

Altech Chemicals Limited ASX: ATC FRA:A3Y

**Youbisheng Green Paper AG
General Meeting**

**Iggy Tan
Managing Director**



**Altech Chemicals
Limited**



4,500 tpa High Purity Alumina Plant



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- **Sapphire gemstone**
- **Purified alumina (Al_2O_3)**
- **99.99% (4N) purity or greater**
- **Smelter Grade Alumina (SGA) ~ 99.5%**
Bayer Process uses sodium hydroxide (NaOH)
- **Sodium impurity is a problem for sapphire and lithium batteries**

What is HPA?



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HPA substrate for LEDs



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\$20,000 per t
US\$40,000 per t



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

**High price
for purity**

Our Target Business

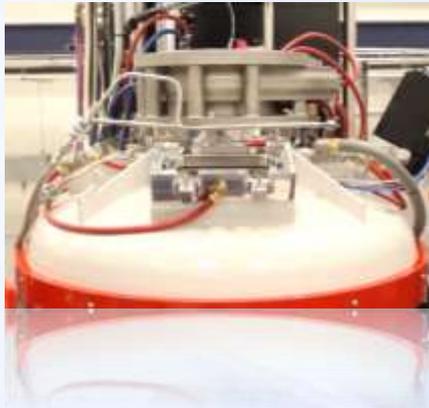
4N HPA produces synthetic sapphire glass



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LEDs & LITHIUM-ION BATTERIES

Sapphire Furnace (2,000 °C)



Sapphire Crystal Boule



Sapphire Wafer LEDs



Nano Powder



Separator Coatings



LITHIUM ION BATTERIES





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LED Expansions

Osram opens \$440M Malaysian plant amid world's widening clamor for LED chips (UPDATED)

NOVEMBER 24, 2017 BY RAHUL1

Energy Efficient Lighting Market Rising at a CAGR of 13.4% from 2016 to 2024, will reach to US\$15 bn by 2024

LED UPSTREAM | LED APPLICATIONS |

ARTICLE COMMENTS (0) RELATED CONTENT

PRINT EMAIL

Sanan Optoelectronics to set up LED production base in southeastern China

Siu Han, Taipei; Adam Hwang, DIGITIMES [Thursday 7 December 2017]

The largest China-based LED epitaxial wafer and chip maker Sanan Optoelectronics has announced it will invest CNY33.3 billion (US\$5.03 billion) to set up an LED production base in Quanzhou, southeastern China.

Xiamen Changelight Purchases AIXTRON MOGVD Technology to Expands ROY LED Production

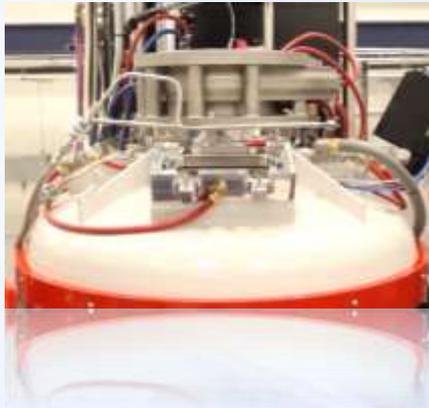




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LEDs & LITHIUM-ION BATTERIES

Sapphire Furnace (2,000 °C)



