



**Breakaway
Research**

December 2014

Grant Craighead | Research Manager
gcraighead@breakawayinvestmentgroup.com

Mark Gordon | Senior Research Analyst
mgordon@breakawayresearch.com

Company Information (pre-rights)

ASX Code	ATC
Share Price	A\$0.094
Ordinary Shares	107.76m
Options - in the money	0.00m
Options – out of the money	34.09m
Performance Rights	15.39m
Market Cap (Diluted for in money options)	A\$10.13m
Cash (20 November 2014)	A\$1.30m
Notional cash on in money option conversion	A\$0.00m
Total Debt	A\$0m
Enterprise Value - Diluted	A\$8.83m

Directors and Management

Non-Exec Chairman	Luke Atkins
Managing Director	Iggy Tan
Non-Exec Director.	Dan Tenardi
Non-Exec Director	Peter Bailey
Company Secretary	Shane Volk

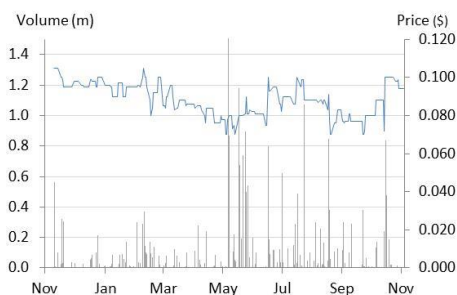
Company Details

Address	3 Bay Road Claremont, WA 6010
Phone	+618 9389 5557
Web	Altechchemicals.com

Top Shareholders (pre-rights)

Lake McLeod Gypsum Pty Ltd	22.18%
Mr. Dan Tenardi	6.50%
Mr Paul Sharbanee	4.48%
Australian Mineral Investment	3.48%
Eagle River Holdings Pty Ltd	2.69%
Top 20	61.3%
Board and Management	13.8%

1 Year Price Chart



Source: IRESS

Altech Chemicals (ATC)

Potential Game Changer in the HPA Space

Recommendation: Speculative BUY
Midpoint Valuation of \$0.25/share

Key Points

- **Ideally positioned to enter the rapidly expanding high purity alumina (“HPA”) market which is expected to grow at ~27% CAGR over the next 4 years to around 48,000tpa**
- **Low cost acid leach process developed from well understood technology to treat high purity aluminous clay feedstock**
- **Operating costs potentially up to 40% lower than current average industry cost, placing Altech as a first quartile producer**
- **Feedstock source at Meckering in WA owned 100% by Altech**
- **Proposed plant operations in southern Malaysia – low operating and capital cost environment**
- **Board and Management with broad technical and financial experience in the alumina and chemicals industries, and significant holdings in the Company**
- **Current 1 for 4 rights issue at 10c – closes December 15, 2014**
- **Base case post rights issue valuation range of \$0.13 to \$0.36/share, this is a risked valuation to reflect project stage**

Following a change of management and name, Altech Chemicals (previously Australian Minerals and Mining Group) has recently commenced a BFS on its 4,000tpa HPA project. Work over recent years has developed a patented, low cost acid leach process that has produced HPA of the requisite quality.

As a result of the recent Integrated Plant Study (“IPS”) Altech has published estimated operating costs in the order of \$8,600/tonne of 99.99% purity HPA for a small scale plant, which is significantly lower than our estimated current industry average costs of ~US\$14,000-17,500/tonne for the equivalent product, and could be a potential game changer for the industry.

Our view is that share price catalysts will be material progress on the BFS and optimisation testwork, and for the valuation to increase as the HPA project is advanced and de-risked.

Company Overview

Altech Chemicals (ASX: ATC) is an ASX-listed mineral and chemical processing company concentrating on the development of an HPA production operation, to enter into what is forecast as a rapidly growing market driven largely by the increased demand from the electronics industries.

Altech owns significant aluminous clay resources in Western Australia, which it has demonstrated is suitable feedstock for the proposed process. Plans are to mine and beneficiate clays at its 100% owned Meckering deposit, some 130km east of Perth, and then ship the material for processing at the proposed plant at the Tanjung Langsat Industrial Complex (“TLIC”) in Johor Bahru, in southern Malaysia.



Investment Thesis

Targeting a Growing Technology Market

Targeting the growing HPA market, expected to more than double to 48,000tpa by 2018

Altech Chemicals Ltd (“Altech” or “the Company”) is targeting the lucrative HPA market, which is expected to grow strongly over the next few years on the back of technology applications (refer to the “HPA 101” section at the end of this report). The current market, estimated at ~19,000tpa of HPA, has been forecast to more than double over the next few years to over 48,000tpa to supply sapphire glass and other products to the strongly growing LED and electronic industries.

The Company is currently working on a bankable feasibility study (“BFS”), which it expects to complete in Q3, 2015.

Potential Low Cost Proprietary Process

Altech has developed a potentially low cost acid leach process to produce HPA from its high purity clay feedstock

In association with TSW Analytical Pty Ltd (“TSW”) and Simulus Engineering Pty Ltd (“Simulus”), Altech has developed a potentially low cost acid leach processing technology to convert aluminous clays to HPA. The process has successfully produced the targeted 99.99% 4N HPA at a bench testwork scale, with results of the IPS indicating costs in the order of \$8,600/tonne for a small scale plant. This compares with current industry average costs in the order of \$30,000/tonne over all grades of HPA, and our estimates of costs in the order of US\$14-\$17.50/kg for the Company’s target product of 4N HPA.

The process has inert waste and by-products

Another aspect of the process against those used by most other HPA producers is the lack of toxic waste by-products – the main by-product is silica (~10,000tpa), and by virtue of the low impurity feedstock no other waste products are expected to be produced.

The feedstock chosen is aluminous clay, expected to be significantly cheaper than feedstocks such as aluminium and aluminium hydroxide used by the majority of other current HPA manufacturers, which requires more complex and costly processing.

Large, High Purity Feedstock Resources

The Company holds large aluminous clay resources, more than sufficient to supply the proposed operation for the foreseeable future

Altech has large deposits of aluminous clay (also termed kaolin) in Western Australia, with the one currently earmarked for production being located at Meckering, approximately 130km east of Perth. The 100% held 65Mt JORC-compliant indicated and inferred clay resource at Meckering has more than ample resources to supply the expected ~40,000tpa ROM clay required for the proposed 4,000tpa HPA facility in Malaysia.

Meckering Location



Source: Thundelarra



A LOI has been signed to acquire a plot in the TLIC in southern Malaysia

Malaysia Chosen for Plant Site

Altech has submitted a Letter of Intent (“LOI”) to acquire a 4 hectare plot of land within the TLIC in Johor Bahru, Malaysia. This decision has been taken largely due to anticipated lower operating (~40% lower) and capital costs (~50-60% lower) than those expected in Australia. The TLIC is well serviced by a dedicated port and established infrastructure.

