

Due Diligence and Valuation Report

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Fair share value bracket:	AUD 0.29 to AUD 0.68 ⁱ
Share price (Apr 03, 2019):	AUD 0.14 ⁱⁱ

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Company:	Altech Chemicals Ltd.
Ticker:	ASX: ATC, FRA: A3Y
Headquarters:	Subiaco, Australia
Managing Director:	Iggy Tan
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Market Data

52-Week Range:	AUD 0.08 – AUD 0.22 ⁱⁱⁱ
Average Daily Volume:	752,596 ^{iv}
Market Cap. on date:	AUD 77.3 million (mn)

Fiscal Year (FY) 1st July– 30th June

Summary

Altech Chemicals Limited (“Altech” or “ATC” or “the company”) is a high-purity alumina (HPA) development company listed on the Australian Securities Exchange (ASX). The company aims to be a major integrated HPA producer globally. It has 100% ownership of the Meckering Kaolin deposit in Western Australia and has commenced Stage 1, which is, construction of an HPA plant in Johor, Malaysia.

The company’s strategy is to become a world-leading producer of HPA with a key economic advantage of owning its own Kaolin deposit (aluminous clay) as feedstock.

The global HPA market is forecasted to grow more than two times to around USD 2.2 billion (bn) by 2024. The global HPA demand is estimated to have a CAGR of 15% to 16% between 2017 and 2025. Importantly, 4N HPA (99.99%) is estimated to have a CAGR of 16.2% over the same period.

The rise in demand is expected due to HPA’s non-substitutable characteristics in the production of synthetic sapphire, which is used in the manufacture of substrates used in the light-emitting diode (LED) industry, semi-conductors and other sapphire glass applications. HPA is increasingly used in lithium-ion batteries, as a coating on battery separator sheets.

HPA Project

Feedstock from Meckering Kaolin deposit: Kaolin extracted using simple and inexpensive open-pit

mine methods. The mine has a total measured, indicated and inferred JORC Mineral Resource of 12.7 million metric tons (MMT) @ 29.5% Al₂O₃ (minus 300 micron). From the resource, Altech has determined a 30-year proved and probable ore reserve of 1.2 MMT @ 30.0% Al₂O₃ (minus 300 micron and 25% Al₂O₃ lower cut-off) to be mined over 10 discrete mining campaigns.

Meckering Kaolin Deposit: The deposit occurs in highly weathered granite where high grades of Al₂O₃ are concentrated in freely mineable clay. The orebody is flat lying, which allows a very low waste-to-ore-strip ratio of 0.66:1 resulting in low mining costs.

Altech owns 100% of granted mining lease M70/1334 over the Meckering Deposit and approvals to mine and construct a screening and container loading facility were granted by the WA Department of Mines and Petroleum in March 2017.

Ore Movement and Loading Facility: The feedstock, mined from the kaolin deposit, will be stockpiled on the Run of Mine stockpile, constructed adjacent to the container loading facility. It is expected 43,538 tons per year (t/y) of raw material will be transported comprising approximately 36 containers of 22 tons (t) each of Kaolin per week.

Malaysian HPA processing plant: Altech executed the Stage 1 construction agreement in July for its Malaysian HPA plant. Stage 1 construction included bulk earthworks, extensive piling, retaining walls, storm water management and an electrical sub-station. Work has commenced with the conduct of a detailed geotechnical study. The plant design and layout has also been finalized. The development order for the company’s HPA plant in Johor, Malaysia, has been approved and the site establishment work has commenced. The Stage 1

work is progressing steadily, and the site is gradually moving from the establishment phase into the construction phase. Work is being conducted in accordance with the highest safety standards.

The Malaysian HPA site was secured via payment of the final instalments totaling AUD 5.1 mn for the 4 hectares (ha) of industrial land in the Tanjung Langsat Industrial Complex, Johor, Malaysia in May 2018. Altech has a 30-year lease agreement and a 30-year renewal option with Johor Corporation for the site. The HPA plant is fully designed, costed and Malaysian environmental approval has been obtained. The plant will be ideally located in a low-operating-cost jurisdiction in close proximity to gas, electricity, water, hydrochloric acid and quicklime supply infrastructure, which should provide an operating advantage over competitors.

