



# Neometals

The Evolution of Lithium™

Investor Presentation

15 May 2017

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## Competent Persons Statement:

The information in this document that relates to “Barrambie Mineral Resource Estimates”, “Barrambie Pre Feasibility Study Results”, “Mt Marion Mineral Resource Estimates” and “Lithium Battery Recycling – Scoping Study Results” are extracted from ASX Releases set out below. The Company confirms that it is not aware of any new information or data that materially affects the information included in the ASX Releases set out below, and in the case of estimates of mineral resources, that all material assumptions and technical parameters underpinning the estimates in those ASX Releases continue to apply and have not materially changed.

6/12/2013	Barrambie - Amended JORC 2012 Mineral Resource Estimate
25/08/2015	Barrambie Pre Feasibility Study Results
27/10/2016	Mt Marion Mineral Resource Upgrade
22/02/2017	Lithium Battery Recycling – Scoping Study Results

The Company confirms that all the material assumptions underpinning the production target and the forecast financial information derived from the production targets in the Barrambie Pre-feasibility Study and Lithium Battery Recycling – Scoping Study continue to apply and have not materially changed.



# Corporate

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Neometals



# Human & Financial Resources



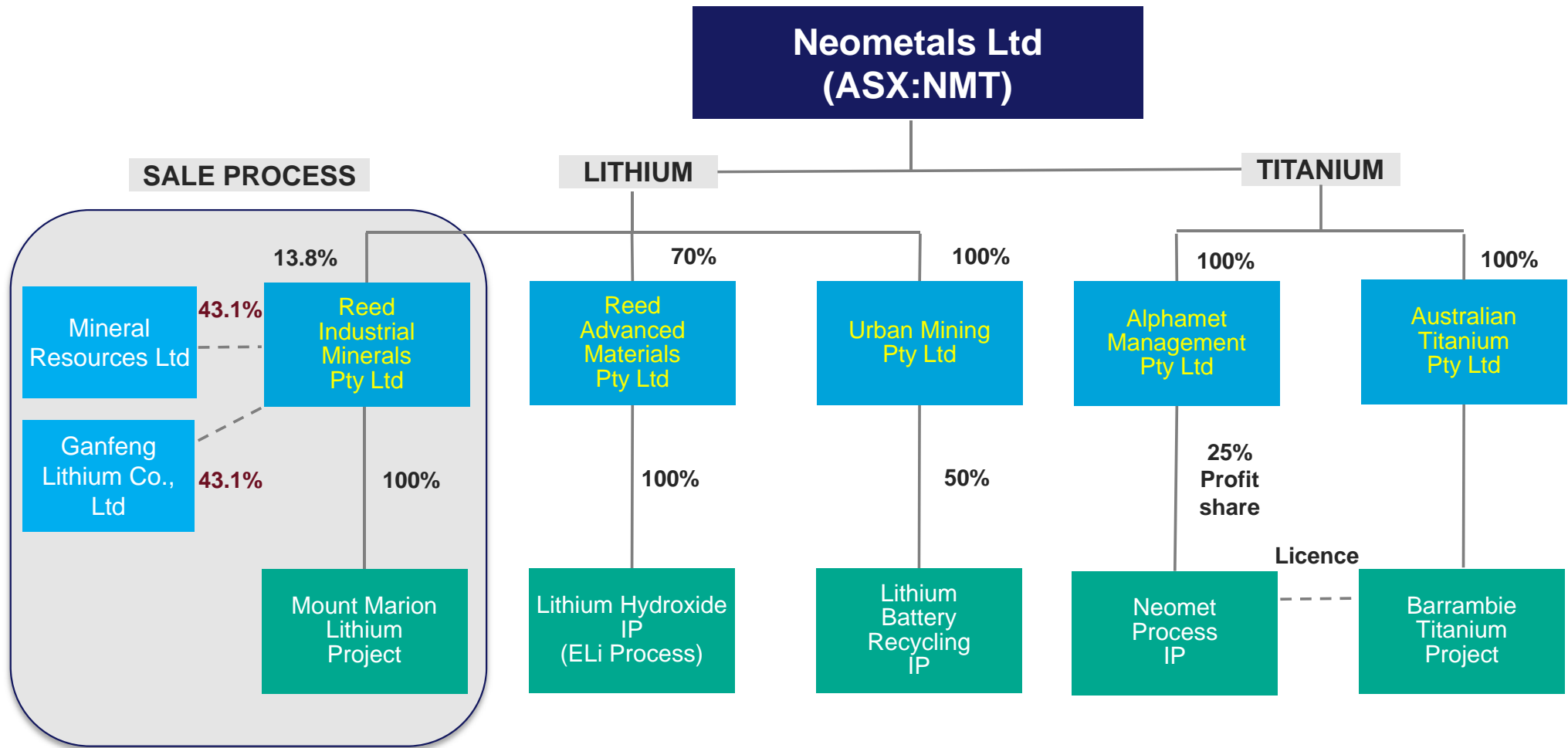
ASX CODE: NMT	OTC:RDRUY	
Last close (12-5-2017)	A\$	0.265
Shares on issue	M	560
Market capitalisation	A\$M	148
Net Cash (at 31-3-2017)	A\$M	<b>53.5</b>
Receivables/Investments	A\$M	<b>16.5</b>

DIRECTORS/MANAGEMENT	
Steven Cole	Non-Executive Chairman
Chris Reed	Managing Director & CEO
David Reed	Non-Executive Director
Natalia Streltsova	Non-Executive Director
Doug Ritchie	Non-Executive Director
Michael Tamlin	COO
Jason Carone	CFO & Company Sec.



MAJOR SHAREHOLDERS	
David Reed	10.9%
Kilkenny Limited	4.3%
Top 20 (10-5-2017)	38.0%

# Operating structure



All the right elements

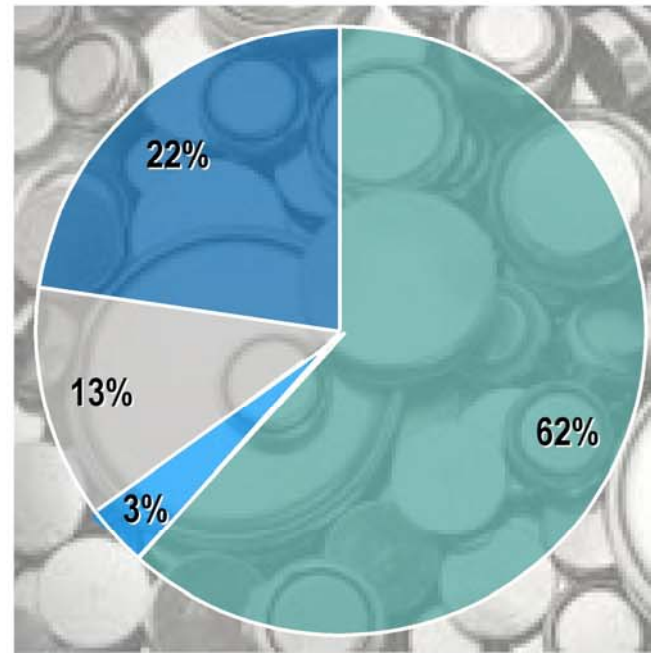
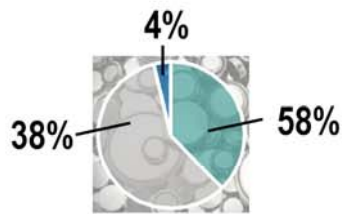


# Investment Thematic – Conservative Exposure to Energy Storage Revolution



Global Lithium-Ion Battery Capacity - 2016  
(27.9 GWh)

Global Lithium-Ion Battery Capacity - 2020  
(173.5 GWh)



**6X  
Growth**

- China
- Poland
- Korea
- United States

Source: estimates on battery capacity courtesy of Benchmark Mineral Intelligence

# Leading Cathode Producer – 6 X Growth



## Accelerated expansion of cathode materials production capacity

- Sharp uplift in Umicore's orders for NMC cathode materials for xEV
- Outpacing global market growth due to unique positioning
- Decision to invest € 300 million to accelerate expansion of cathode materials capacity, on top of investment of € 160 million currently in execution
- Combined investments to increase total cathode material production capacity more than six fold between 2015 and 2020, with revenue ramp-up starting in 2017
- Drives value creation and underlines Umicore's leadership in clean mobility

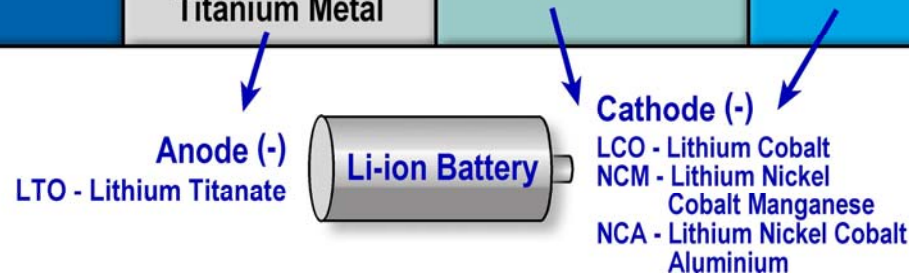
Source: Umicore May 2017



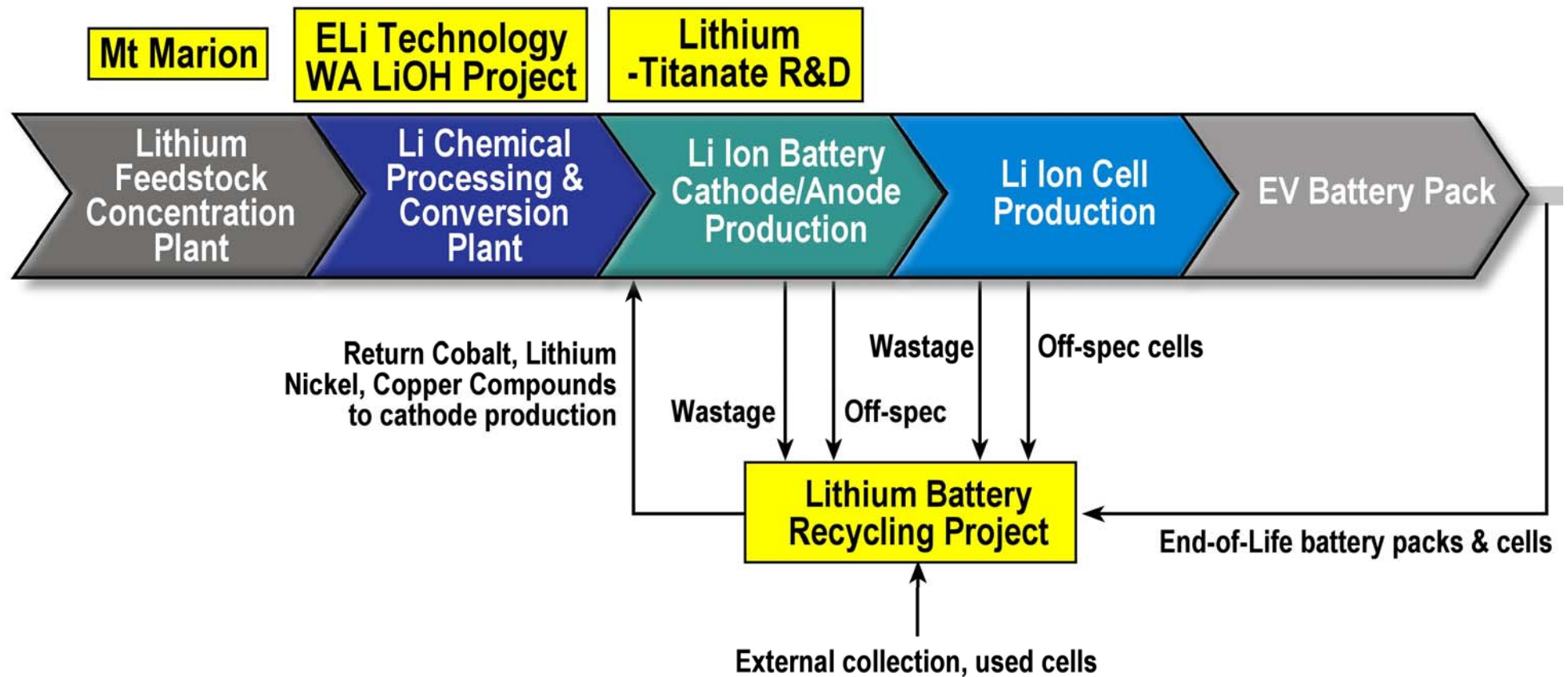
# Focus on Li-Ion Battery Commodities



Element	Ti	Li	Co
Feedstock(s) Source	Barrambie (100%) 47Mt @ 22% TiO <sub>2</sub>	Mt Marion (13.8%) 77.8Mt @ 1.37%Li <sub>2</sub> O	Lithium Battery Producers Consumer Electronics Electric Vehicles
Upstream Product	+ 40% TiO <sub>2</sub> Concentrate	6% Li <sub>2</sub> O Concentrate	Lithium Ion Batteries ≤ 20% Co
Downstream Product/Process	<u>Neomet Process (25%)</u> Titanium Hydroxide Ti (OH) <sub>4</sub>	<u>ELi™ Process (70%)</u> Lithium Hydroxide LiOH	<u>Unnamed Process (50%)</u> Cobalt Sulfate CoSO <sub>4</sub> + Li <sub>2</sub> CO <sub>3</sub> Lithium Carbonate
Target Applications	Titanium Pigment Titanate Adsorbent Lithium Titanate Titanium Metal	Lithium Battery Cathode Materials	Lithium Battery Cathode Materials



# Our Positions in the Supply Chain



# Long-term Strategy



Combining innovative cost advantages and strong partners



to develop a portfolio of globally significant mineral resources



into lower-risk, long-life, high-margin operations to optimise stakeholder returns



2 cent unfranked div – April '16  
2 cent unfranked div – Aug '16  
A\$5M/5% on market buyback

# Tactical Plan - FY17

Nm

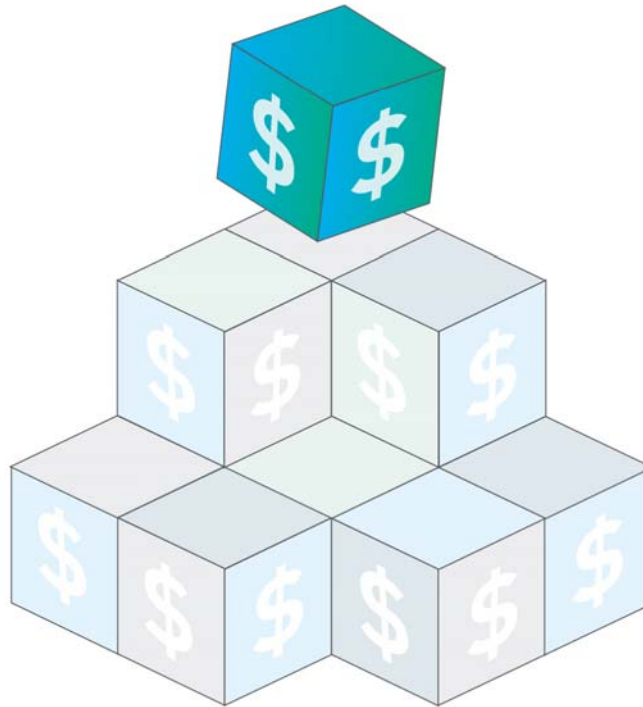
Grow market cap from maximising returns from existing operations, increasing margins via higher value (downstream) products and developing growth options.