Sapphire Crystal Boule



Sapphire Wafer LEDs



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Separator Coatings

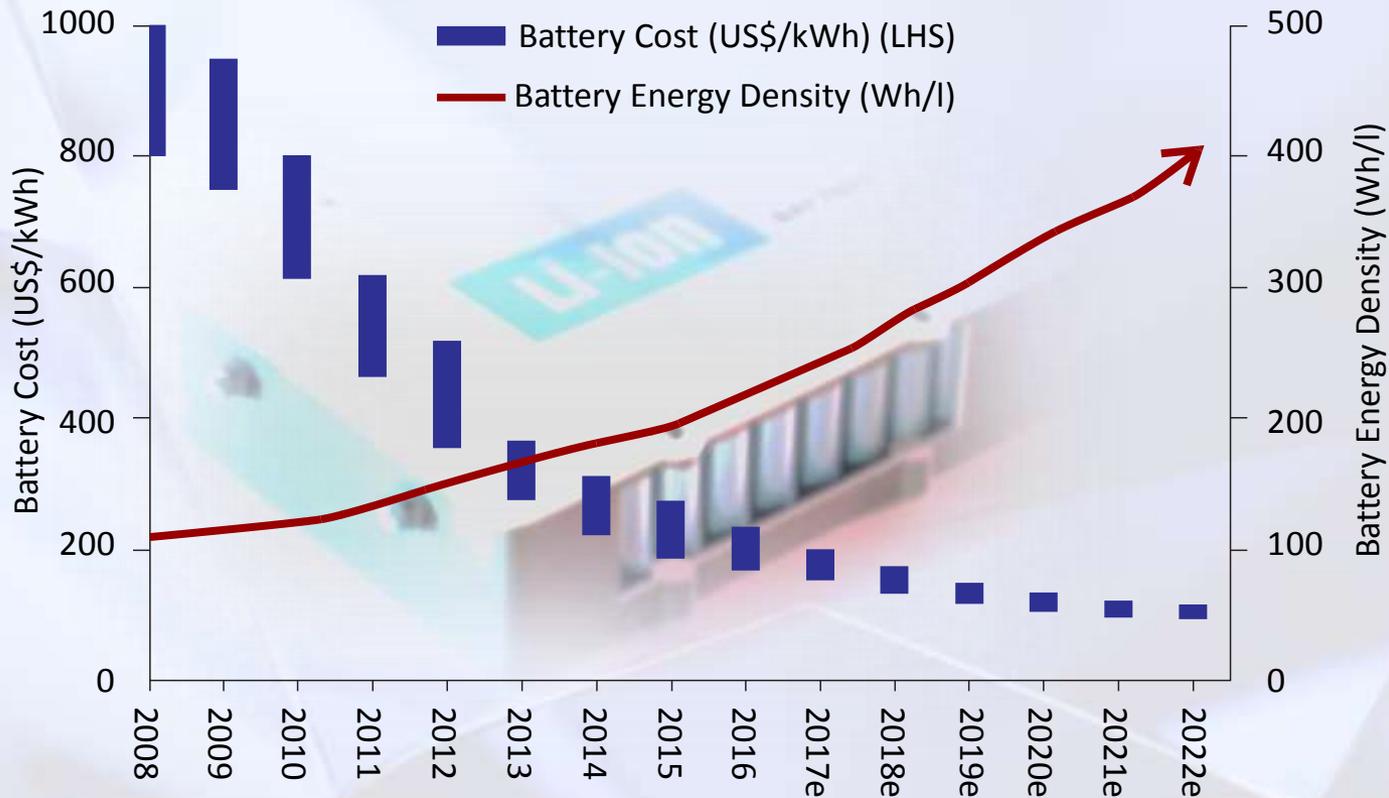


LITHIUM ION BATTERIES





Battery Energy Density

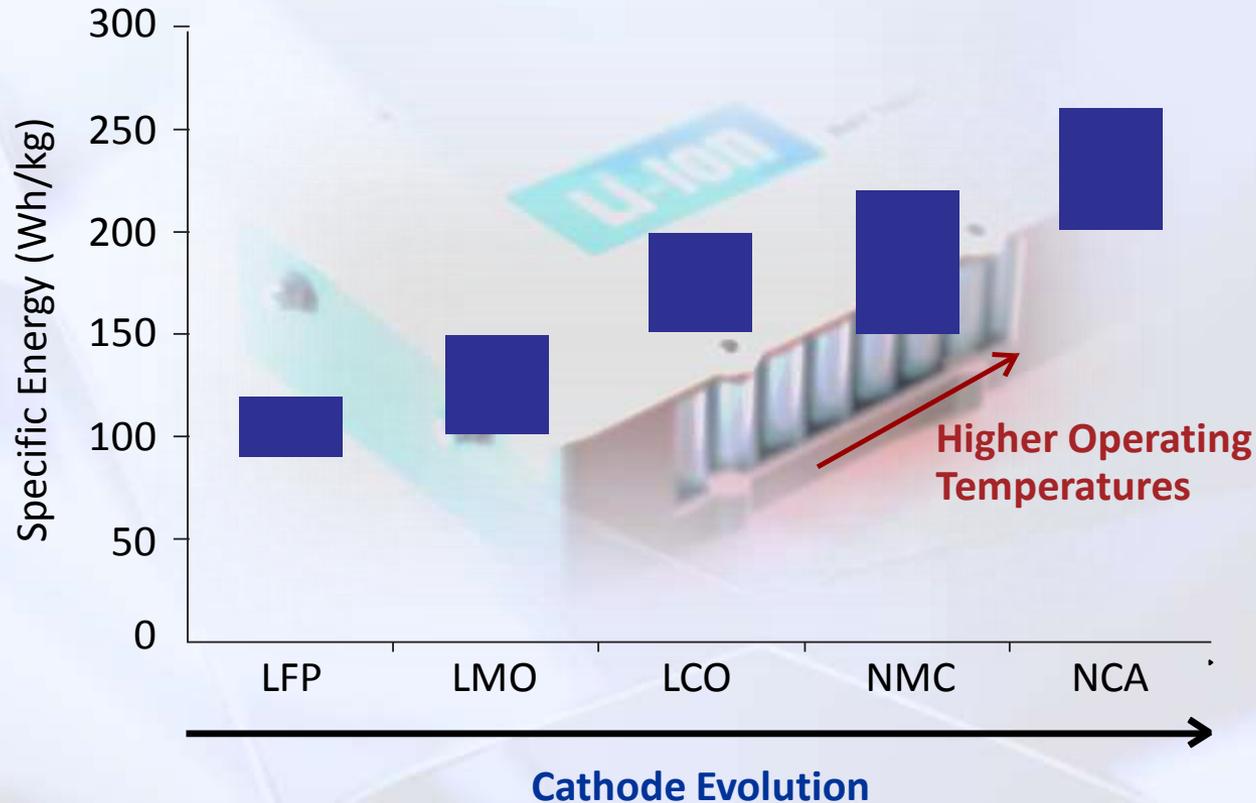


Battery costs are reducing due to increased energy density



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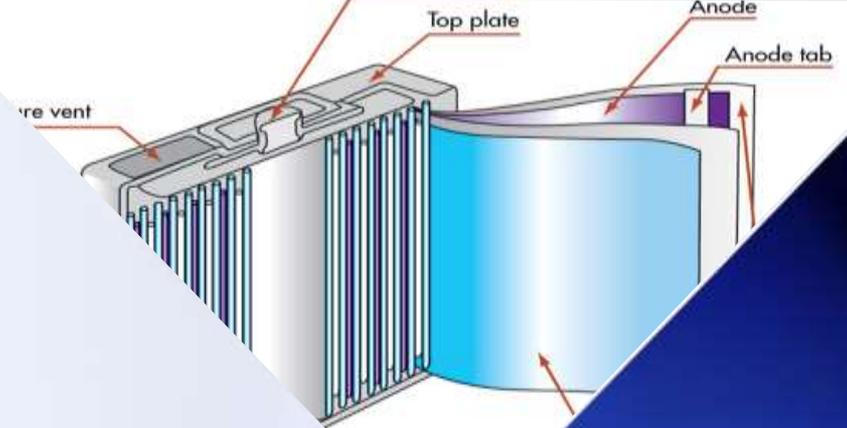
Battery Energy Density vs Temp