Final Investment Decision Study (FIDS): An FIDS for the 4,500 tons per annum (tpa) HPA project was published on October 23, 2017. The positive FIDS reported a mine life of 30 years, estimated Pre-tax net present value (NPV)_{7.5} of USD 505 mn (AUD 656 mn) and full production of 4,500 tpa of HPA. The FIDS also defined associated capital development costs for the plant and the mine of USD 298 mn, payback of 3.9 years and an internal rate of return (IRR) of 22%.

Off-take agreement with Mitsubishi: In April 2016, Altech entered an off-take agreement with Mitsubishi Corporation's Australian subsidiary Mitsubishi Australia Ltd. Mitsubishi will be the exclusive buyer and global distributor of 100% of Altech's HPA production for an initial 10 years which is scheduled to commence on the date of first shipment of the final HPA product.

Project phase: The company received an indicative non-binding mezzanine debt term sheet for up to USD 90 mn from an international investment bank for its HPA project for the quarter ended on June 30, 2018, which would complement the USD 190 senior debt package. The project is at an advanced financing stage with a USD 190 mn project finance debt package secured. The debt package from the German government-owned KfW IPEX-Bank is linked to a fixed-price lump-sum engineering, procurement and construction (EPC) contract to construct the HPA plant with German engineering firm SMS Group GmbH. It also includes a fixed-price lump-sum EPC contract for construction of the Meckering kaolin container loading facility by Perth-based Simulus Engineering Pty Ltd.

Altech has officially mandated Macquarie Bank (Macquarie) as the preferred mezzanine lender for its proposed HPA plant. The proposed mezzanine debt provider has now completed its assessment of the independent technical advisor's report that it commissioned on the company's HPA project and has notified Altech that it now plans to proceed towards preparation for the internal approval process of a proposed mezzanine debt facility. The next step for both the proposed mezzanine lender and the stream finance facility provider would be to present the project to the respective internal investment committees for final approval. An updated HPA market report from CRU Consulting is also likely to be commissioned prior to respective investment committee consideration. Upon investment committee approval, a binding term sheet and an exclusive mandate would be executed for each proposed facility. After this, the processes of final loan documentation and the negotiations of inter-creditor arrangements with the senior lender are expected to commence, and this would be ultimately followed by the project finance closure.

Construction has commenced with operations targeted for late 2020, early 2021. The HPA production schedule will be 3,000 tpa in year 1, 4,000 tpa in year 2 and full production of 4,500 tpa at a grade of 99.99% Al₂O₃ (4N) by year 3.

In H1 2019, Altech continued its efforts to secure the balance of project funding required to draw-down on the USD 190 mn project finance debt package. As for the USD 90 mn mezzanine debt facility, the proposed mezzanine lender focused on completing a detailed technical review of the company's HPA project. The company announced the successful conclusion of the technical review in January 2019. Along with the financing activities, Altech also raised equity worth ~AUD 20 mn and some of the proceeds were used for the HPA plant site clearance works and stage-1 construction.

Valuation

We believe Altech is financially well-positioned (after sanction of USD 190 mn debt from KfW IPEX-Bank) and has high potential in its value proposition. If the funding phase of the project goes as per schedule, the construction timetable will be met, and the project can commence initial operations.

Given the due diligence and valuation estimations based on NPV of its HPA project, we believe that Altech's fair share value lies between AUD 0.29 and AUD 0.68.

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Company Presentation

Altech is an ASX-listed specialty chemicals developer focused on the financing and construction of an HPA processing plant with capacity of 4,500 tpa for delivery into the high-tech manufacturing industries. It is expected that Altech would rank in the top three HPA producers globally and one of the lowest cost producers at full capacity utilization.

ATC has an enormous feedstock source at its 100% owned Meckering Kaolin deposits in Western Australia which comprises high-grade aluminous clay. Current ore reserve is 1.2 MMT @ 30% Al₂O₃ (minus 300 micron and 25% Al₂O₃ lower cut-off) for 30 years (Stage 1) with an estimated mineral resource of 12.7 MMT @ 29.5% Al₂O₃ (minus 300 micron) which could supply feedstock for 250 years. ATC has also secured a ~4 ha plot of land in a major industrial park in Johor, Malaysia, where it will build its HPA processing plant. Total capital cost is estimated at USD 297.6 mn.

