

**Altech Chemicals Limited (ASX:ATC)**

## **Low Emission & Technology Mineral Conference**

**Iggy Tan  
Managing Director**



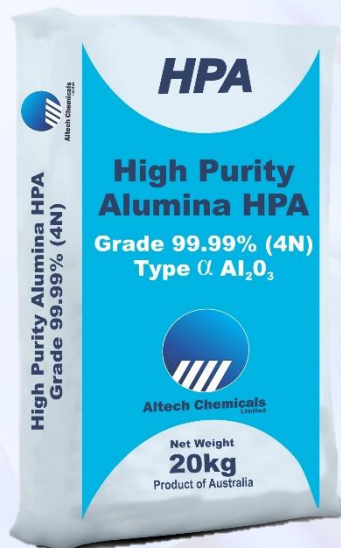
**Altech Chemicals**  
Limited





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**To be a world leading producer of  
high purity alumina (HPA)**



**Our Vision**







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- **Sapphire & Ruby**
- **Natural form of high purity alumina (HPA)**
- **Formed by mother nature like diamonds**
- **Colour from impurities**
- **Nearly as hard as diamond (Moh 9)**

**Sapphire  
Gemstone**





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

**What is HPA?**



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



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



**High Purity  
Alumina**  
HPA 99.99% (4N)  
**\$23,000 per t**



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

**Our Target Business**

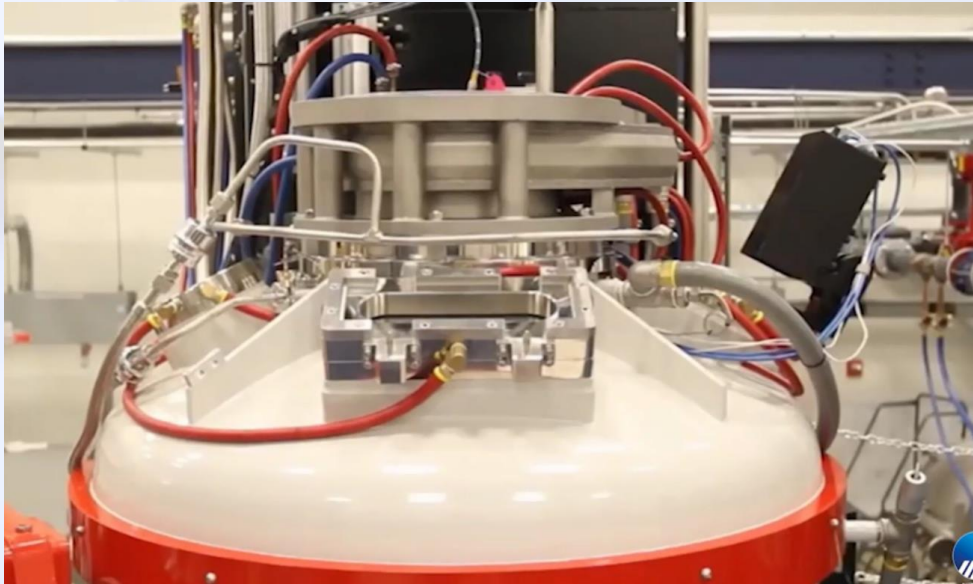
HPA in Sapphire Crystal Glass

HPA substrate for LEDs

**High Price  
for Purity**



# Sapphire Production



HPA Furnance



Sapphire crystal boule

# Sapphire Wafer Production

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Sapphire wafer



Sapphire glass screen

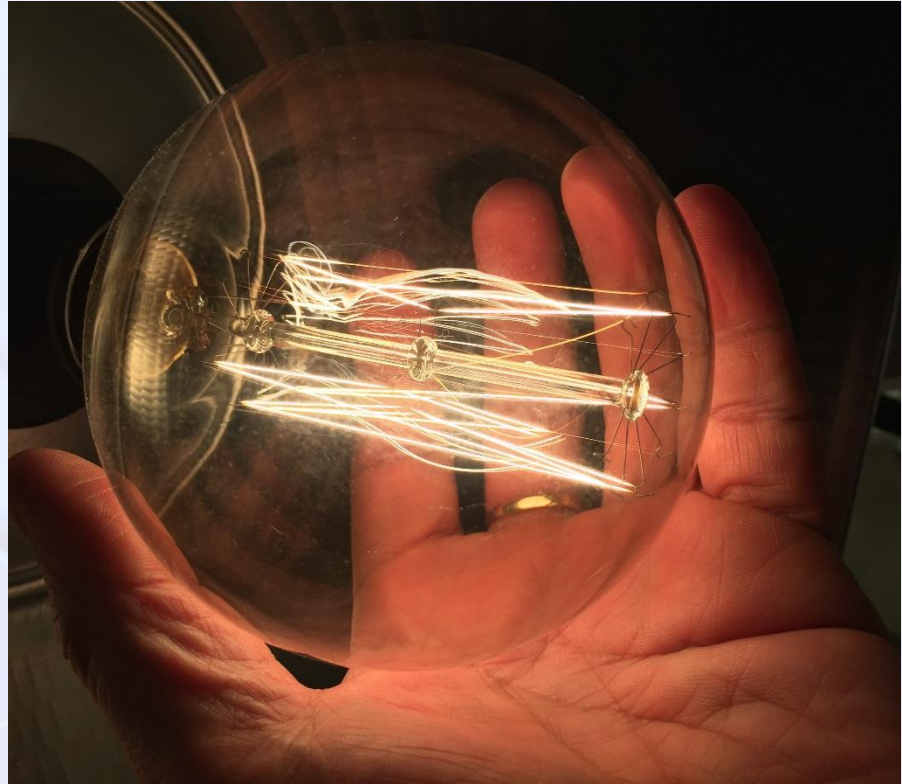


# LEDs lights of the future

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Conventional LEDs



New LED products



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### High Purity Alumina Applications