Cathode changes – higher operating temperatures

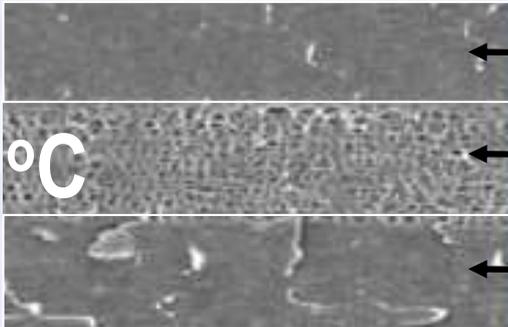


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Normal Polymer Separators

<135 °C

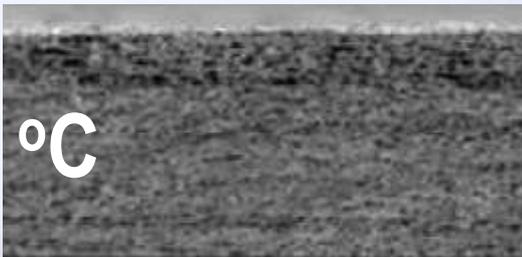


← Polypropylene (PP) 155 °C

← Polyethylene (PE) 135 °C

← Polypropylene (PP) 155 °C

>200 °C



← HPA layer

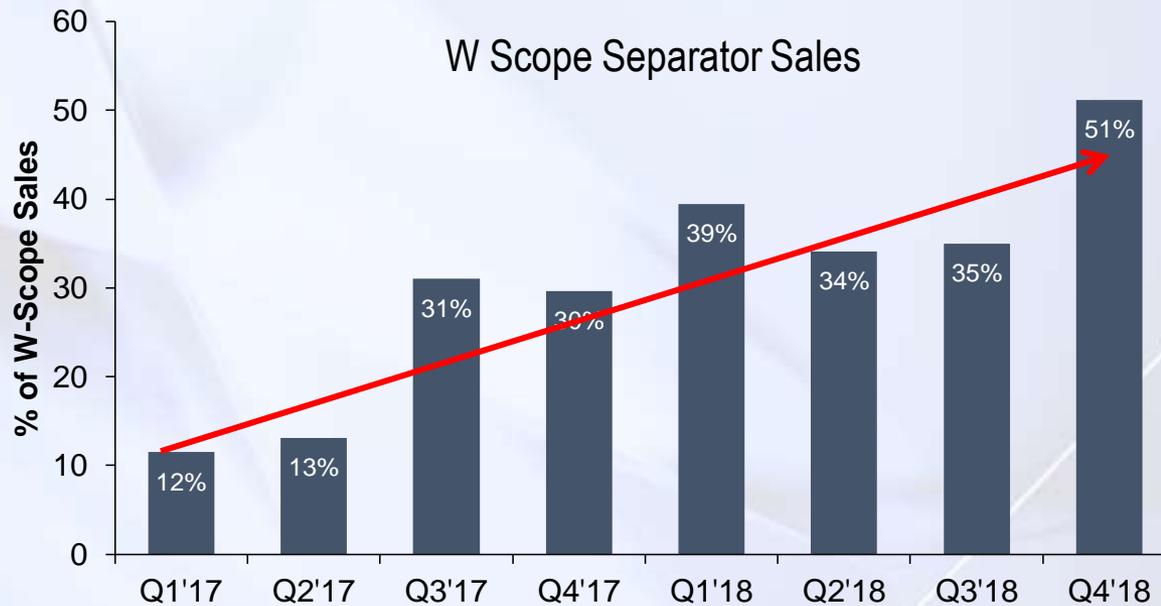
← Polymer membrane

HPA Coated Separators (HPACS)

**HPA
required
for higher
temps**



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**HPA
Coated
Separators**



**Japanese separator manufacturer reports
40% HPA coated separators
12% only 24 months ago**



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Capex Plans of Battery Manufacturers



LG Chem

Korea - 50-70 GWh by 2020
China 32 GWh by 2023

Panasonic

Japan - JV with Toyota
50x capacity by 2020



Korea - 30 GWh by 2020



Korea - 20 GWh by 2020

CATL

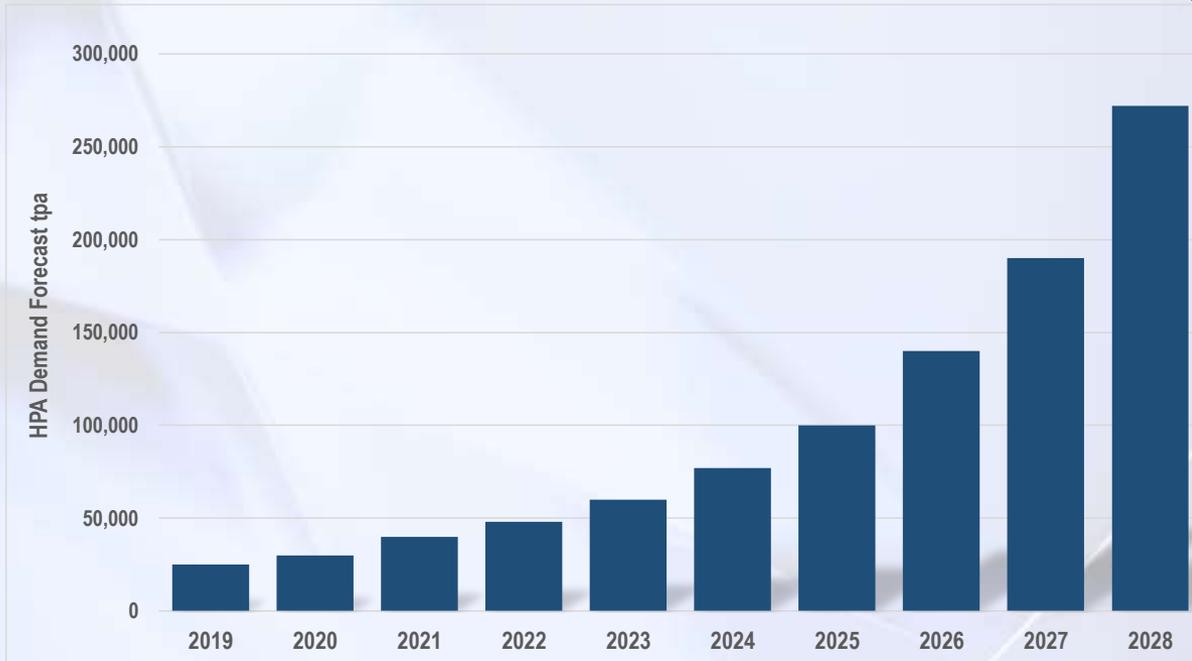
China - 50 GWh by 2020

northvolt

Sweden - Spending US\$4 B to achieve 32 GWh



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- **30% CAGR demand growth**
- **272,000 tpa. by 2028**

**Demand
for HPA**





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- **CRU upgraded previous forecast to 272,000 tpa by 2028**
- **30% CAGR demand growth 2028**
- **Future LED market - will require higher quality**
- **LIB separators demand 187,000 tpa by 2028**
- **LEDs demand forecast 85,000 tpa by 2028**
- **Significant supply deficit**

**CRU Latest
Forecast**



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**CRU warns
of significant
supply deficit**

- **About 20,000 tpa by 2021**
- **Peaking in 2028 by 50,000 tpa**
- **New entrants 3-4 years behind**