In October 2017, ATC completed a FIDS for the project and in December 2017 secured a commercially attractive Project Finance Debt Package of USD 190 mn from the German government-owned KfW IPEX-Bank.

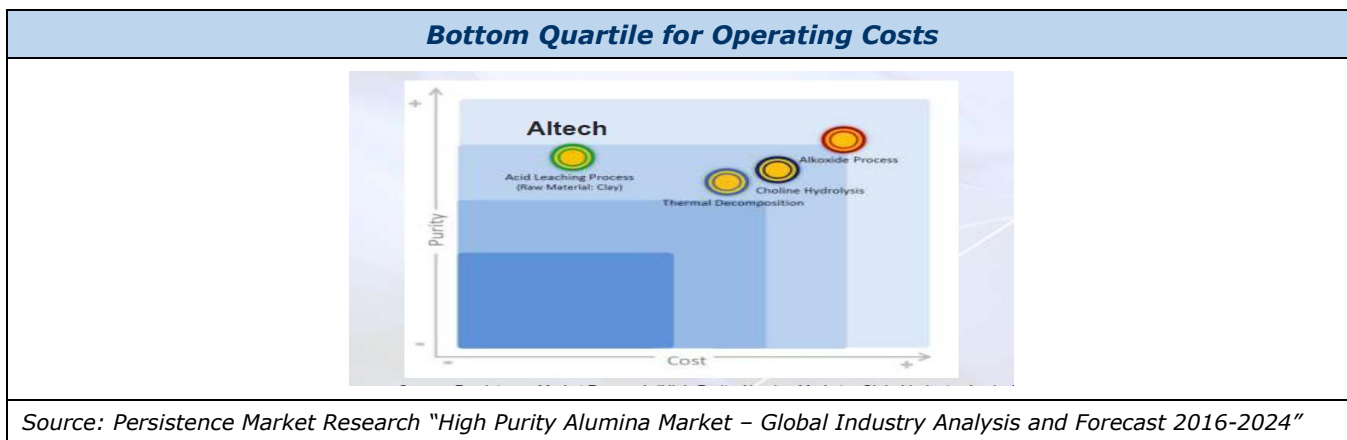
The company has conducted extensive laboratory and pilot plant test work, completed detailed capital and operating cost estimates, full plant design and project approvals. It has secured an off-take agreement with Mitsubishi for 100% of up to 4,500 tpa HPA plant production for first 10 years. Also, it has entered into a lump sum turn-key contract with SMS group, a German EPC contractor which has agreed to guarantee the finished product quality, production process and throughput level of the HPA plant. KfW IPEX-Bank and the SMS group have conducted full due diligence activities as part of the cost estimates and debt funding package.

Financial Summary: In H1 2019, Altech earned an interest income of AUD 65,455, as against AUD 18,390 in H1 2018. The company registered a loss of AUD 4.1 mn in H1 2019 in comparison with a loss of AUD 1.9 mn in H1 2018. The company recently raised fresh equity worth ~AUD 20 mn and this led to an increase in the company's cash and cash equivalents to AUD 4.1 mn as on December 31, 2018. Altech currently has no debt on its balance sheet. In the future, the company targets a debt-to-equity ratio of 65%-70%.

