

Altech Chemicals Limited ASX: ATC FRA:A3Y

Company Presentation

Iggy Tan
Managing Director



Altech Chemicals
Limited



4,500 tpa High Purity Alumina Plant



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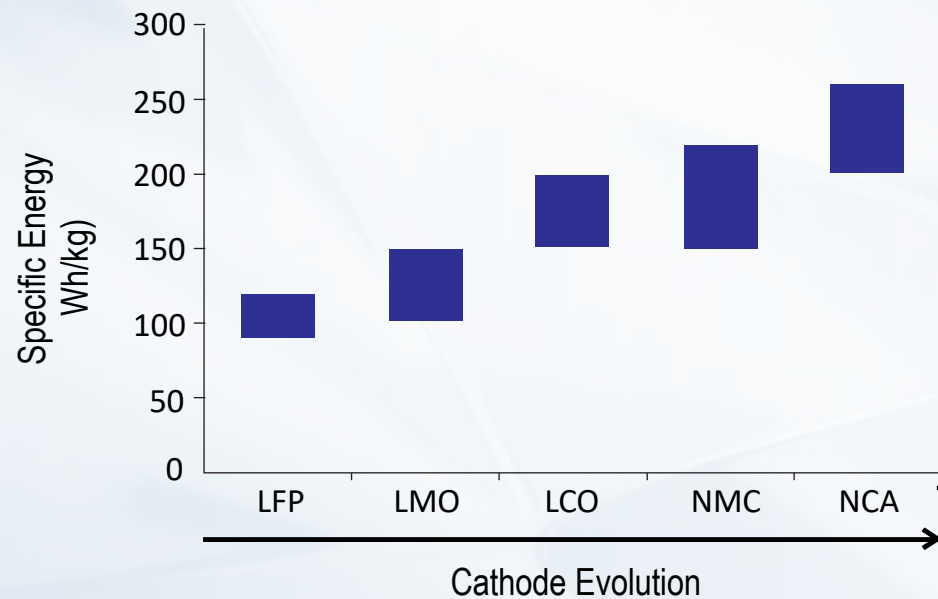
- Halve the cost per KWh of battery production
- Below the \$US100/KWh threshold
- “4680” Tesla cell (5x energy, 6x power)
- 3TWh per year at its own factories by 2030
- Equal 20 giga factories
- Increased use of Silicon (30%) in anodes
- Si has ten times higher capacity than graphite

**Tesla Battery
Day 2020**



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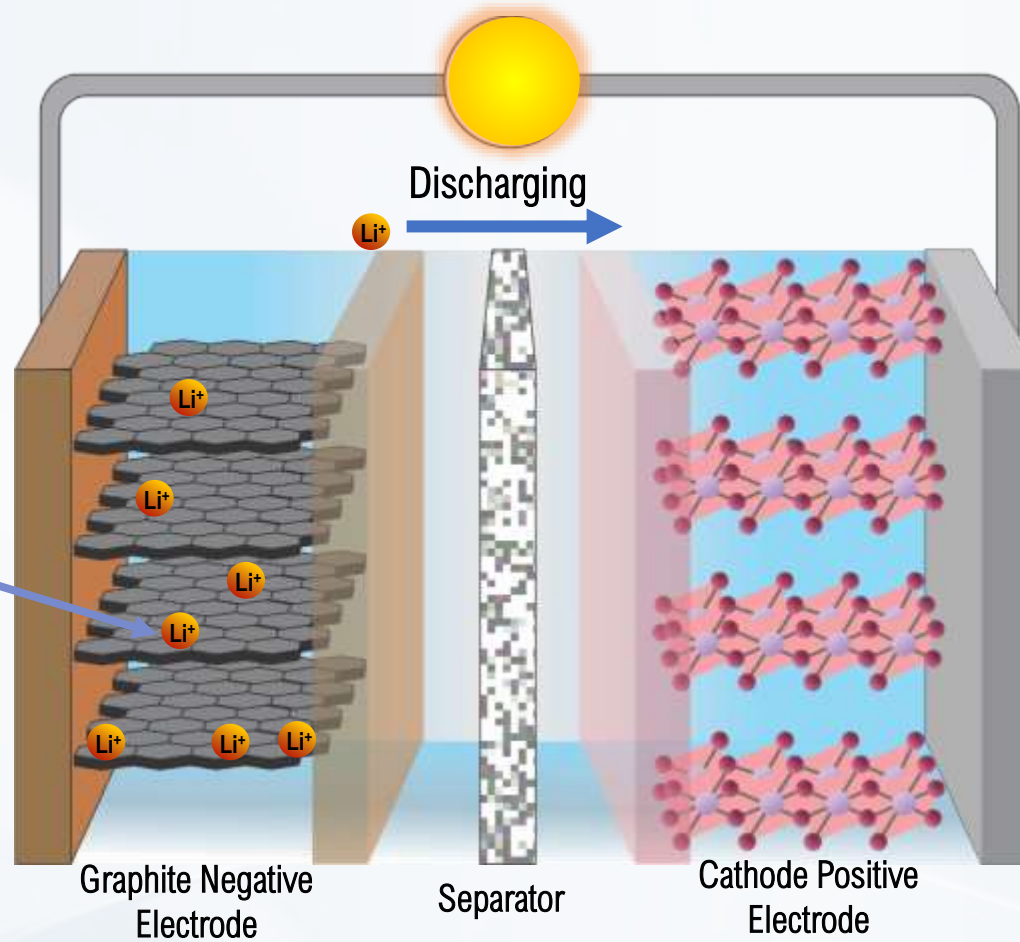
- Predominant development of cathodes
- Increasing Ni, Co content
- Higher energy density