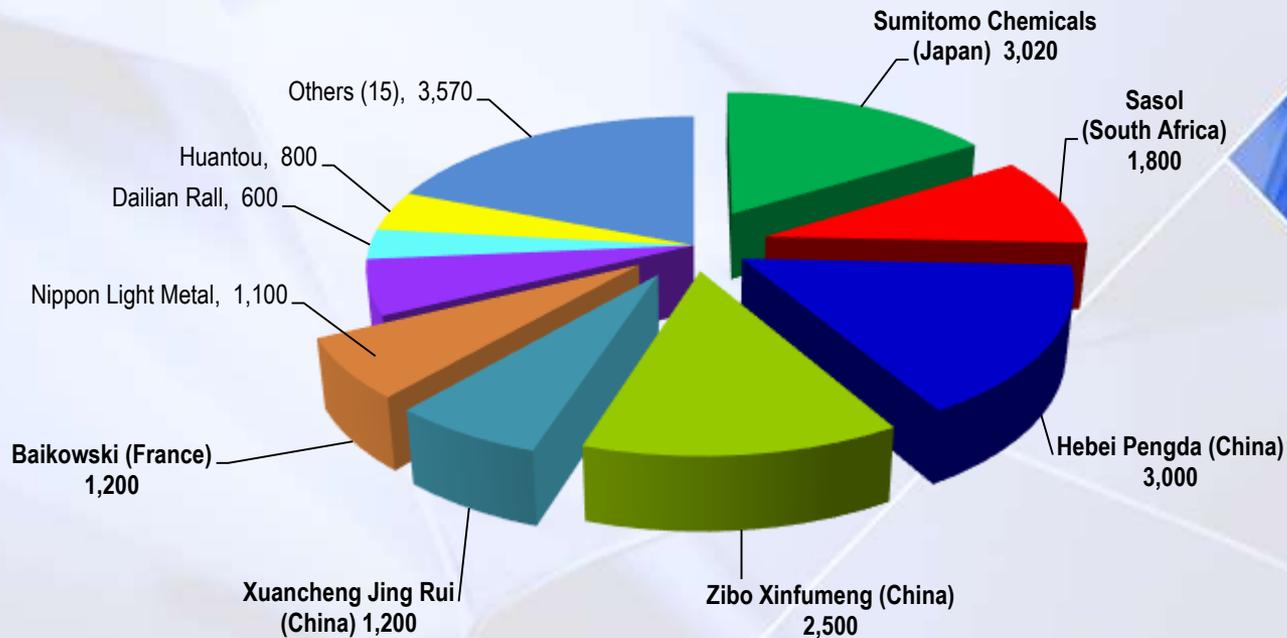
Sapphire Glass Scratch Test





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- HPA producers – Chemical companies
China (3), Japan (2), South Africa (1) France (1)



**Current HPA
Producers**



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Altech's Differentiation

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



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Typical bauxite deposit



- **Very low iron (Fe) due to weathering**
- **12.7Mt JORC Mineral Resources[^] (250 yrs)**
 - Measured Resources 1.5Mt @ 30% Al₂O₃
- **Deposit in Western Australia**

**Low-impurity
Kaolin Feedstock**

%	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

Altech's kaolin deposit



* Beneficiated Kaolin in FIDS



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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
- Fremantle to Johor easy shipping

Meckering Kaolin Deposit in West Aust





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- **Chemical-zoned industrial park**
- **60% lower operating costs**
- **HCl plant nearby**
- **Services, natural gas, electricity, water**
- **Access to 17th largest container port**
- **5-10 year corporate tax free**
- **No radioactive waste – chemical park**