Mine, process, sell globally relevant minerals with strong market fundamentals

Commercialise proprietary processing Technologies

Build strong Human and Financial Capability

Leverage Project Acquisition and Development Capacity

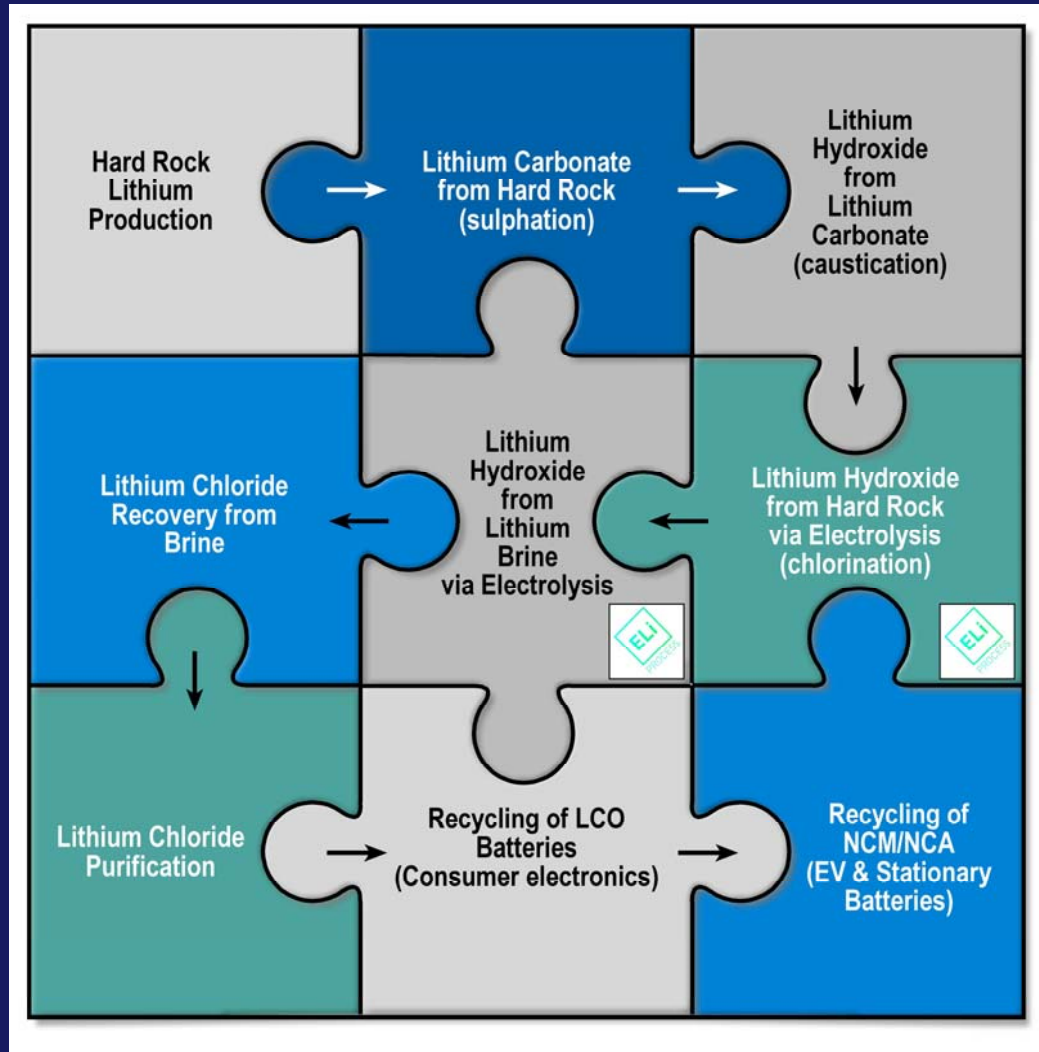


- Negotiated increased output and offtake pricing. Running sale process for stake in Mt Marion
- Advancing local LiOH project in parallel with equipment vendor testwork, offtake and partner selection processes.
- Fast-track evaluation of proprietary recycling process to recover Lithium/Cobalt/Nickel from Lithium-ion batteries with focus on EV.
- Build royalty portfolio from commercialisation of Neomet Process with Sedgman and Andritz
- Cash and investments ~ A\$70M, no debt

All the right elements



# Evolution of our Lithium Business



- Commercialise Mt Marion ✓
- Evaluating local Conventional Downstream Processing ✓
- Co-developed, Evaluated, Patented New ELi® Process ✓
- Co-developed, Evaluated, Patent Pending ELi® for brines ✓
- Testing and Evaluating Lithium-Ion Battery Recycling ✓



# Mt Marion Lithium Operation

Sale process underway for  
remaining 13.8% equity



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$$\boxed{\text{Li}} + \boxed{\text{Ti}} = \boxed{\text{Nm}}$$

# World's largest lithium concentrator

Li

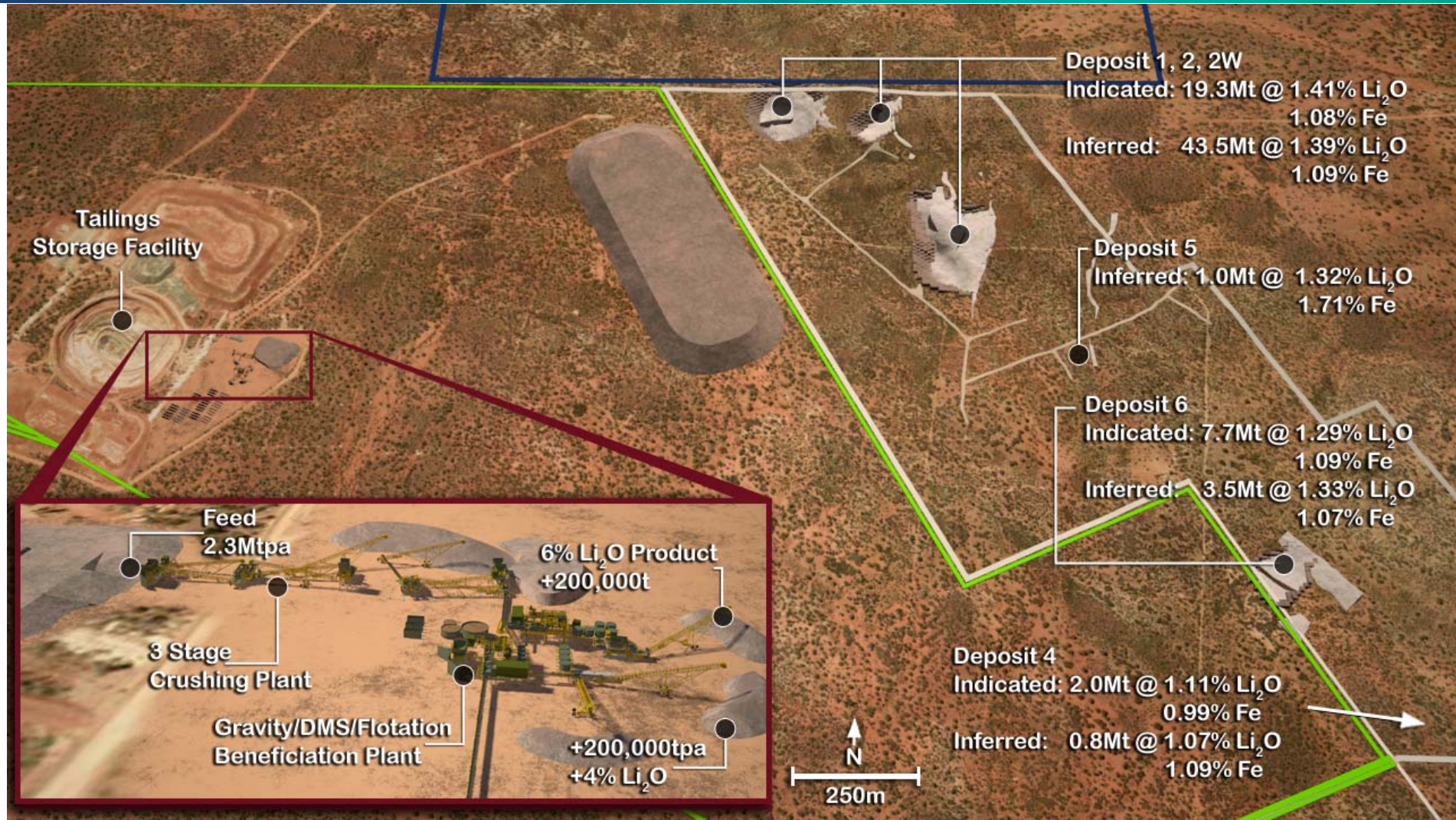


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# Globally Significant Operation – 400kt concentrates (~50kt LCE)



## Neometals

Li + Ti = Nm

# Outstanding Offtake Agreement



- ✓ China's largest, most diverse lithium producer
- ✓ Life-of-Mine, Take-or-pay Offtake Agreement
- ✓ From 1 July moving to transparent Lithium Carbonate/Lithium Hydroxide linked formula, with floor price protection
- ✓ Letter of Credit (100% payment on invoice)
- ✓ Ability for MIN/Neometals to take 51% share of production in 2020.

**Neometals**

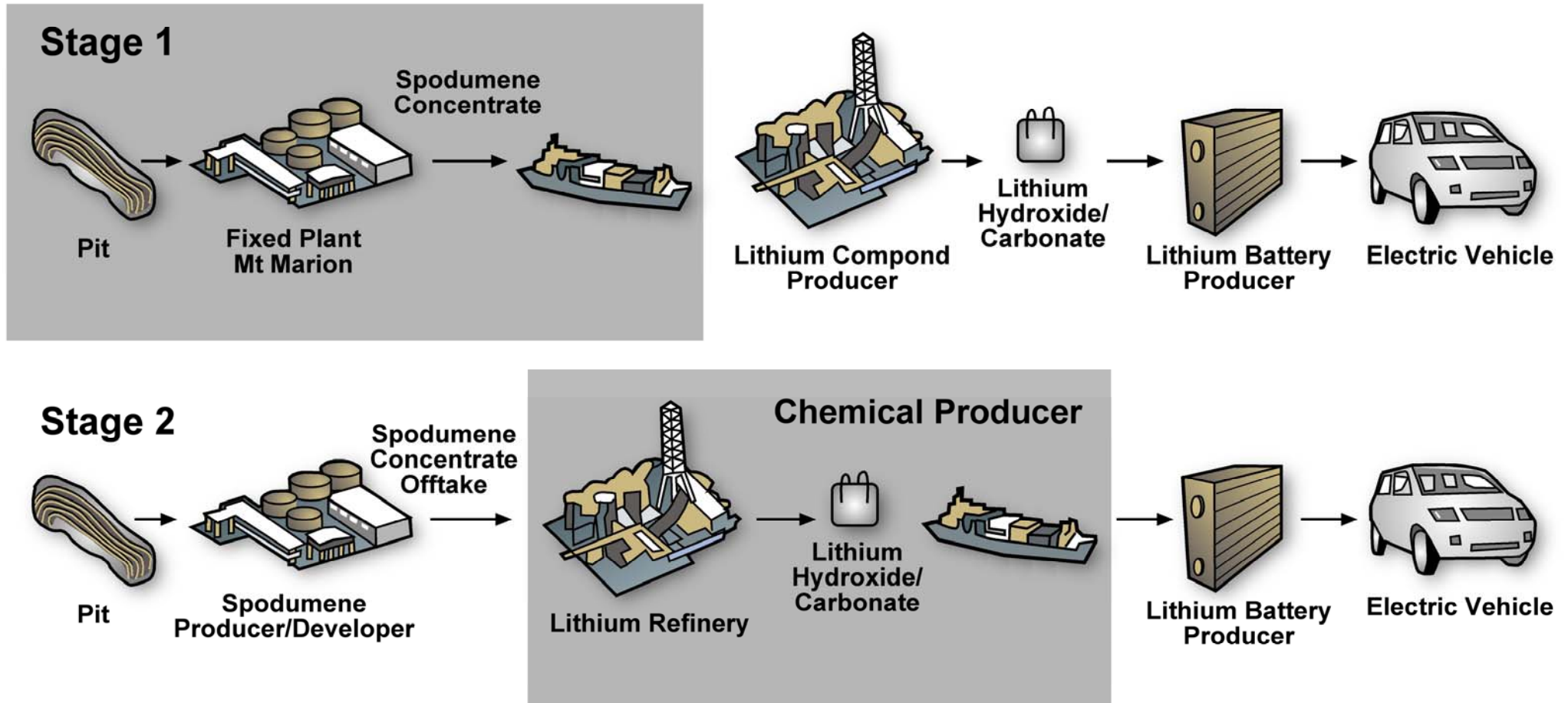




# Downstream processing

## WA-based LiOH Project

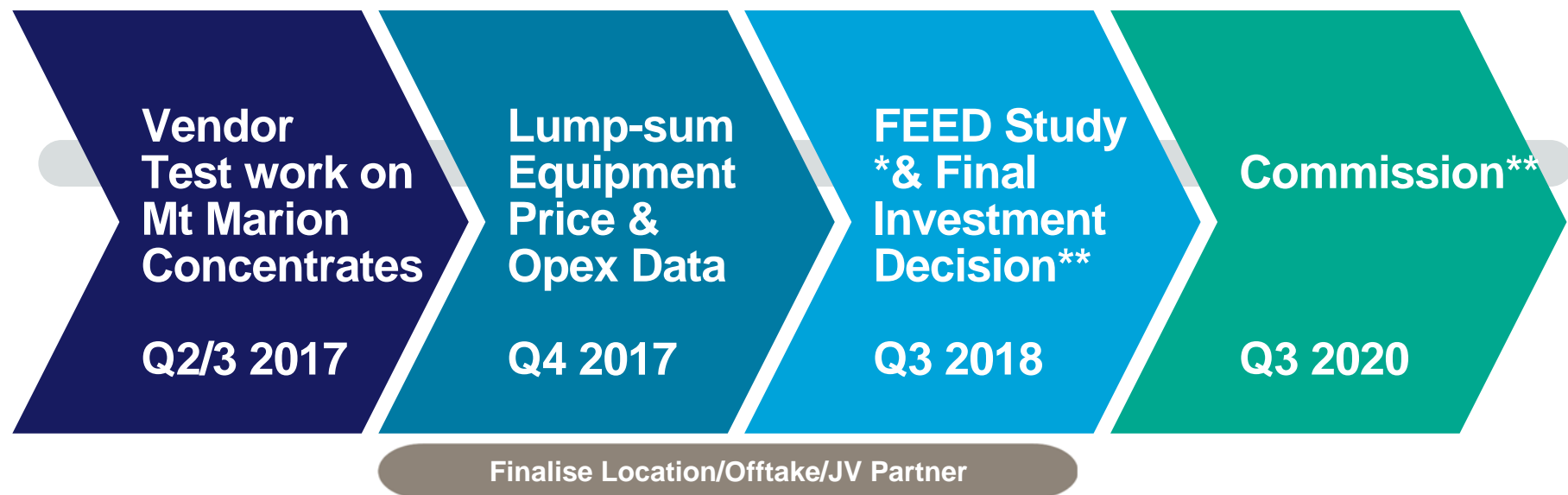
# Lithium users want LiOH/Li<sub>2</sub>CO<sub>3</sub> from spodumene converted outside China