Portfolio and Premiums

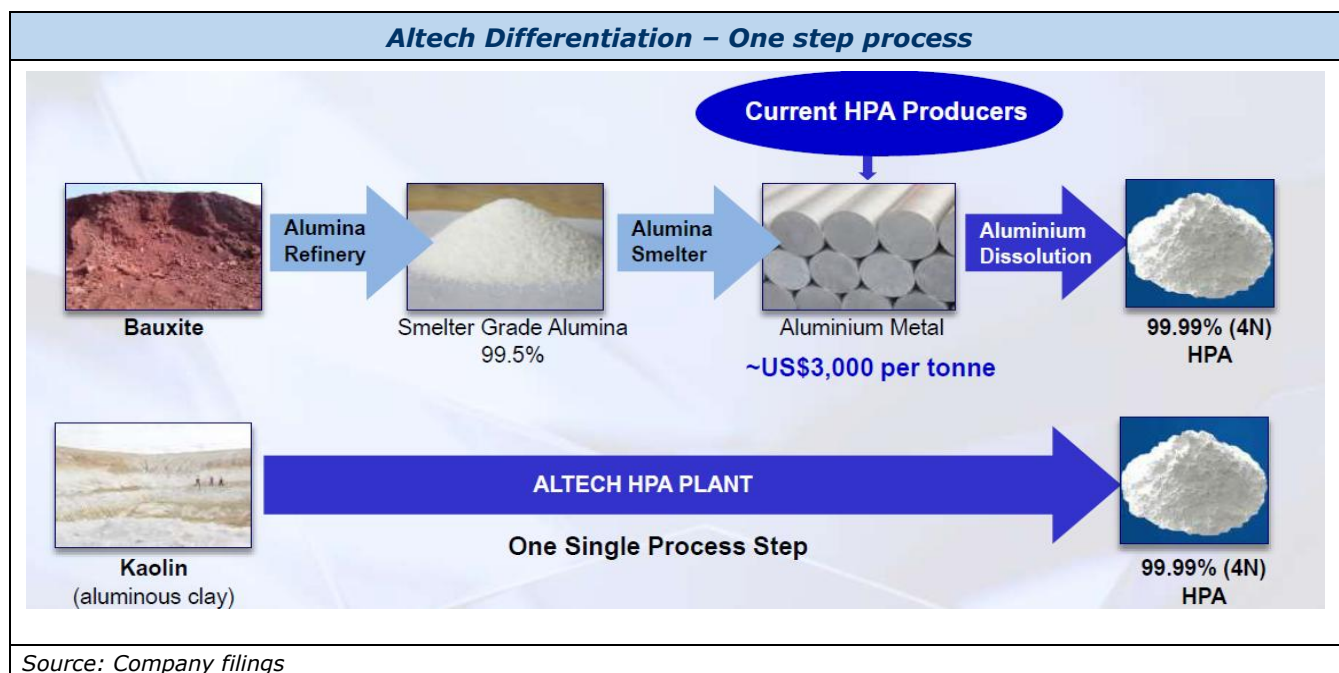
The kaolin feedstock location at Meckering in Western Australia and the HPA processing plant location in Johor Malaysia offer accessibility to existing infrastructure facilities and government incentives: The Meckering kaolin mine will have a low environmental impact due to simple geology and mining methods and it is located a mere 130 km from Fremantle port. The Johor HPA site has access to nearby international sea container ports, hydrochloric plants, natural gas, and electricity supply. Government and tax incentives will also be available for the Malaysian operations.

For Altech to become a global leader, its HPA cost base must be low and this can be achieved due to the 100% ownership of kaolin feedstock, and application of the acid leaching process and operating in Malaysia.



Having obtained required operating permits and licenses ensure kaolin feedstock: On 14 March and 25 August 2017, Altech was granted mining and works approvals by the Western Australian Department of Mines and Petroleum and the Department of Water and Environmental Regulation (DWER) for the open pit mine at Meckering. Construction of the kaolin screening, loading facility infrastructure and Run of Mine (ROM) stockpile can commence.

One single-step process: The distinguishing feature of ATC’s operations is the one-step processing route from aluminous clay to HPA using hydrochloric acid leaching, rather than having to derive HPA by re-refining aluminum metal that has been produced from bauxite via the Bayer process.



Off-take agreement secured sales of 100% of HPA production: A purchase commitment for 100% of Altech’s HPA (originally 4,000 tpa with the intent for 4,500 tpa) production in the initial 10 years reduces the commercial risk aspect of the project and secured a major step towards project financing. This helped to demonstrate to banks and other potential project financiers that the product has a solid market to underpin debt financing and construction.

High HPA demand projected: The global HPA market is forecast to grow two-fold and is set to reach around USD 2.2 bn by 2024 and global HPA demand is estimated to have a CAGR of 15% to 16% (2017-2025).

In case of 4N HPA (99.99%), the global demand is estimated to have a CAGR of 16.2% over that period. HPA is a non-substitutable constituent in the production of synthetic sapphire, which is used in the manufacture of substrates used in the LED industry, semi-conductors and other sapphire glass applications. HPA is increasingly used in lithium-ion batteries, as a coating on battery separator sheets and/or directly on the anode and cathode battery components.