Capacity
development in
cathodes

First Cycle of a Brand New Battery

First Cycle
Lithium Loss
Capacity



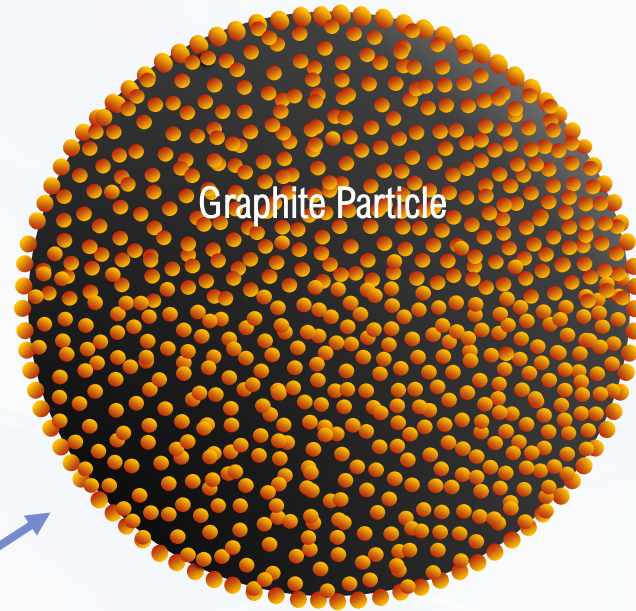


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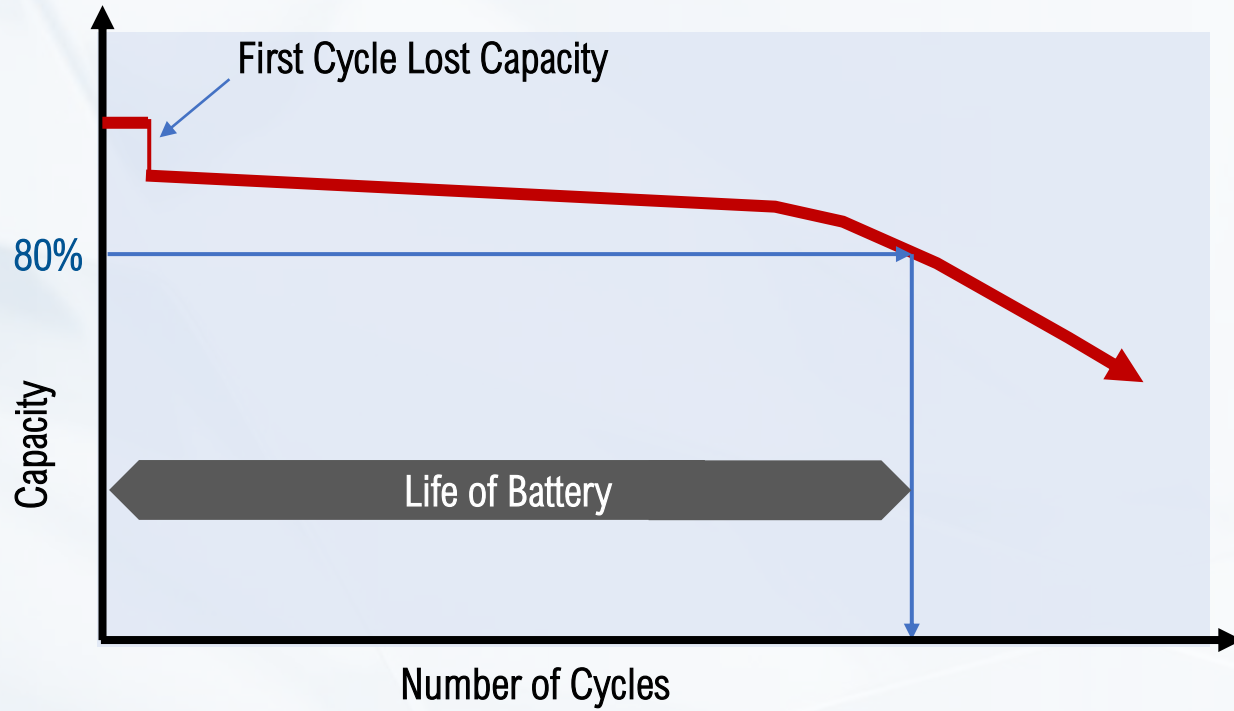
- **Eight (8%) of Li becomes inactive on first charge**
- **Forms SEI coating on anode particles**
- **Industry has been trying to solve this problem**
- **Attempts to pre-coat anode with alumina**
- **Expensive and not commercial**