# Commercialisation Plan



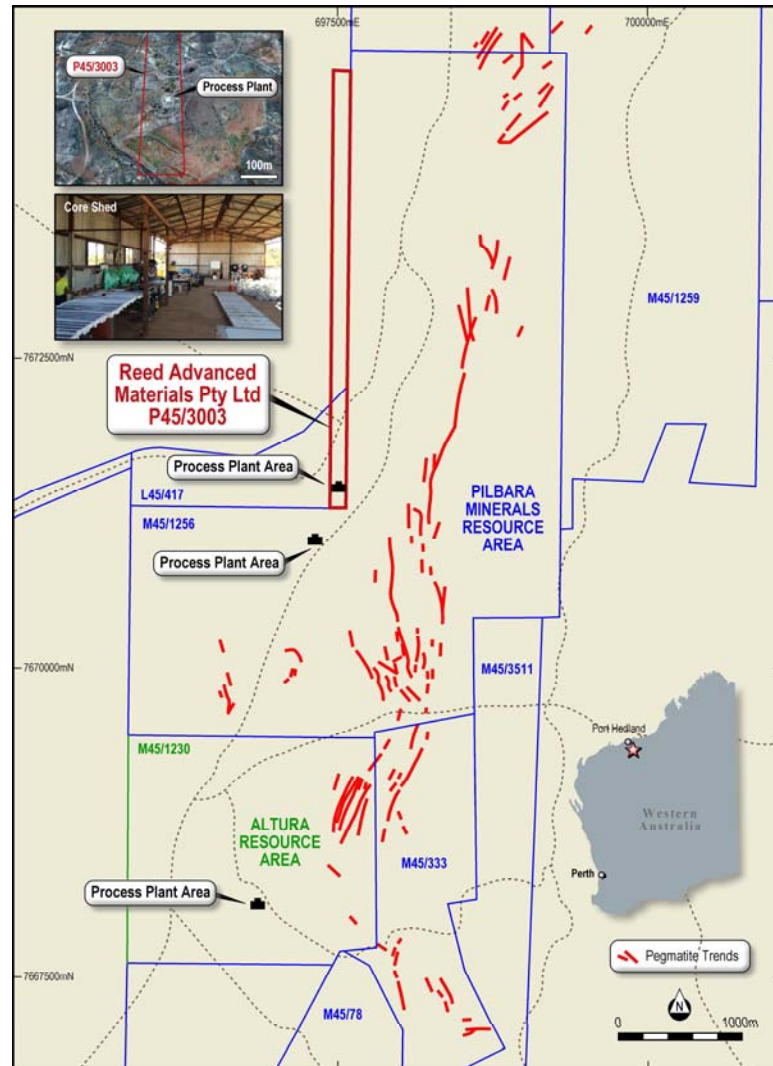
- Locate plant in WA to minimise transport, 7t spodumene concentrate needed for 1t of Lithium Hydroxide
- Utilise local spodumene (Share of Mt Marion or Third Party), natural gas, reagents and staff
- Use Sulfate/Caustic Flowsheet from leading Lithium equipment supplier
- Remove technology risk – speed to market



(\*) Subject to NMT Board Approval    (\*\*) Subject to FID



# Potential Site Evaluation



- Hatch benchmarking Capex/Opex for 3 locations: Kalgoorlie, Kwinana and Port Hedland
- NMT has 70% beneficial interest in PLA45/3003 which covers the Pilgangoora Tin-Tantalum Plant and Workshop, and historic tailings
- Adjacent tenure contains Pilbara Minerals and Altura Mining's Proposed Mine/Concentrators.

Neometals





# Downstream processing

## ELi Process™

Neometals 70%

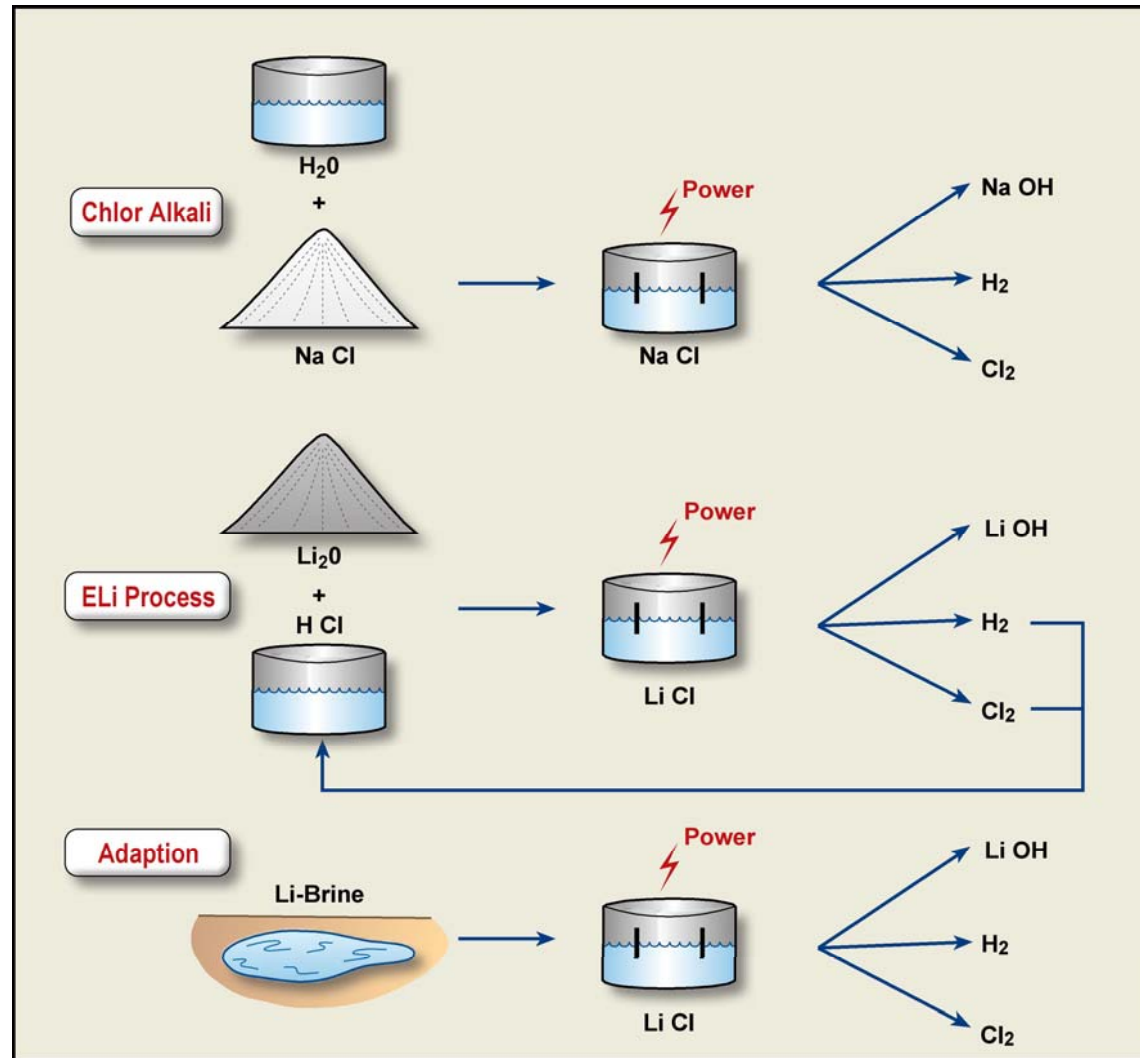
Mineral Resources Ltd 30%

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Neometals



# Competitive advantage from Patented Technology for production of LiOH



Neometals

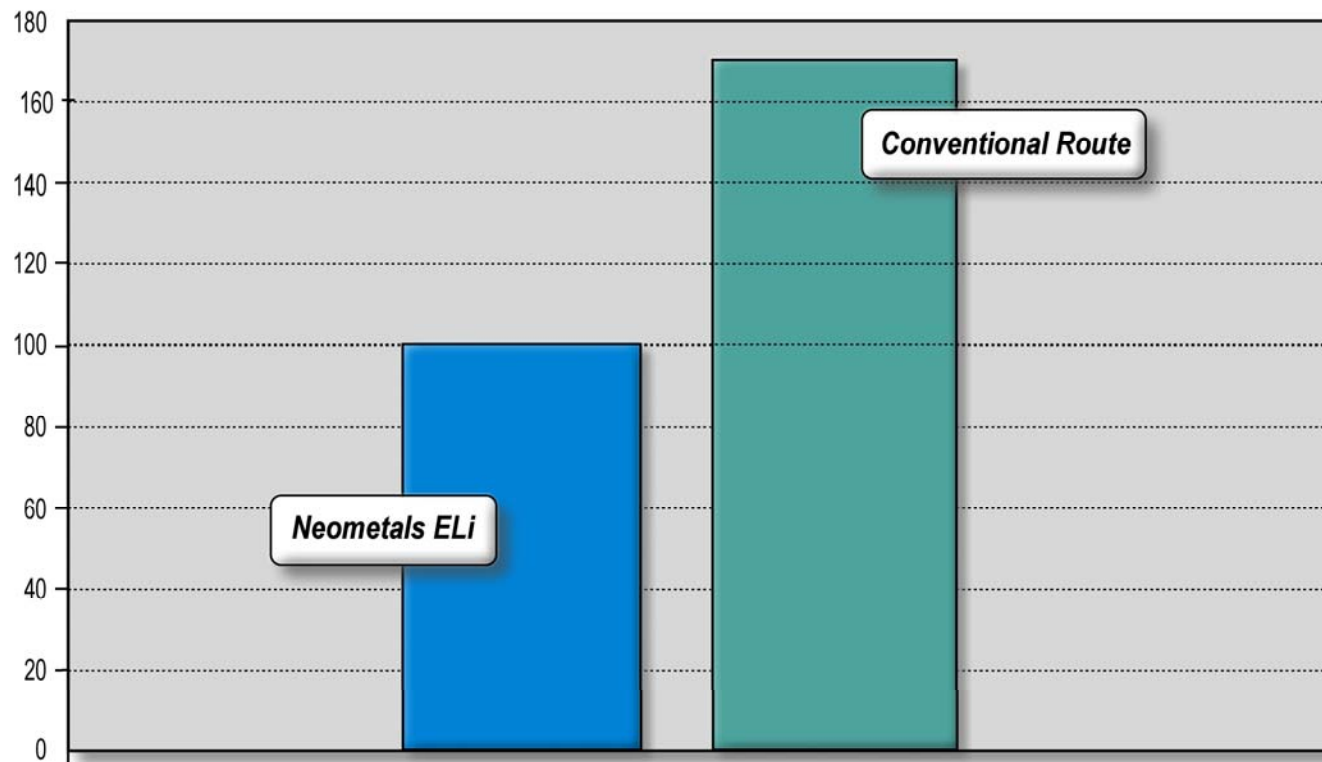




# ELi potentially levels playing field for western hard rock developers



**Relative LiOH Conversion Costs from Spodumene Leach Solution**  
(US\$ per tonne LiOH.H<sub>2</sub>O) - Malaysia basis  
ELi Process = Base 100



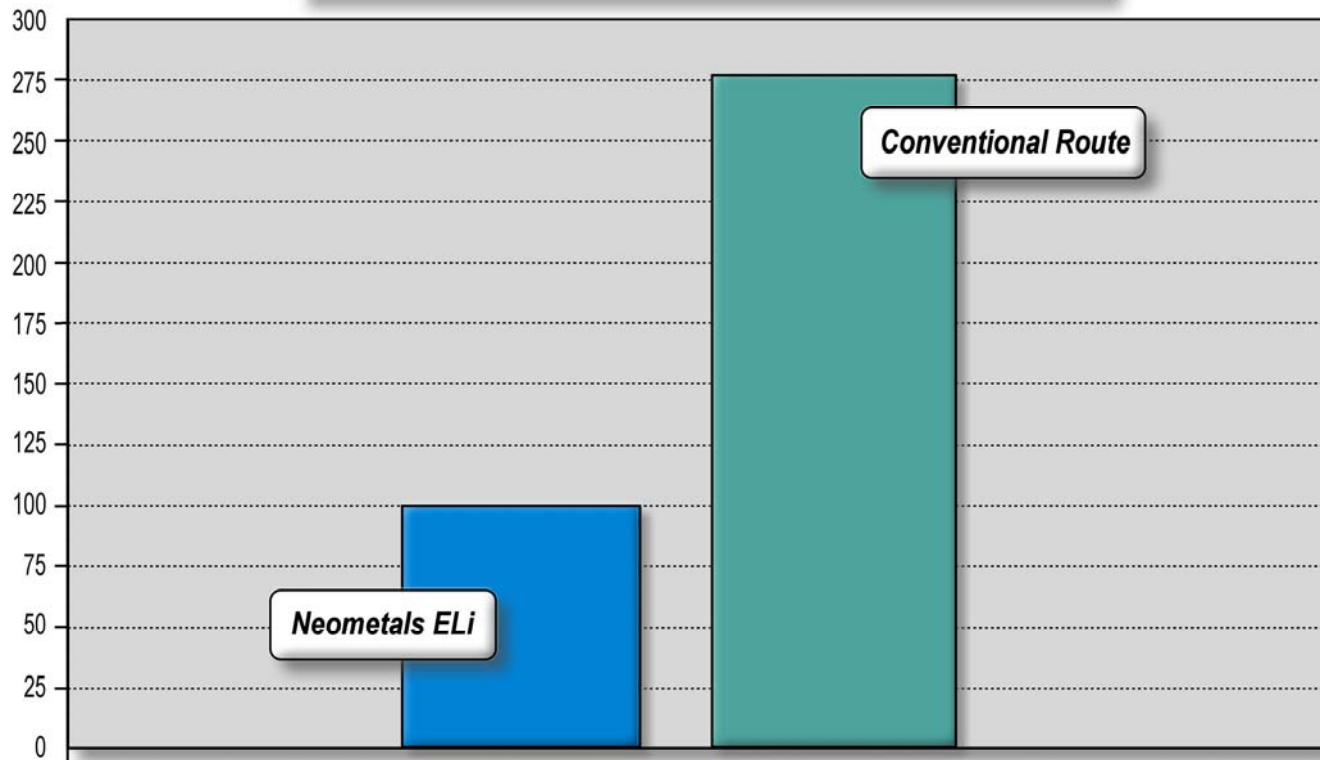
Business model is to deploy/co-invest in partnership with and/or licence to integrated hard-rock developers in return for equity/royalty stream.

\*Source: Global Engineering Group (2016) (Identity not for publication)

# ELi potentially slashes brine-based LiOH opex vs conventional causticising



**Relative LiOH Conversion Costs from LiCl Brine**  
(US\$ per tonne LiOH.H<sub>2</sub>O) - Argentina basis  
ELi Process = Base 100



Business model is to licence to existing brine producers in return for royalty stream:

- De-risks ELi for own use later
- Quicker cashflow
- Higher P/E multiple

\*Source: Global Engineering Group (2016) (Identity not for publication)



# Downstream processing

## Lithium Battery Recycling

Neometals 50% of IP, Exclusive licence

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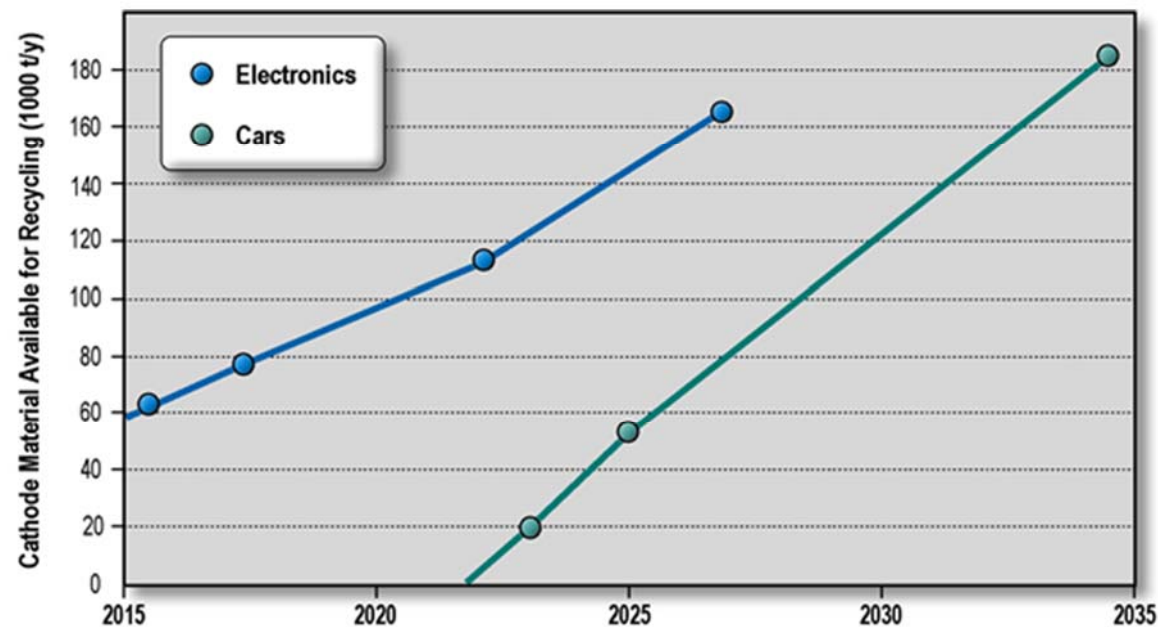


# Lithium Battery Recycling Strategy



Exploiting cost advantage in recovery of Cobalt from Lithium Cobalt Batteries in Consumer Electronics to develop a low-risk, long-life, high-margin operation with strong partners.