Low-impurity kaolin feedstock: The company uses a conventional chemical process which is suitable for its aluminous clay deposit. This clay deposit contains lower levels of impurities (very low iron due to weathering) which aids the production of a very pure alumina product and should prove a competitive advantage for Altech.

%	Bauxite Darling Range*	Altech HPA Project
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

*Source: Corporate presentation for February 2019 *Typical Mean Analysis*

Experienced and qualified leadership team helps in efficient management: The company's executives are highly experienced with industrial commodities, project construction and operating in Malaysia and Australia. The board is highly experienced in the Alumina industry and through project development, has worked with some of the largest organizations across the globe.

Greenhouse credentials of Altech's HPA process: In Q2 2019, Altech was requested by a green fund (a fund which invests in low-emission / energy-efficient businesses) to identify the energy savings and greenhouse gas reduction of the Altech kaolin-alumina process, compared to the conventional alkoxide HPA production process. On being tested, the company reported that the project would realize a 46% reduction of greenhouse gases per ton of HPA using Altech's low-energy kaolin-alumina process. This puts the company in an attractive position as its production processes are environment friendly and therefore, will have a lesser carbon footprint.

Portfolio and Risks

Capital expenditure financing: The company has an estimated capital expenditure of USD 297.6 mn for near-term production and construction of the HPA processing plant as per the recent FIDS. To fund its capex plans, the company has taken USD 190 mn from KfW IPEX-Bank – with USD 170 mn of the debt at very long tenure (+10 years) and at low interest rates (~4%) as it has been awarded German government export credit cover; the remaining USD 20 mn will be at normal commercial terms. Altech will have to ensure raising the balance of funds to achieve its objectives and to fast track the development of its HPA plant and kaolin mine. The company has also received an indicative non-binding mezzanine debt term sheet for up to USD 90 mn from an international investment bank for its proposed HPA project during the quarter ended on June 30, 2018. Apart from this, Altech also executed an indicative non-binding term sheet for a USD 60 mn stream finance facility from a US-based global alternative investment group during the June-ended quarter. Recently, the company also raised equity to the tune of ~AUD 20 mn for its project financing and the company may raise further equity depending upon the mezzanine debt being secured.

Commodity price risk: The company is exposed to commodity price risk. Its projected revenue and operating margins significantly depend on the price of HPA, which might fluctuate significantly due to numerous factors beyond the control of the company. In such a situation, Altech must closely monitor the price of HPA to determine the appropriate course of action.

Single mine risk: Currently, ATC is fully reliant on revenues from its Meckering kaolin feedstock mine and HPA plant. This might adversely impact its cash flow, profitability and share price, in case of any unexpected interruptions at the Meckering operations.

Corporate Strategy

Raising equity vis-à-vis a joint venture (JV) or a private equity (PE) funding: The company recently raised equity worth ~AUD 20 mn for the financing of its HPA plant, and it further expects to raise more equity. However, the amount will be dependent on the mezzanine debt being secured, the outcome of the JV and the project sell down option. Currently, the possibility of a JV partnership or direct investment at either the project level (Malaysia), or at the Australian level is being assessed. Altech is targeting potential partners that can add value to the company's HPA project. Such an option of adding a strategic partner may lead to lesser shareholder dilution, and therefore, can prove to be a positive step towards the holistic development of the company.

Target business is to produce HPA 99.99% (4N) and earn high margins: ATC continuously thrives to establish itself as a leading producer of HPA and is focused on transition from developer to producer. The company has already signed a long-term off-take agreement with the major global distributor Mitsubishi for the first 10 years' sales of 100% of 4,000 tpa (intent for 4,500 tpa) HPA production. The current demand of HPA globally provides an exciting opportunity for the company to enter the market.

Product-related strategy: ATC has conducted tests to demonstrate that its HPA is suitable for synthetic sapphire production and use in lithium-ion batteries. Typical li-ion battery specifications demand a minimum purity of 99.99% HPA. The 99.99% purity is a significant step forward in demonstrating that its alumina is suitable for li-ion batteries and therefore a larger market.

Patent Application Update

Altech has been consistently applying for patents to protect its intellectual property rights. Currently (on 14 November 2018), seven patent applications have been lodged for Altech HPA process. Out of these, 5 have been lodged in Australia, and 2 patent applications have been lodged in Malaysia. One innovation patent has been granted in Australia and is currently under examination.