**Developments
Anode side**

Formation of SEI layer on first charge

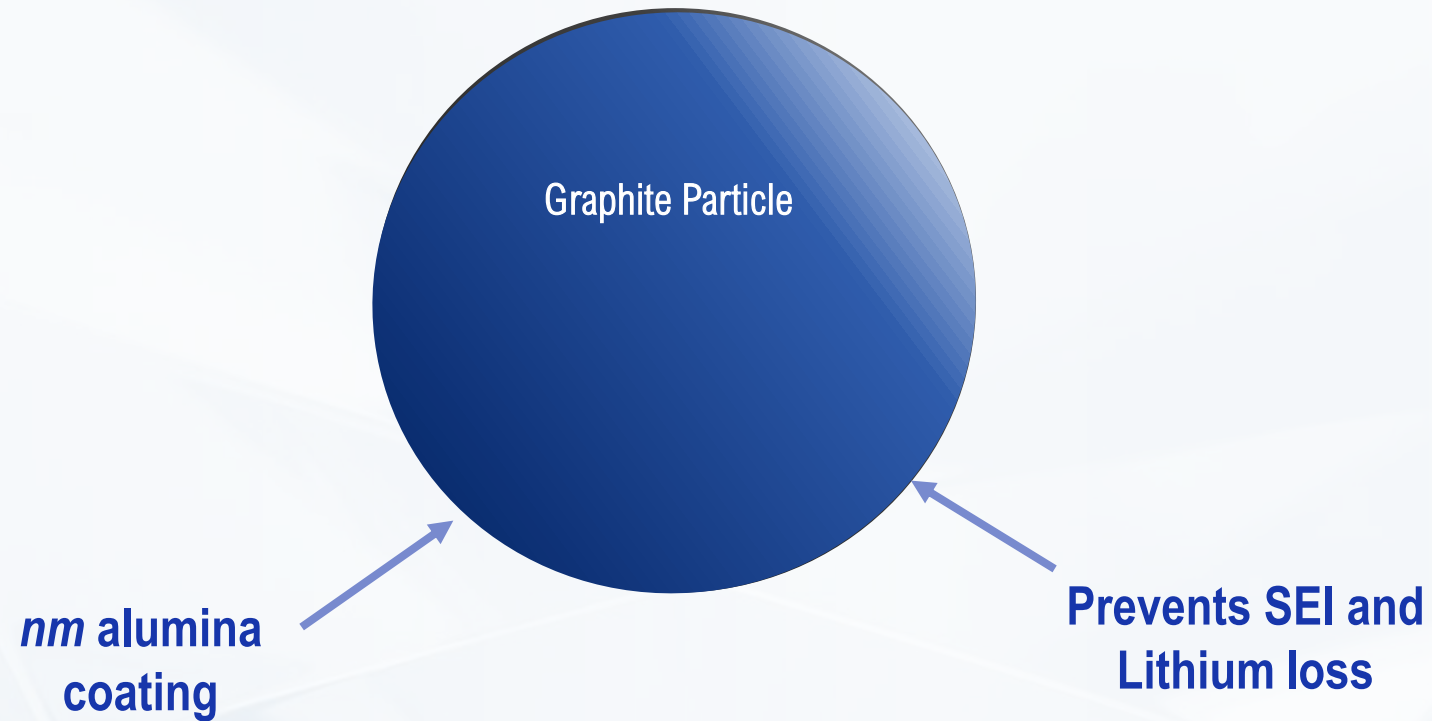


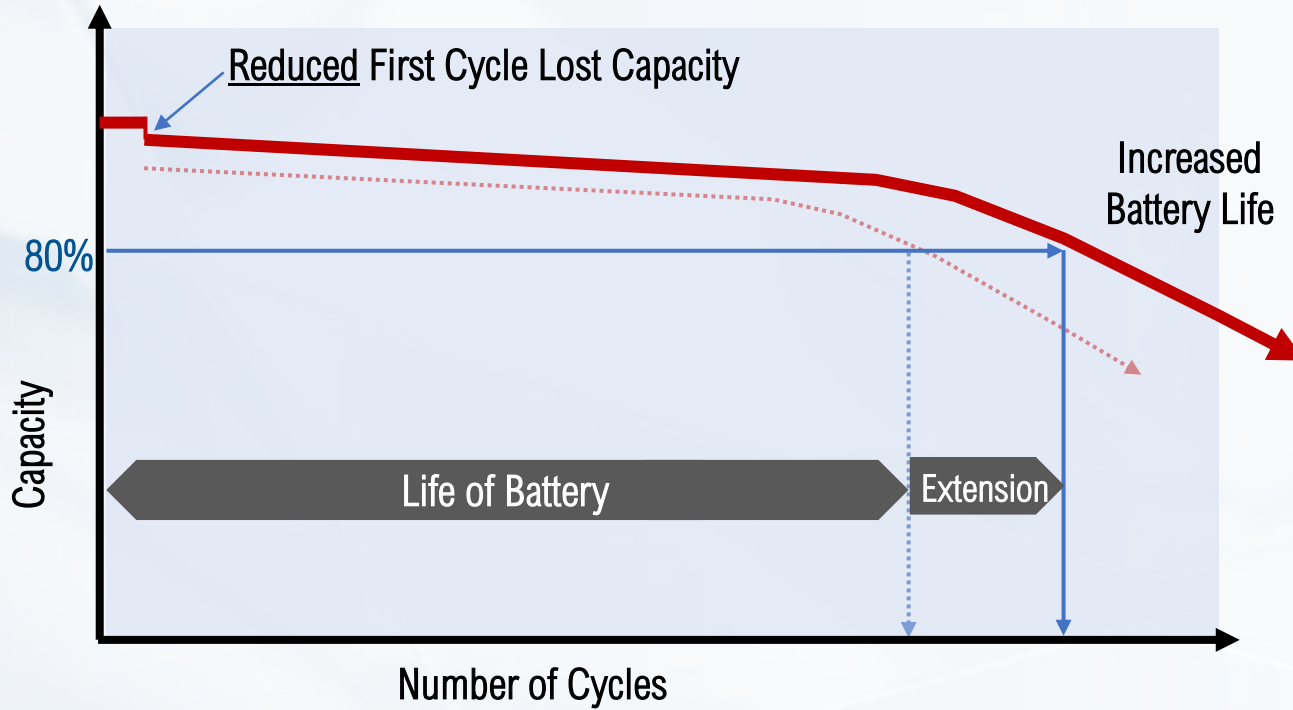
**Lithium ions in SEI
become inactive**



**First cycle
loss capacity**

Altech's alumina coating technology

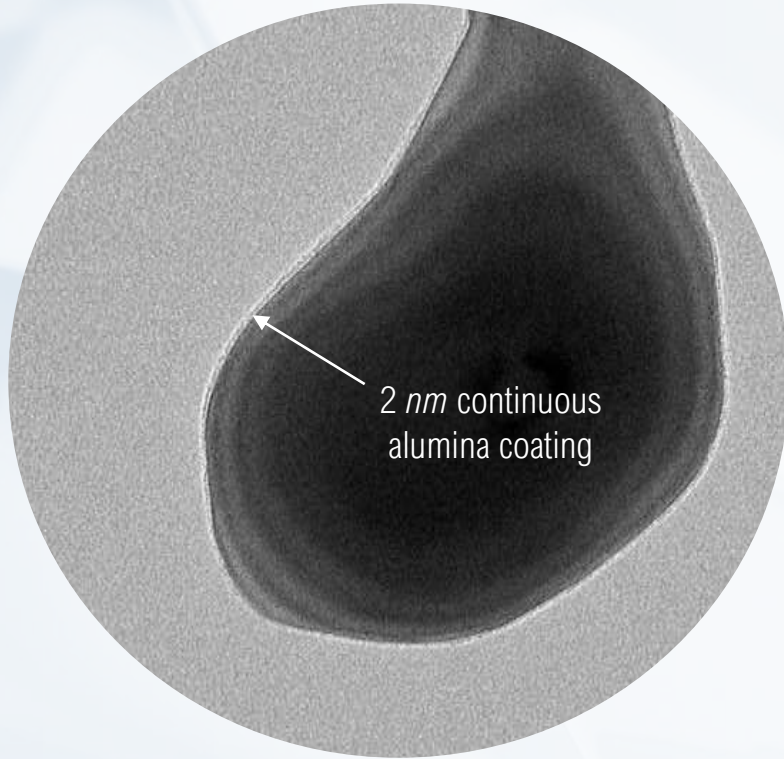




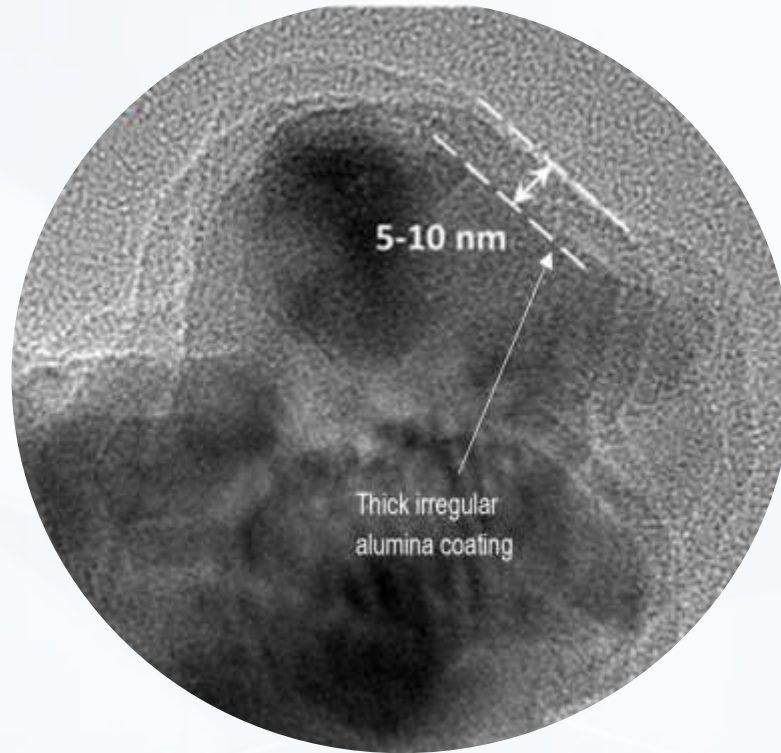
Potential
reduction
first cycle
loss capacity



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Altech alumina coating technology



Current attempts at alumina coating

Under the
Electron
Microscope



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- **Breakthrough alumina coating technology**
- **Coating graphite particles with nano layer HPA**
- **Potential to reduce the “first cycle” lithium loss**
- **Game changer if successful**
- **Potential to increase energy density by 8%**
- **Potential to increase Li-ion battery life by 20-30%**
- **Final test work in progress**

**Battery
Material
Coating
Technology**



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- **Pre-feasibility battery materials coatings plant**
- **Schwarze Pumpe, Saxony State, Germany**
- **State where EV's and battery plants are located**
- **Option to purchase industrial site**
- **Anode alumina coating**
- **Strong interest in Europe**

Battery Materials Coating Project Germany



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- **Collaboration agreement with Ferroglobe**
- **Leading Li-ion battery Si supplier**
- **Increased Si - future in Li-ion batteries**
- **Volume change, low initial Coulombic Efficiency are roadblocks**
- **Alumina coating of silicon seen as long-term solution**

**Collaboration
Agreement
with
Ferroglobe**



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- **Europe major battery industry**
- **Capacity of 147 GWh by 2024**
- **Stringent 2020 EU CO2 emission (95g/km)**
- **Push to EVs by European car manufacturers**
- **Less reliant on Asia**
- **VW retooling 16 factories**

Europe's Push for Battery Industry



Li-Ion Battery Cell Capacity - Europe

About 500 GWh/a Li-Ion Battery Cell Production Capacity Announced in Europe

© Roland Zenn, June 2020





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- **Sapphire gemstone from alumina (Al_2O_3)**
- **Synthetic sapphire – hard as diamond**
- **99.99% (4N) purity or greater**
- **Smelter Grade Alumina (SGA) ~ 99.5% Bayer Process uses sodium hydroxide (NaOH)**
- **Sodium impurity is a problem for downstream users**

**What is
HPA?**



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Smelter Grade Alumina
SGA 99.5%
US\$400 per t