A BFS has recently commenced

Bankable Feasibility Study Underway

A BFS on the proposed 4,000tpa operation commenced in September 2014, and is expected to be completed in Q3, 2015. A team of highly skilled and experienced consultants has been engaged for the study, with funds from the current rights issue to be used to fund the BFS through to completion.

The Company has an experienced and committed board and management, with significant shareholdings

Experienced and Committed Board and Management

Collectively the board and management have extensive technical and financial/corporate experience in the alumina and chemicals sector. These include managing director Mr. Iggy Tan, formerly MD of Galaxy Resources, and non-executive directors Messrs. Luke Atkins, Peter Bailey and Dan Tenardi, who have both had extensive alumina and chemical industry experience.

In addition directors hold significant shareholdings, and thus will be motivated to produce strong returns for shareholders.

A 1 for 4 rights issue to raise ~\$2.69m has been announced

Rights Issue

A pro-rata non-renounceable, 1 for 4 rights issue at 10c was recently announced by the Company, with each new share subscribed for including one free attaching 10c listed option with an expiry date of December 15, 2015. Proceeds from the right issue (up to \$2.69 million), which closes on December 15, 2014, will be used to complete the BFS and for working capital.

Altech Post-Rights Pro-forma Structure

Item	Pre Rights	Post Rights (100% take-up)
Cash	\$1.30m	\$3.95m
Shares on Issue	107,758,002	134,698,128
Quoted Options	21,465,000	48,404,626
Unquoted Options	12,633,333	12,633,333
Performance Rights	15,384,000	15,384,000

Source: Altech

We have completed an indicative valuation with a midpoint of \$0.25/share post rights

Valuation

We have carried out an indicative valuation of Altech, with a risked undiluted price range (post rights issue) of \$0.13 to \$0.36 per share, with a midpoint of \$0.25/share, a 150% premium to the rights issue price. We would expect the HPA valuation to increase as the project is progressively de-risked.

Indicative Valuation – Altech Chemicals Post Rights Issue

Item	Risk Multiple	Total Value			Per Share Undiluted			
		Low	Mid	High	Shares	Low	Mid	High
HPA	7.5%	\$10.96	\$26.49	\$42.03	134.7m	\$0.081	\$0.197	\$0.312
SW Titanium	100%	\$2.00	\$2.00	\$2.00	134.7m	\$0.015	\$0.015	\$0.015
Constance Range	100%	\$0.00	\$0.00	\$0.00	134.7m	\$0.000	\$0.000	\$0.000
Donnelly Graphite	100%	\$1.00	\$1.00	\$1.00	134.7m	\$0.007	\$0.007	\$0.007
Cash	100%	\$3.90	\$3.90	\$3.90	134.7m	\$0.029	\$0.029	\$0.029
Total	N/A	\$17.86	\$33.39	\$48.93	134.7m	\$0.133	\$0.248	\$0.363



Peer Comparison

There are no direct peers listed on the ASX, and the only other globally listed peer is Orbite Aluminae Inc. (“Orbite”), a TSX listed company developing a 1,050tpa 4N and 5N HPA plant in Cap-Chat, Quebec, Canada, on the site of an alumina pilot plant operated until 2012. Like Altech, the process uses an acid leach process rather than the caustic leach Bayer Process. The majority of the world’s HPA is currently produced in China, or else by major conglomerates including Sumitomo and Sasol.

Orbite is currently constructing its HPA plant, after a number of delays due to technical issues and a change in business plan amongst others. Orbite expects to commence production in the first quarter of 2015, and then increase the plant to 5tpd, with expanded production planned to commence in early 2016.

Orbite has published a capex figure of C\$106 million for the HPA plant; however this differs from the proposed Altech plant due to the reason that the Orbite feedstock contains a number of impurities, including iron, and thus the plant requires additional circuits to extract those impurities. The feedstock source is its 100% owned Grande-Vallee aluminous clay deposit. There are no published figures for Orbite’s expected operating costs – a NI43-101 compliant Preliminary Economic Assessment (“PEA”) completed in 2011 was based on a 565,000tpa smelter grade alumina (“SGA”) plant; no PEA has been published for the HPA operation.

Orbite has a current market capitalisation in the order of C\$110 million, and an enterprise value of C\$126 million, with a current share price of C\$0.36.

Risks

Resource Risk

We see only minor resource risk – the previously defined aluminous clay resources are more than adequate to meet the Company’s requirements for the foreseeable future.

Technology Risk

We see this as being the main risk in the project. Although most components of the proposed flow sheet are well understood and proven processes, and bench scale testwork has produced 4N HPA, there is a significant jump to take this to a full blown commercial operation. However the Company will be continuing pilot-scale optimisation testwork during the ongoing BFS.

Market Risk

Available forecasts suggest an extremely strong market for HPA, with expected shortfalls requiring new capacity to come on-stream. However current supply is concentrated amongst a relatively small number of powerful players, and an important issue is how they react to the threat of a potentially low cost newcomer that is likely to undercut their higher cost operations. Although on the face of it there will be room for all, there is always the risk of “cartel” style behaviour by larger players to drive out newcomers.

Permitting Risk

Permitting is a perennial consideration in any resources and industrial development. This is mitigated at both potential sites – Western Australia is a mining friendly jurisdiction, and the small scale of the proposed Meckering clay mine should be a positive in the approvals process. The Company also has a number of other suitable aluminous clay resources.

The proposed location of the HPA plant in an established industrial park which is host to a number of chemical industries should be positive for the Malaysian permitting process. This is also mitigated by the generally benign nature of reagents, products and waste.

The only peer is Orbite Aluminae, a TSX listed company that plans to produce up to ~2,000tpa of HPA in Canada

We see technology and markets as being the key risks for Altech



Project and Activities Review

Introduction

Altech's strategy is to enter the potentially lucrative HPA sector

Altech's strategy is to enter the potentially lucrative HPA sector of the electronic chemicals sector, through the chemical processing of aluminous clay material that the Company holds at its Meckering Deposit in Western Australia.

Following the appointment of Mr. Iggy Tan as MD, the Company has commenced a BFS

Following the recent appointment of Mr. Iggy Tan as managing director, the Company has commenced a BFS based on the production of 4,000tpa of HPA, with the BFS planned to be completed in Q3, 2015.

Work to date has included successful bench scale and optimisation testwork

Work to date has included successful bench scale process testwork, ongoing pilot scale optimisation process testwork and an IPS based on a theoretical 700tpa demonstration operation to elucidate indicative operating costs and operational parameters. With the recent management changes the Company has elected to skip constructing a demonstration plant, and move directly to a full scale commercial operation.

Plans are to mine feedstock in Western Australia, and ship it to Malaysia for processing

The HPA project includes:

- Mining of ~40,000tpa of aluminous clays at Meckering in Western Australia
- Simple upgrading on site, including crushing, drying and screening
- Transport of the screened process feed (21,000tpa) to Johor Bahru in southern Malaysia – approximately 3,000km shipping distance
- Production of 4,000tpa of HPA at a purpose built plant, using proprietary acid leach processing developed by Altech.