## Electronic Batteries Will Come Back Much Sooner

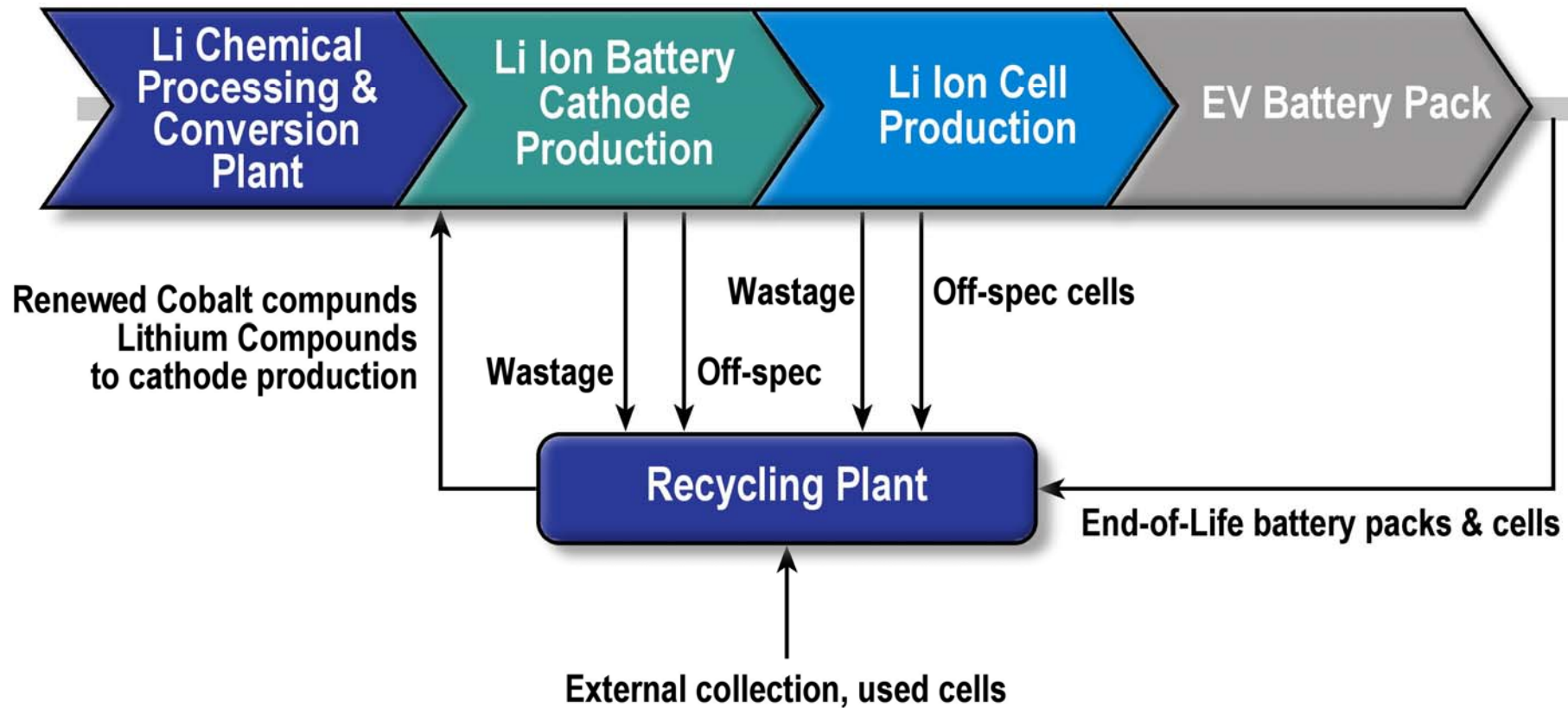


source: Argonne National Laboratory - 2016

Estimated  
< 5%  
Recycled

# Closing the loop: Recycle and re-use

Co



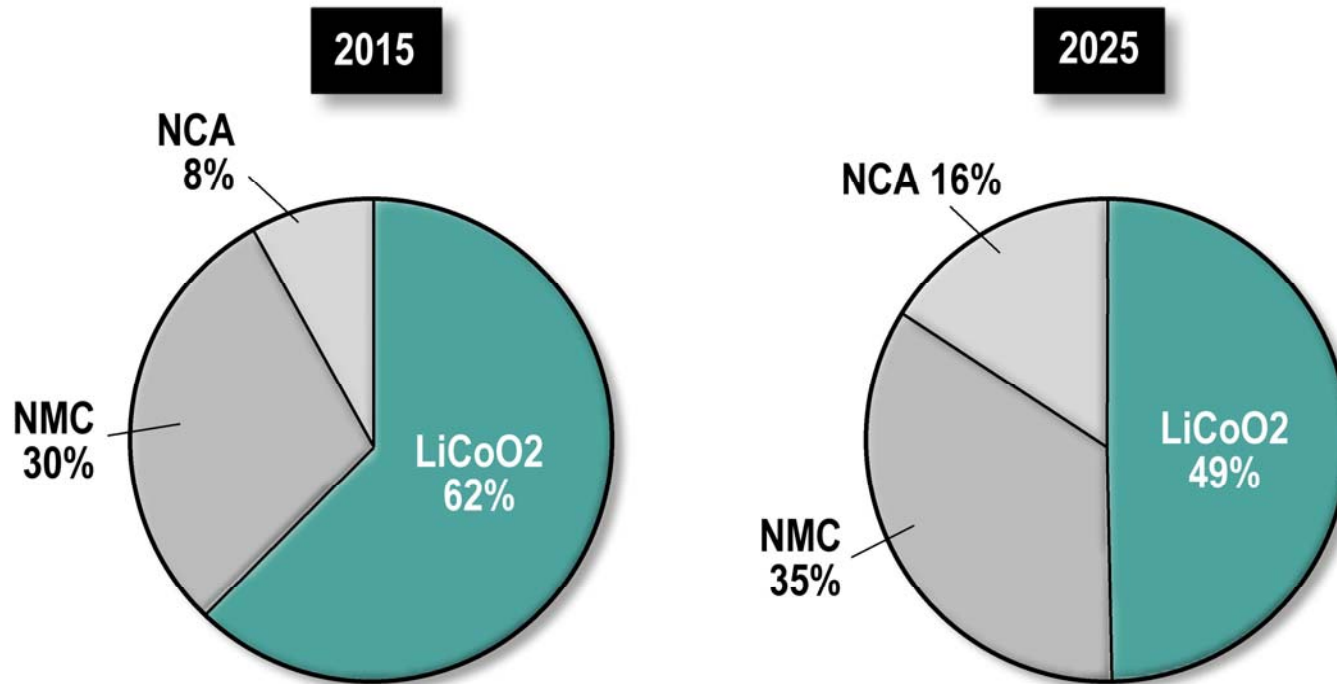
Neometals

Li + Ti = Nm

# Initial test work and Scoping Study on Consumer Electric Batteries - LCO



**NMC and NCA batteries will overtake LCO batteries as the leading consumer of cobalt in the next ten years**

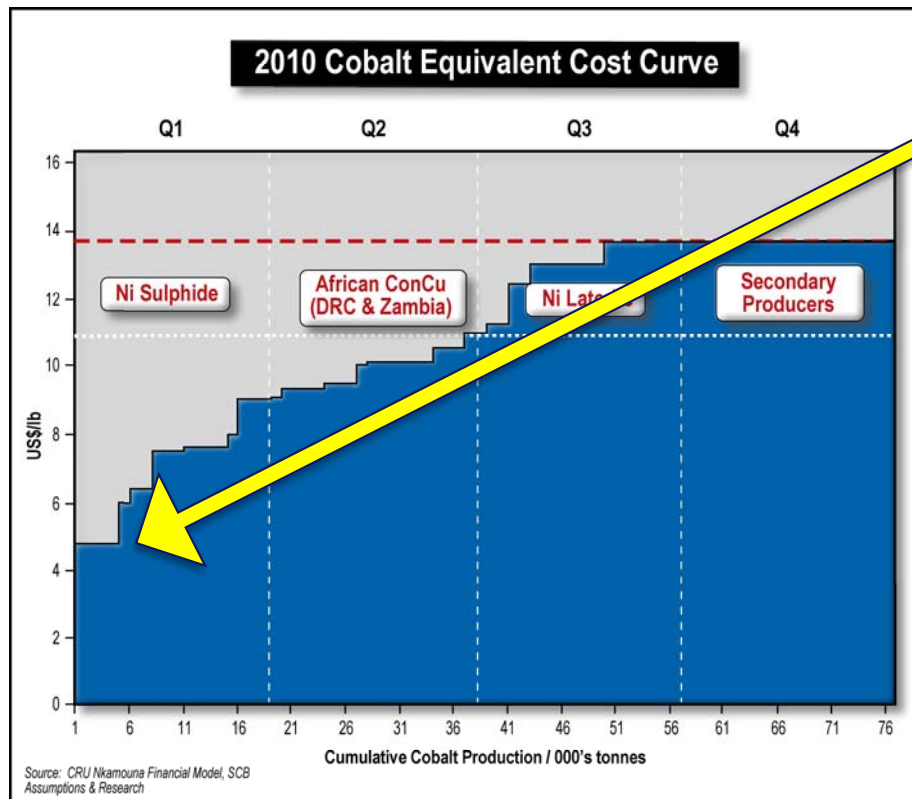


Source: CRU International Limited (2016)

# Scoping Study Results



(± 30% accuracy)



Operating Costs **US\$4.45/lb Co** (US\$10k/t)

Spot price **US\$25/lb Co** (US\$55k/t)

Capex **US\$4.5M**

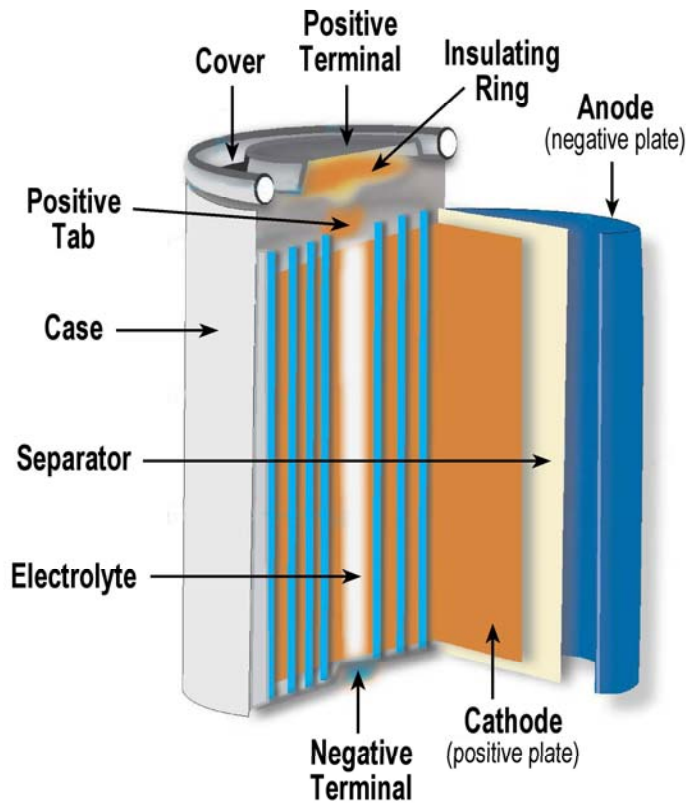
**Proceeding to pilot plant – Q3 '17**

**Can be constructed and commissioned in 42 weeks**

# Constructing Pilot Plant to process Typical EV Battery Cells - NMC



## Schematic of Lithium-ion Battery & Average Composition of Components by Material



Source: Chris Hillseth Enterprises - 2014

Lithium-ion Battery Component	Materials	Percentage (%) Composition
Cathodes	Li <sub>2</sub> CO <sub>3</sub> (lithium carbonate)	15-27%
	LiCoO <sub>2</sub> (lithium cobalt oxide)	
	LiMn <sub>2</sub> O <sub>4</sub> (lithium manganese oxide)	
	LiNiO <sub>2</sub> (lithium nitrogen oxide)	
	LiFePO <sub>4</sub> (lithium iron phosphate)	
	LiCo <sub>1/3</sub> Ni <sub>1/3</sub> Mn <sub>1/3</sub> O <sub>2</sub> LiNi <sub>0.8</sub> Co <sub>0.15</sub> A <sub>10.05</sub> O <sub>2</sub>	
Anodes	LiC <sub>6</sub> (graphite)	10-18%
	Li <sub>4</sub> Ti <sub>5</sub> O <sub>12</sub>	
Electrolyte	Ethylene carbonate	10-16%
	Diethyl carbonate	
	LiPF <sub>6</sub> (lithium hexafluorophosphate)	
	LiBF <sub>4</sub> (lithium tetrafluoroborate) LiClO <sub>4</sub> (lithium perchlorate)	
Separator	Polypropylene	3-5%
Case	Steel	40%