High Purity Alumina
HPA 99.9% (3N)
US\$6,000 per t
US\$9,000 per t



High Purity Alumina
HPA 99.99% (4N)
US\$15,000 per t
US\$40,000 per t



High Purity Alumina
HPA 99.999% (5N)
>US\$50,000 per t

Our Target Business

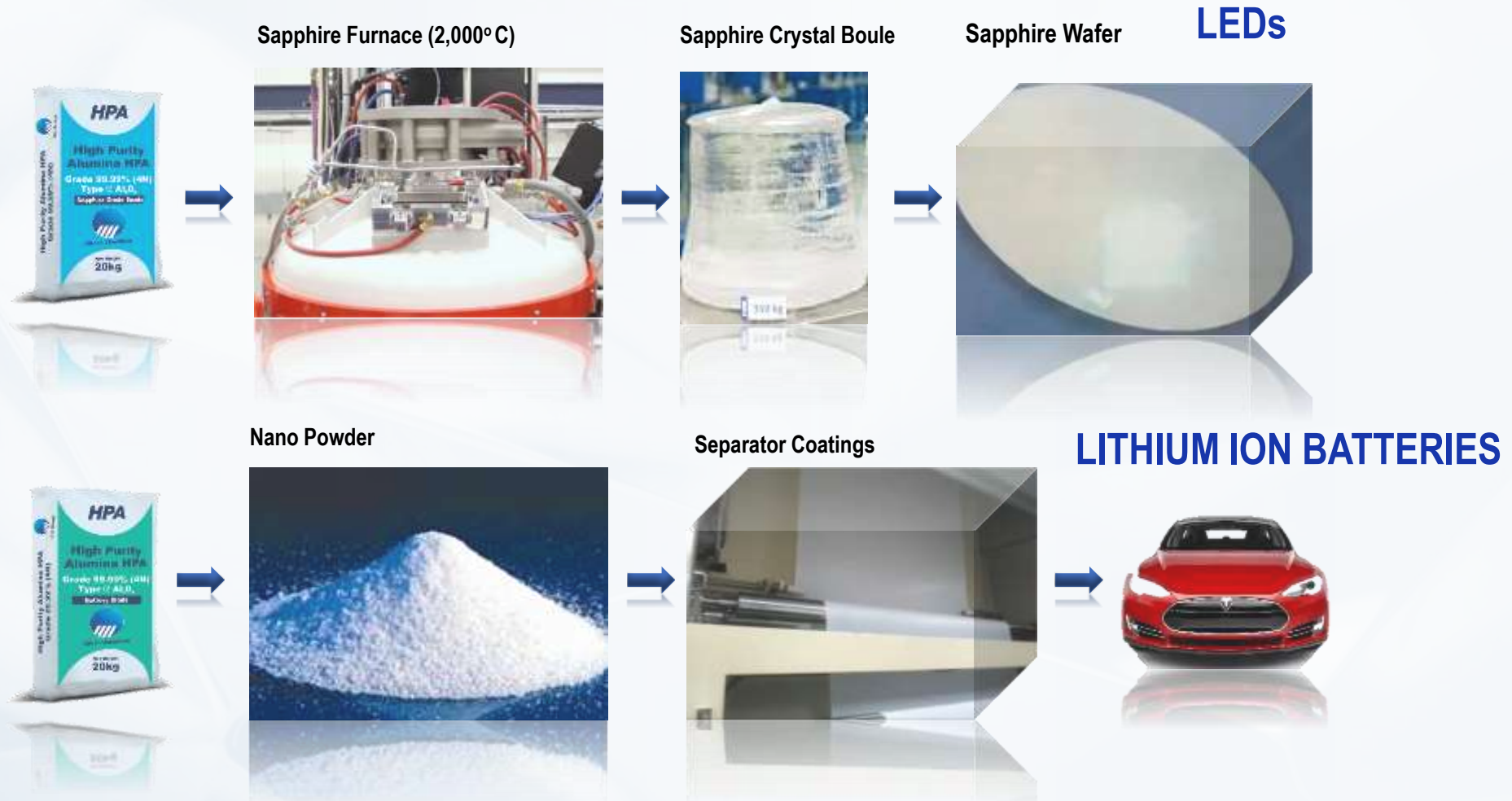


**High Price
for Purity**



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HPA in LEDs & Lithium Ion Batteries