LEDs

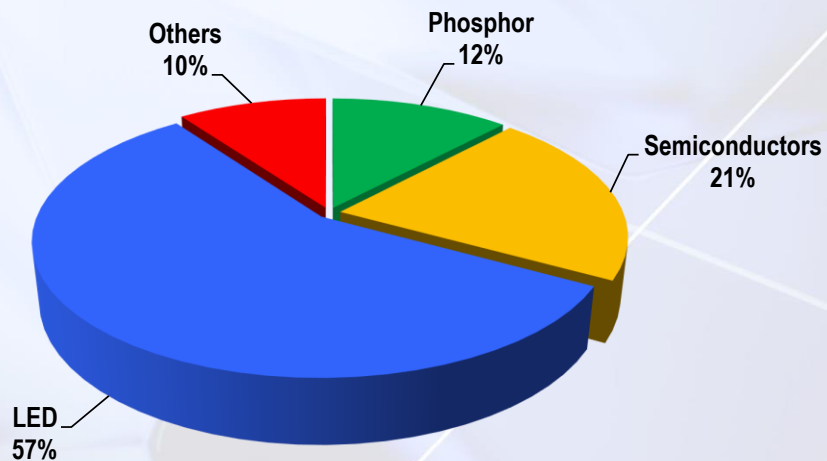
Semi  
conductors

Phosphor  
Based  
Applications

Other  
Applications

**Uses of HPA**  
**99.99% 4N**

Smartphone and  
Lithium batteries  
are new markets



- 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%
- Driven by LED growth & Lithium batteries
- Entering a fast growing market

Source: Persistence Research "High Purity  
Alumina Market – Global Industry Analysis and  
Forecast 2016-2014



# Demand for HPA

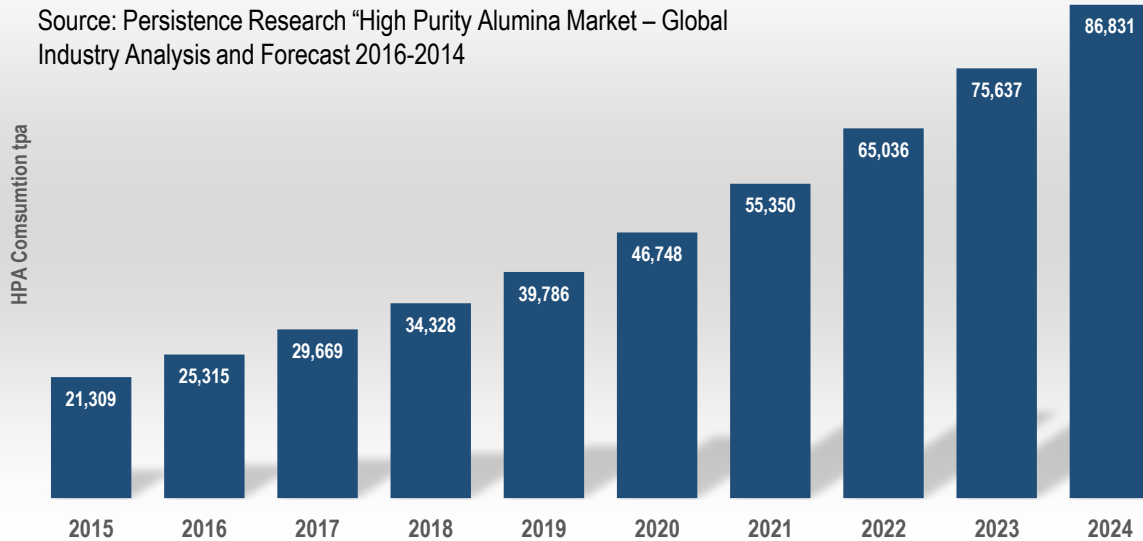




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## Global High Purity Alumina Forecast 2015 -2024

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



**Demand  
for HPA**

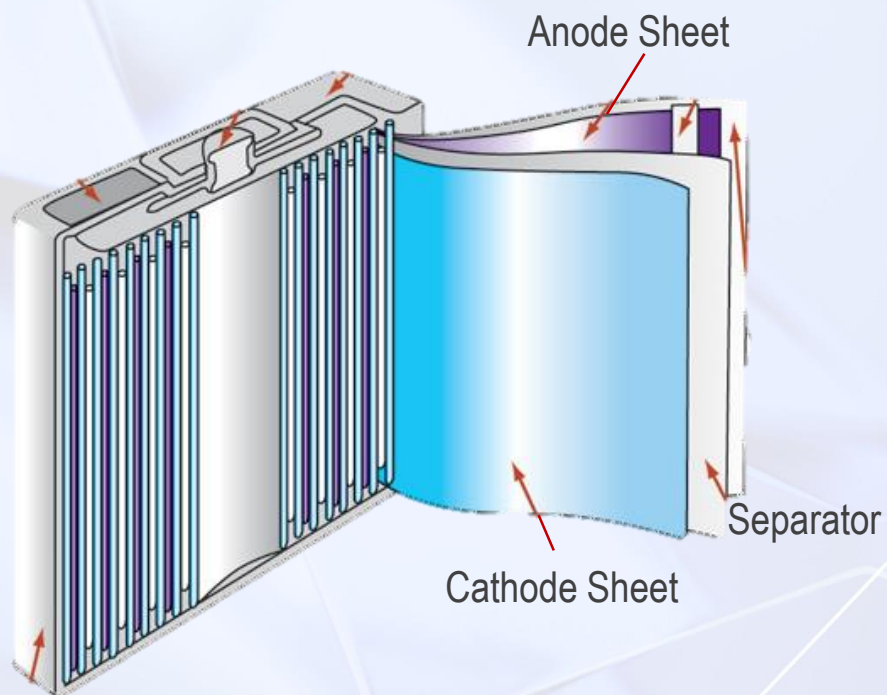
*Global LED lamps forecast - 864 million in 2015 to 4.1 billion by 2024*