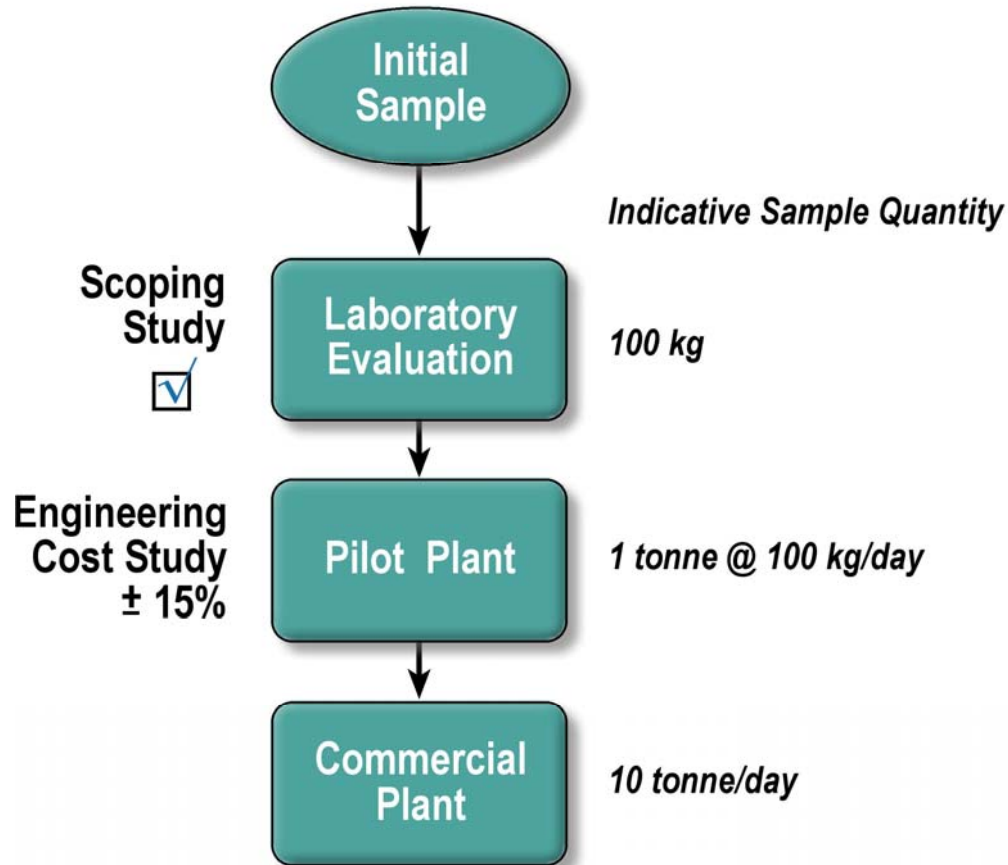
Source: Sullivan, L. & L.Gaines - 2010

## Neometals



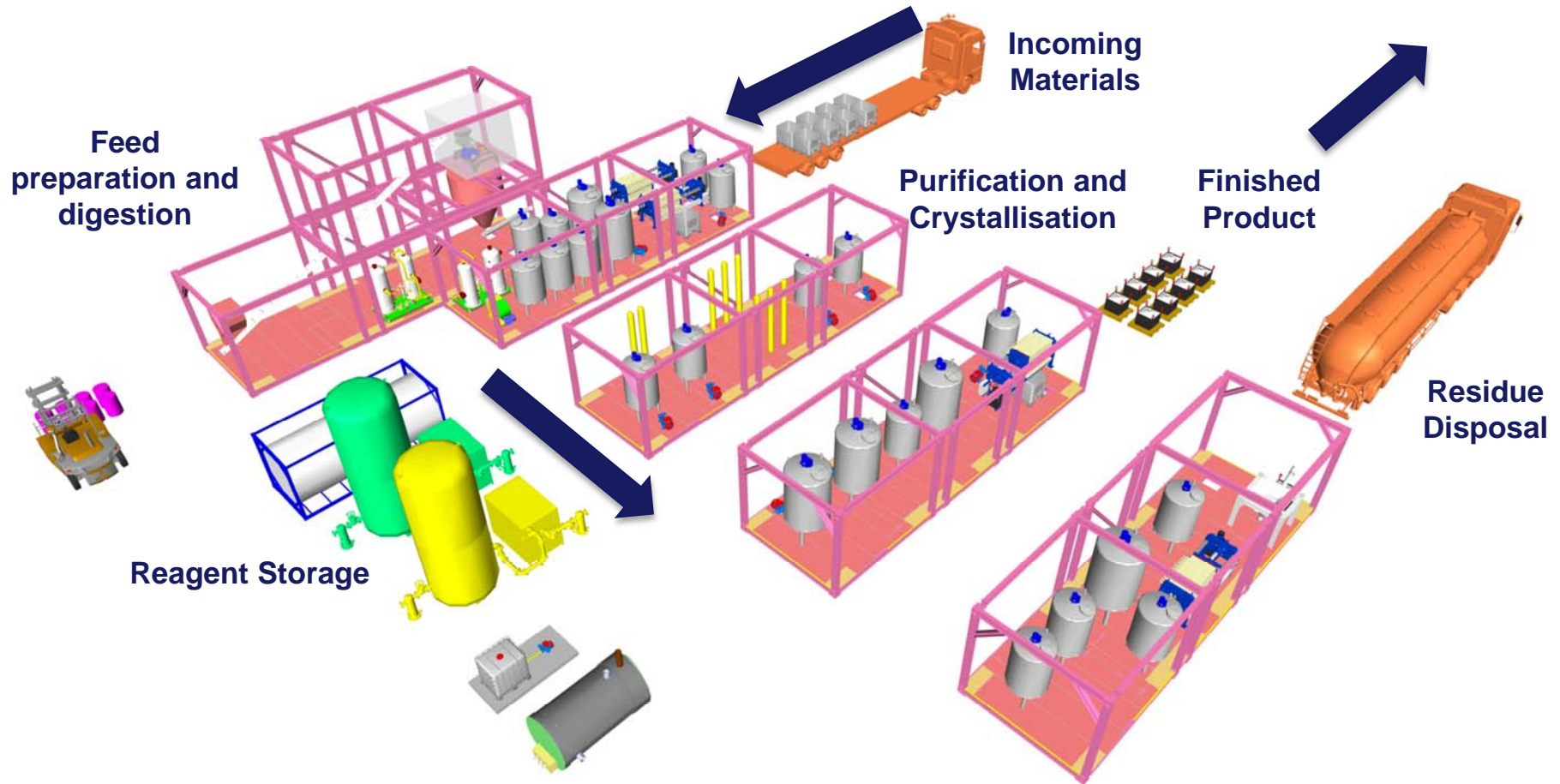


# Project Development Phasing



Running Partner/Site Selection Processes in parallel with test work and engineering programs

# Commercial Plant Schematic

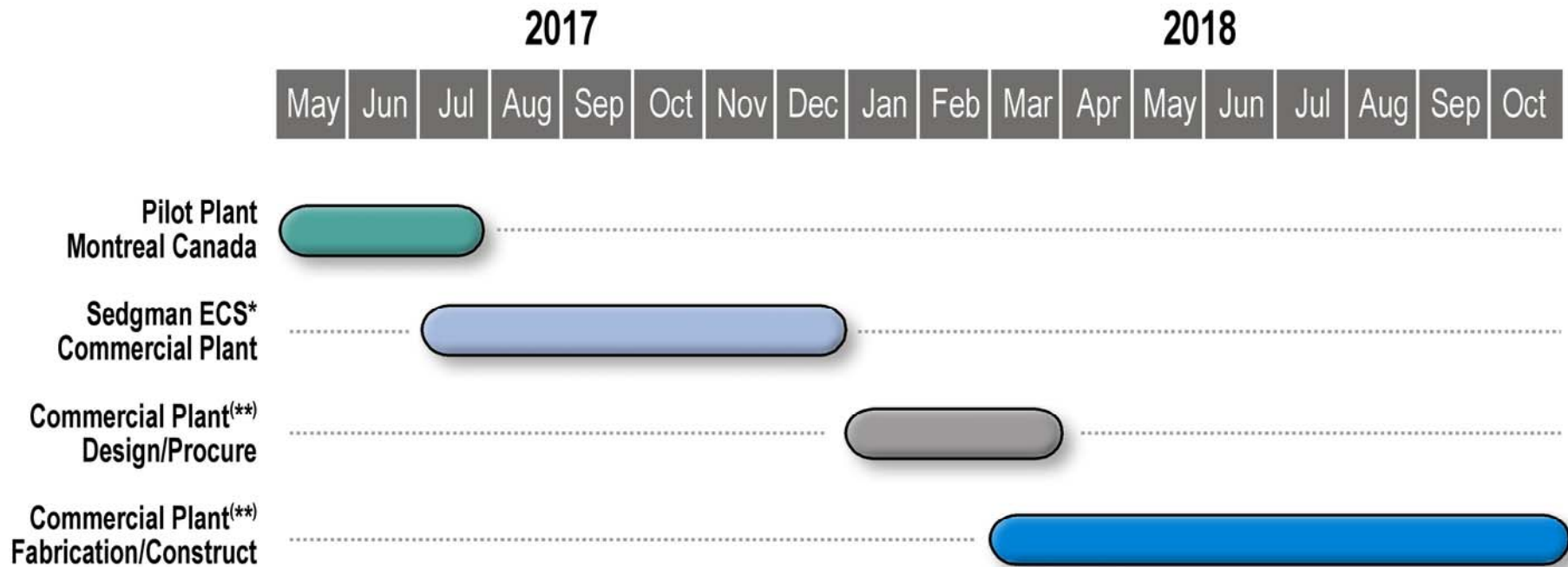


Plant footprint approx. 30m x 50m

**Neometals**



# Commercialisation Plan



Source: Neometals 2017

\*Subject to Board Approval \*Subject to FID



# Barrambie Titanium Project

100% Neometals



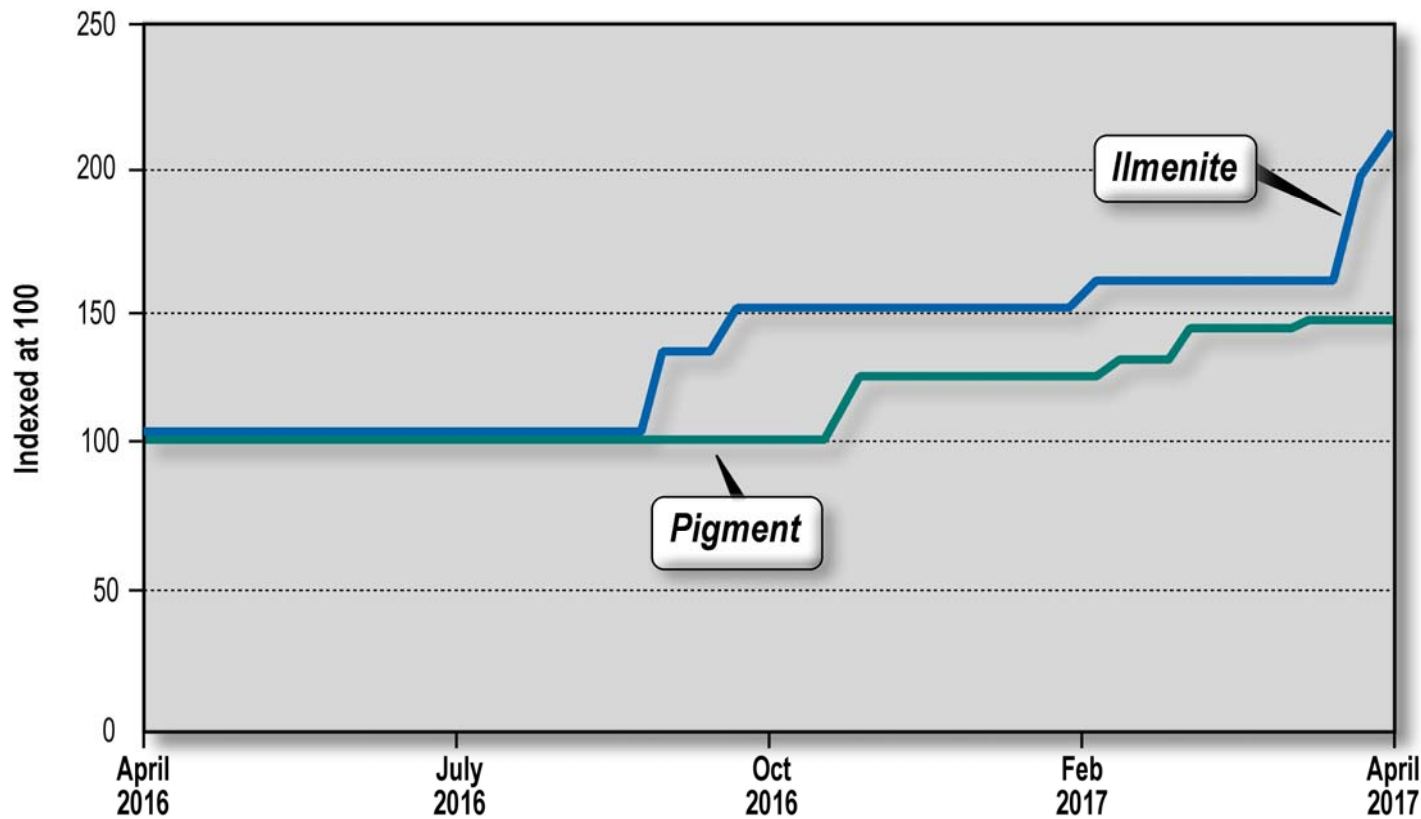
Neometals



# Strong demand/supply fundamentals



## Relative Ilmenite and Pigment Prices



Source: Metal Bulletin - 2017

The titanium pigment industry is 10x as large as the lithium compound industry.

Growth = GDP

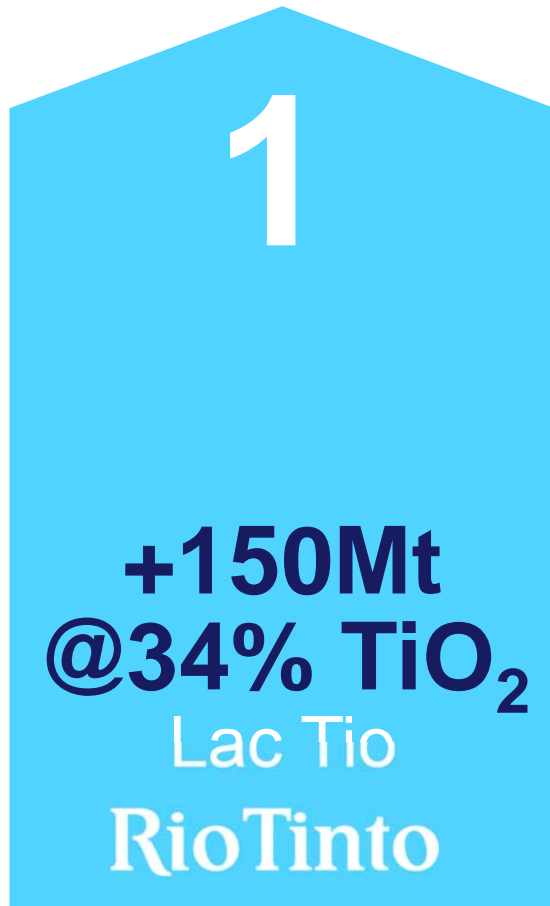
Globally declining grades and quality

Cost push price inflation

## Neometals

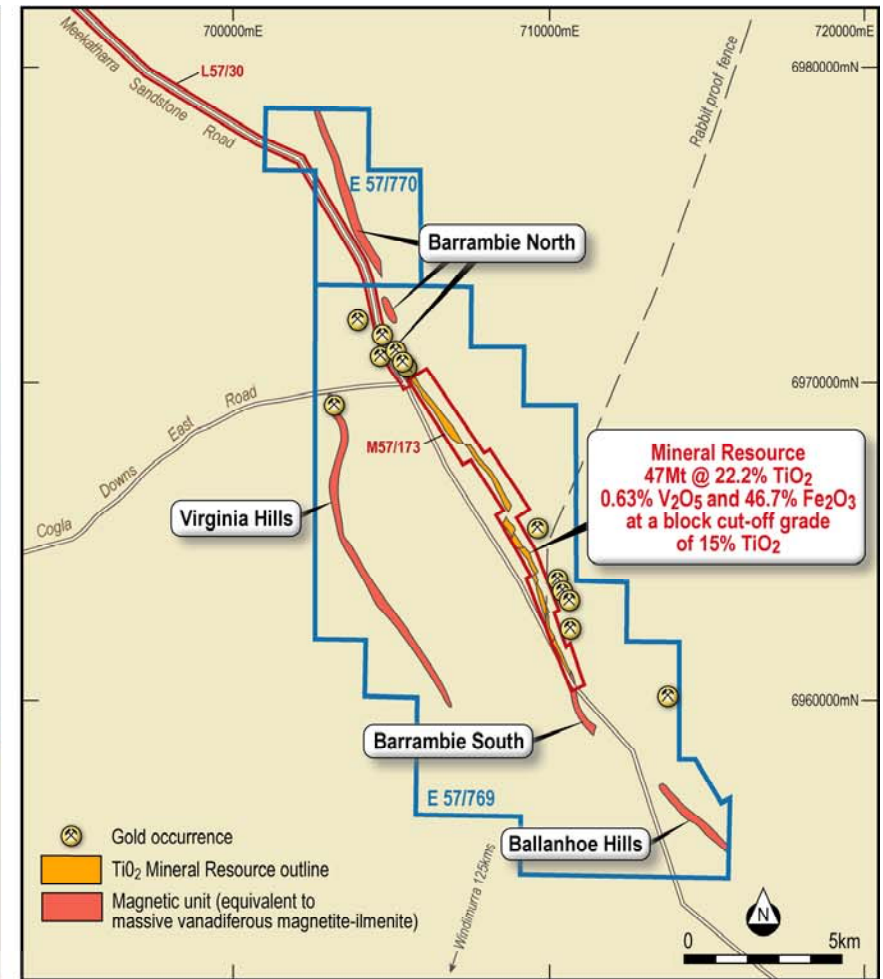
$$\boxed{\text{Li}} + \boxed{\text{Ti}} = \boxed{\text{Nm}}$$

