

**Altech Chemicals Limited ASX: ATC FSE:A3Y**

**Internationale Delmetall-Rohstoffmesse  
Munich, Germany**

**Iggy Tan  
Managing Director**



**Altech Chemicals  
Limited**

**World leading producer of  
high purity alumina (HPA)**



**4,500 tonnes pa**

**Our Vision**





**Altech Chemicals**  
Limited

- **Sapphire & Ruby**
- **Natural form of high purity alumina (HPA)  $\text{Al}_2\text{O}_3$**
- **Formed by mother nature like diamonds**
- **Colour from impurities**
- **Nearly as hard as diamond (Mohs 9)**

**Sapphire  
Gemstone**





- Purified alumina ( $\text{Al}_2\text{O}_3$ )
- 99.99% (4N) purity or greater
- Smelter Grade Alumina (SGA) ~ 99.5% (5,000ppm impurities, mainly sodium)
- Bayer Process uses sodium hydroxide ( $\text{NaOH}$ )
- Sodium impurity is problem for electronics industry



**What is HPA?**



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



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



**High Purity  
Alumina**  
HPA 99.99% (4N)  
**US\$27,000 per t**



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

**Our Target Business**

4N HPA produces synthetic sapphire glass

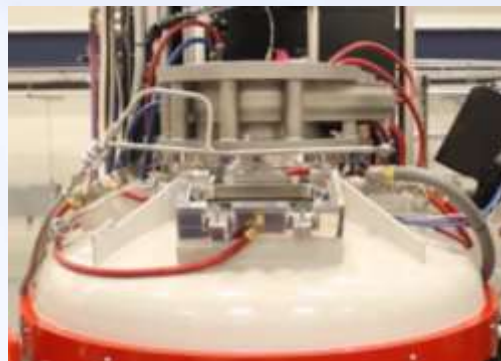
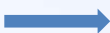
HPA substrate for LEDs

**High price  
for purity**

# High Purity Alumina



**High Purity  
Alumina**

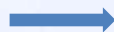


**Sapphire Furnace (2,000 °C)**



**Sapphire Crystal Boule**

**Synthetic  
Sapphire**



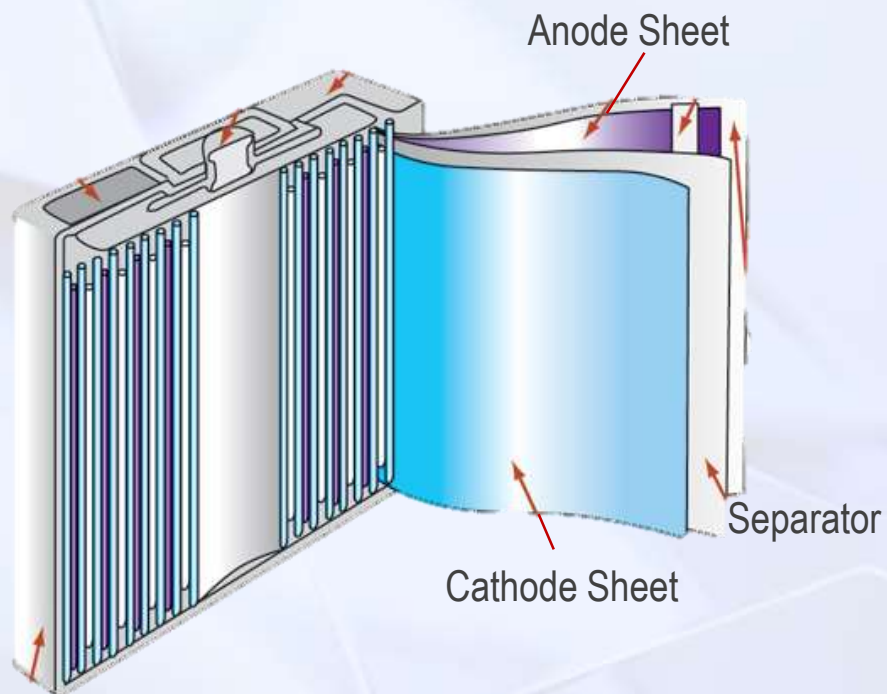
**Battery Separators / Cathode / Anode**