*Source: 'LED Lighting: Global Outlook'*



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# Lithium Battery Separator



**HPA used in lithium batteries**



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# HPA Separator Forecast

## GLOBAL SEPARATOR HIGH PURITY ALUMINA DEMAND

99.99% HPA Used in Lithium Battery Separators

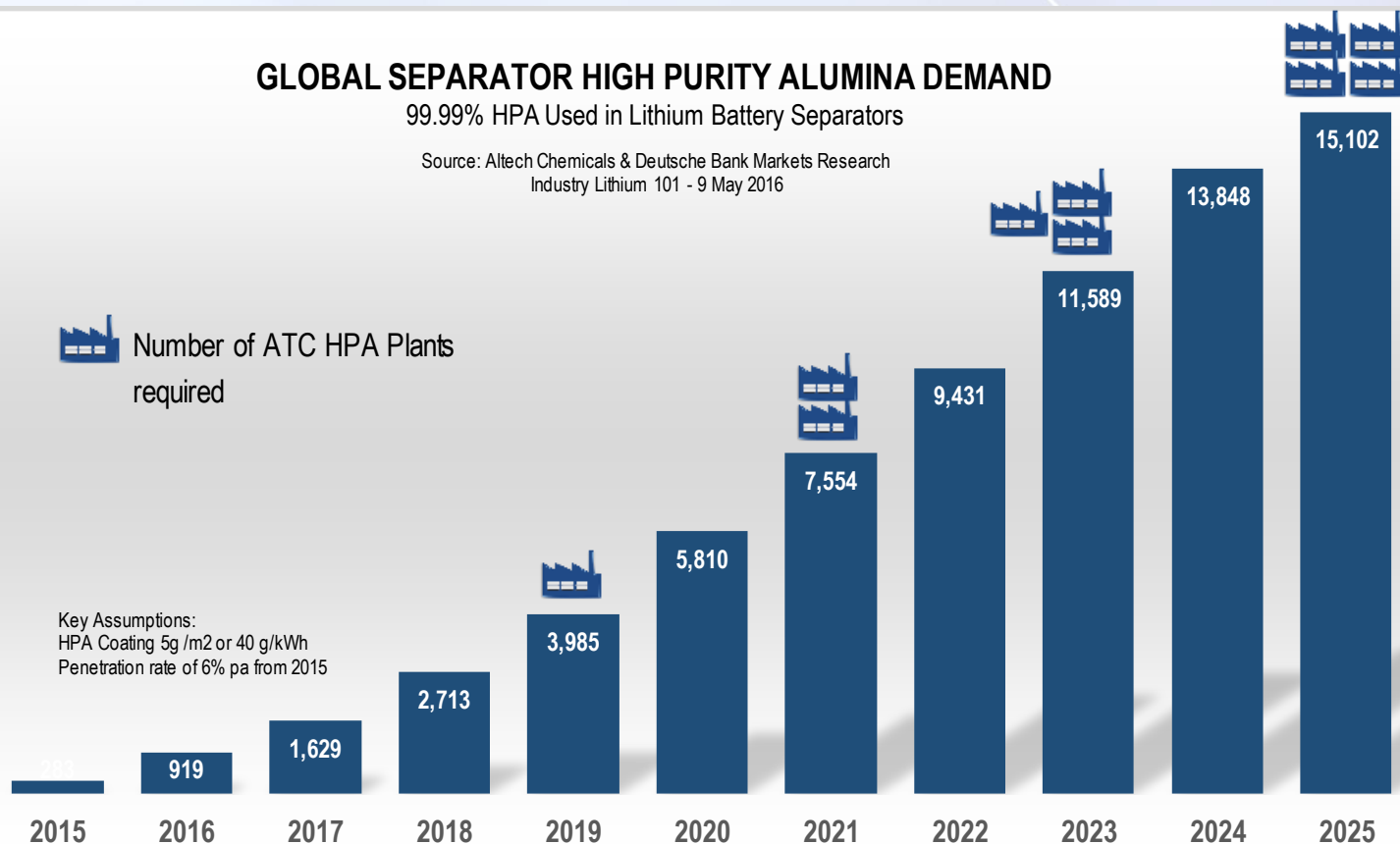
Source: Altech Chemicals & Deutsche Bank Markets Research  
Industry Lithium 101 - 9 May 2016

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







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- High end Vertu TI with sapphire crystal screen
- Rumour iPhone 8 will be sapphire

Vertu TI luxury mobile phone

## Huawei beats Apple to sapphire glass smartphone

By *Reuters Staff* on Sep 7, 2014 10:11 PM

Filed under *Mobility*

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### High-spec features for limited-edition Aspire.

Huawei Technologies has unveiled a slate of new devices meant to showcase the Chinese company's hardware technology, just days before Apple releases its highly anticipated iPhone 6 on 9 September.

Huawei, which began as a telecom equipment company in 1987, has rapidly

Smartphones  
Sapphire Crystal  
Screen

HUAWEI

# Sapphire Glass Scratch Test

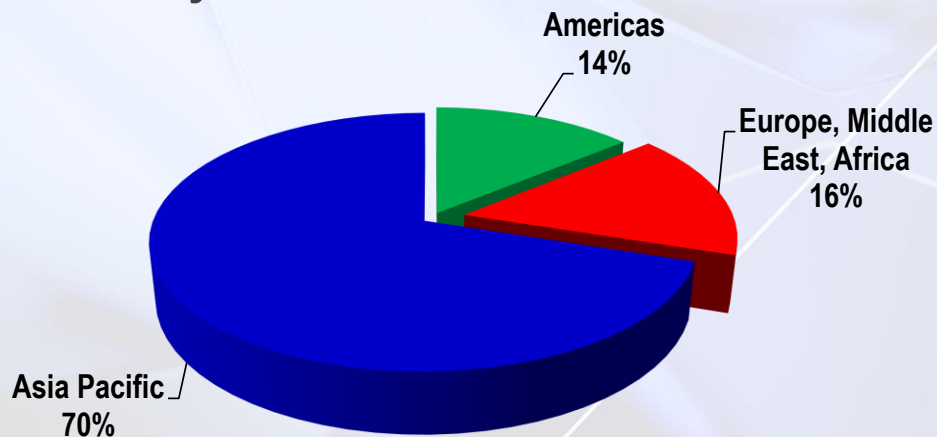






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- 70% of HPA demand - Asia Pacific region (APEC)
- Region for the world's manufacturing
- Altech's HPA plant (Malaysia) well-positioned to service APEC region
- Transport, customer service, technical credibility