# High Quality Resource



\* Mineral Resource Estimate  
(JORC2012) on page 29

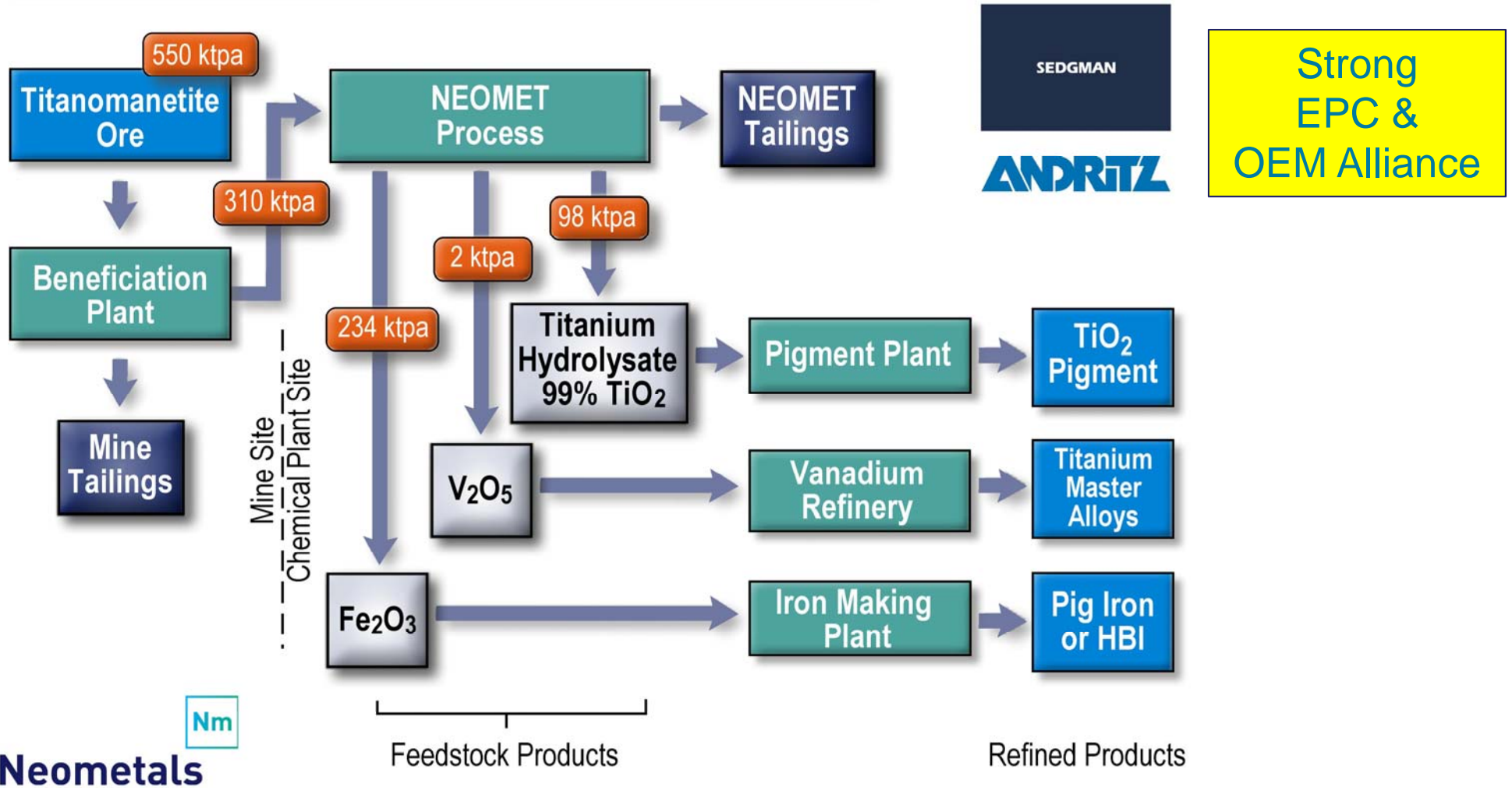
# Globally Significant Ti Resource



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# Neomet Process: 3 Product Efficiency



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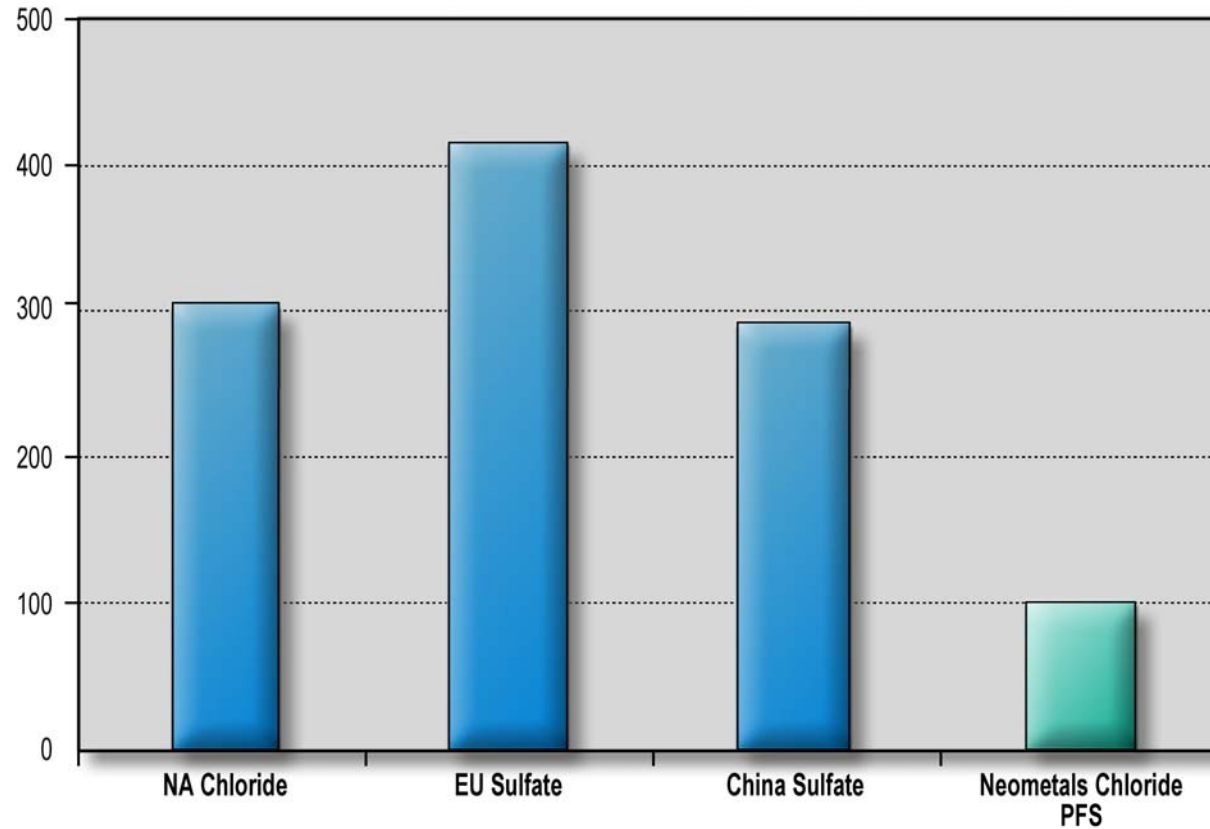
$$\boxed{\text{Li}} + \boxed{\text{Ti}} = \boxed{\text{Nm}}$$



# Neomet Process: Patented, low-cost



Relative Standard-Plant Cash Operating Costs  
(US\$ per tonne TiO<sub>2</sub> delivered basis)  
Neometals PFS = Base 100

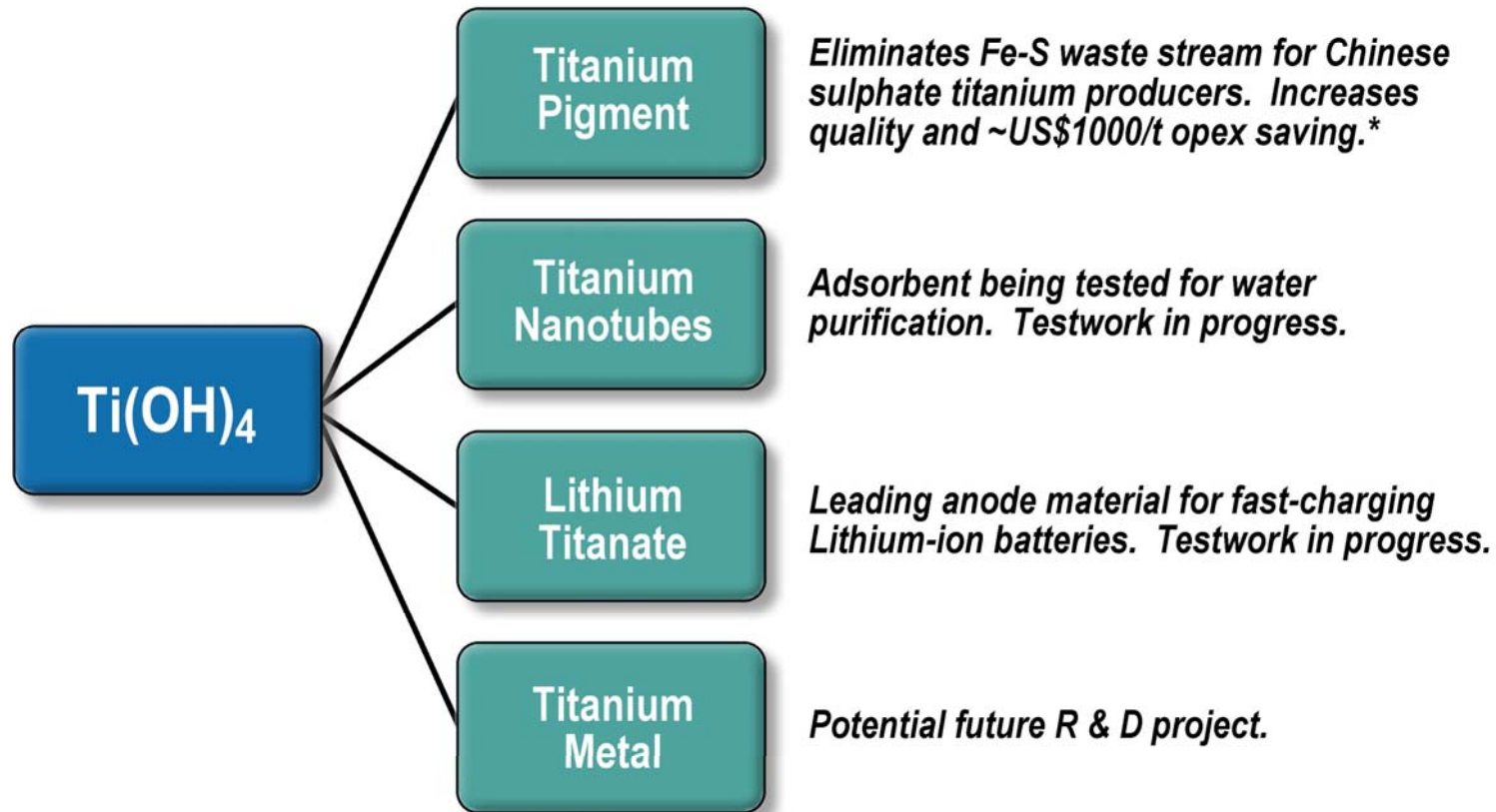


*Disclaimer: The TZMI costs (NA, EU, China) are for standard plant models in each location. They are not specific costs, neither are they averages of the costs for a location. Q4 2014. TZMI information and Neometals scoping and pre-feasibility studies performed separately and may not be like-for-like analysis.*