A LOI has recently been submitted to acquire an industrial plot in the TLIC in Johor Bahru

The Company has recently submitted an LOI to reserve a 4ha lot within the TLIC in Johor Bahru, the capital of Johor State. Malaysia has been chosen as it is close to end user markets, and has lower costs than those expected in Australia.

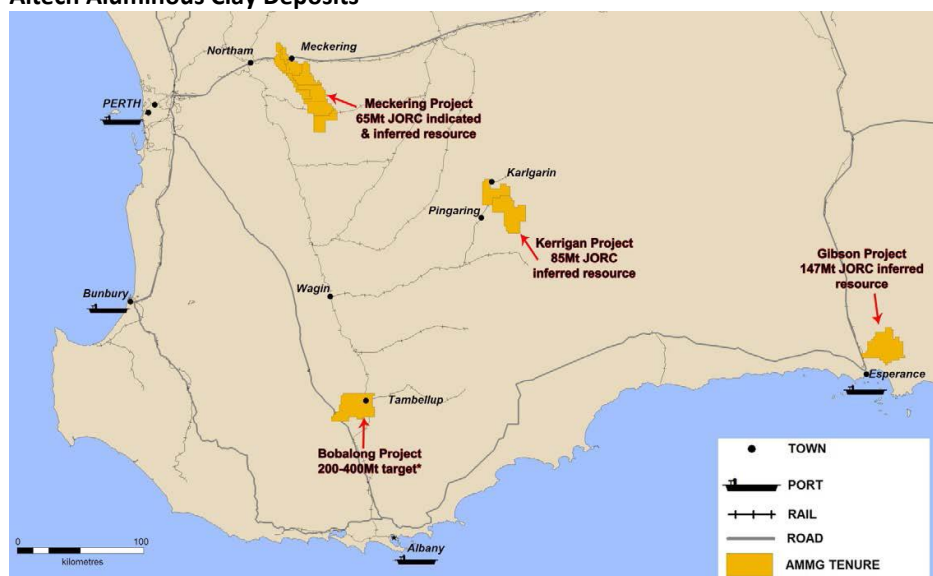
In addition to the HPA project Altech has interests in other projects – these are peripheral to the Company's strategy and will only be discussed briefly.

Aluminous Clay Resources

Location and Resources

Altech Aluminous Clay Deposits

The Company holds significant aluminous clay resources in Western Australia



Source: Altech



Altech holds three aluminous clay deposits in southern Western Australia, with total resources of 150Mt of aluminous clays, and an exploration target of 1.44 to 2.29Bt. These are located within one granted tenement and nine tenement applications.

Altech Aluminous Clay Resources¹

Project	Indicated (Mt)	Inferred (Mt)	Exploration Target (Mt)	Land Holding (km ²)
Meckering	16	48	~1,100-1,700	1,000
Kerrigan	-	85	~140-190	736
Bobalong	-	-	~200-400	568
Total	16	133	~1,440-2,290	2,304

Source: Altech

1: Amount of aluminous clay (39% Al₂O₃) in overall resource – does not include other minerals, including micas and quartz

Resources include 149Mt of aluminous clay

The Meckering deposit, situated on a granted EL, has been chosen as the preferred deposit

Meckering is located on freehold land with good infrastructure

Previous work at Meckering has included bulk sampling for kaolinite testwork

The Meckering clays have been formed by the long term weathering of granites

The overall 19% alumina grade can be upgraded to 30% by simple screening

When compared to other potential HPA feedstocks, Meckering contains low impurities

Given the relatively small annual production requirements, and also being located on granted E70/3923, Meckering, the most advanced of the projects, has been chosen as the preferred deposit for the HPA plant feed. Testwork has shown this to be low impurity material, comprised largely of kaolin and silica, with very low levels of impurities such as iron and titanium. The Company's other clay deposits are of a similar grade to Meckering.

Importantly, the Meckering deposit is located on freehold land close to infrastructure, including roads, rail, power and water, and is approximately 130km by road or rail from Perth. The Company is currently applying for a Mining Lease ("ML") over the deposit.

Previous Work

Previous work at Meckering has included exploration by CRA Exploration ("CRAE") in the 1980's and the calculation of the 64Mt JORC-compliant resource and mining of a bulk sample trial pit by Swan River Kaolin ("SRK") in 2005. SRK extracted 48 tonnes of raw kaolin for bulk sample processing in their Northam pilot plant.

Geology and Mineralisation

The aluminous clay at Meckering has been formed by the ancient natural weathering of underlying granites, and is comprised largely of silica/quartz (SiO₂) and kaolinite. Clays have been recognised to a depth of at least 42m.

The overall Meckering resource has an alumina (Al₂O₃) content of around 19%, with this being upgraded to ~30% Al₂O₃ through simple 0.5mm screening. The 30% Al₂O₃ feedstock has significantly lower impurities than other materials, as shown below.

Comparison of Bauxite and Clay Feedstocks

Oxide (%)	Darling Range Bauxite	Orbite Aluminae Feedstock	Altech Feedstock (after 0.5mm screen)
Al ₂ O ₃	34.5	22.77	30.5
SiO ₂	21.5	53.29	56.3
Fe ₂ O ₃	21.2	8.36	0.7
TiO ₂	2.00	0.98	0.7
K ₂ O	0.24	3.41	0.2
CaO	0.015	0.85	0.1
NaO	0.005	1.42	0.1
MgO	0.01	1.67	0.1
Loss on Ignition	18.1	7.25% ¹	11.3% ¹

Source: Altech

1: Breakaway estimate – not provided in company reports. Calculated assuming all Al₂O₃ is present in Kaolin



Pure kaolinite ($Al_2Si_2O_5(OH)_4$) comprises the following oxides:

- Alumina – Al_2O_3 – 39.5 weight percent
- Silica – $2SiO_2$ – 46.6 weight percent
- Water – $2H_2O$ – 13.9 weight percent

Our estimate is the screened HPA feedstock contains ~75% kaolin

The chemistry of the feedstock indicates that it is comprised of approximately 75-80% kaolinite and 20-25% free silica in the form of quartz. The low impurity content is a key advantage, with very little waste (other than the expected 10,000t of potentially saleable silica) being generated in the chemical treatment process, as well as the natural advantage by virtue of being easier to produce a high purity end product.

Mining and Beneficiation

The proposed operation will require the small scale mining of ~40,000tpa of free dig material

Altech’s plans will require the small scale mining of approximately 40,000tpa of aluminous clays, possibly on a campaign basis extracting two or three year’s feedstock at a time. Given the soft and friable nature of the material free dig mining will be used, and the operation could be carried out on a weekday shift basis with only a few operators.