**HPA**  
**Geographic**  
**Demand**

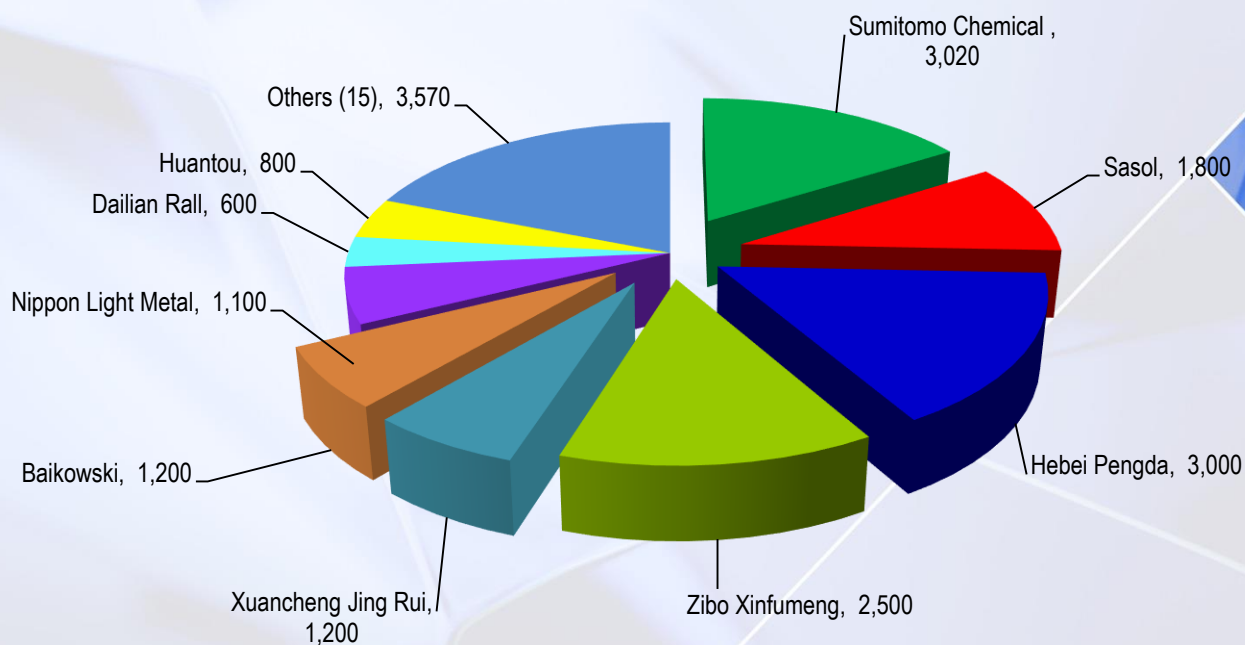






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- Six largest HPA producers
- 3 Chinese, 1 Japanese, 1 Sth African, 1 French



# Current HPA Producers



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# Altech's Differentiation

**Current HPA Producers**



Bauxite

**Alumina  
Refinery**



Smelter Grade Alumina 99.8%

**Alumina  
Smelter**



Aluminium Metal

**US\$3,000 per tonne**

**Aluminium  
Dissolution**



99.99% HPA



Aluminous Clay

**ALTECH HPA PLANT**

**One Single Process Step**



99.99% HPA



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- Processed by mother nature
- Very low Iron (Fe) due to weathering
- Silica is non reactive – easily removed

	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

Typical Mean Analysis

Typical bauxite deposit

Altech aluminous clay deposit

**Low-impurity  
Aluminous Clay  
Feedstock**





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- **Altech owns 100% of deposit in W Aust**
- **Low environmental impact**
- **12 Mt JORC Resource**
- **> 250 year mine life**
- **130kms from Fremantle Port**
- **Mining lease granted**