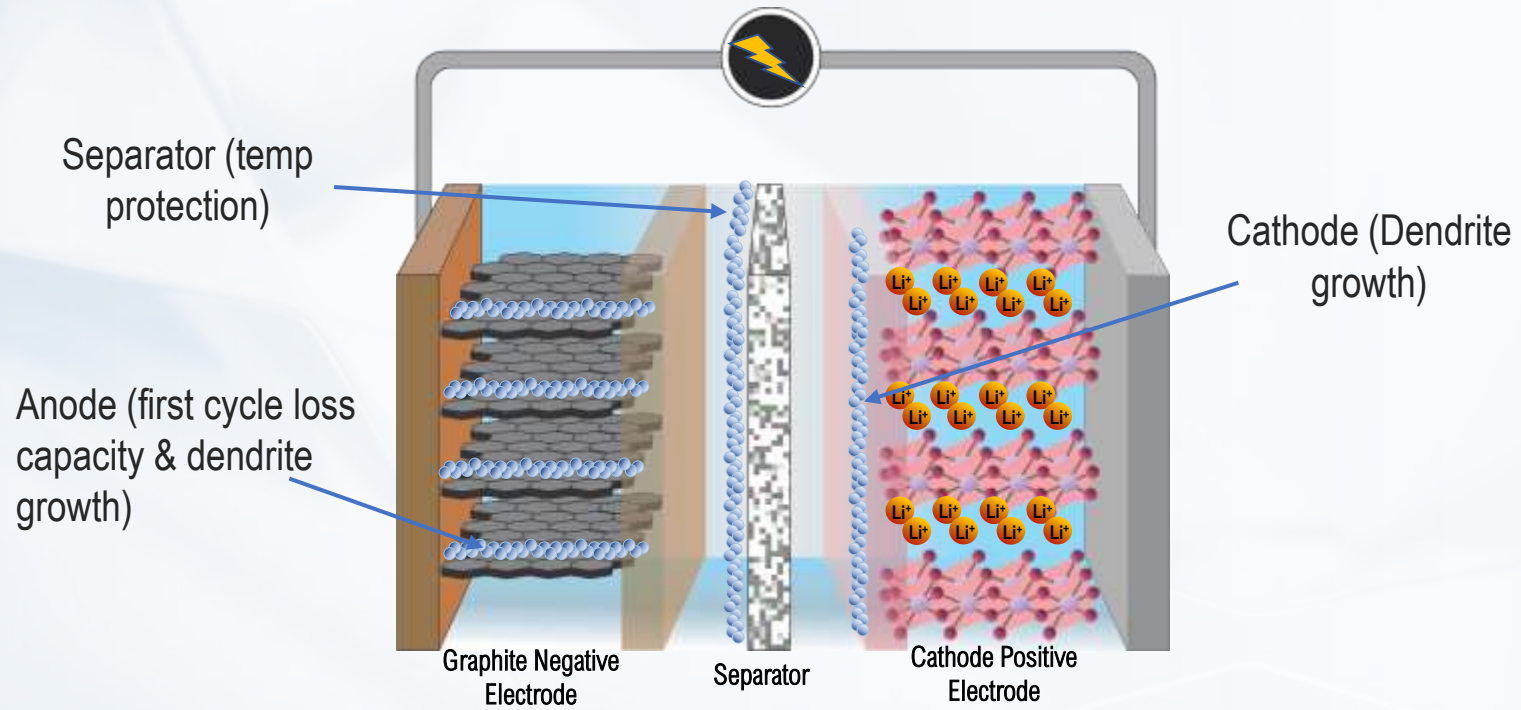




LED Lighting – Sweeping the World



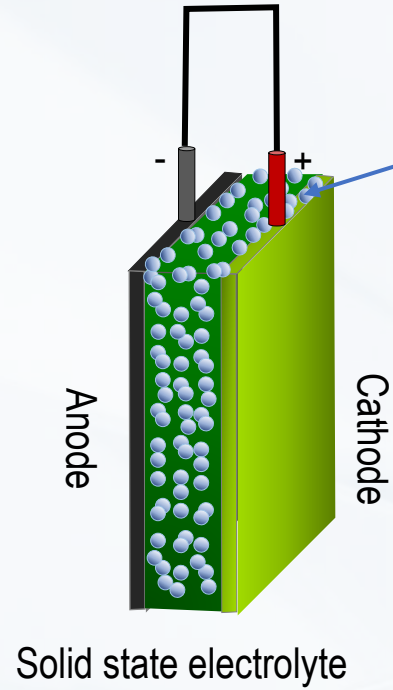
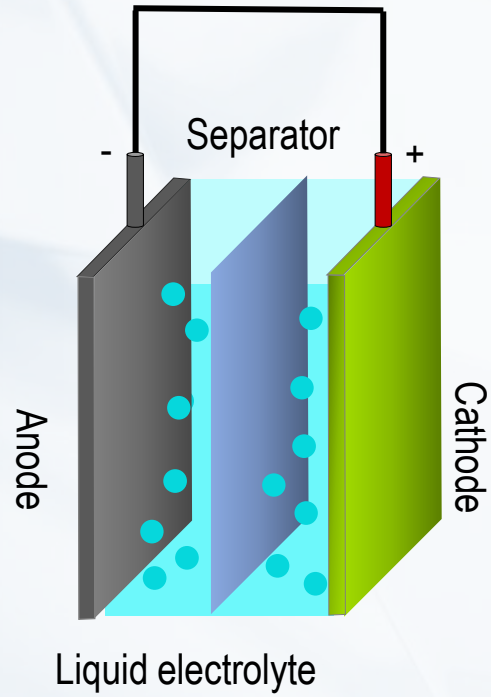
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HPA used in Li-ion Batteries



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2-3 times more
HPA expected

HPA in future
solid state
batteries



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- **Micro chip semi conductors**
- **High performance catalysts**
- **Purity grinding media**
- **High performance ceramics**



**Other Uses
of HPA**



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Source: CRU Consulting

**HPA world
Demand**



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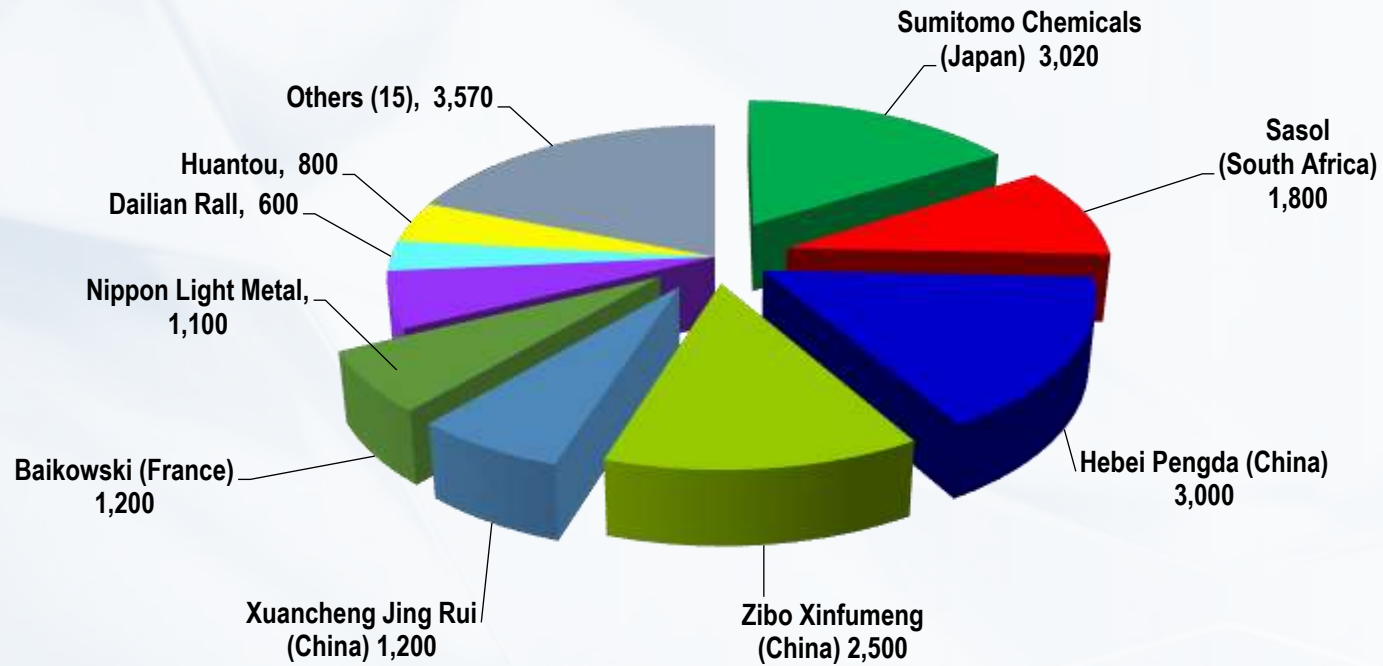


Source: CRU Consulting

Potential
HPA supply
shortage



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**Current HPA
producers**



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Current HPA Producers



Bauxite

Alumina Refinery



Smelter Grade Alumina
99.5%

Alumina Smelter



Aluminium Metal
~US\$3,000 per tonne

Aluminium Dissolution



99.99% (4N)
HPA



Kaolin
(aluminous clay)

ALTECH HPA PLANT

One Single Process Step



99.99% (4N)
HPA

Altech's disruptive technology

- **Very low iron (Fe) due to weathering**
- **12.7Mt JORC Mineral Resources[^]**
- **Meckering, Western Australia**

%	Bauxite Darling Range*	Altech Kaolin *
Al ₂ O ₃	34.5	30.0
SiO ₂	21.5	57.9
Fe ₂ O ₃	21.2	0.4
TiO ₂	2.00	0.7
K ₂ O	0.24	0.2
NaO	0.005	0.01

**Low-Impurity
Kaolin
Feedstock**

[^] Measured Resources 1.5Mt @ 30% Al₂O₃, Indicated Resources 3.3Mt @ 30% Al₂O₃, Inferred Resources 7.9Mt @ 29.1% Al₂O₃
Typical Mean Analysis

[^] JORC (2012) Mineral Resources (refer ASX Announcement 11 October 2016); the Company is not aware of any new information or data that materially affects the information included in this announcement and confirms that all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

Typical bauxite deposit





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- **Mining approval granted**
- **Works approval granted**
- **Simple free dig mining**
- **Campaign mining, 2 months - 3 years feed**
- **Then just sea container loading operation**
- **50,000 tpa kaolin per annum**

**Meckering
all approvals in
place**



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- **Chemical-zoned industrial park**
- **60% lower operating costs**
- **HCl plant nearby**
- **Close to end markets**
- **5-10 year corporate tax free**
- **No radioactive waste**