**Lithium-Ion Batteries**

**Lithium-Ion  
Batteries**

# Lithium-ion Battery Separator



**HPA is used in lithium-ion battery separator coatings**



# Sapphire Applications



**Sapphire Cores**



**Sapphire Wafer / Substrate**



**Sapphire Glass**



**LEDs**

**Light Emitting Diodes LED**



**Glass**

**Smartphone and Lenses**

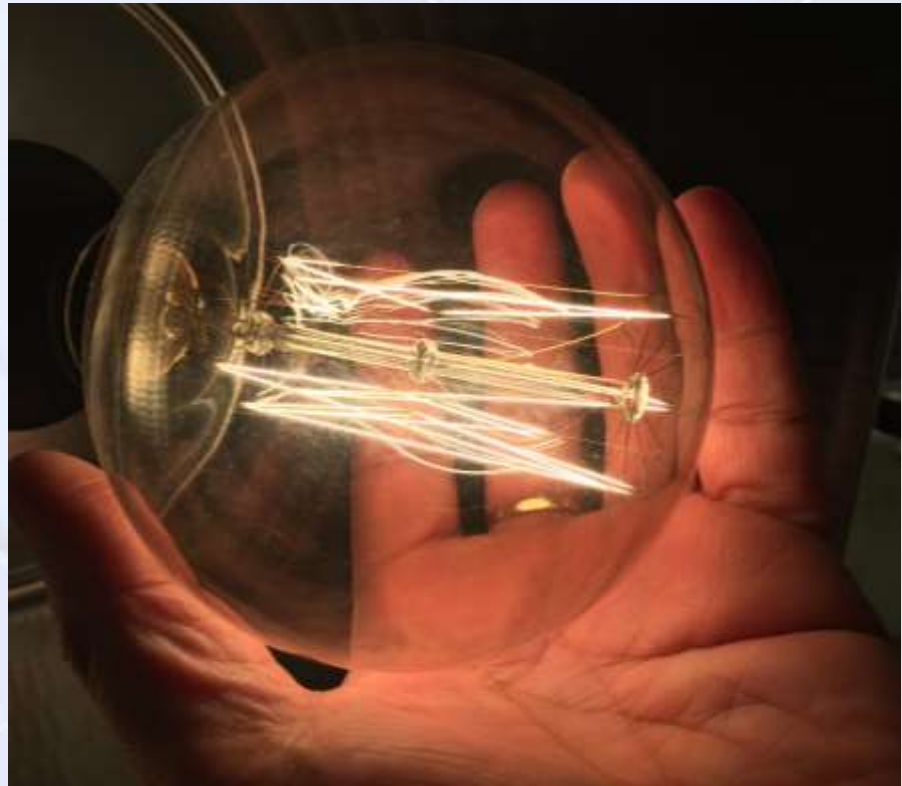


# LEDs – lighting of the future

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Conventional LEDs



New LED products

# Sapphire Glass

Vertu TI luxury smartphone



- HTC U Ultra** (128Gb)
- February 2017
  - Sapphire crystal display



- iPhone**
- Sapphire crystal lens
  - Finger print recognition

**Smartphone  
sapphire screen**

**HUAWEI**



# Sapphire Glass Scratch Test





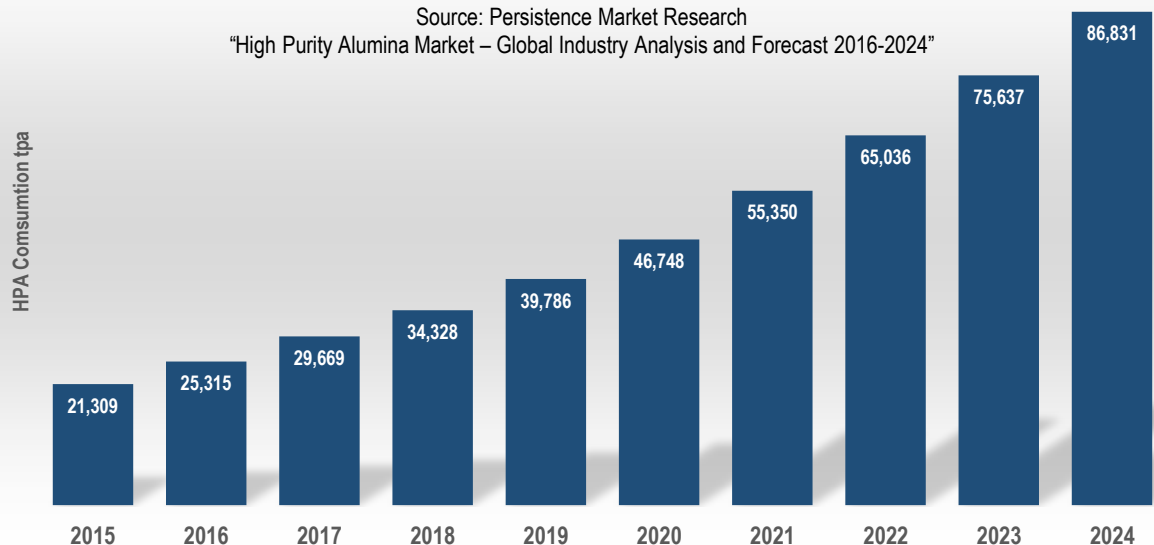
- Global HPA demand 25,315tpa in 2016 <sup>1</sup>
- Expected to increase to 86,831tpa by 2024 <sup>1</sup>
- Growing at a CAGR of 17%<sup>1</sup>
- Driven by LED growth & lithium-ion batteries
- Entering a fast growing market
- Altech production 4,500 tpa