## **Meckering Kaolin Deposit**

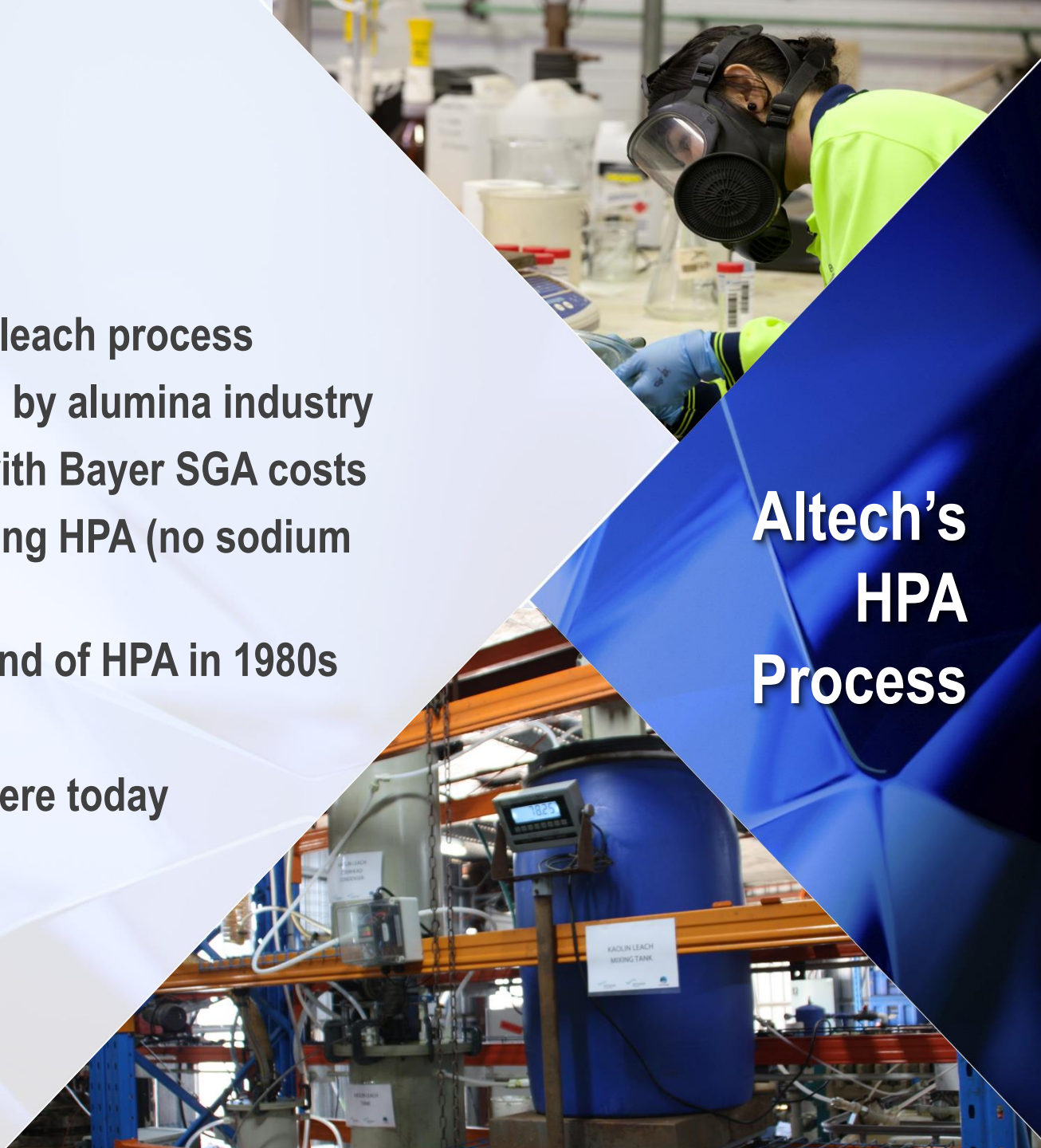




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- Use a standard HCl leach process
- Developed in 1980's by alumina industry
- Couldn't compete with Bayer SGA costs
- But great at producing HPA (no sodium ions)
- However little demand of HPA in 1980s
- Demand of HPA is here today

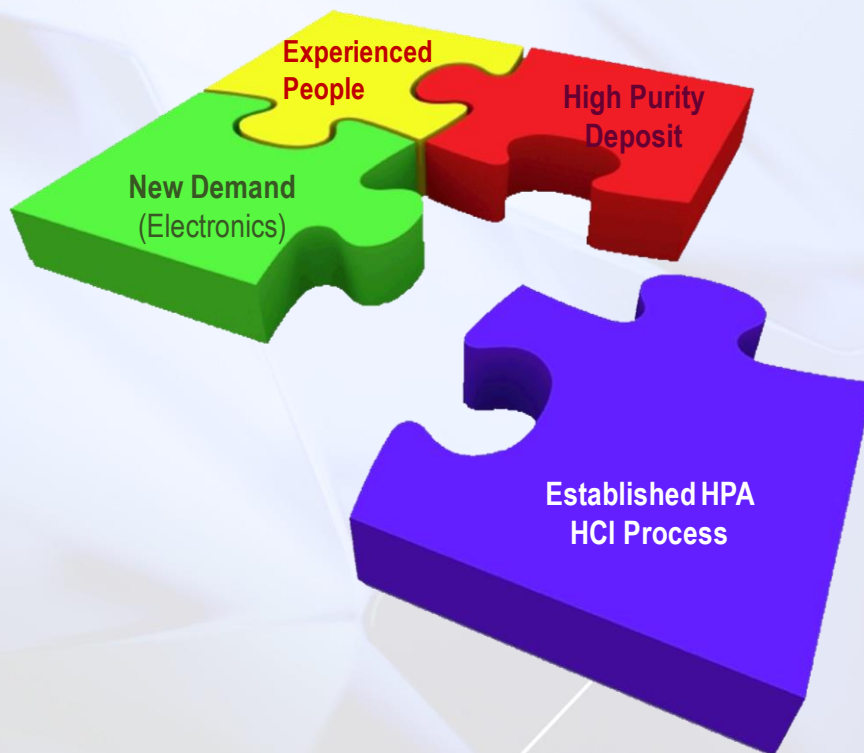
## Altech's HPA Process





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



**Altech  
Business  
Strategy**

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





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- Started work in early 2011
- Many studies and testwork programs
- No issues about producing 99.99% HPA
- Supporting lab pilot plant test work
- Off the shelf plant and equipment
- Bankable Feasibility Study completed

**Development  
Program  
To Date**





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- Lower quartile costs
- Kaolin feedstock shipped from WA
- Chemical industrial park
- Sea container ports
- Site secured
- Malaysian government incentives