CHEMICALS SDN



**HPA Plant
Johor,
Malaysia**



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HCl
Plant

Leach & Neutralisation

Fine
Sand

Kaolin
Calcination

Kaolin
Beneficiation

Kaolin
Receival

Maintenance

Roasting &
Calcination

HPA Finishing Plant

Final Product

Administration

Control Room

Lab

TNB
Substation

Main
Station

Gatehouse

Car Park

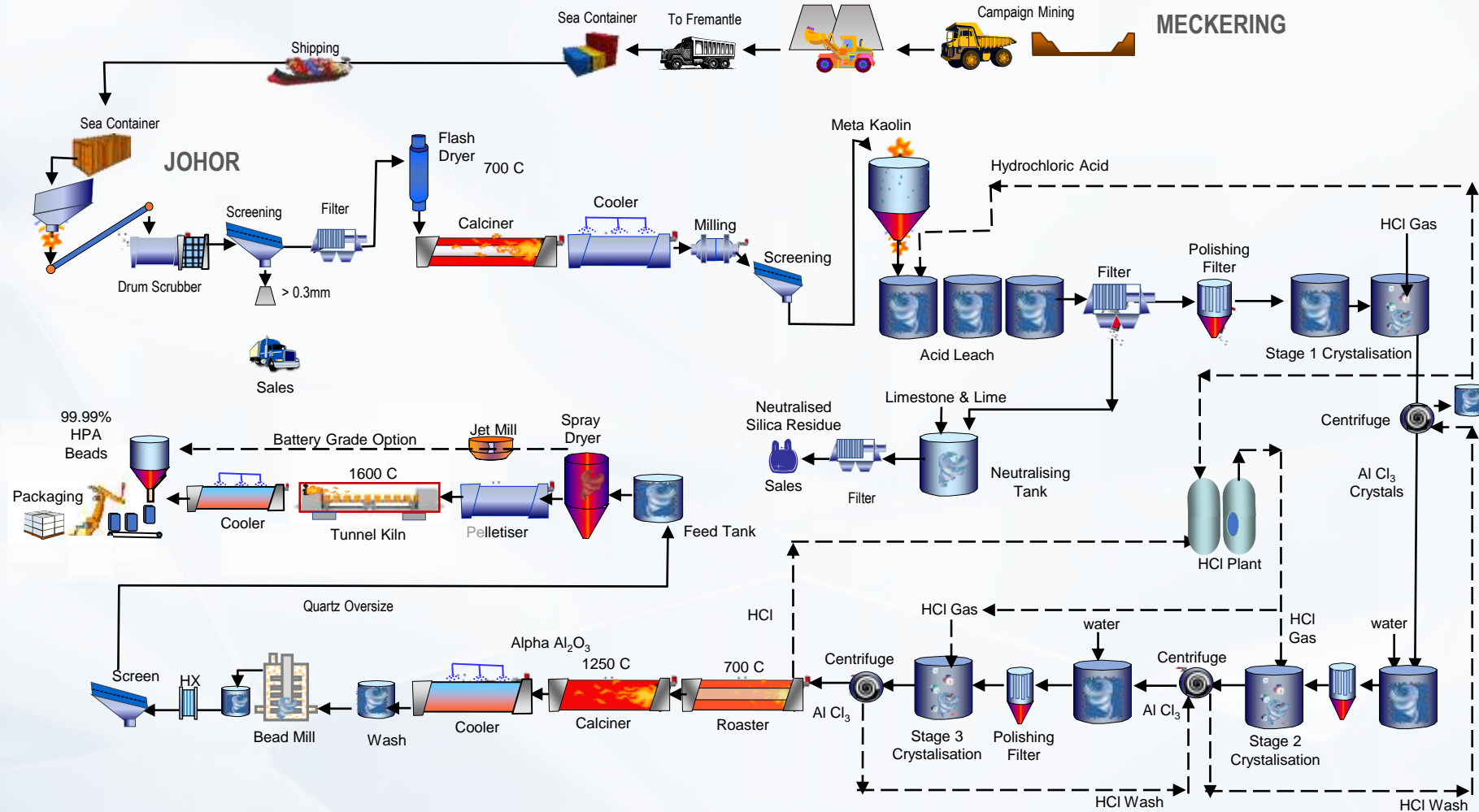
Gate

Proposed HPA Plant



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Altech's Patented HPA Process





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- **Chemistry by Swiss in 1900s**
- **USA & Alcoa developed further 1980's**
- **No demand for HPA in 1980's**
- **New HPA growth demand (LEDs LIBs)**
- **Altech applied chemistry to Meckering**
- **Very successful, disruptive, lowest cost**
- **One patent granted, 8 pending**

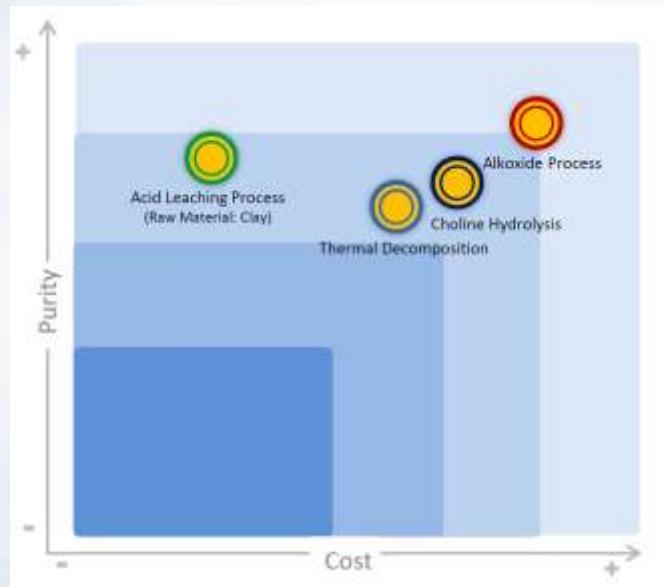
**Established
Proven
Chemistry**



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Our Advantages

1. We own our feedstock
2. Main reactant HCl re-used
3. Plant in low cost country (Malaysia)



**Bottom
Quartile
for Op Costs**

Source: Persistence Market Research "High Purity Alumina Market – Global Industry Analysis and Forecast 2016-2024"

Altech Chemicals Limited ASX : "ATC" FRA : "A3Y"



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- **Certified as “Green” project**
- **Centre of International Climate and Environmental Research (CICERO)**
- **Good environmental governance**
- **Doesn’t use Al metal**
- **46% reduction of greenhouse gases**
- **Uses 41% less energy than conventional**

**Altech’s
Green
HPA process**



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- **10 year exclusive off-take agreement**
- **Mitsubishi has downstream customers**
- **Altech gets paid ex gate**
- **Price is at prevailing market price**
- **Strategic focus for Mitsubishi**

Mitsubishi Corporation

**Mitsubishi
10 year
off-take**



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SMS group

SMS group



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- **SMS group – German EPC contractor**
- **Lump sum turn key contract**
- **Completion and cost risk**
- **Throughput guarantee**
- **Process & quality guarantee**
- **Committed US\$ 15 mil equity**

SMS  **group**

**Lump Sum
Turn Key
Contract**



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- For SMS 100% throughput guarantee
- Lots of “fat” in design assumptions
- Using 79% instead 90% Utilisation
- Using 60% instead 90% Recovery
- Using 30% instead 34% head grade
- 3 Yr ramp up instead of 2 Yr
- Strong possibility of 6,000 tpa