**Demand  
for HPA**

<sup>1</sup> Source: Persistence Market Research "High Purity Alumina Market – Global Industry Analysis and Forecast 2016-2024"

## Global High Purity Alumina Forecast 2015 -2024

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



**Demand  
for HPA**

- **Global LED light demand forecast to increase to 4.1 billion by 2024 (2015: 864 million)**

Source: Navigant Research "LED Lighting: Global Outlook"

# HPA Battery Separator Forecast

## GLOBAL SEPARATOR HIGH PURITY ALUMINA DEMAND

99.99% HPA Used in Lithium Battery Separators

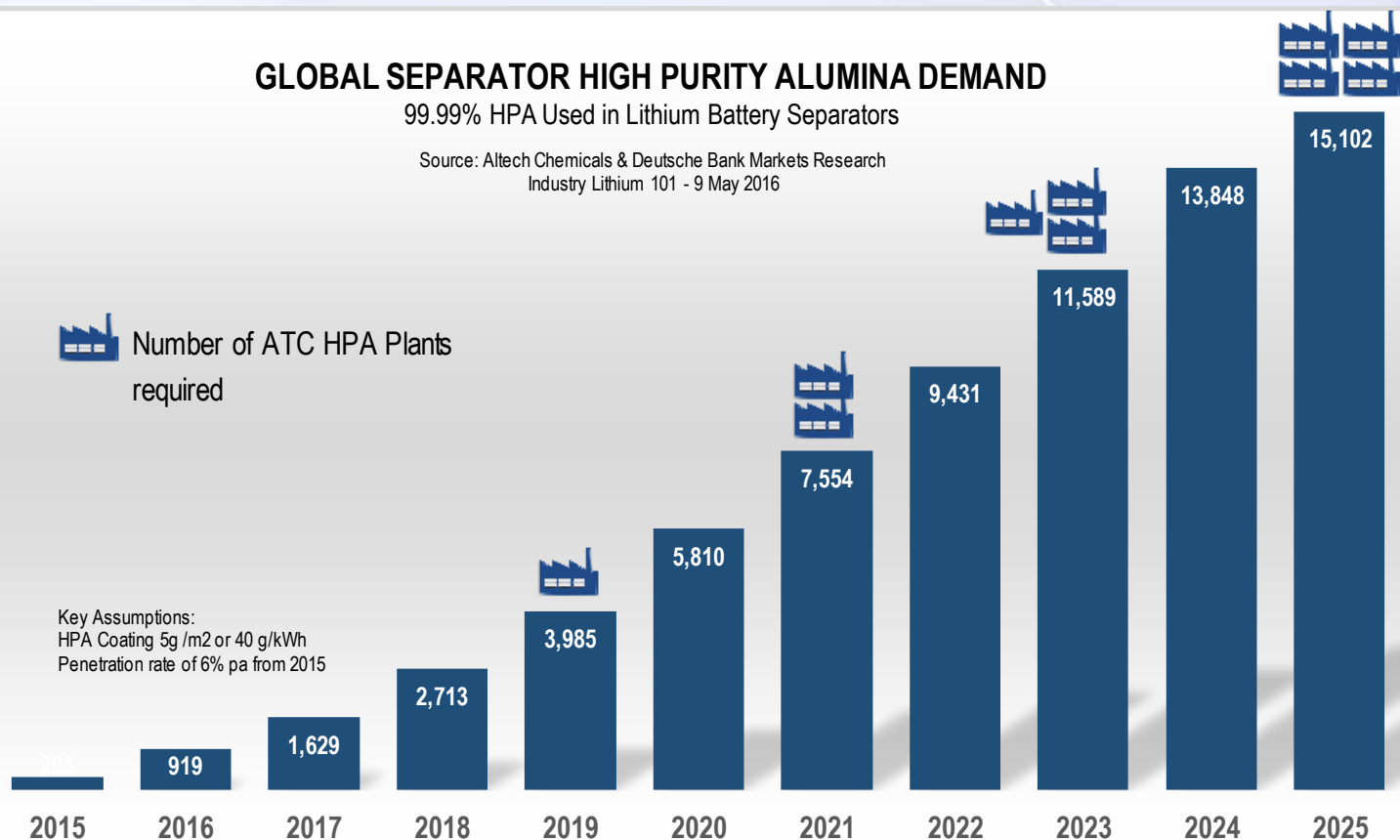
Source: Altech Chemicals & Deutsche Bank Markets Research  
Industry Lithium 101 - 9 May 2016

