ask for the product battery relevant property testing results
- Geologists; do sighter tests on these properties earlier rather than later in a properties life so that suitability is not an assumption
- Sighter tests should be completed asap but it is unreasonable to expect full product specification at the Resource stage. There should be statements in the Resource announcement commenting on stage of investigation and risk.

GRAPHITE

Future and Risks

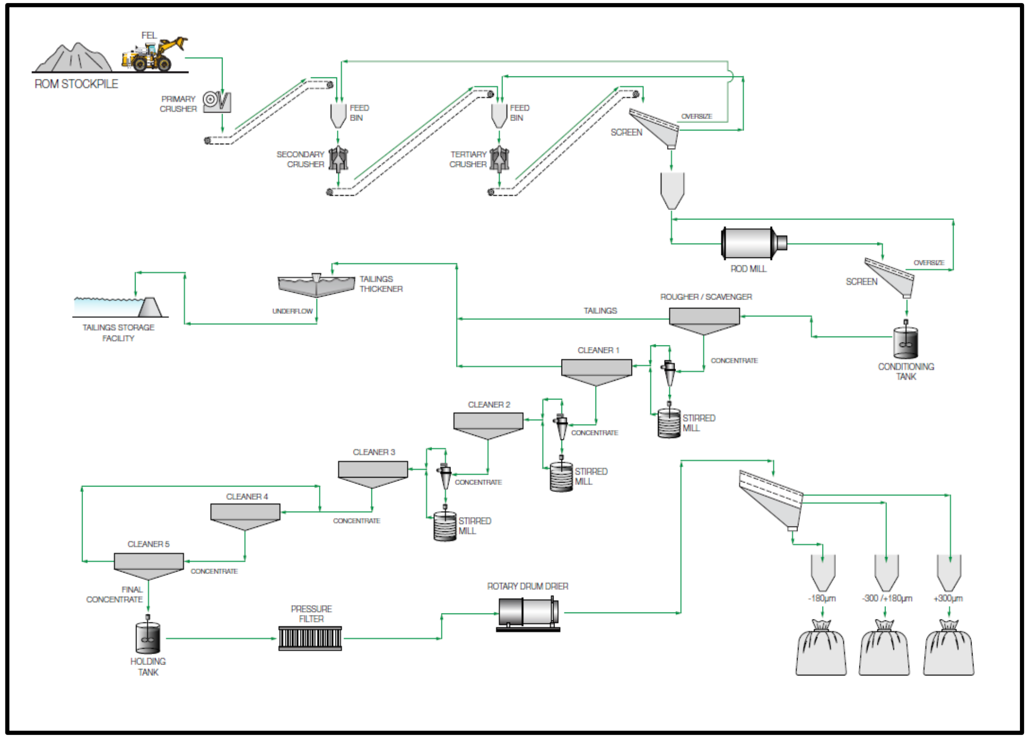
- The Resources / Reserves and Exploration potential are HUGE!
- Future over production?
- Look for or invest in;
  - Early producer projects
  - Low cost jurisdictions, good infrastructure and low political/social risks
  - Near surface and simple geometry projects
  - Good battery graphite properties - test early
  - Offtake agreements with major consumers
  - A team that knows what they are doing in this space
- Mostly are typical mining industry risks, but
- Emphasis on offtake and product characteristics

GRAPHITE PROCESSING

GRAPHITE PROCESSING

EXTRACTION FROM THE ORE

- Mineralogy : mainly 'silicates' with occasionally pyrite
- Graphite is a 'natural floater'
- Flotation is used to separate graphite from other minerals present
- Maintenance of flake size is important
- Several stages of size reduction typically employed : three stages of crushing followed by rod milling
- Classification important – screening used where ores have coarser flake sizes
- Several stages of flotation are used in conjunction with attritioning of the intermediate concentrates
  - Removing impurities e.g. silica and occasionally pyrite from edges of graphite flakes
- Aim to produce a concentrate >94% Cg as coarse as possible
- Premium for larger flakes arises from tendency to have fewer impurities i.e. higher grade and less downstream processing required



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GRAPHITE PROCESSING

ORE EXTRACTION ISSUES

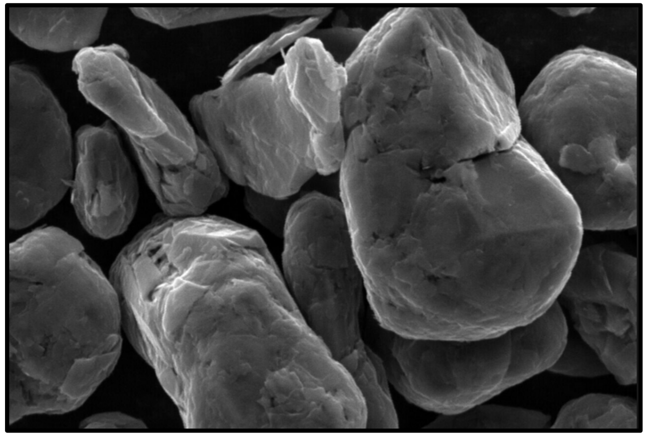
- Fine mineralogy requires a fine grind size
  - Slower floating : larger circuit (capex)
  - Depressants may be required (control silica and pyrite)
  - More stages of cleaning (>4/5)
  - Not readily amenable to column cleaning
- Secondary/weathered ores
  - Presence of clay
  - May require desliming
  - Lower slurry density : larger circuit (capex)
- Not easy to manage processing circuit
  - Unlike base metal sulphide separations :
    - No On-Stream Analysis (OSA) available
    - Difficult to run by 'eye'
    - Combination of constant feed properties and quick concentrate assessment technique
- Processing flowsheets could be more sophisticated
  - Dedicated cleaning circuits for different streams (based on size)
  - Adaptations from base metal sulphide flowsheets

GRAPHITE PROCESSING

DOWNSTREAM PROCESSING

- Battery market requires specific properties

  : Purity (>99.99+% Cg) and size (<20 microns : surface area and packing density)
- Concentrate is subjected to spheriodisation
  - Graphite flakes converted to a spherical shape by blasting particles against each other at high speed using air
  - Numerous stages; product very fine, typically less than 20 microns
  - Increases purity : typically >97% Cg
  - Yield is important : Chinese typically achieve 20% final product, 80% carbon black; Syrah believe that they can achieve 50% with coarser feed
- Leaching
  - Two stages : remove silica and any sulphides
  - Commonly undertaken on spheroidised product but sometimes prior to spheroidisation
  - Silica : historically hydrofluoric acid; typically caustic digestion; extraction with chlorination proposed
  - Sulphides (mainly pyrite) : nitric acid
- Surface treatment
  - Proprietary process
  - Surface coating (carbon source)



Superior Graphite, website (field 20 microns)

GRAPHITE CONCLUSIONS

- Battery commodity demand is dynamic – predictions have low certainty
- Graphite product properties should be addressed at an early stage of exploration to find whether the there are reasonable expectations for battery use
- Large graphite Resources exist, there is a race to production and potential for eventual over supply
- There have been significant failures in graphite processing … pick a winning team