SMS  **group**

**Aiming to
Under-promise
Over-deliver**

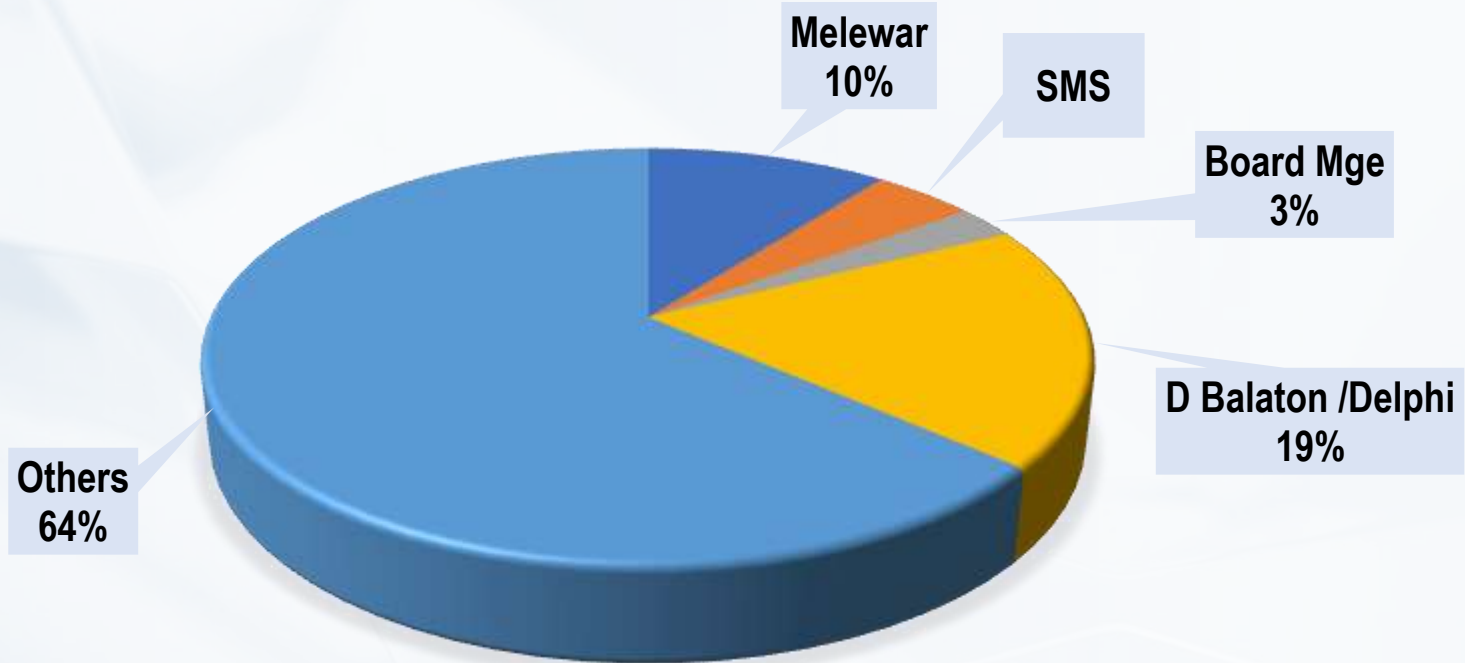


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- **Pre-tax NPV 7.5 US\$ 505 million**
- **Payback (full rate) 3.9 years**
- **IRR - 22%**
- **EBITDA US\$ 76 million p.a.**
- **Capital cost US\$ 298 million***
- **Production Costs - US\$ 8.55 /kg**
- **LT Sale Price - US\$ 26.9/kg**
- **Gross Margin – 68%**

- Pre tax, pre financing equity model

Economics FIDS Equity Model



Quality Major Shareholders



**Senior Debt by
KfW IPEX-Bank**



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- **Senior debt funding - KfW IPEX-Bank**
- **German state owned bank**
- **Total debt of US\$ 190 million**
- **US\$ 170 million export credit finance**
- **50% of plant – German suppliers**
- **Low interest, long tenure**
- **18 months of due diligence**

**Senior Debt
of US\$190m
Completed**



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- **Commenced listed green bond process**
- **Target raising of US\$144 million**
- **US\$100 million as project debt**
- **Balance as prepaid coupon interest**
- **Bonds to be listed in Frankfurt**
- **Five year term**
- **SPV as lender, 2 lien to KfW IPEX-Bank**

Secondary Debt – Listed Green bonds



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Use of Funds (US\$m)

Plant Capex	\$298
KfW Contingency	\$ 28*
Debt Res & WC	\$ 46*
Fees & Costs	\$ 41
<u>Less Spent</u>	<u>(\$ 23)</u>
Total Use of Funds	\$390

Source of Funds (US\$m)

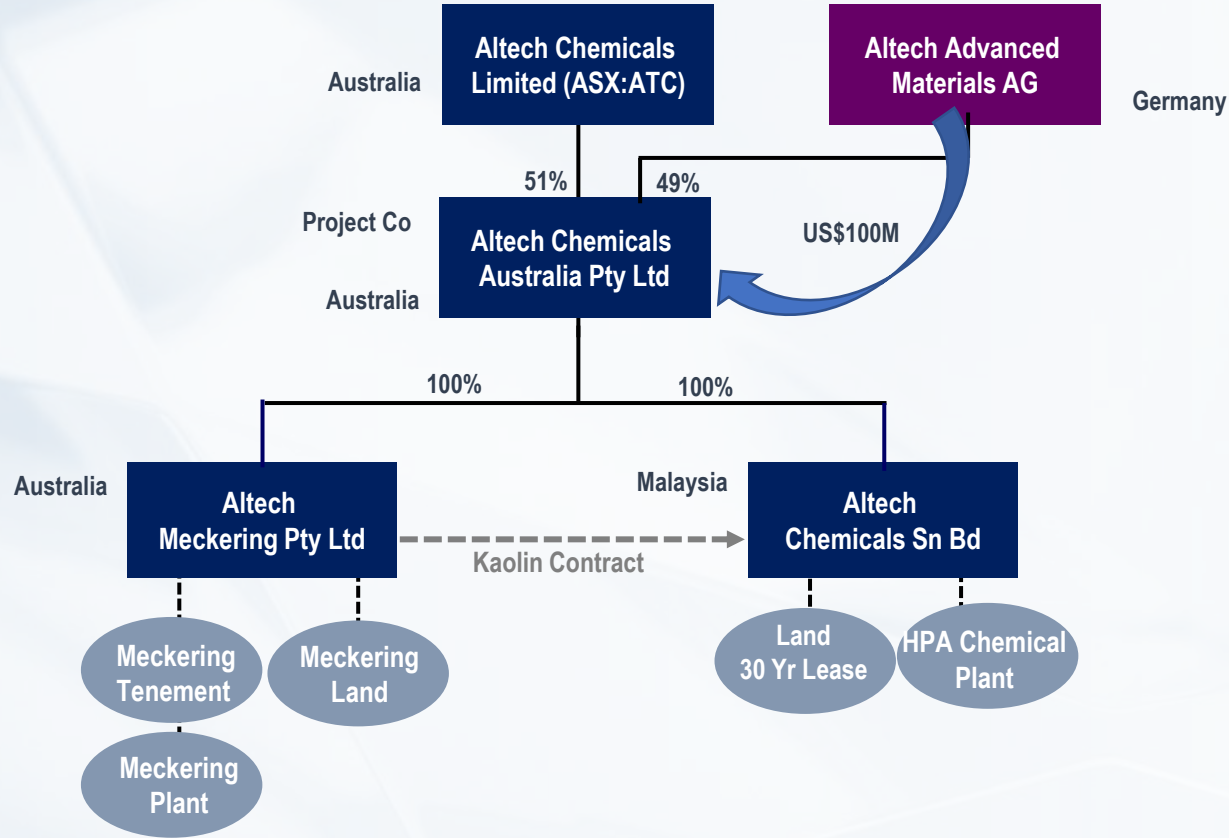
KfW Senior Loan	\$190
Sec Debt (Green Bonds)	\$ 90
SMS Equity Contribution	\$ 10
<u>Project Equity (Sell 49%)</u>	<u>\$100 ^</u>
Total Funding	\$390