HPA Consumption in Li-Ion Battery Industry, tpa



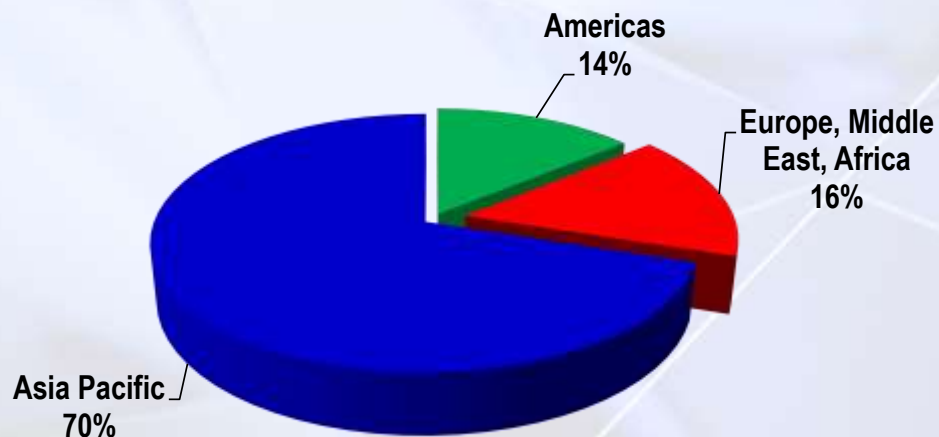
Number of ATC HPA Plants  
required

Key Assumptions:  
HPA Coating 5g /m2 or 40 g/kWh  
Penetration rate of 6% pa from 2015





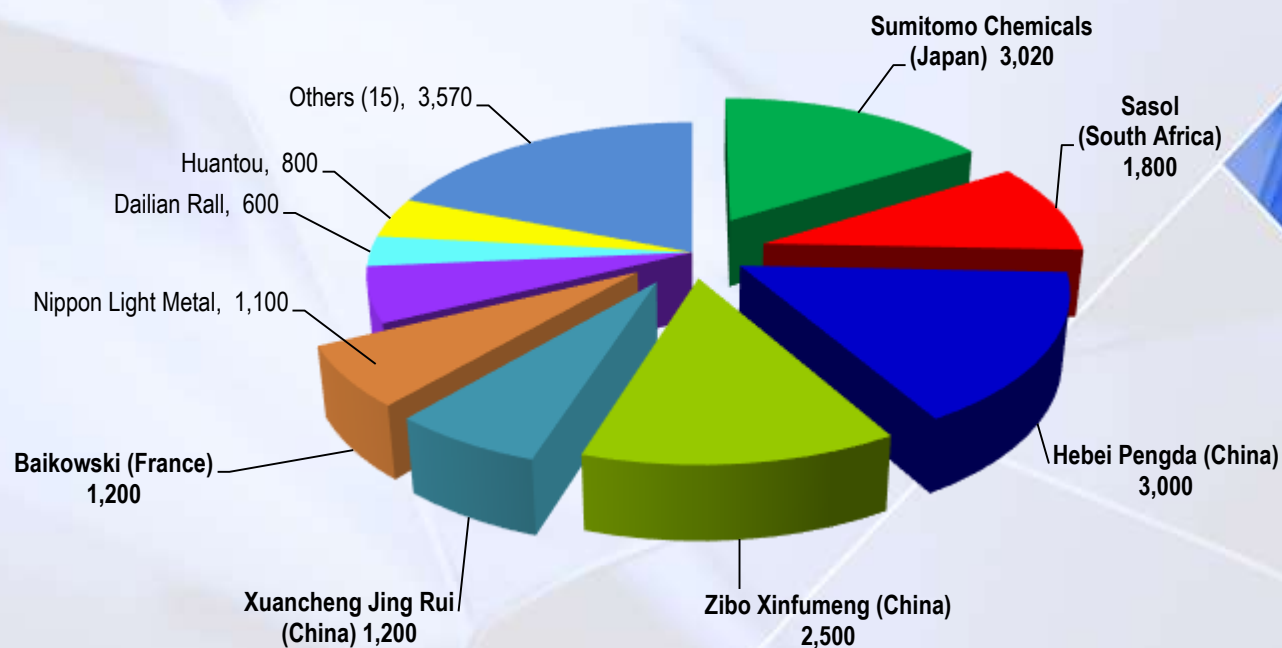
- 70% of HPA demand Asia Pacific (APEC)
- World's manufacturing hub
- Malaysian HPA plant location well-positioned
- Transport, customer service, technical credibility



## HPA Geographic Demand



- Six largest HPA producers:  
China (3), Japan (1), South Africa (1) France (1)