**HPA Plant to
be in Johor,
Malaysia**

ALTECH CHEMICALS





HCl Plant

Leach & Neutralisation

Fine Sand

Crystallisation

Kaolin Calcination

Kaolin Beneficiation

Kaolin Reveal

Roasting & Calcination

Maintenance

HPA Finishing Plant

Final Product

Administration

Control Room

Lab

TNB Substation

Main Station

Gatehouse

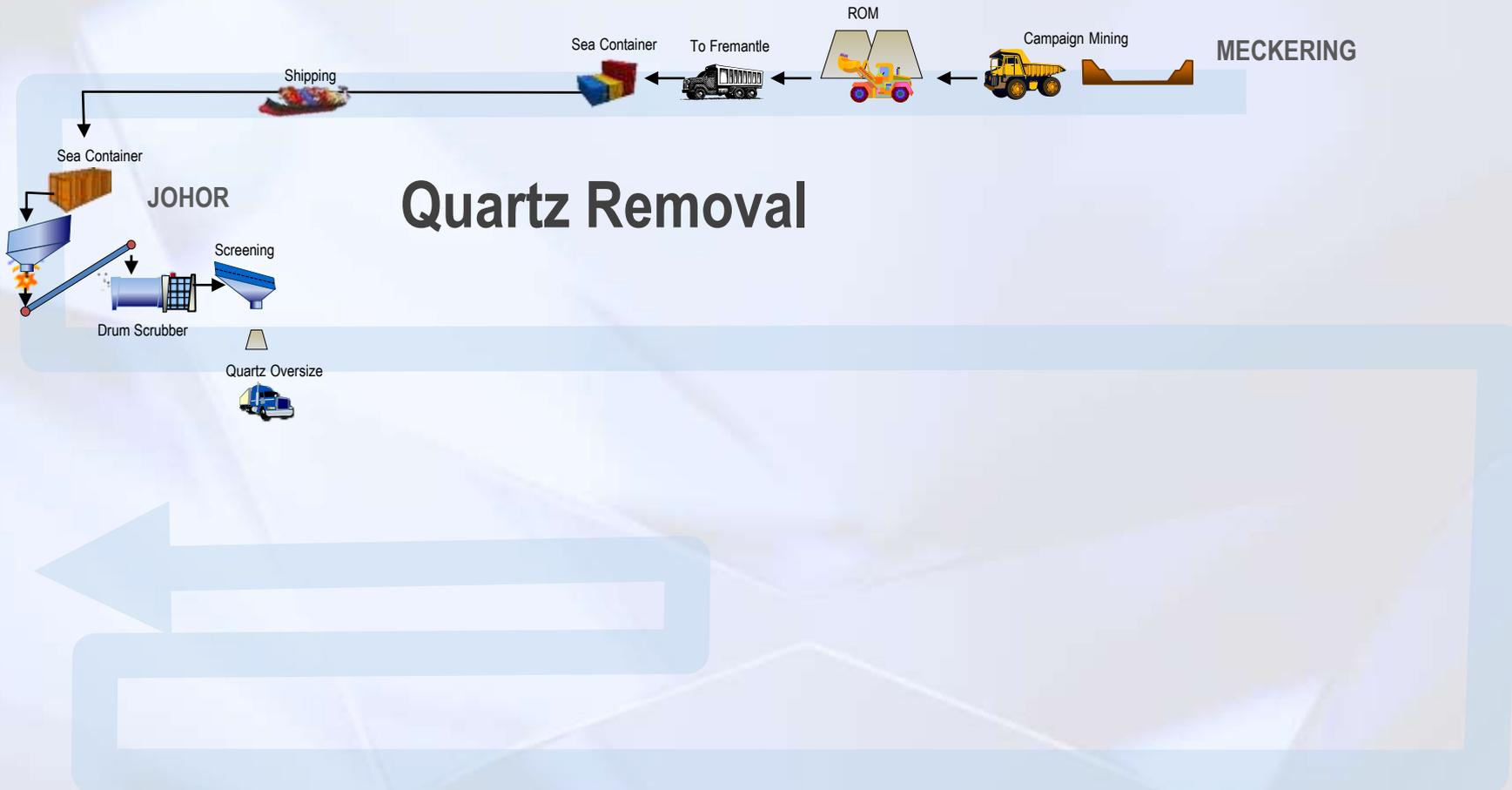
Car Park

Gate



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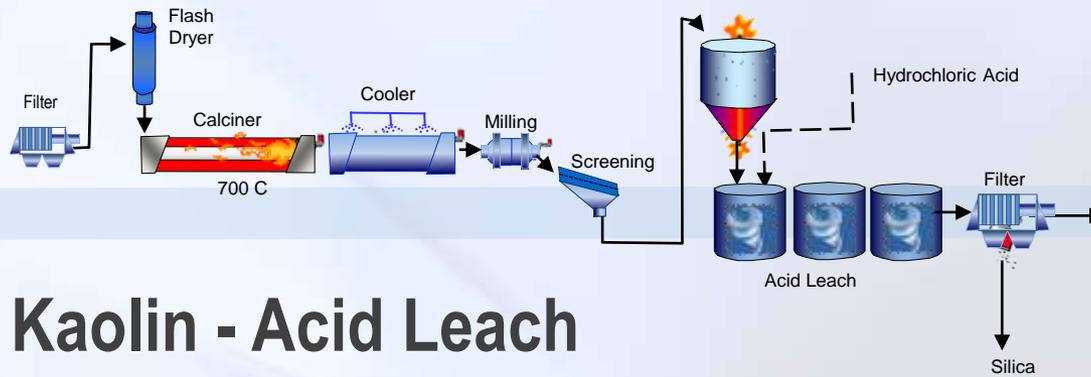
Altech's Patented HPA Process





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Altech's Patented HPA Process



Meta Kaolin - Acid Leach

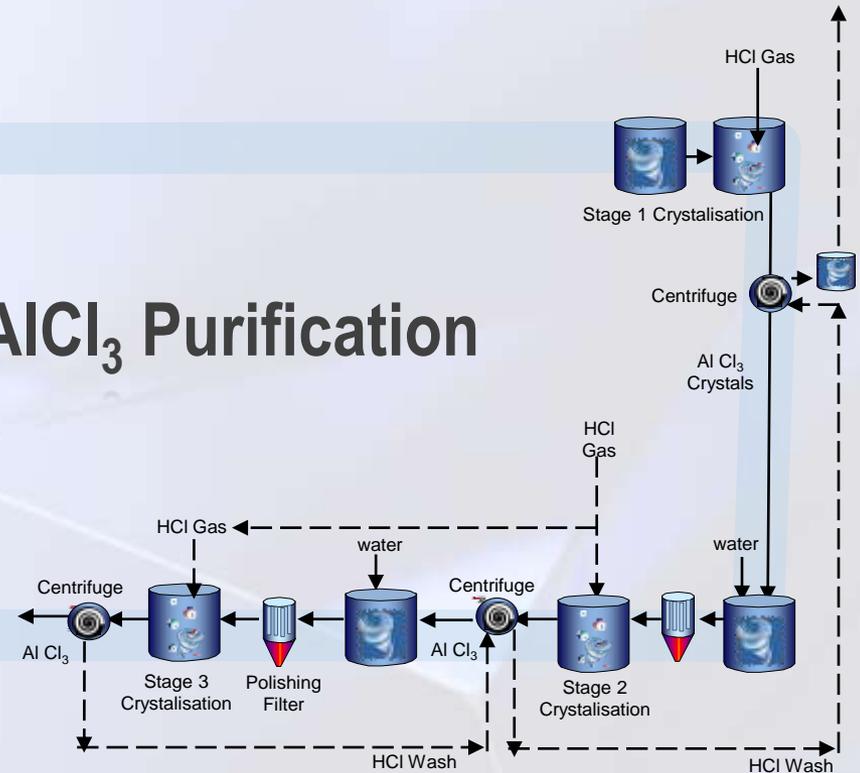




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Altech's Patented HPA Process

AlCl_3 Purification

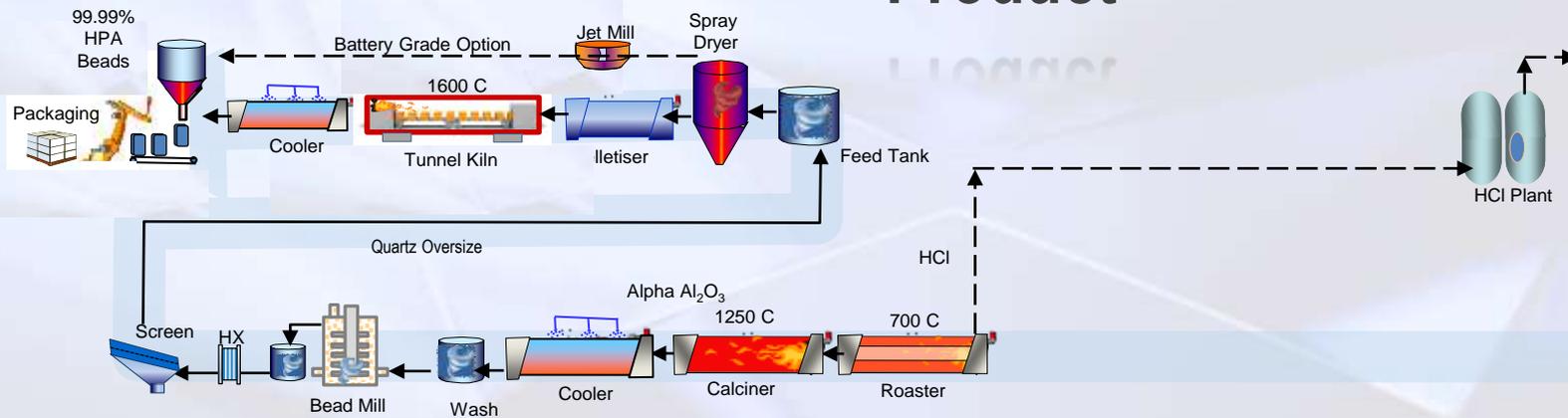




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Altech's Patented HPA Process