**HPA Site  
Location  
Johor**

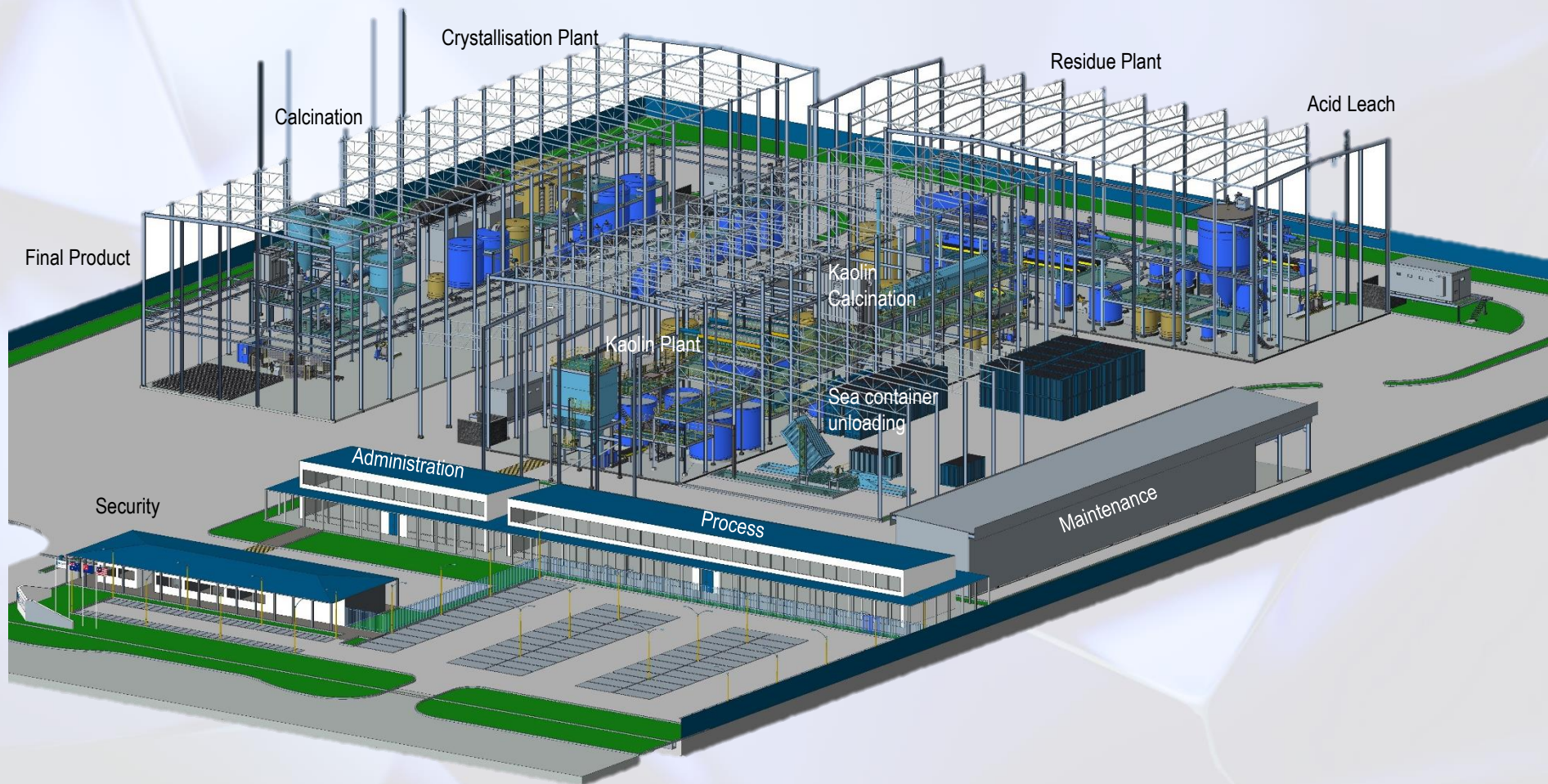






**Altech Chemicals**  
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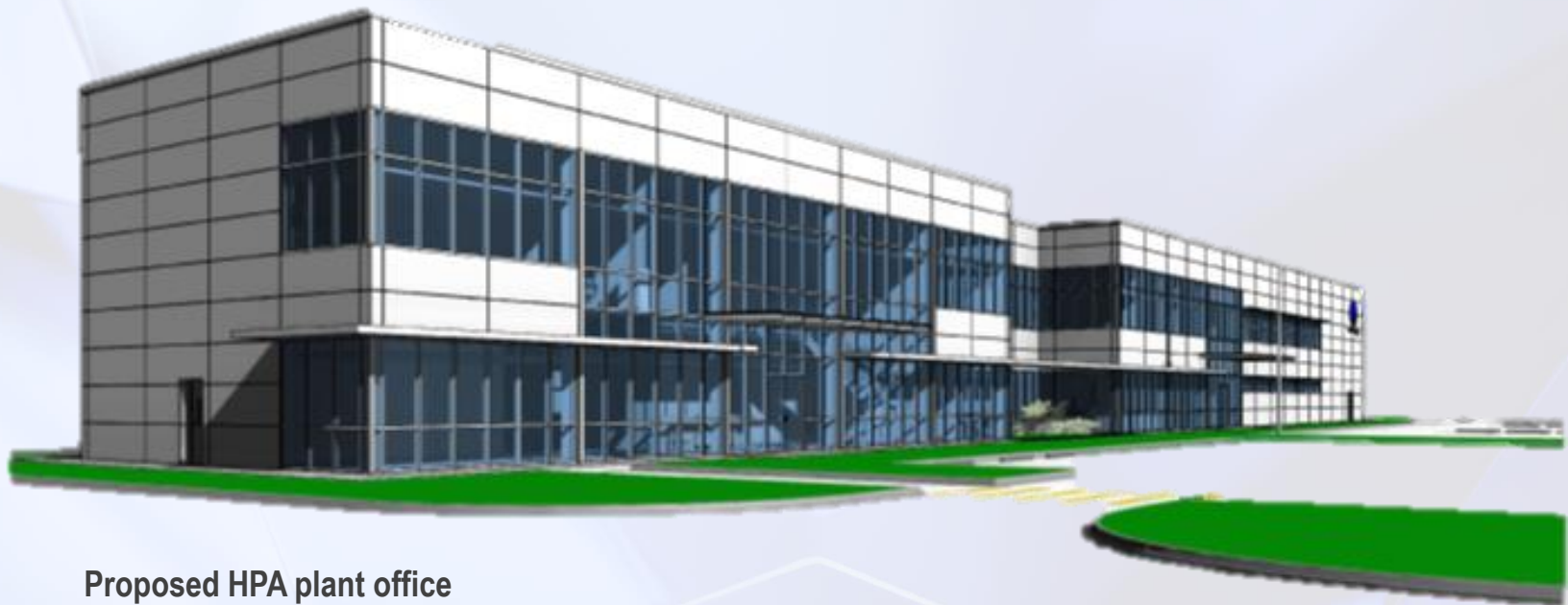
# Altech's HPA Plant - Malaysia