**Current HPA  
Producers**

# 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**



Typical bauxite deposit

- Very low iron (Fe) due to weathering
- **12.7Mt JORC Mineral Resources<sup>^</sup> (250 yrs)**
  - Measured Resources 1.5Mt @ 30% Al<sub>2</sub>O<sub>3</sub>
  - Indicated Resources 3.3Mt @ 30% Al<sub>2</sub>O<sub>3</sub>
  - Inferred Resources 7.9Mt @ 29.1% Al<sub>2</sub>O<sub>3</sub>
- **Deposit in Western Australia**

**Low-impurity  
Kaolin Feedstock**

%	Bauxite Darling Range*	Canadian HPA Project	Altech HPA Project
Al <sub>2</sub> O <sub>3</sub>	34.5	22.77	30.5
SiO <sub>2</sub>	21.5	53.29	56.3
Fe <sub>2</sub> O <sub>3</sub>	21.2	8.36	0.7
TiO <sub>2</sub>	2.00	0.98	0.7
K <sub>2</sub> O	0.24	3.41	0.1
NaO	0.005	1.42	0.1

Altech's kaolin deposit

\* Typical Mean Analysis

<sup>^</sup> 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.



**Altech Chemicals**  
Limited

- Altech owns 100% of kaolin deposit in WA
- Low environmental impact
- 130kms from Fremantle Port
- Mining lease (M70/1334) granted
- Ore Reserve 1.2Mt @ 30%  $\text{Al}_2\text{O}_3$  for 30 year (stage 1) mine-life



## Meckering Kaolin Deposit





**Altech Chemicals**  
Limited

- Lower quartile costs
- Kaolin feedstock shipped from WA
- Chemical-zoned industrial park (Tanjung Langsat)
- Sea container ports
- Plant site secured
- Malaysian government incentives

**HPA Site  
Location  
Johor**







**Altech Chemicals**  
Limited

- Established HCl leach process
- Developed in 1980's by alumina industry
- Couldn't compete with Bayer SGA costs
- But great at producing HPA (no sodium-ions)
- However little demand for HPA in 1980s
- Demand for HPA is here today

## Altech HPA Process





**Altech Chemicals**  
Limited

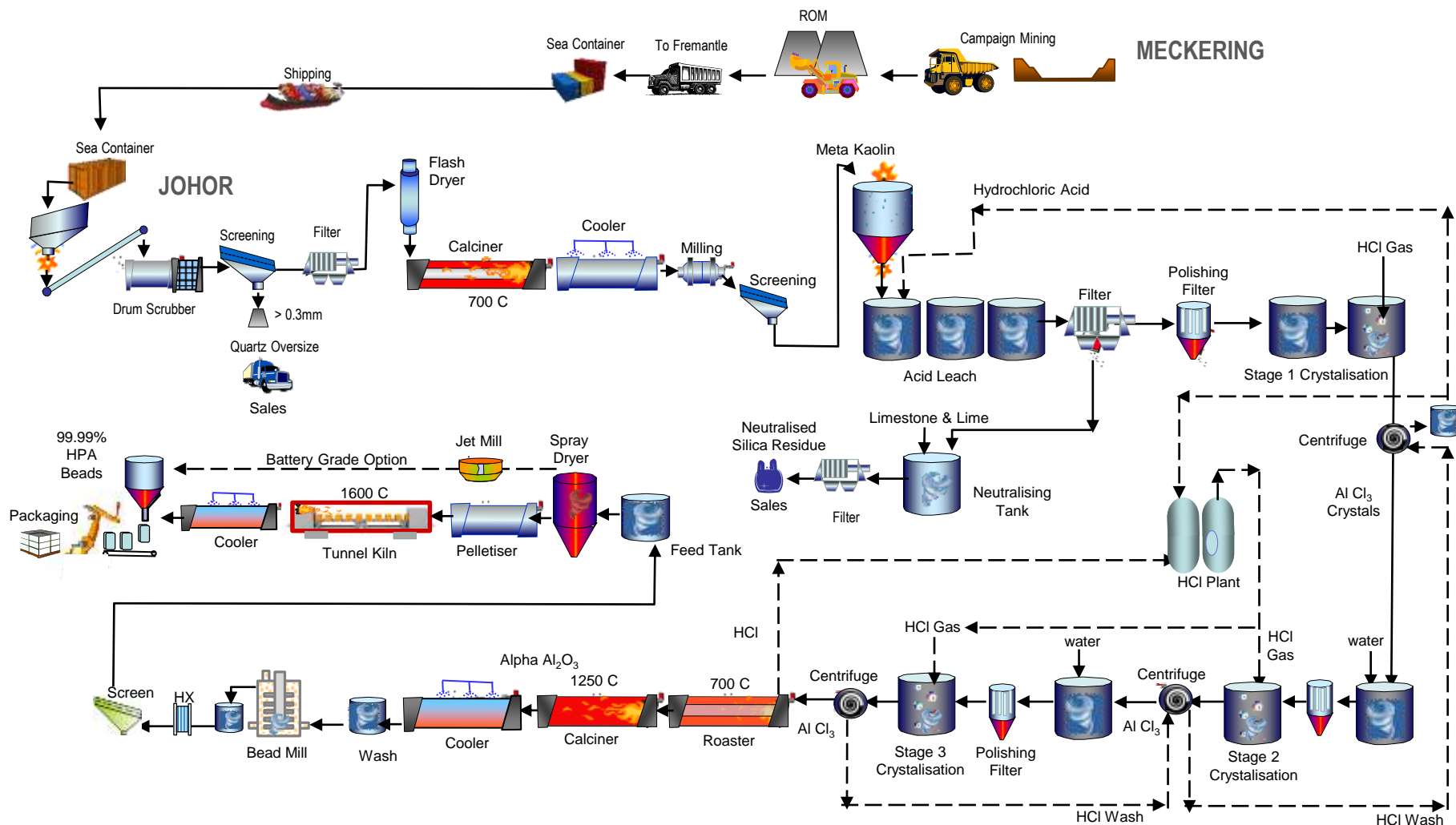
**New HPA Demand + Established Process  
+ Unique Deposit + Experienced People  
→ Shareholder Value**