ROM material will be crushed, dried and screened on site and then shipped to Malaysia

We would expect beneficiation to be carried out on site, to produce the ~21,000tpa (wet) of -0.5mm feedstock required to feed the proposed 4,000tpa HPA production. This will then be transported to Fremantle in “bulka bags” by road, and then shipped to the proposed Malaysian processing plant in Johor Bahru via the Tanjung Langsat sea container port.

Processing

The key to the project is the successful operation of the HPA processing

The key to Altech’s strategy is the successful processing of the clay feedstock to HPA using a process developed by Altech in conjunction with TSW and Simulus. Three patents have been applied for that cover the proposed processing route.

The process is broadly similar to that to be used by Orbite in Canada

The process is broadly similar to that being developed by Orbite, which is constructing a 3tpd HPA plant in Quebec, Canada. The acid leach method of extracting alumina from aluminous clays was originally developed in the early 1980’s as a possible smelter grade alumina (“SGA”) process, but couldn’t compete at that time with the Bayer Process for extracting alumina from bauxite on costs due to the low value of the SGA end product.

The Company plans to produce 99.99% (4N) purity HPA

The Company aims to produce what is known as 4N HPA, which has a purity of 99.99% alumina. Other products, which Altech is not targeting, include 5N HPA (99.999% purity) and 6N HPA (99.9999% purity) – the Company considers the risks and returns on additional investment to produce these higher purity products not worthwhile pursuing. In addition it will not target the lower value SGA or 3N HPA.

Alumina Products and Indicative Pricing



Source: Altech

4N HPA has been successfully produced at a bench scale

An acid leach, using HCl, rather than the toxic Bayer Process is to be used

Most of the HCl is recycled, hence cutting costs

Key steps include calcination, leaching, crystallisation of $AlCl_3$, and then calcination of the $AlCl_3$ to produce Al_2O_3

To date the Company has successfully produced 4N HPA in bench scale testwork, as announced to the market in May 2013. Pilot scale optimisation testwork is currently underway, although there are no plans to construct a demonstration plant.

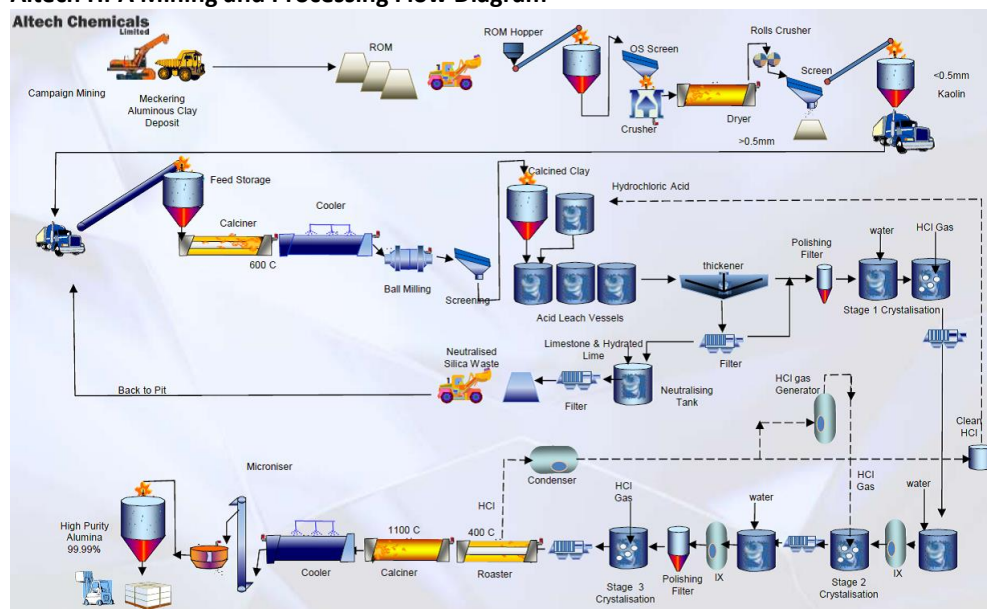
Hydrochloric acid is the main reagent for the proposed acid leach process. This is different to the Bayer Process which is commonly used to produce alumina from bauxite in the global aluminium industry. The Bayer Process uses sodium hydroxide as the main reagent, and produces waste products including potentially toxic "red mud", a highly basic material comprising largely iron oxides and other minerals including silica and titanium dioxide and which requires neutralisation.

Another key to the proposed process is that most of the hydrochloric acid is recycled, and the only waste products, due to the high quality nature of the feedstock, comprising of silica, which is inert and non-toxic.

The key steps of the process include:

- Calcination of the aluminous clay feedstock to produce meta-kaolinite
- Crushing and grinding of the calcine to $<300\mu m$
- Acid leaching using recovered HCl – this dissolves all oxides with the exception of silica, and produces a high concentration hydrated aluminium chloride ($AlCl_3$) solution
- Removal of the silica residue, which is neutralised and dried
- Crystallisation of $AlCl_3$ by sparging with HCl – increasing acidification promotes the crystallisation of aluminium chloride
- The $AlCl_3$ is filtered and washed to remove impurities – there are three washing steps involved in the purification process
- The purified $AlCl_3$ is then roasted and calcined to remove water and chlorine, and produce HPA.

Altech HPA Mining and Processing Flow Diagram



Source: Altech



Advantages of the Process

We can see a number of potential advantages to the Altech process, including:

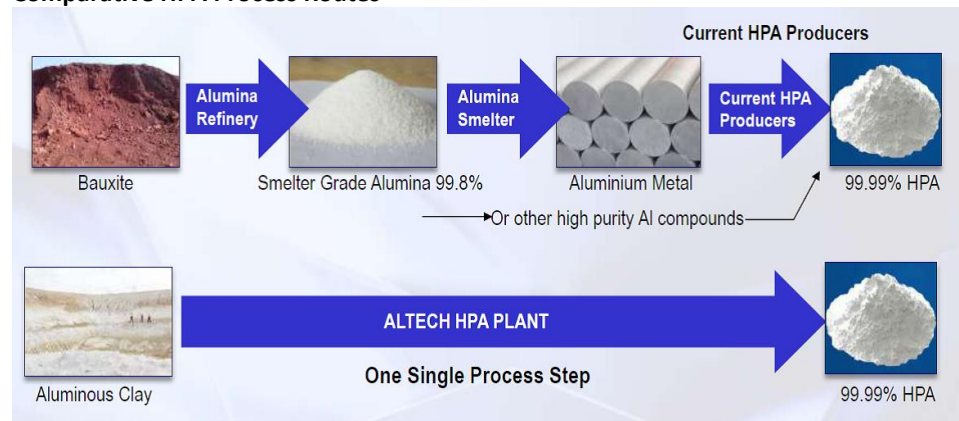
- Altech has published preliminary operating costs, based on a 700tpa pilot plant operation, in the order of \$8.60/kg, which is significantly lower than current operations (potentially making Altech a first quartile producer), due to low cost feedstock, lower power requirements, and recycling of acid which is the main agent used in the process.
- Our analysis indicates average operating costs for current 4N HPA producers are in the order of US\$14-\$17.50/kg, with gross margins of around 30%.
- Use of hydrochloric acid doesn't introduce potential contaminants (e.g. sodium as the case with the Bayer Process) into the process, and hence simplifies the process of producing 4N HPA.
- The waste product, silica, is benign and potentially marketable.