Use and Source of Funds

* US\$ 76 m of cash reserves required by KfW for project protection

^ Altech Advanced Materials AG has option to purchase 49% for US\$100m

^ Open to other strategic investors or JV partners



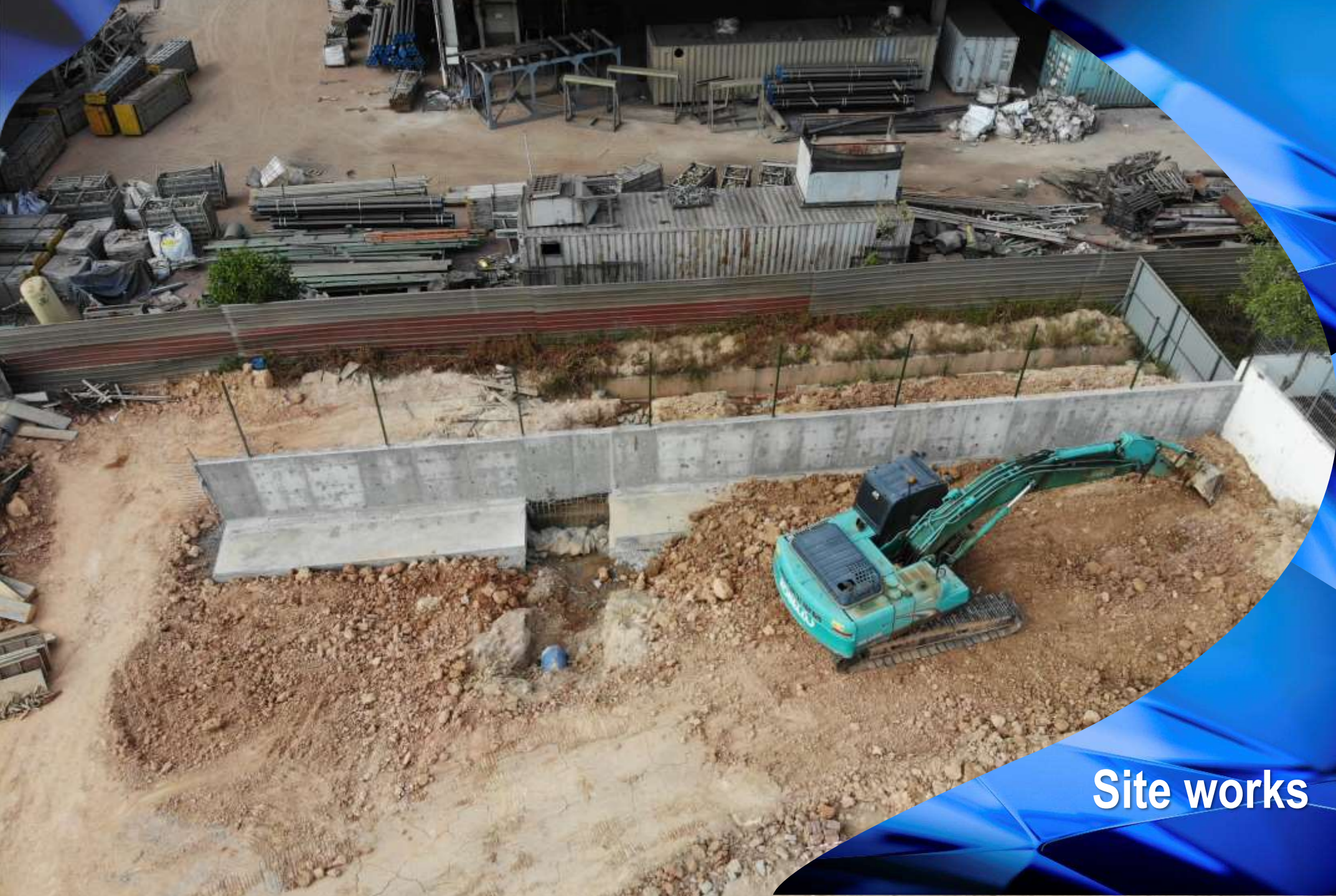
**Equity sell
down of 49%
for US\$100m**



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- **Environmental approvals completed**
- **All permitting approvals completed**
- **Operating licence granted**
- **Construction commenced**
- **Ground conditions known**
- **Contractors known**
- **Stage 1 and 2 completed**
- **Running start when project finance done**

**Removed
Greenfield
Risks
Construction
Commences**



Site works



Maintenance Building



Maintenance Building



Electrical Substation



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Altech - Development leader in HPA

	ASX Code	Deposit location	JORC Resource	Scoping or PFS Study	Pilot Plant	JORC Reserve	DFS Study	Offtake Arrangement	HPA Plant Engineered	Site for Plant Purchased	EPC Contractor Appointed	Lump sum fixed price	Mine Permitted	Plant Construction Commenced	Final Investment Decision	Senior Project Finance Secured	Plant Construction commenced	Balance of finance/equity
Accelerate Resources (kaolin to HPA)	AX8	WA (Tambellup)																
Alchemy Resources (kaolin to HPA)	ALY	NSW (West Lynn)	✓															
Alpha HPA (Solvent Extraction)	A4N	Qld (Gladstone)	n/a	✓	✓	n/a	✓						n/a					
Altech Chemicals (kaolin to HPA)	ATC	WA (Meckering)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Andrometa (kaolin to HPA)	ADN	SA	✓															
FYI Resources (kaolin to HPA)	FYI	WA (Cadoux)	✓	✓	✓	✓	✓											
Peak Minerals (kaolin to HPA)	PUA	WA (Yendon)	✓	✓														
King River (Solvent Extraction)	KRR	WA	n/a	✓									n/a					
LavaBlue (kaolin to HPA)	n/a	QLD (Lava Plains)																
VeccoGroup (kaolin to HPA)	n/a	QLD (Arizona)																
Zeotech (kaolin to HPA)	ZEO	QLD (Abercorn)	✓															



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**Right Place
Right Time
Right Feedstock
Right Technology**



Thank you

Forward Looking Statements

Forward-looking Statements

This announcement contains forward-looking statements which are identified by words such as 'anticipates', 'forecasts', 'may', 'will', 'could', 'believes', 'estimates', 'targets', 'expects', 'plan' or 'intends' and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of our Company, the Directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.

The mezzanine debt facility terms referred to in this ASX announcement are indicative in nature; are non-binding; and contain the general terms of proposed a transaction. Any future commitment for the facility will be subject to and is contingent upon all internal approvals of the financial institution as well as the completion of detailed due diligence (including but not limited to HPA market, legal and technical due diligence) and legally binding documentation and senior lender agreement. There is no certainty that the mezzanine project debt finance will be approved or that a transaction will be concluded based on what is contemplated in the term sheet. The Company makes no representations or warranties whatsoever as to the outcome of the mezzanine debt finance process.

Competent Persons Statements – Meckering Kaolin Deposit

The information in this announcement that relates to Mineral Resources and Ore Reserves is extracted from the report entitled "Maiden Ore Reserve at Altech's Meckering Kaolin Deposit" released on 11 October 2016; the report is available to view on the Company's website www.altechchemicals.com. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources and Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.