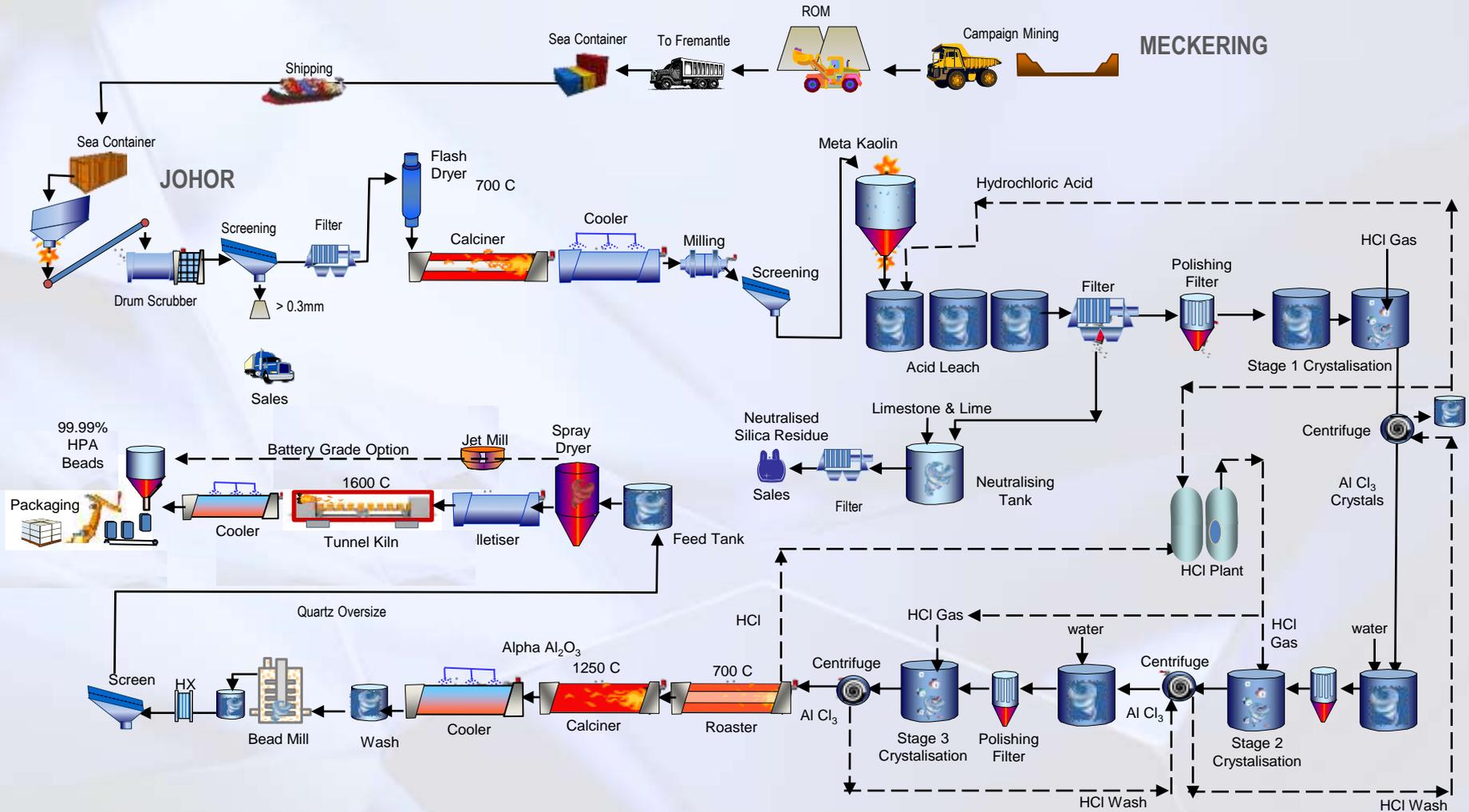
Roasting & Final Product





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Altech's Patented HPA Process





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

**Established
Proven
Chemistry**



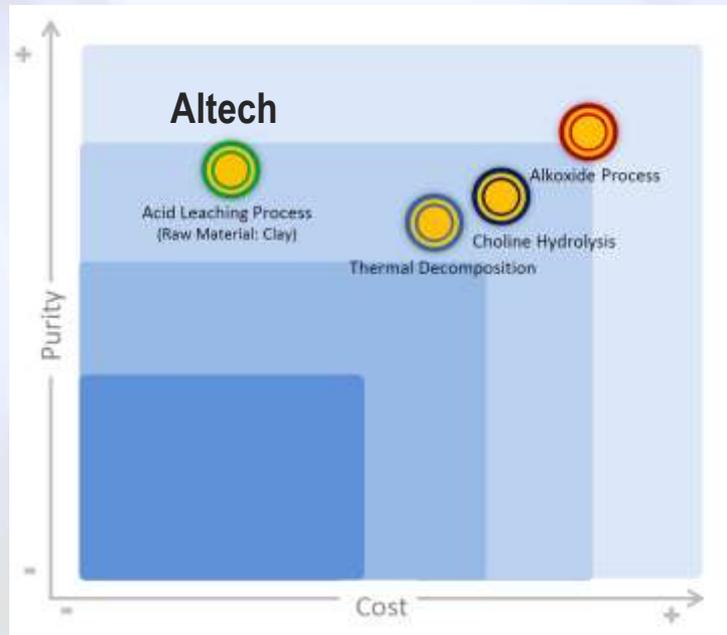
Australian Government
IP Australia

CERTIFICATE OF GRANT
INNOVATION PATENT



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



**Bottom
Quartile
for Op Costs**



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 **Mitsubishi Corporation**



- **Off-take sales agreement with Mitsubishi**
- **First 10 years of HPA operations**
- **Secures sales for HPA plant production**
- **Exclusive global distributor**
- **Experienced with HPA**
- **Strategic priority: lithium-ion batteries**

Mitsubishi
10 year
off-take







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

SMS  **group**

**Lump Sum
Turn Key
Contract**





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- 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
- Possibility of 6,000 tpa

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



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- **Pre-tax NPV_{7.5} US\$ 505 million**
- **Internal Rate of Return (IRR) 22%**
- **Payback (full rate) 3.9 years**
- **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 Finance Costs