Potential process advantages include low cost compared to current producers, and a relatively benign waste product

Current producers use relatively high cost feedstock, predominantly aluminium metal to produce HPA. For example, Sumitomo synthesise aluminium alkoxide from aluminium metal and alcohol, which is then hydrolysed to form hydrated alumina. This is then calcined to form HPA.

Current producers use high cost feedstock, including aluminium, for their HPA production, and complex processing resulting in higher operating costs

Comparative HPA Process Routes



Source: Altech

Comparative HPA Process Feedstock Costs

Route	HPA Process Method	Feedstock Costs USD/t per 100% Al ₂ O ₃
1	Aluminium Metal	\$1,052 /t
2	Aluminum Hydroxide	\$570 /t
3	Altech Aluminous Clay	\$220 /t

Source: Altech

Proposed Johor State Plant Site

The TLIC, where Altech proposes to construct its processing plant, is located in Johor State in southern Malaysia, immediately across the Straits of Johor from Singapore, 40 minutes' drive from Singapore City. The Company has recently submitted a LOI for the reservation of the 4ha Lot PLO 127.

The TLIC covers 2,000ha (including a port), and has been designed to cater for light to heavy industry, including petrochemical, chemical, oil and gas and steel fabrication operators.



The TLIC is served by a dedicated port, and has all requisite infrastructure for light to heavy industry

TLIC Plant Location



Source: Altech

Altech has appointed local environmental consultant Daya Eco Techno Sdn. Bhd. to assist in applications for the necessary approvals for the construction and operation of the proposed plant.

Bankable Feasibility Study

The Company recently announced the team for the BFS, which is to largely concentrate on HPA processing options, optimisation and design of the full scale process plant. In addition associated work will include the application for a Mining Lease at Meckering.

The BFS team includes experienced industry consultants, with areas covered including mine design, environmental, geology and resources, chemical processing and analytical testwork.

Other Projects

The Company has a portfolio of other projects, including the following.

A JVA has been entered into with Midas Engineering over the South West Titanium Project, which has a JORC-compliant resource of 807Mt @ 3.7% HM

South West Titanium Project

The South West Titanium Project of approximately 150km² is located 120km SSW of Bunbury in SW Western Australia. The area has had a long history of exploration for mineral sands, and most recently in 2013 Altech delineated a resource of 807Mt @ 3.7% heavy minerals (“HM”).

Altech has entered into a joint venture agreement (“JVA”) with Midas Engineering Group (formerly METS), whereby Midas will fund a series of engineering studies to earn up to a 50% interest in the project. The key terms of the earn-in (as originally stated in the heads of agreement) include:

- Midas to fund and complete a scoping study to earn 20% of the project.
- Dependent upon the results of the scoping study, Midas can earn a further 30% (taking ownership to 50%) by funding and completing a pre-feasibility study.
- After the 50% earn-in both companies will contribute pro-rata for further development funding.

The project will be managed through a JV management committee, chaired by Mr. Tan.



South West Titanium Project Location



Source: Altech

Other non-key projects include the Constance Range Iron Ore and Donnelly Graphite Projects

Constance Range Iron Ore/DSO Project

The Company holds three granted tenements and two applications totalling 350km², located approximately 180km NW of Mount Isa in Queensland.

The area was subject to historical exploration by BHP in the 1950's and 1960's, where a number of ironstone deposits were delineated. Subsequent work by Altech has estimated a JORC-compliant indicated resource of 6.1Mt @ 39.9% Fe.

Donnelly Graphite Project

The 100% held 21-block application is located approximately 95km south of Bunbury in SW Western Australia. The area is a historical producer of graphite, with estimates that approximately 1,000t of graphite was produced from 4,000t of ore in 1905 from underground workings.

Work in the 1980's by Cable Sands (WA) Pty Ltd (now Bemax) delineated a number of EM conductors in the area, potentially due to graphite within the metamorphic host rock.

Valuation

We have carried out an indicative valuation on Altech, concentrating on the potential value of the proposed HPA operation.

Given the lack of firm operating and capital expenditure data, we consider a rigorous DCF valuation not to be appropriate.

We have however calculated a range of valuations using:

- EV/EBITDA multiples on forecast maximum production
- Indicative DCF as a check

We have carried out an indicative EV/EBITDA multiple and DCF check valuation on the HPA Project



EV/EBITDA Multiple Valuation

This is a common valuation method for operating industrial and chemical companies, with the following characteristics:

- Multiples for specialty chemical producers have historically ranged from around 5x (at the low part of the business cycle) to 10x (at the higher end of the cycle).
- Full valuations are generally reached only after the Company has demonstrated continuous returns, unlike in the resources sector where full valuations can be reached in anticipation of expected returns.

We have used a range of costs and HPA prices at +/-20% of current values

In calculating the potential value, we have used a range of product prices and operating costs. With regards to prices we have used a range of \$17,500-\$27,500/tonne for 4N HPA, with operating costs of \$7,000 to \$11,000/tonne. Both ranges approximate +/-20% around the central value, with median costs similar to the A\$8,600 operating costs published by the Company, and the HPA price being the AUD equivalent of a US\$20,000 4N HPA price using a 0.85 exchange rate.

Results using a 7.5x EV/EBITDA multiple are presented in the table below.

Indicative EV/EBITDA Valuation – 4,000tpa 4N HPA Operation

We have used a 7.5x EV/EBITDA multiple

		Total Operating Cost (A\$/tonne)				
		\$7,000	\$8,000	\$9,000	\$10,000	\$11,000
4N HPA Price	\$17,500	\$315m	\$285m	\$255m	\$225m	\$195m
	\$20,000	\$390m	\$360m	\$330m	\$300m	\$270m
	\$22,500	\$465m	\$435m	\$405m	\$375m	\$345m
	\$25,000	\$540m	\$510m	\$480m	\$450m	\$420m
	\$27,500	\$615m	\$585m	\$555m	\$525m	\$495m

Source: Breakaway analysis

Indicative DCF Valuation

Our DCF valuation is to be considered indicative, due to the lack of firm input data

This has been carried out as a validation of the EV/EBITDA multiple valuation. However, given the lack of firm data, particularly estimated capex, this is considered as indicative only. Again, like the valuation using multiples, we have used the same range of prices and operating costs to arrive at a range of valuations.