**Business  
Strategy**

***“the last piece of the  
puzzle is in place”***

# Altech HPA Process





**Altech Chemicals**  
Limited

- **Work started early 2011**
- **Extensive lab and pilot plant test work**
- **Successfully produced 4N 99.99% HPA**
- **Off-the-shelf plant and equipment**
- **Completed successful BFS**
- **Final Investment Decision approved**

**Going  
Commercial**

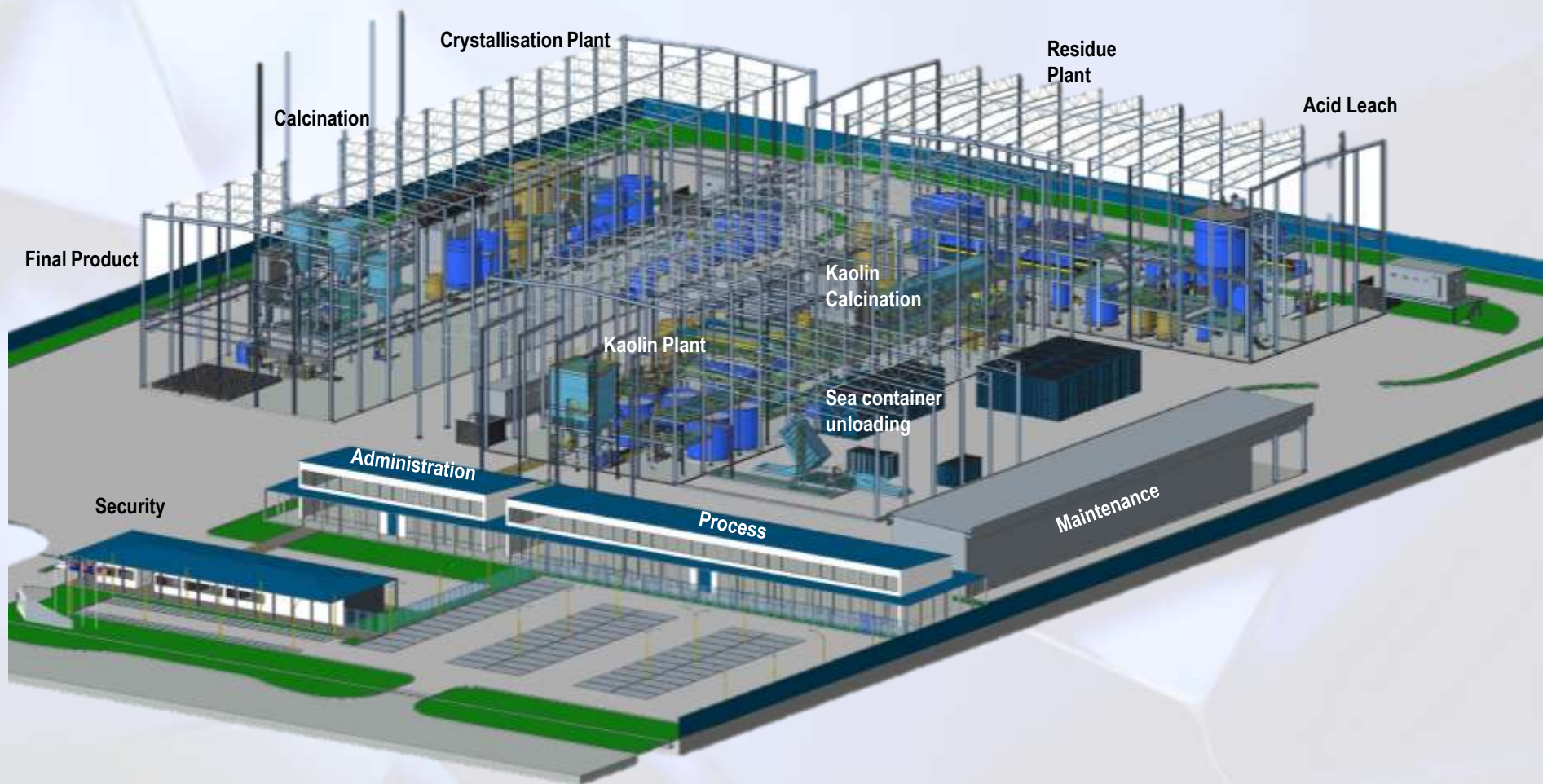






**Altech Chemicals**  
Limited

# Altech's HPA Plant – Malaysia





**Altech Chemicals**  
Limited

- **Pre-tax NPV<sub>7.5</sub> 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**
- **Total target debt of US\$ 185 million**
- **Production Costs - US\$ 9.90/kg**
- **LT Sale Price - US\$ 26.9/kg**
- **Gross Margin – 63%**

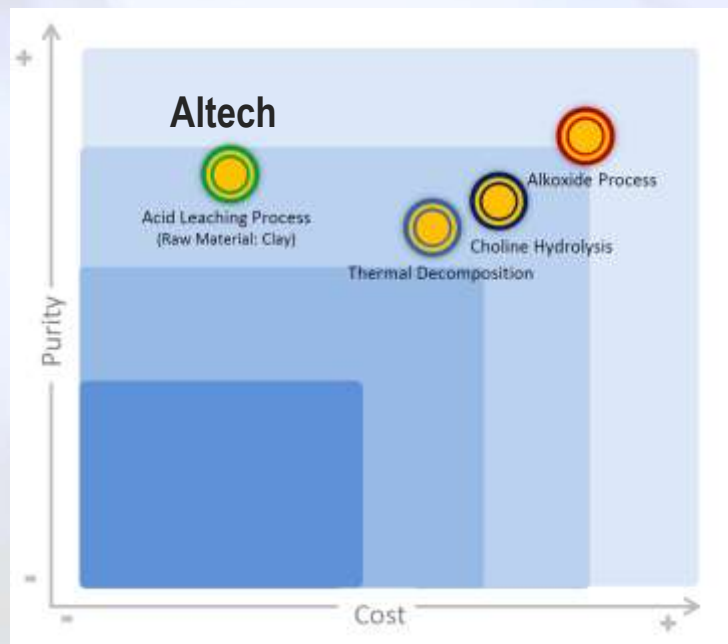
# **Final Investment Decision Study FIDS**

- Current price in Japan - US\$ 40.0/kg
- Pre-tax NPV<sub>7.5</sub> US\$ 1.1 billion
- Internal Rate of Return (IRR) 33%
- Payback (full rate) 2.2 years
- EBITDA US\$ 133 million p.a.
- Production Costs - US\$ 10.50/kg
- Sale Price - Gross Margin – 74%

## High Case Economics



- **Competitors US\$14 - 17,000/t (Breakaway Research)**
  1. We own our feedstock
  2. Main reactant HCl re-used
  3. Plant in low cost country (Malaysia)



**Bottom  
Quartile  
for Op Costs**





**Altech Chemicals**  
Limited

- Off-take sales agreement with Mitsubishi
- First 10 years of HPA operations
- Secures sales for 100% of 4,000tpa HPA plant production
- Exclusive global distributor
- Experienced with HPA
- Strategic priority: lithium-ion batteries



**Mitsubishi  
signs  
off-take**



**mitsubishi**

- Target total debt of US\$ 185 million
- US\$ 165 million export credit finance
- Debt funding with KfW IPEX-Bank
- 50% of plant – German suppliers
- Low interest, long tenure
- ECA approval date 14 Dec 2017



**Final Stage of  
Debt Funding  
Approval**



**Altech Chemicals**  
Limited

- **SMS group German EPC contractor**
- **Lump sum turn key contract**
- **Completion and cost risk**
- **Process & throughput guarantee**
- **Equity investment contribution**
- **Detailed design at advanced stage**
- **Completing EPC cost estimate**