Economics Equity Model



Altech Chemicals Sdn Bhd

GRAND OPENING CEREMONY

8TH AUG 2018







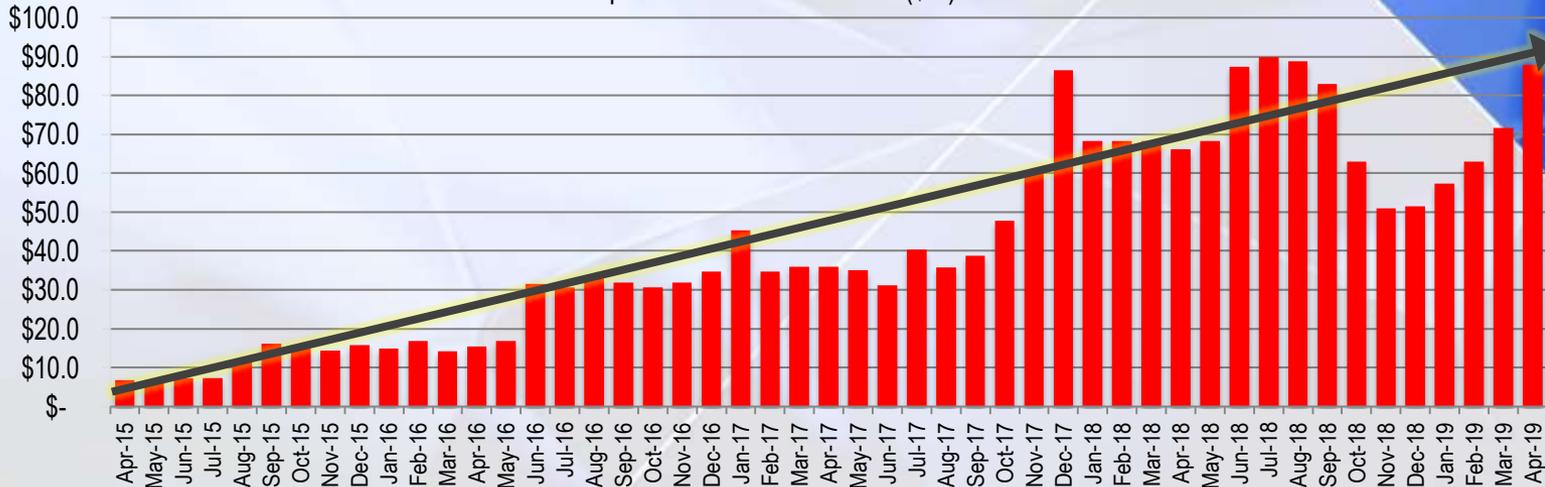
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- 11 x market cap growth (4.5 years)
- Ave trade value \$2k/day to \$350k/day
- Mar Cap \$80m - 706 m shares
- Cash - \$8 m +\$4m to come
- No debt



Altech Growth Performance

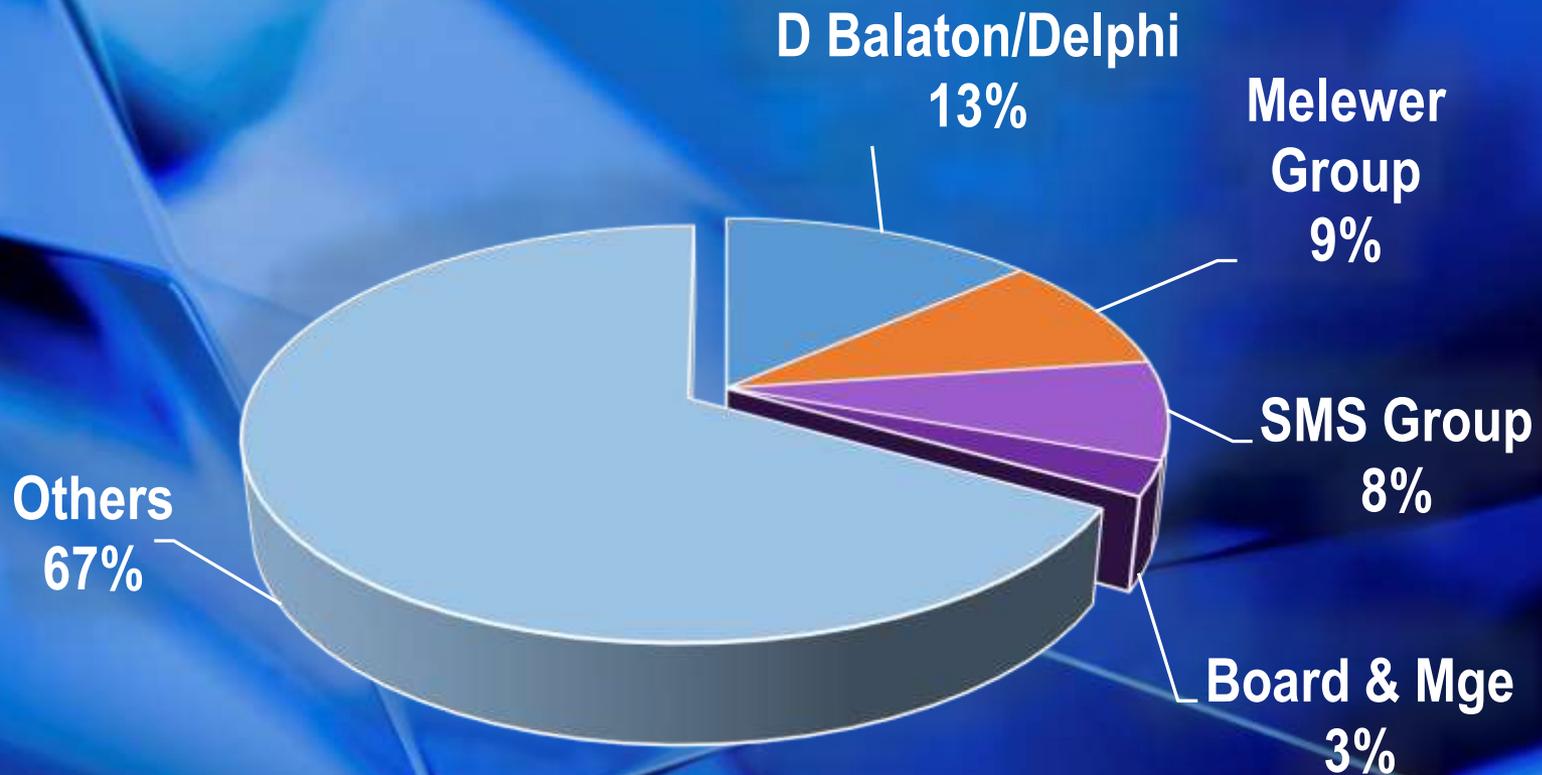
Altech Chemicals Limited
Market Capitalisation - end of month (\$m)