# Why Titanium Hydrolysate ?



## Premium Feedstock for broad application

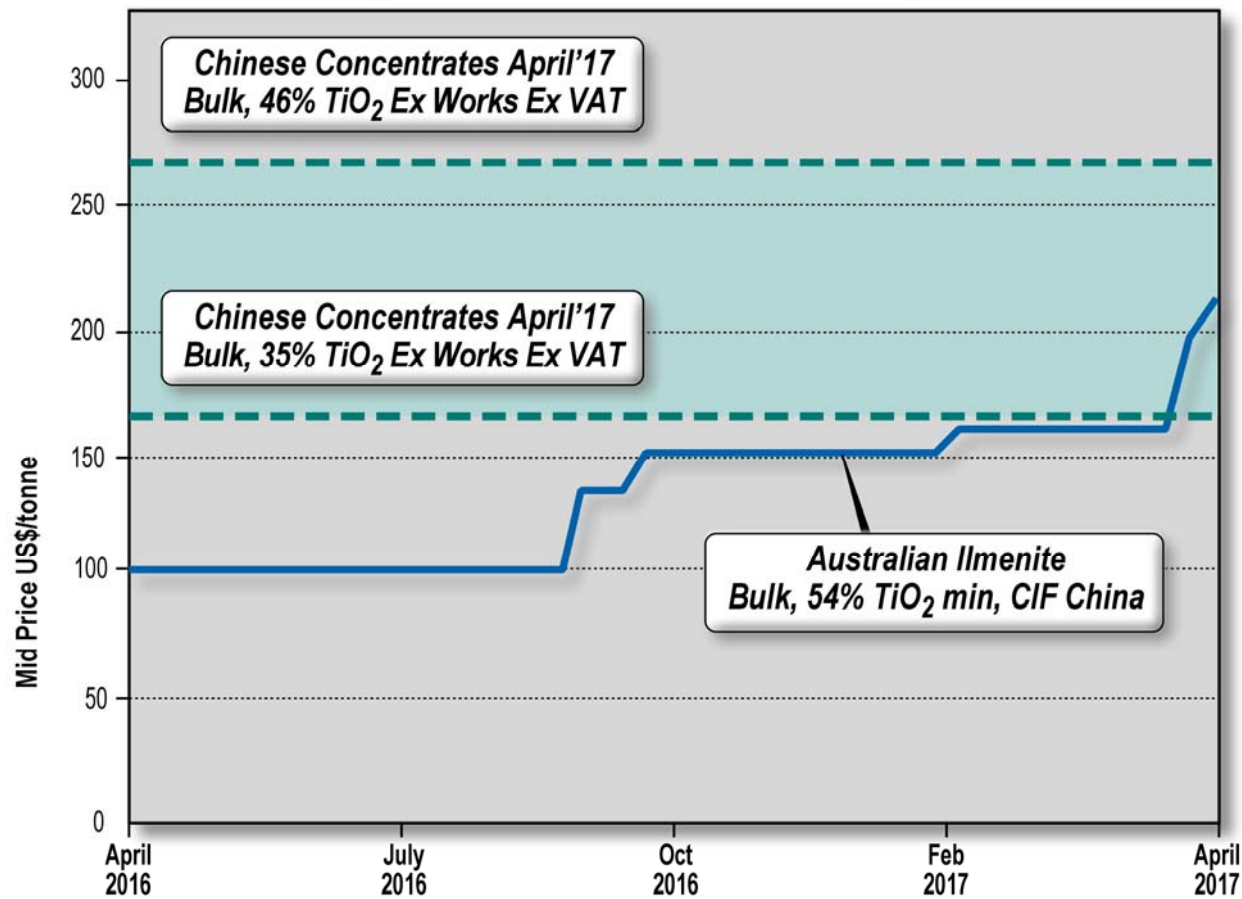


\* Source: Neometals/Sedgman PFS August 2015

# Evaluating potential for Direct Shipping Ore and Toll-concentration in China



**Titanium Feedstock Prices**

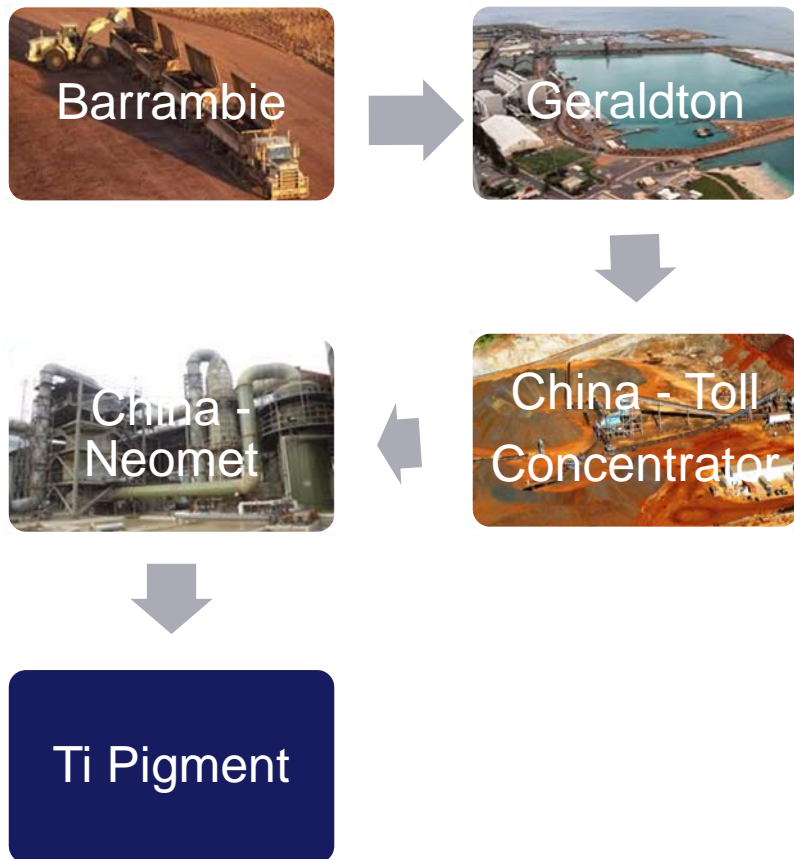


Source: Metal Bulletin. Woaen and Neometals Management

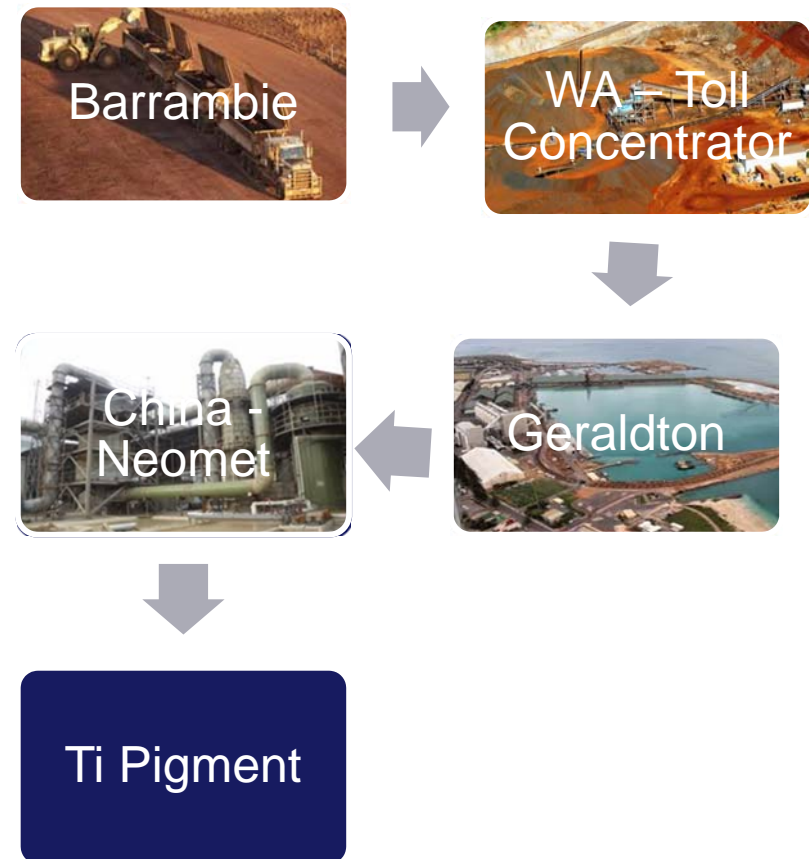
# Potential Fast-Track Configurations



## Direct Ship



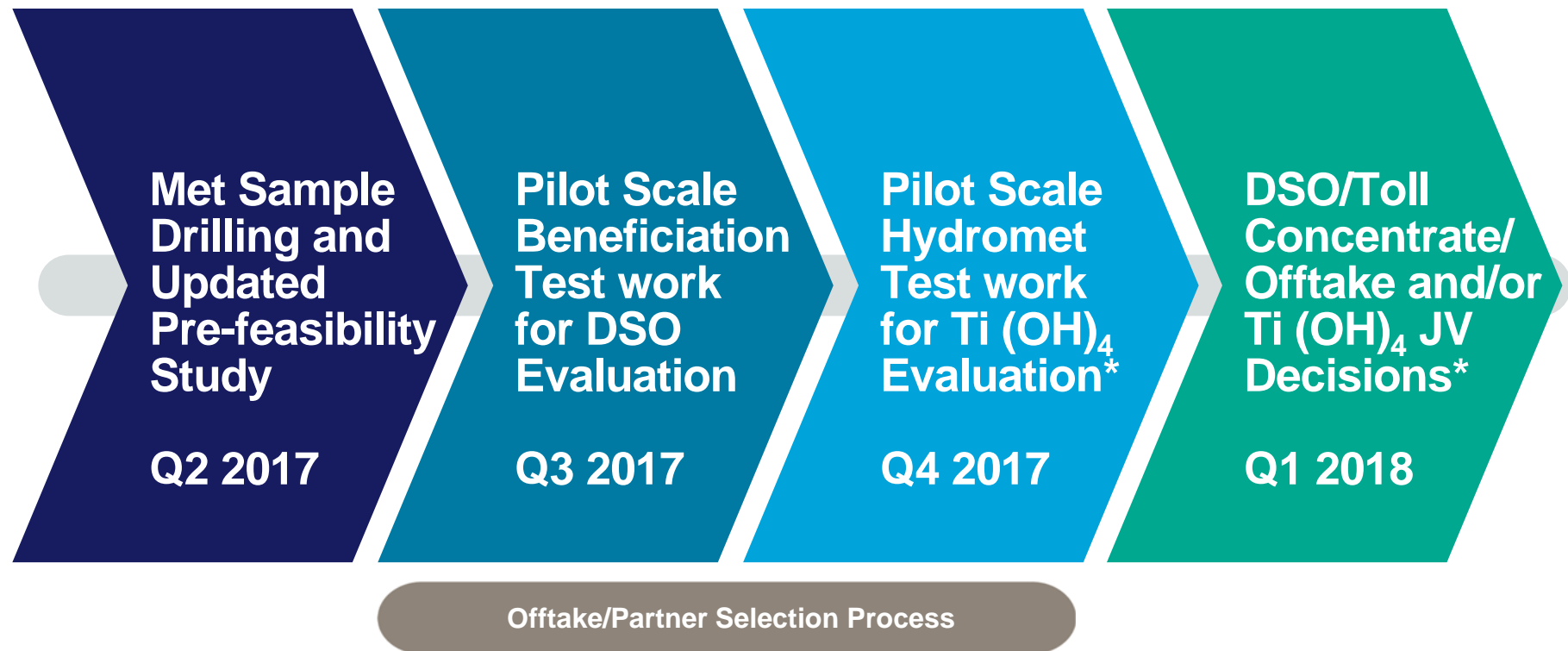
## Concentrate



Neometals



# Commercialisation Plan



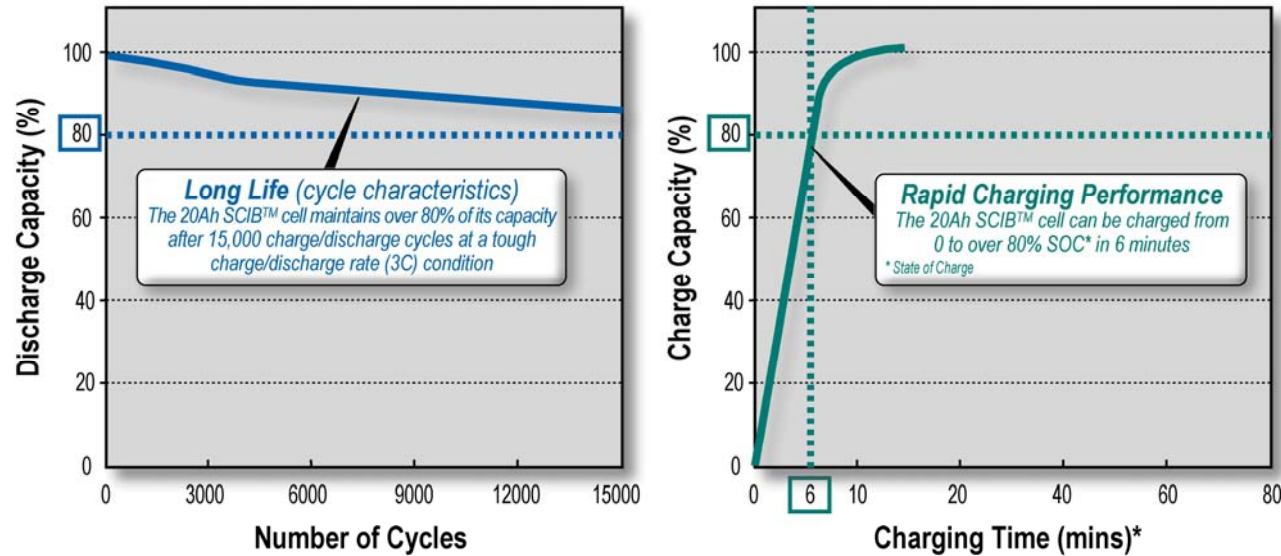
(\*) Subject to Board Approval

# Research & Development



- Lithium-Titanate (LTO) has surface area of +100m<sup>2</sup>/g vs 3m<sup>2</sup>/g for Carbon = superfast charging = minutes not hours
- The Lithium-titanate nanocrystals are superstrong/stable/safe with effective lives of +40 years of daily cycling

## SCIB™ LTO-Anode Cell Characteristics



Source: Toshiba

\* Performance depends on usage conditions

## Neometals



# Research & Development

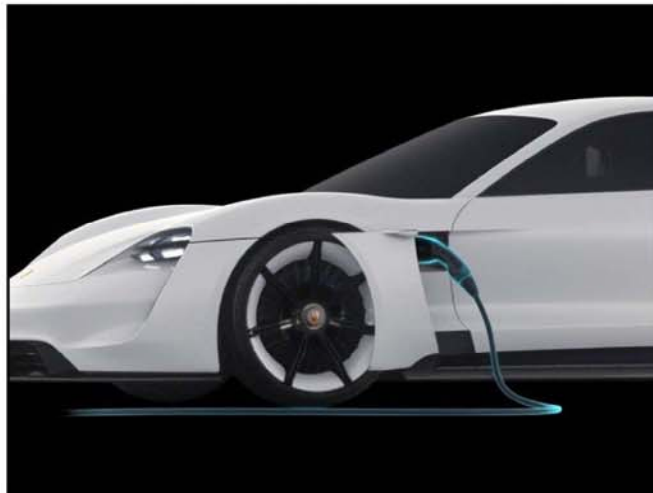


- We think Lithium-Titanate (LTO) will become the anode of choice for EV and conventional stop-start engines. Apparently so to do Porsche and Johnson Controls/Toshiba.

In just 15 minutes, the car can charge up to 80%, giving it a range of 250 miles (400km). With a full charge, it can drive for up to 310 miles (500km). Tesla's Model S with a 90 kWh battery has a range of 294 miles (475km) per charge according to EPA ratings.

Inductive charging tech enables the car to be charged in a unique way. To charge the vehicle, a user simply drives over a charging base plate in a garage and automatically the battery begins to repower.

Johnson Controls New Battery System for Advanced Start-Stop Vehicles, is a collaboration with Toshiba. Latest 12-volt Lithium-ion technology, will help automakers meet fuel efficiency regulations