Schedule of Patent Applications

Number	Country	Type	Title	Description	Priority Date	Status
2014253487	Australia	Standard Patent Application	A Method for the Preparation of Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination	26/02/2014	Pending Application
2018233001	Australia	Standard Patent Application	A Method for the Preparation of Smelter Grade Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination	22/09/2017	Pending Application
P12018704039	Malaysia	Standard Patent Application	A Method for the Preparation of Smelter Grade Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination	20/09/2018	Pending Application
2018900572	Australia	Provisional Patent Application	A Method for the Preparation of Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination, bead milling, spray drying, produce high density beads and fine powder	22/02/2018	Pending Application
P12018700927	Malaysia	Standard Patent Application	A Method for the Preparation of Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination, bead milling, spray drying, produce high density beads and fine powder	22/02/2018	Pending Application
2018903911	Australia	Provisional Patent Application	A Method for the Preparation of Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by evaporation, ACH Purification, ACH Decomposition, alumina calcination, bead milling, spray drying, produce high density beads and fine powder	16/10/2018	Pending Application
2018101228	Australia	Innovation Patent	A Method for the Preparation of Alumina	Including, Kaolin beneficiation, calcination, leach, ACH precipitation by HCl, ACH Purification, ACH Decomposition, alumina calcination	22/09/2017	Granted

Source: Company filings

News

HPA Plant Stage 1 Construction Update: On March 12, 2019, the company provided an update of the activities at the HPA project site in Johor, Malaysia, where the stage 1 construction had been progressing as planned. The initial site establishment activities were complete, with the site being fully fenced and secured. Removal of the top soil from the site was also complete and bulk earthworks and site levelling were in progress.

Macquarie Bank Appointed as Mezzanine Debt Arranger: On March 8, 2019, the company announced that it had officially mandated Macquarie Bank (Macquarie) as the preferred mezzanine lender for its proposed Malaysian HPA plant.

Attended the 3-day international rechargeable battery exhibition in Japan: On March 6, 2019, the company provided an update on its attendance at the Battery Japan 2019 conference, held in Tokyo. Altech was an exhibitor at the Battery Japan 2019 conference, and the company continued to work with its off taker, Mitsubishi Corporation, to build brand and product awareness. Delegates at the conference reported strong demand for HPA from South Korea and Japan.

Mezzanine Finance Proceeded to the Next Stage: On February 19, 2019, the company announced that the proposed mezzanine debt provider had completed its assessment of the independent technical advisor's report that it commissioned on the company's HPA project and had notified Altech that it now planned to proceed towards preparation of the internal approval process of a proposed mezzanine debt facility.

Mezzanine Debt Technical Review Completed: On January 29, 2019, the company announced that the technical review of its proposed Malaysian HPA plant had been completed. The report concluded that the company had suitable proposed mitigation steps to manage the identified technical risk areas and the report was being reviewed by the mezzanine debt provider.

Development Order Approved for Malaysian HPA Plant: On January 24, 2019, the company announced that the development order for its proposed Malaysian HPA plant had been approved and the site establishment work had commenced.

Development Order Application for HPA Plant: On November 14, 2018, the company announced that it had been issued a land sub-title number (PTD number) for its ~4 ha site in Johor, Malaysia. The receipt of the PTD had enabled the company to submit a development order application to local authorities in Johor for its proposed HPA plant.

Withdrawal of AGM Resolution: On November 12, 2018, the company announced that due to the recent deterioration of the global equity markets, the company had resolved to withdraw the approval of an AUD 30 mn share placement.

HPA plant site layout and building design finalized: On November 6, 2018, the company announced that it had finalized the site layout and building design for its proposed Malaysian HPA plant.

Schedule of patent applications to protect Altech HPA process: On November 2, 2018, the company provided an update on the numerous patent applications it has filed. So far, Altech has lodged 7 patent applications for the Altech HPA process. Five patent applications have been lodged in Australia, with one granted, and 2 have been lodged in Malaysia.

Patent granted for kaolin to HPA production process: On October 16, 2018, the company announced that it had received the Certificate of Grant for an innovation patent from the Australian Patent Office, for the company's process of producing HPA from kaolin.