With regards to the capital expenditure, we have used \$100m as a ball park figure, which does not reflect any figures that Altech may release in the future. In arriving at this we have:

Our capex has been estimated with regards to Orbite Aluminae's published figures

- Used Orbite Aluminae's figure of C\$109m as a reference – this is for a 1,050tpa plant, but with additional circuitry to recover impurities not present in Altech's proposed operations, and also possibly includes costs relating to the previously operating pilot plant,
- Using economies of scale equations, a 4,000tpa plant would cost in the order of \$220 million in Canada,
- Adjusting this for expected lower capex in Malaysia, we have arrived at ~\$100m as an indicative capex for the purposes of this exercise.

Other inputs used include a Malaysian corporate tax rate of 25%, sustaining capex of 3% of revenue, equipment fully depreciated over the 20 year modelled life of mine and a real discount rate of 10% on an ungeared operation. We have assumed a 2,000tpa ramp up in 2017, and full production in 2018.



The results of this indicative DCF estimation are presented below.

Indicative 10% DR DCF Valuation – 4,000tpa 4N HPA Operation

		Total Operating Cost (A\$/tonne)				
		\$7,000	\$8,000	\$9,000	\$10,000	\$11,000
4N HPA Price/tonne	\$17,500	\$217m	\$187m	\$157m	\$128m	\$98m
	\$20,000	\$289m	\$260m	\$230m	\$200m	\$170m
	\$22,500	\$362m	\$332m	\$302m	\$272m	\$242m
	\$25,000	\$434m	\$404m	\$374m	\$344m	\$314m
	\$27,500	\$506m	\$476m	\$446m	\$416m	\$386m

Source: Breakaway analysis

The results from the two analyses are compared in the table below. Here we have also applied a discount multiple of 7.5% to reflect the stage of the project, and the still significant risks involved. We would expect our valuation to increase as the project progresses.

This is similar to a multiple that would be applied to an NPV calculated on an inferred resource for a potential base or precious metal mining operation. This is a subjective 'rule of thumb' factor, and given the current state of the small end of the market, as well as the technological risk we have used a multiple in the lower end of our usual 5% to 20% range.

Valuation Comparison – HPA Operation

Our risked EV/EBITDA multiple and DCF valuations give similar results, ranging from \$7.35m to \$46.1m for the HPA project

Item	Low	High	Midpoint	Discount Multiple	Low discounted	High discounted	Midpoint discounted
EV/EBITDA	\$195m	\$615m	\$405m	7.5%	\$14.6m	\$46.1m	\$30.4m
DCF	\$98m	\$506m	\$302m	7.5%	\$7.35m	\$37.9m	\$22.7m
Average	\$146m	\$560m	\$353m	7.5%	\$11.0m	\$42.0m	\$26.5m

Source: Breakaway analysis

It can be seen that the two valuations give reasonably consistent results.

Per share Valuation – Pro-Forma After Rights Issue

We have completed a per share valuation based on Altech's assets, using a pro-forma undiluted post rights share structure and balance sheet. This assumes all rights are taken up.

This results in a range of \$0.13 to \$0.36 per share, with a midpoint of \$0.25 per share.

We have included nominal figures for the non-core projects, including, given the current iron ore market, a value of zero for the Constance Range Iron Ore Project. There is value ascribed to the others – SW Titanium by virtue of Midas Engineering entering into a JV, and Donnelly Graphite by virtue as there still is some life left in the graphite space.

Indicative Valuation – Altech Chemicals Post Rights Issue

Our post rights per share valuation for Altech is from \$0.13 to \$0.36, with a midpoint of \$0.25

Item	Total Value			Per Share Undiluted			
	Low	Mid	High	Shares	Low	Mid	High
HPA	\$10.96	\$26.49	\$42.03	134.698m	\$0.081	\$0.197	\$0.312
SW Titanium	\$2.00	\$2.00	\$2.00	134.698m	\$0.015	\$0.015	\$0.015
Constance	\$0.00	\$0.00	\$0.00	134.698m	\$0.000	\$0.000	\$0.000
Range							
Donnelly	\$1.00	\$1.00	\$1.00	134.698m	\$0.007	\$0.007	\$0.007
Graphite							
Cash	\$3.90	\$3.90	\$3.90	134.698m	\$0.029	\$0.029	\$0.029
Total	\$17.86	\$33.39	\$48.93	134.698m	\$0.133	\$0.248	\$0.363

Source: Breakaway analysis



Breakaway's View

With its HPA Project, our view is that Altech have a potentially viable and robust chemical industry play. This is not a junior resources play in the usual sense.

Potential low operating cost project

Although current HPA prices are forecast to fall marginally in the medium term due to advances in technology and hence lower operating costs (and our view is that pricing is set to return a gross margin of around 30% to HPA producers), Altech still has a potentially game changing project by virtue of expected low operating costs – our analysis indicates that costs expected by Altech could be in the region of 40% lower than those of current producers. This is due to Altech's simpler production process, significantly lower feedstock costs and the lower operating costs associated with the Malaysian business environment.

"Clean" process route

Another attraction of the project is the relatively clean nature of the process – given the high purity clay feedstock and the acid leach process, the only significant waste product is silica, which could possibly be sold. In addition the process is expected to recycle virtually all of the HCl used in processing – again resulting in a significant saving in costs.

Key risk is technology

The key risk here is technological risk – will the process reliably produce the required 4N HPA product at targeted production rates? We gain comfort in the fact that bench scale testwork has produced material of the correct purity, and the Company is now carrying out pilot scale optimisation testwork in the laboratory. Orbite, in Canada, has shown that a similar process can work from the results of its pilot operations, which does give us further comfort (Orbite is now building the full scale plant).

The Company is working methodically through processing options

Also, the proposed flowsheet contemplates only known and understood processing procedures, and the Company is working through the optimisation and processing options in a methodical way as part of the current BFS.

Significant growth in the HPA market is expected over the next few years

Significant growth in the HPA industry is forecast over the next few years, due to the expected large increase in demand for artificial sapphire for LED applications. This is timely for Altech, and given the potentially low operating costs the Company should be able to gain a foothold into the market and become a significant player. The Company will need to be aware of the potential for predatory pricing and cartel like behaviour by the major players.

The Company's share price has been reasonably stable over recent years

The Company has enjoyed a reasonably stable share price over recent times, and has not suffered the malaise of a large number of junior resources players. This may reflect market recognition that Altech is not a typical junior resources company.

We rate Altech as a SPECULATIVE BUY, with a midpoint valuation of \$0.25/share

The current rights issue will allow the Company to progress and hopefully finalise its BFS, at which time development decisions should be made.

Given the above, we rate Altech as a medium term **Speculative Buy** with a midpoint valuation risked for the project stage of \$0.25/share – we expect the key share price catalyst over the next six to nine months to be material progress on the BFS, particularly optimising the processing. We would also expect our valuation to increase as the project is progressively derisked.

Also, should the junior market improve we may also see upward movement in line with the general market.



HPA 101

'What is HPA' and 'What are its Uses'?

HPA is the high purity form of alumina, the basic feedstock for aluminium production

As its name suggests, HPA is a high purity form of aluminium oxide, commonly known as alumina. Alumina is the basic feedstock for aluminium production, albeit in a lower purity form, which comprises approximately 90% of the demand for alumina. The remaining 10% is used in the non-metallurgical market for specialty or chemical use, of which HPA is the high end product.