Source: Porsche



Source: Johnson Controls

## Neometals



# Research & Development Plan



(\*) Subject to Board Approval



# Technology Licensing

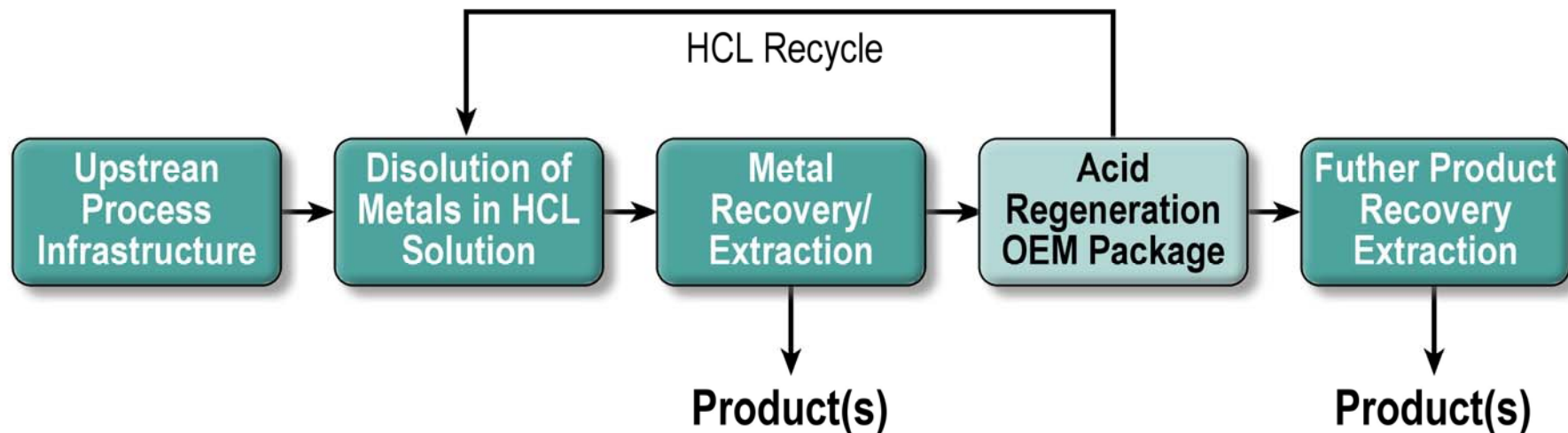
## Neomet Process

Neometals - 25% of royalty revenues

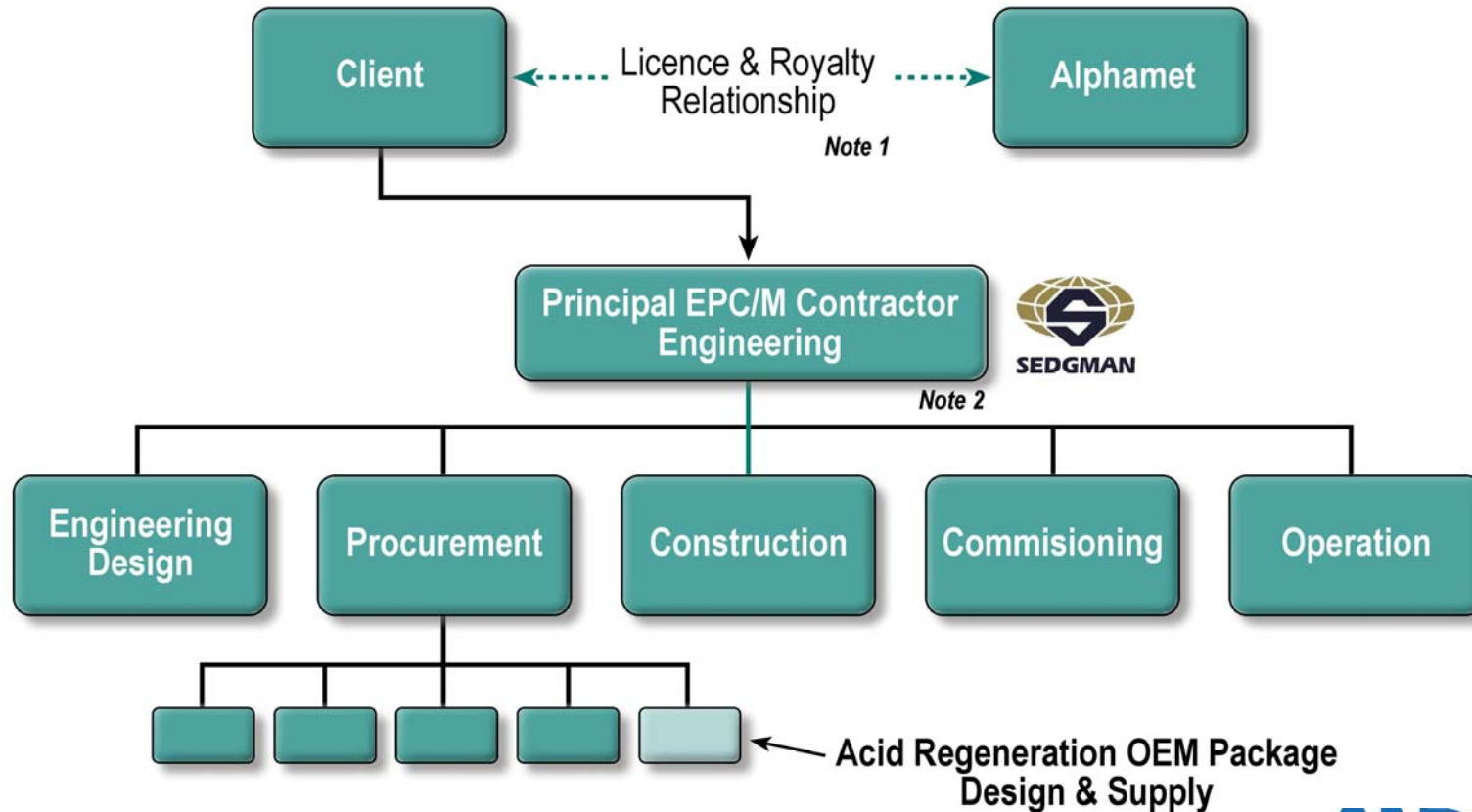
# Patented Neomet Process



**Commodity agnostic** – developed in Canada for Ni-laterites, used commercially for treating refractory copper-gold concentrates, adapted for titanium concentrates.



# Commercialising technology with leading industry partners



**Note 1:** The licence and royalty relationship may be managed through the EPC Contractor pending project and Client requirements

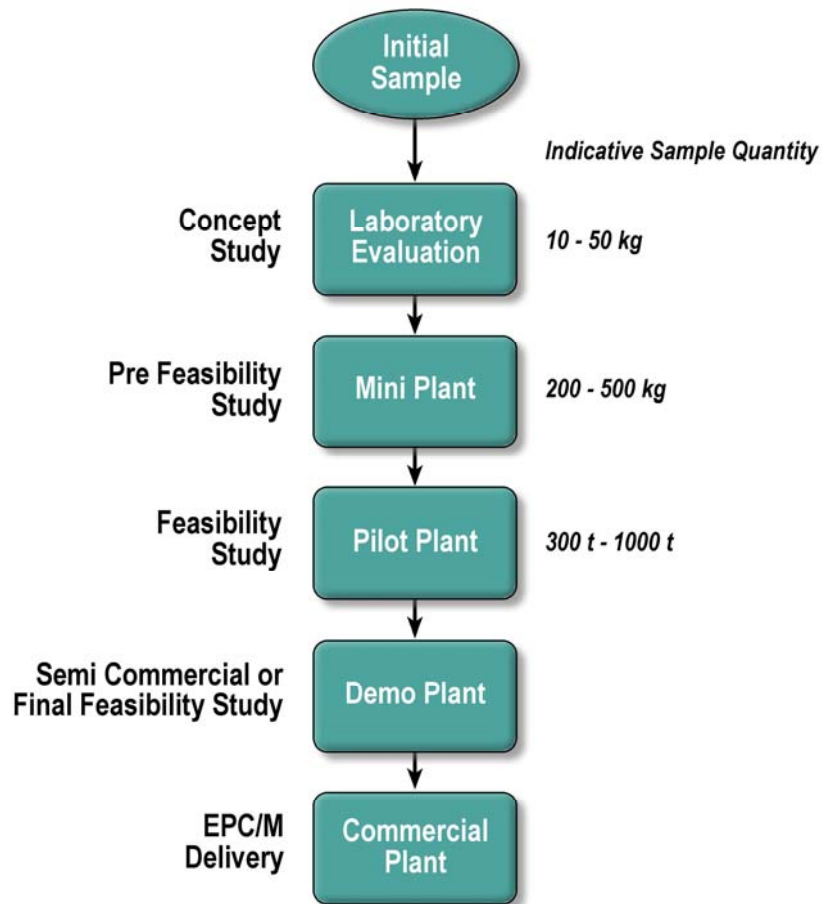
**Note 2:** The Principal Contractor will interface with the client directly and manage all delivery functions relating to the project (eg engineering, procurement and construction)



# Project Development Phasing



## Project Development Phasing



Neometals Testing Facility in Montreal



Laboratory scale set up (above) Pilot scale up (below)



# Investment Proposition

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Neometals



# Lithium: Cash, cashflow & growth options



**Neometals**

**Li + Ti = Nm**

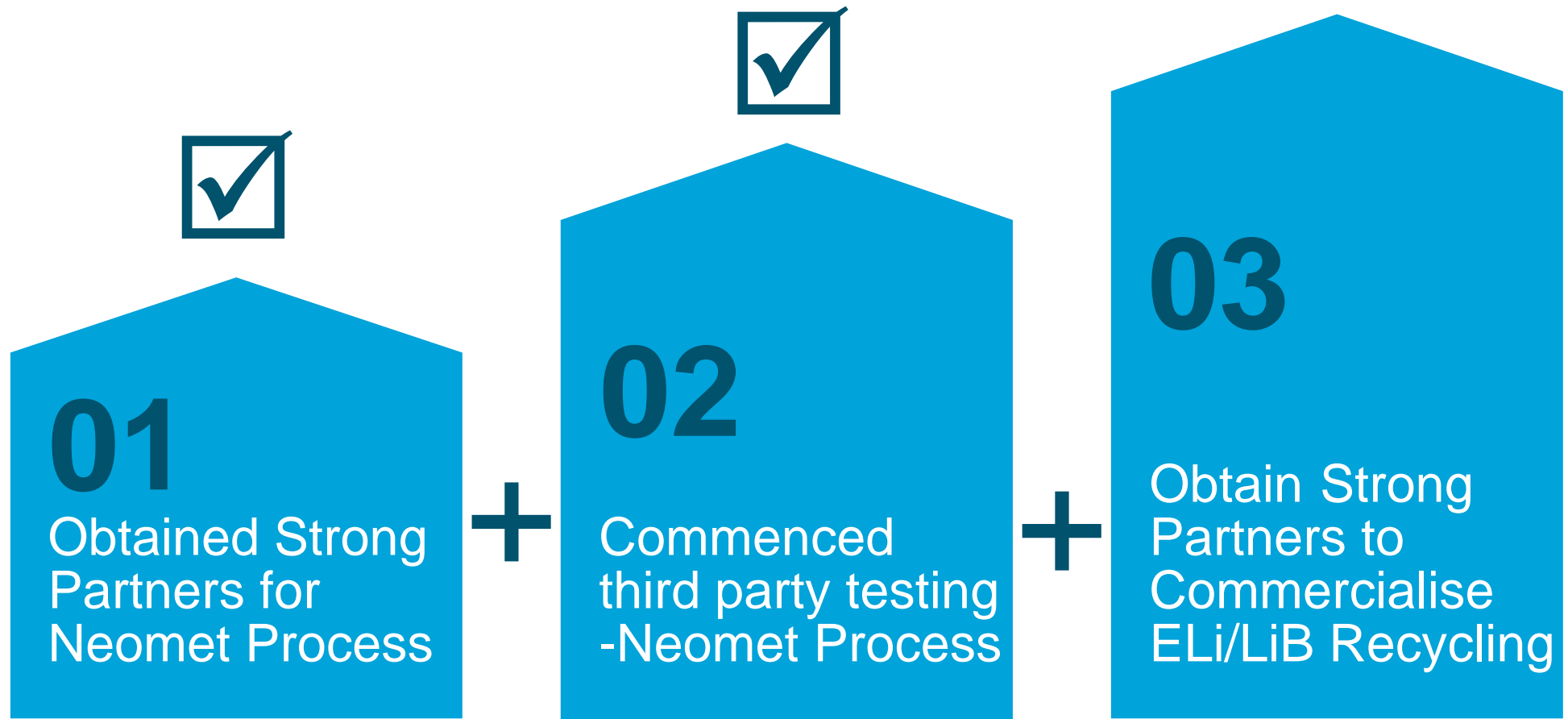
# Titanium : A growth story for 2018



**Neometals**



# Technology : developing a diversified portfolio



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# Thank you

[www.neometals.com.au](http://www.neometals.com.au)

# Mineral Resource Estimate

Mt Marion Lithium deposit, as at October 2016, for a block cut-off grade of 0.5% Li<sub>2</sub>O



Classification	Deposit	Tonnes (Mt)	Li <sub>2</sub> O %	Fe %
<b>Indicated</b>	Area 1,2,2W	19.3	1.41	1.08
	Area 4	2.0	1.11	0.99
	Area 6	7.7	1.29	1.04
<b>Indicated Total</b>		<b>28.9</b>	<b>1.35</b>	<b>1.06</b>
<b>Inferred</b>	Area 1,2,2W	43.5	1.39	1.09
	Area 4	0.8	1.07	1.09
	Area 5	1.0	1.32	1.71
	Area 6	3.5	1.33	1.07
	<b>Inferred Total</b>		<b>48.9</b>	<b>1.38</b>
<b>Grand Total</b>		<b>77.8</b>	<b>1.37</b>	<b>1.09</b>

## Neometals



# Feasibility Study - Financial Metrics



FS

Life of Plant (LOP)	20 years
<b>Pre-production Capital cost</b>	<b>US\$ 158 million**</b>
<b>Average Annual Pre-tax Net Cashflow</b>	<b>US\$ 82 million</b>
<b>Pre-tax Internal Rate of Return</b>	<b>51%</b>
<b>Pre-tax NPV (12% real discount rate)</b>	<b>US\$ 481 million</b>
Payback of capital costs	2.6 years
Average Annual Production	14,000t LiOH 5,600t Li <sub>2</sub> CO <sub>3</sub>
Average Cost per tonne of LiOH	US\$ 4,630/t
Average Cost per tonne of Li <sub>2</sub> CO <sub>3</sub>	US\$ 5,345/t

\*\* Capital costs valid at June 2016. Estimated to accuracy of  $\pm 15\%$ , **Including** EPCM and Contingency  
 Assumptions: 2016 Spodumene feedstock US\$440/t CIF (6% Li<sub>2</sub>O); LiOH/Li<sub>2</sub>CO<sub>3</sub> selling price US\$11k/10k/t CIF respectively

# Mineral Resource Estimate

Barrambie Ti-V deposit, as at September 2015, for a block cut-off grade of 15% TiO<sub>2</sub>



Classification	Zone	Oxidation	MTonnes	Density (t/m <sup>3</sup> )	TiO <sub>2</sub> (%)	V <sub>2</sub> O <sub>5</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	SiO <sub>2</sub> (%)
Indicated	Eastern	Oxide	18.7	2.82	23.29	0.59	42.93	10.70	16.36
		Transition	8.7	3.52	23.11	0.61	50.80	7.34	12.99
		Fresh	2.4	3.85	21.77	0.56	52.90	5.99	12.84
		Sub-total	29.8	3.10	23.11	0.60	46.02	9.35	15.10
	Central	Oxide	3.5	2.95	16.84	0.92	49.82	11.06	14.91
		Transition	1.3	3.50	17.39	0.89	54.76	8.49	12.15
		Fresh	0.1	4.04	15.59	0.88	59.93	7.22	10.96
		Sub-total	4.9	3.12	16.95	0.91	51.40	10.28	14.08
		Total	34.7	3.11	22.25	0.64	46.77	9.48	14.95
Inferred	Eastern	Oxide	2.6	2.71	20.88	0.48	40.00	12.20	19.42
		Transition	3.3	3.29	23.04	0.59	47.51	8.62	14.45
		Fresh	5.5	3.71	22.82	0.57	47.50	8.39	14.57
		Sub-total	11.4	3.36	22.44	0.55	45.78	9.33	15.65
	Central	Oxide	0.1	3.07	16.64	0.98	53.63	9.96	13.33
		Transition	0.4	3.47	18.36	0.86	54.15	8.79	12.43
		Fresh	0.7	3.86	17.30	0.91	53.48	9.44	13.17
		Sub-total	1.2	3.64	17.55	0.90	53.71	9.30	12.96
		Total	12.5	3.38	21.99	0.58	46.51	9.32	15.40
		<b>Grand Total</b>	<b>47.2</b>	<b>3.18</b>	<b>22.18</b>	<b>0.63</b>	<b>46.70</b>	<b>9.44</b>	<b>15.07</b>

## Neometals



# Pre-feasibility Study - Financial Metrics (\*)

Life of Mine (LOM)	19.6 years
Pre-production Capital cost (excluding EPCM and Contingency)	A\$ 549 million
Average Annual Pre-tax Net Cashflow	A\$ 123 million
Pre-tax Internal Rate of Return	21%
<b>Pre-tax NPV (12% real discount rate)</b>	<b>A\$ 355 million</b>
Payback of capital costs	3.9 years
Average Annual Production	98,000t TiO <sub>2</sub> 2,000t V <sub>2</sub> O <sub>5</sub> 234,000t Fe <sub>2</sub> O <sub>3</sub>
<b>Cash Operating Cost per tonne of paid TiO<sub>2</sub> net of co-product credit</b>	<b>US\$ 572/t</b>

(\*) Estimated to accuracy of  $\pm 25\%$

Assumptions: US\$1,838/t TiO<sub>2</sub>; US\$14,873/t V<sub>2</sub>O<sub>5</sub>, US\$520/t Fe<sub>2</sub>O<sub>3</sub> Pigment, A\$/US\$0.75, Royalties (State/Technology) 10% Gross