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Quality Shareholders







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- Debt funding with KfW IPEX-Bank
- Total debt of US\$ 190 million
- US\$ 170 million export credit finance
- 50% of plant – German suppliers
- Low interest, long tenure
- Best debt in the world

**Debt
Funding
Successful**





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Three work streams

1) Subordinated mezzanine debt

- Macquarie Term sheet of US\$90m
- } Proceeding to internal approval

2) Equity work stream

- Lead - Petra Capital



3) Possible JV Partner



- Partial project sell down
- Various parties in dataroom

**Advancing
Final Stage
Funding**



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- **Indicative non binding term sheet of US\$90m**
- **Technical due diligence – Worley Parson appointed**
- **5 months of technical due diligence**
- **Positive technical report – no fatal flaws**
- **Internal financial modelling done**
- **Completed market due diligence by CRU**
- **Legal due diligence to commence**

**Macquarie
Mezzanine Debt
DD Status**



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HIGH PURITY ALUMINA PROJECT

Altech Chemicals Sdn Bhd



**Stage 1 & 2
Construction
underway**











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Global Quality Partners

- Australian Company
- Kaolin mine
- Aust Technology



- Malaysian HPA plant
- Major shareholder
- Tax incentives

- German debt (KfW)
- EPC contract (SMS)
- Frankfurt dual listing

- Mitsubishi offtake
- Major markets

German Project Equity Strategy



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- **Germany, France creation of a major battery industry in Europe**
- **By 2024 capacity will be 147 GWh**
- **Stringent 2020 EU CO2 emission standards (95g/km)**
- **Push to electric vehicles (EVs) by European car manufacturers**
- **Less reliant on Asia**
- **Volkswagen - all supply chain in Europe**

Europe Battery Industry





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- **Acquire 29% Youbisheng Green Paper AG (YAG) Frankfurt listed**
- **Name change to Altech Advanced Materials AG**
- **Sell right for YAG to acquire up to 49% of HPA project for US\$100m**
- **Larger pool of European institutional investors**
- **Enhanced project valuation**
- **Less dilution for current Altech shareholders**
- **European investors desire for battery materials exposure**

The background of the slide is a collage. The top right corner shows a busy stock exchange floor with many computer monitors and people, with the text 'BÖRSE FRANKFURT' visible. The bottom right corner features a close-up of the European Union flag, showing the blue field with white stars and the red and yellow stripes of the German flag.

**German
Project Equity
Strategy**



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- **Altech (51%) has invested A\$60m to date**
- **5 year development effort**
- **250 year mine life deposit**
- **Intellectual property, process technology**
- **Brought Mitsubishi 10 year off take**
- **Established KfW US\$190m senior debt**
- **Fixed price EPC contract with SMS**
- **Mezzanine debt term sheet of US\$90m with Macquaire**



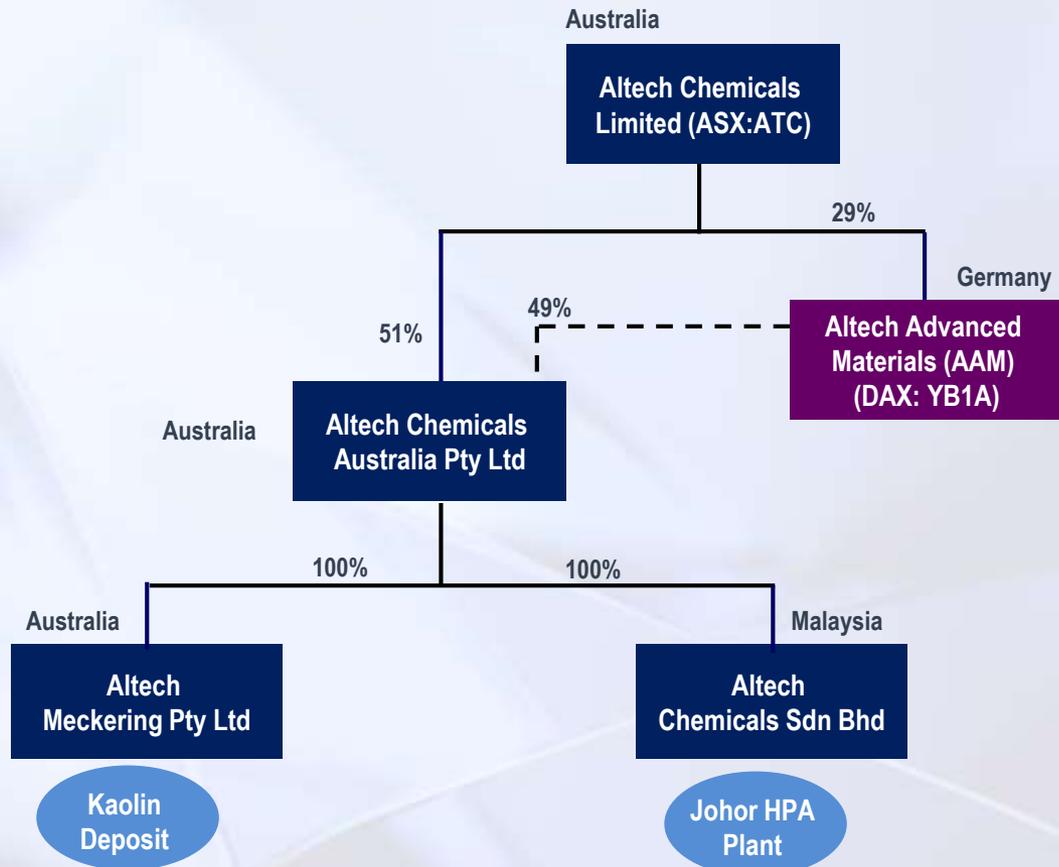
49%
US\$100m
Valuation





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Proposed JV Structure





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- **Non-refundable fee of €500,000 in cash**
- **Right executed before 1 Jan 2021**
- **Min 10% direct HPA project interest (US\$20m)**
- **Invest Altech parent shares at 15% discount**
- **Altech will buy back at end year 6 for 15% pa return**
- **Minimum US\$231m at end year 6**
- **Altech can buy back earlier as long as return is 15% pa**
- **YAG can cancel the buy back anytime**

Transaction Details





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- Acquisition of 29% of YAG shares
- Satisfactory DD outcome by YAG and Altech
- Approval of Altech board of directors
- Regulatory approvals
- YAG change of company name to Altech Advanced Materials AG (AAM)
- YAG structure to allow €70 m raise
- Appointment Altech nominees
YAG Mge and Supervisory board

**Conditions
Precedent**





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Right Place
Right Time
Right Feedstock
Right Technology



Thank you



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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.