Sapphire is a form of HPA, with artificial sapphire being one of the key HPA uses

The gemstone sapphire is also a form of HPA, and can occur naturally as well as being formed in the laboratory from 99.99% HPA, with artificial sapphire being one of the key uses for HPA. Artificial sapphire is produced by heating HPA powder in an autoclave to its melting point of 2,000°C under intense pressure, at which point an individual crystal is formed. The crystal is then allowed to cool (~22 day cycle), and then can be cut using diamond cutting equipment to suit individual applications.

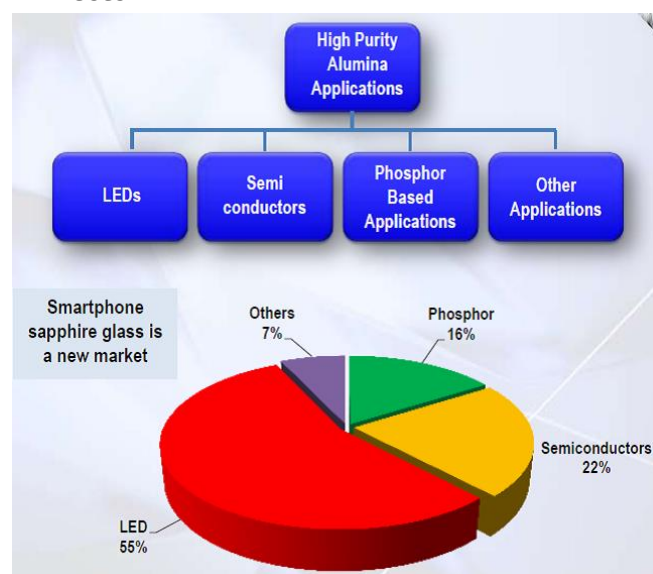
HPA has a number of desirable properties that make it an important part of the technology industry:

HPA has a number of desirable properties

- **Hard and Strong**– sapphire has a hardness of 9 on the Mohs scale, second only to diamond, and is important for abrasive applications, including sapphire single crystal applications (phone screens amongst others).
- **Resistant to Corrosion** – important in semiconductor manufacturing and display screens, where corrosion by plasma is an issue.
- **High Brightness** – key in effective LED lighting, which is more energy efficient than traditional incandescent bulbs – different jurisdictions have mandated requirements to introduce LED lighting as a replacement for incandescent lighting.
- **Biocompatibility** – important in prosthetic devices including implants.

Around 55% of the global HPA market is in the growing LED sector, where LED's are produced from artificial sapphire crystal. Other key markets include semiconductors (22%), phosphor in plasma display panels (16%) and other uses (7%).

HPA Uses



Source: Altech/Technavia



Demand and Pricing

Forecasts indicate double digit growth for the HPA sector

Forecasts indicate double digit growth in the HPA sector for the immediate future, largely driven by increasing demand for LED applications. This has been forecast by two separate groups, Technavio, who has forecast total demand to grow to 48,200tpa by 2018, and QY, with a forecast demand of 36,000tpa by 2017. The bulk of production is of the 4N HPA product.

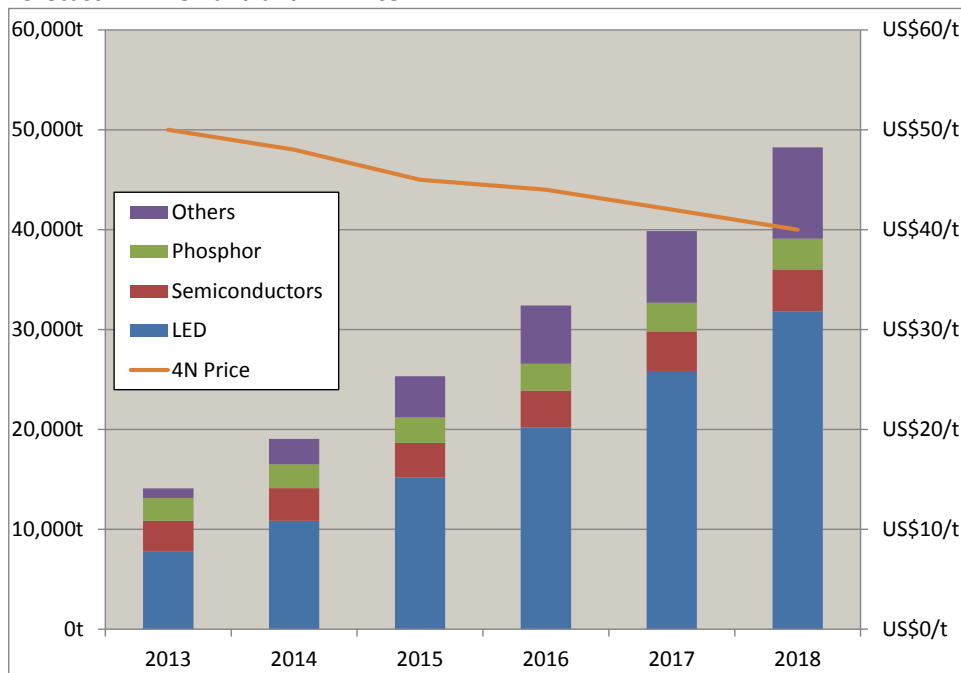
HPA Demand is concentrated in the Asia-Pacific region

Demand is concentrated in the Asia Pacific region, with some 70% of demand, followed by the EMEA at 16% and the Americas at 14%.

Technavio also forecast a gradual reduction in price, largely through the development of new technology leading to a decrease in the price of production and, as we have stated, our view is that pricing is set to return a fixed margin.

Current research indicates HPA (all grades) operating costs are in the order of US\$30-35/kg. At current sales prices in the order of US\$50/tonne, this equates to a gross margin of around 30%. Applying this margin to current 4N prices of ~US\$20-25/kg results in current operating costs in the order of US\$14-17.50/kg.

Forecast HPA Demand and 4N Price



Source: Altech, Technavio Research

There is the potential for additional demand for smart phone glass

Smartphone glass is not at present a significant demand driver of sapphire glass; however it does have the potential, if widely adopted, to significantly increase the above forecasts. Premium smartphone maker Vertu currently use the material, however Apple is looking at sapphire glass (which it already uses for phone camera lenses and fingerprint readers) to replace gorilla glass on iPhones.

Supply

Supply is dominated by a number of major producers, with Sumitomo being the largest

Current supply is dominated by a number of major players, with Sumitomo being the largest. The table below lists the major producers – note that the bulk of this analysis was completed in 2012, with figures being updated from more recent research. These major producers are augmented by a number of smaller producers, largely located in China.