## **Lump Sum Turn Key Contract**





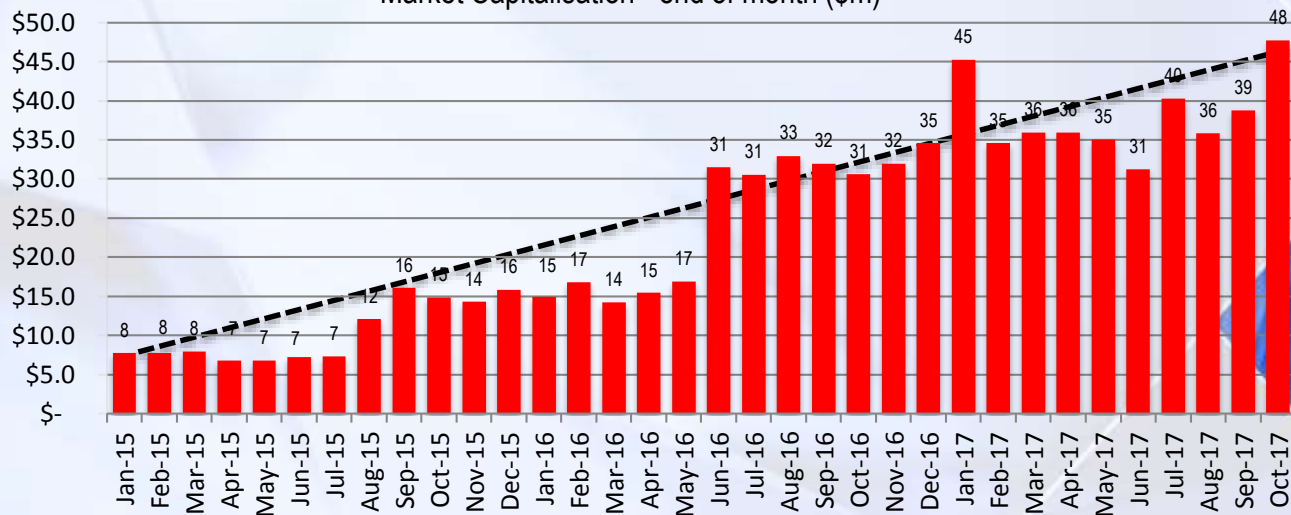


**Altech Chemicals**  
Limited

- All consultants report completed
- Expert opinion report 9 Nov 2017
- IMA ECA approval meeting 14 Dec 2017

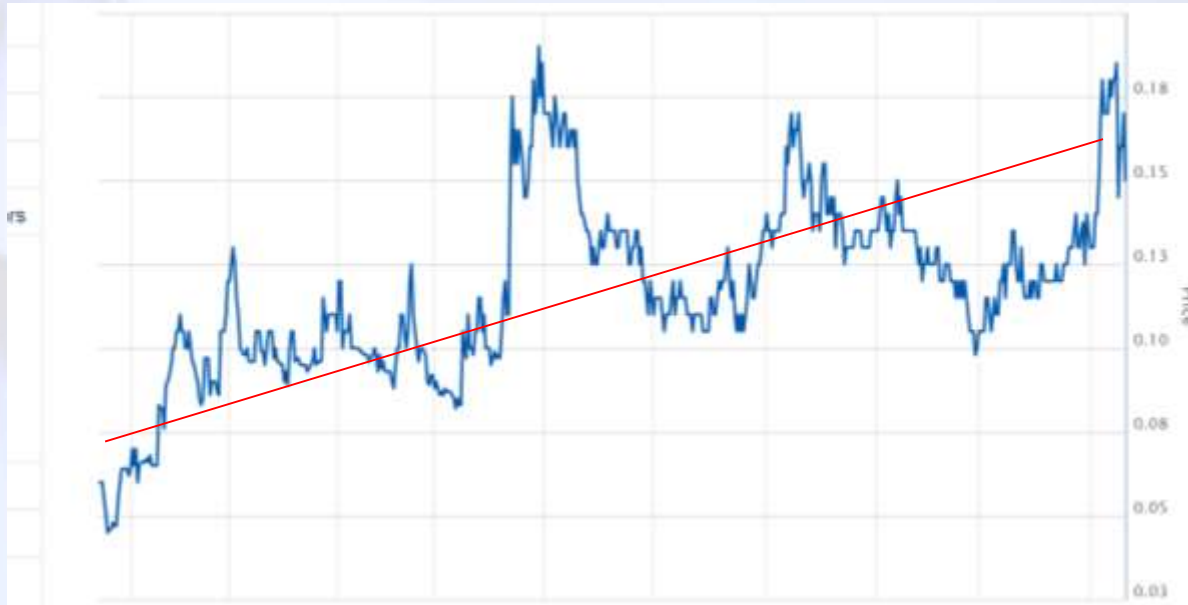
**Target  
Final ECA  
Approval**

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



**Altech  
growth  
performance**

- **Steady market cap growth**
- **Ave trade value \$2k/day to \$50k/day**
- **640 shareholders to 1,850 shareholders**



## Altech 3 Year Share Price Trend

- 300% growth in share price in 3 years
- Still early in valuation stage



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



**Thank you**



### **Forward-looking Statements**

The Company reports that the ECA application process is set for end 2017 and there is no certainty that the export credit and debt finance will be approved. The Company makes no representation or warranties whatsoever as to the outcome of the ECA approval process

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.

### **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](http://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.