# Altech's HPA Plant - Malaysia

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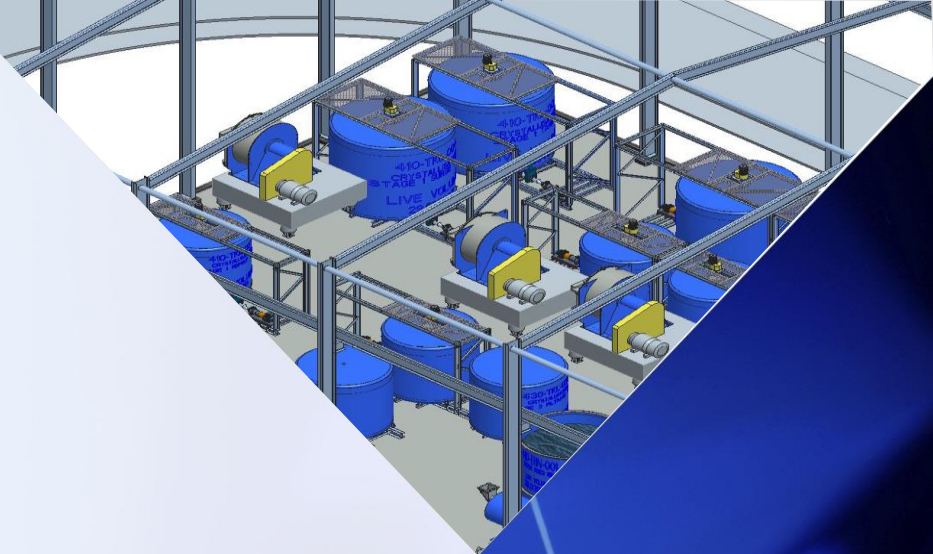


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- Capital cost estimate US\$78.7m
- Payback period 3.7 years
- Pre-tax NPV<sub>9</sub> of US\$357.5m
- Highly attractive IRR of 33.3%
- Operating cost of US\$9,070/t
- Sale price of US\$23,000/t
- Margin of US\$13,930/t
- EBITDA US\$55.7m pa

*Last updated March 2016*

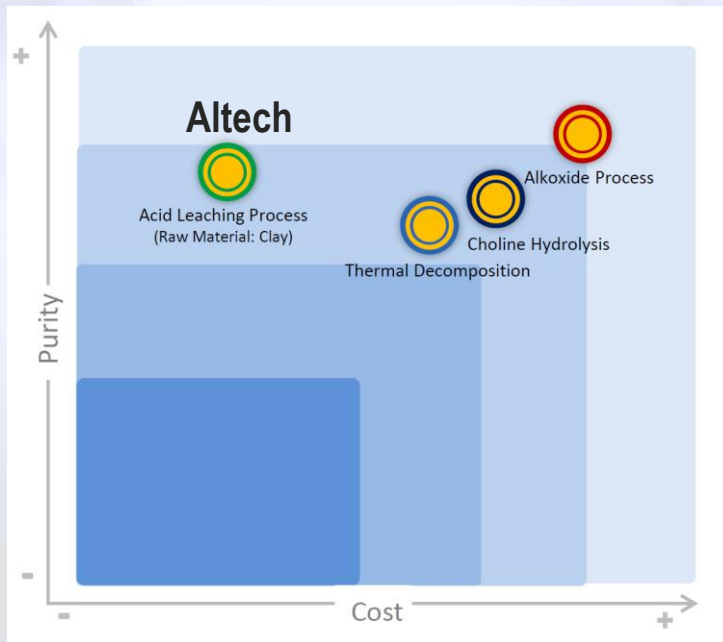
**Highly  
Attractive  
BFS**





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- Breakaway - competitors US\$14-17,000 /t
  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 Research "High Purity  
Alumina Market – Global Industry Analysis and  
Forecast 2016-2014





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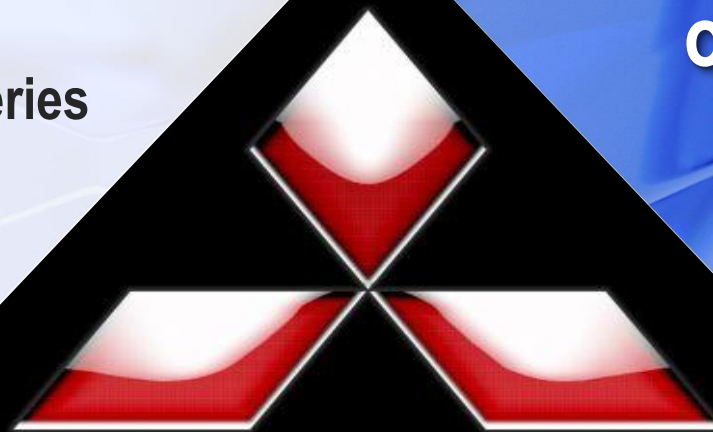
- Off take sales with Mitsubishi
- First ten years of HPA operations
- Secures sales for 100% of 4,000tpa HPA production
- Exclusive global distributor
- Experienced with HPA
- Strategic priority – Lithium batteries