A number of producers, particularly Chinese, are increasing capacity to meet the expected increases in demand

There is however room for new players

Recent research indicates that, particularly in the case of Chinese companies, producers are increasing capacity to take advantage of the expected demand increases, and may lead to further concentration of supply.

These forecast increases in demand however leave room for new players, such as Altech, to enter the market.

Estimated HPA Production to 2015 – Top 10 Companies

Company	Plant Location	Capacity 2013 est	Capacity 2015 est	Production 2013 est	Production 2015 est
Sumitomo Chemical	Japan/South Korea	4,000	6,000	2,900	5,000
Hebei Pengda Advanced Materials Technology	China	3,000	4,500	2,300	3,500
Zibo Xinfumeng Chemicals	China	2,500	4,000	1,900	3,200
Sasol	Germany/USA	2,000	2,600	1,600	2,000
Orbite Aluminae	Canada	0	1,050	0	1,050
Dalian Rall Fine Ceramics	China	600	1,100	480	980
WEC Superabrasives	Taiwan	550	900	400	680
Zibo Xinmeiyu Alumina	China	400	900	220	660
Zibo Hengii Tianli Industry and Trade	China	300	560	250	440
Hong Fu Crystal Technology	China	360	600	270	480
Total		13,610	20,210	10,320	17,990

Source: Orbite Aluminae, QY Research



Directors and Management

Non-Executive Chairman

Luke Atkins LLB

Mr Atkins is a lawyer by profession and one of the founders of the company. Mr Atkins brings to the board extensive experience in the areas of mining, exploration, and corporate governance. Mr Atkins is also Non-Executive Director of the successful ASX listed mining and exploration company, Bauxite Resources Ltd (BRL). Mr Atkins formerly held the role of Executive Chairman of BRL after co-founding the company in 2007. He has played a key role in BRL third party negotiations to successfully access funding, joint venture partnerships, land and infrastructure.

Mr Atkins has had extensive experience in capital raisings and has held a number of executive and non-executive directorships of private and publicly listed companies including a number of mining and exploration companies.

Managing Director

Iggy Tan BSc MBA GAICD

Mr Tan is a highly experienced mining and chemical executive with a number of significant achievements in commercial mining projects such as capital raisings, funding, construction, start-ups and operations. Mr Tan has over 30 years' chemical and mining experience and been an executive director of a number of ASX-listed companies. He holds a Master of Business Administration from the University of Southern Cross, a Bachelor of Science from the University of Western Australia and is a Graduate of the Australian Institute of Company Directors.

Mr Tan became the Company's managing director in August 2014. He is responsible for managing and implementing the next stage of the Company's strategic business objectives, which includes the commercialisation of the high purity alumina (HPA) project. Having been involved in the commissioning and start-up of seven resource projects in Australia and overseas, Mr Tan is an accomplished project builder and developer.

Mr Tan previously held the positions of managing director of Nickelore Limited, Galaxy Resources Limited and Kogi Iron Limited. At Galaxy Mr Tan was responsible for the capital raising, construction and start-up of the company's Mt Cattlin spodumene mine (\$80m) and the Jiangsu lithium carbonate plant (\$100m), which resulted in Galaxy becoming the world's leading producer of high grade lithium carbonate. The Jiangsu plant was eventually sold for \$260m in 2014.

Non-executive Director

Dan Tenardi

Mr Tenardi is a highly experienced mining executive with some 40 years in the industry, including with a number of global resource industry leaders across a range of commodities, including iron ore, gold, bauxite, and copper. Mr Tenardi previously spent 13 years with Alcoa, at its bauxite mines in the Darling Range in Western Australia, and a further two years at Alcoa's Kwinana refinery. He has substantial gold mining experience, including with Roche Mining at the Kalgoorlie Superpit and at Anglo Gold Ashanti's Sunrise Dam. Mr Tenardi subsequently worked at executive level for Rio Tinto's Robe River Iron Associates and their East Pilbara Division, and was appointed as a Director of Robe River Iron Associates in the latter years of his employment with Rio Tinto.

Prior to this appointment, Dan was Managing Director of Bauxite Resources Ltd, where he led the rapid growth of the company from its initial exploration phase, expansion of land holdings, to the commencement of trial shipments and securing supportive strategic partnerships with key Chinese partners. Mr Tenardi also held the positions of General Manager of Operations and Chief Operating Manager at CITIC Pacific Mining.

Mr Tenardi is currently non-executive director of Grange Resources Ltd.

Non-executive Director

Peter Bailey

Mr Bailey is a highly experienced and qualified engineer with over 40 years' experience in the mining and industrial mineral production industry and has an electrical engineering degree from the University of London. Mr Bailey spent the majority of his career in the iron ore mining, bauxite mining, zinc-lead-copper mining, alumina refining and alumina chemicals industries respectively.

Mr Bailey was President of Alcoa Bauxite and Alumina in 1996, and was responsible for Alcoa's eight alumina plants outside of Australia. He was also the chairman of the Alcoa Bauxite joint venture in Guinea, Africa.

In 1998, he was appointed President of Alcoa Worldwide Chemicals' industrial chemicals



department from 1998. He was responsible for Alcoa's worldwide chemicals business, comprising 13 plants across eight countries, with annual revenue of approximately \$700 million. Post Alcoa, Mr Bailey was chief executive officer of Sherwin Alumina, an alumina refinery based in Texas, USA. The Sherwin alumina plant was capable of producing 1.4 mtpa of smelter grade alumina and 300,000 tonnes of chemical grade or specialty alumina per year. The Sherwin alumina plant was eventually sold to China Minmetals (51%) and then the remaining 49% to Glencore in 2007.

Mr Volk has extensive accounting and corporate governance experience in Australian and international mining operations.

Company Secretary

Mr Shane Volk *BBus (Acc); GradDip (ACG); CSA*

Mr Volk is a qualified Chartered Secretary and has a Bachelor of Business (Accounting) from the Royal Melbourne Institute of Technology. Mr Volk has previously worked in Papua New Guinea, Indonesia and Australia across a diverse range of mining-related capacities such as exploration, operations, business development and corporate governance. Mr Volk was previously chief financial officer and company secretary for African Iron Ltd, Emerson Resources Limited, and Kogi Iron Limited.

Biographies extracted from ATC website, November 22, 2014



Analyst Verification

We, Grant Craighead and Mark Gordon, as the Research Analysts, hereby certify that the views expressed in this research accurately reflect our personal views about the subject securities or issuers and no part of analyst compensation is directly or indirectly related to the inclusion of specific recommendations or views in this research.

Disclosure

Breakaway Investment Group (AFSL 290093) may receive corporate advisory fees, consultancy fees and commissions on sale and purchase of the shares of Altech and may hold direct and indirect shares in the company. It has also received a commission on the preparation of this research note.

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Breakaway Investment Group

AFSL 290093 ABN 84127962387

T+61293928010

F+61292792727

PO Box H116 Australia Square

Sydney, NSW 2001

Suite 505, 35 Lime Street,

Sydney, NSW 2000