Contract Year	Forecast Production	Contracted Sales
Year 1	2,700t	2,700t
Year 2	3,000t	3,000t
Year 3	3,400t	3,400t
Year 4	3,800t	3,800t
Year 5	4,000t	4,000t

Contract Year	Forecast Production	Contracted Sales
Year 6	4,000t	4,000t
Year 7	4,000t	4,000t
Year 8	4,000t	4,000t
Year 9	4,000t	4,000t
Year 10	4,000t	4,000t



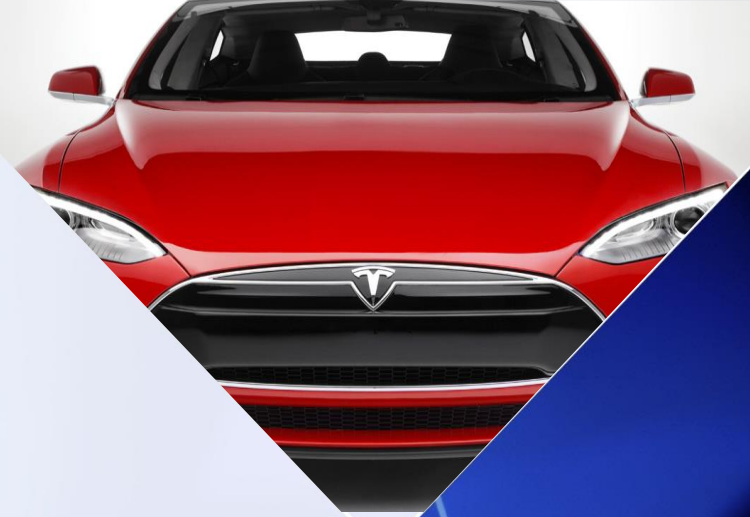
**Mitsubishi  
signs full  
off take**



**mitsubishi**



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- HPA used in lithium battery separators
- Strong growth in large format batteries
- Altech targeting 50% sales in Japan
- Japan price of 4N HPA – US\$30,000 /t
- ATC BFS long term price used – US\$23,000/t
- NPV would be US\$ 597 million, IRR 47%
- Prefer to use conservative price
- Rumour iphone 8 is sapphire glass

**HPA  
Market  
Update**





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- Debt funding with KfW IPEX Bank
- 60% of plant – German suppliers
- Target of US\$70m
- Export Credit cover of \$60m
- Target sole lender – KfW IPEX Bank
- M+W Group as general contractor

**We are at the  
funding  
stage**



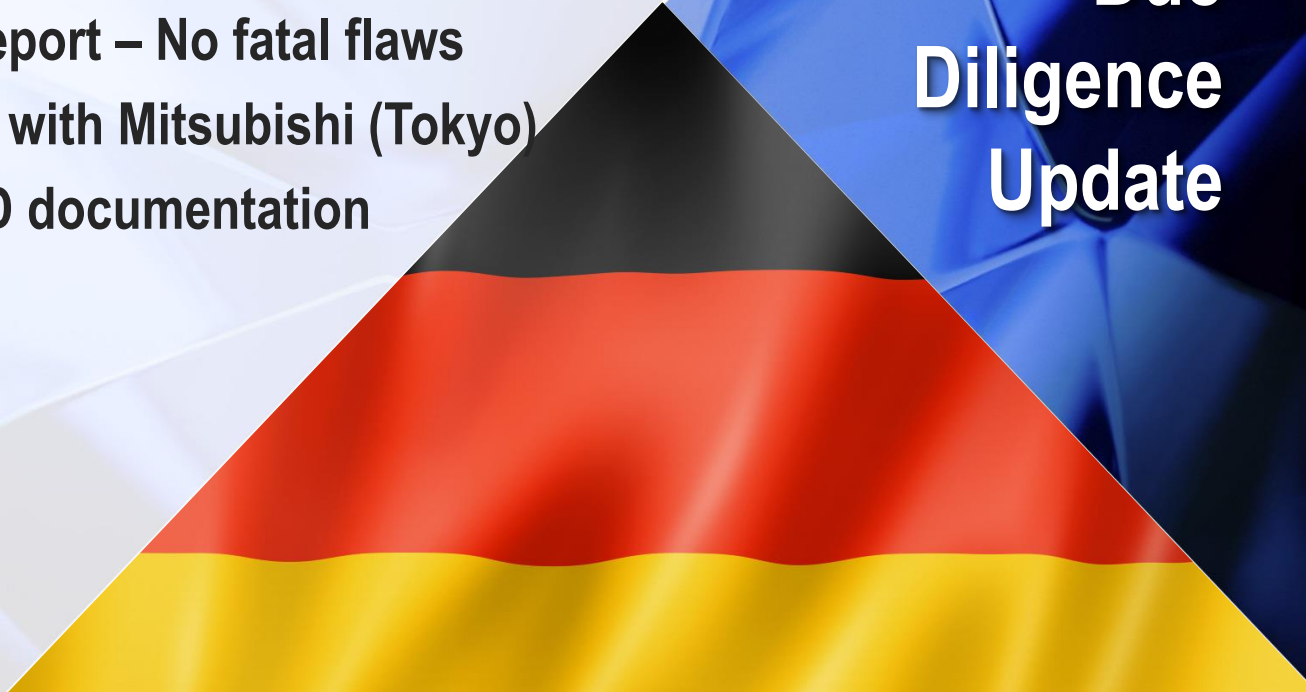




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- Independent DD consultants appointed
- Technical, legal and market consultants
- Thorough DD including site visits
- Review of lab pilot plant operation
- Preliminary DD report – No fatal flaws
- KFW DD meeting with Mitsubishi (Tokyo)
- Preparation of DD documentation

**Due  
Diligence  
Update**





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- Debt funding term sheet Q1 2017
- Project equity Q2 2017
- Site works commencing Q2 2017
- 18 months construction
- First product due early 2019

**Timeframe to  
market**





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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.

### **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 of 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.