Mezzanine debt due diligence update: On October 10, 2018, the company provided an update on the progress of detailed project due diligence. The independent adviser – Advisian – anticipated that the due diligence would be completed by November-end 2018, thus, resulting in a 4-month due diligence process.

Official Geotech Survey at Johor HPA site well advanced: On September 5, 2018, the company announced that it completed the geotechnical ground drilling and survey program. The work included an assessment of soil types, soil stability and a detailed assessment of site topography.

Official ground-breaking ceremony at Johor HPA site: On August 20, 2018, the company announced that it completed the official ground-breaking ceremony, which, led to the commencement of Stage 1 construction of its HPA plant at Johor, Malaysia.

Share Purchase Plan raised AUD 4.3 mn: On August 1, 2018, the company announced that it received an extremely positive response from existing shareholders for AUD 4.3 mn of new shares at an offer price of AUD 0.165 per share under the share purchase plan.

Altech completed HPA site clearance works at Johor, Malaysia: On July 27, 2018, the company announced that it completed clearing of the 4 Ha site for its proposed HPA plant in Johor, Malaysia. Site clearance commenced in early July followed by the execution of the Stage 1 construction agreement for the HPA plant with appointed German engineering, procurement and construction (EPC) contractor, SMS group.

Altech raised AUD 20 mn to fund the construction of its plant in Malaysia: On July 9, 2018, the company announced that it has received positive commitments from various institutional and professional investors for a share placement of AUD 17 mn. The company also stated that it will be offering a share purchase plan for the existing shareholders to raise AUD 3 mn.

Altech Chemicals signed USD 60 mn stream finance facility for alumina project: On June 15, 2018, the company that it had signed an indicative non-binding term sheet for a USD 60 mn stream finance facility for its proposed HPA project in Malaysia. The company signed this stream finance facility with a US-based global investment group with USD 4.5 bn under management.

Altech Chemicals deployed 'disruptive technology' that slashes HPA production costs: Altech managing director Iggy Tan stated that the company was following a different process that was disruptive and found that the cost of production was nearly one third of the traditional cost.

Altech ideally positioned to capitalize on forecast increase in HPA demand: On June 8, 2018, the company announced that the total HPA demand was expected to reach 92,473 tpa in 2025 on average basis, which was equivalent to approximately 20 plants at 4,500 tpa.

Altech made final installments for Johor HPA site: On May 22, 2018, the company announced that it paid the final installments totaling AUD 5.1 mn for 4 ha of industrial land within the Tanjung Langsat Industrial Complex, Johor, Malaysia.

Altech received first Mezzanine Debt Term Sheet: On May 11, 2018, the company announced that it received mezzanine debt term sheet for up to USD 120 mn from an international bank, for its proposed Malaysian HPA plant and associated Kaolin Western Australia Project.

Altech completed purchase of Meckering mining lease freehold land: On April 5, 2018, the company announced that its wholly owned subsidiary Altech Meckering Pty Ltd had completed the purchase of approximately 92 ha of freehold land covering its granted mining lease M70/1334, at Meckering, Western Australia.

Altech advanced final stage of project financing: On 2 February 2018, Altech announced that it will be getting a senior debt package of USD 190 mn from German government-owned KfW IPEX-Bank as the

company executed a commitment letter together with agreed terms and conditions to formalize this debt package.

Altech filed new provisional patent application: On February 27, 2018, Altech announced that it lodged a new provisional patent application with the Australian Patent Office, which incorporated the finished product HPA technology developed by it for its HPA project. The new patent application integrated various refinements made to the company's HPA processing route during project due diligence, and incorporated the company's latest invention, the flexible finished product line that was capable of producing HPA products for both the synthetic sapphire industry and HPA for the lithium-ion battery industry.

Manufacturing License approved for HPA plant: On February 21, 2018, the company announced that it got the approval of a manufacturing license from Malaysian Investment Development Authority (MIDA) for its 4,500 tons HPA plant at Johor, Malaysia.

Export credit cover increased to USD 170 mn: On December 20, 2017, Altech announced that German government-owned KfW IPEX-Bank approved the credit facility for a total project finance debt package of USD 190 mn for its HPA project. The increase in finance package than the initial proposed USD 185 mn amount signified strong scope of the project and was due to increase in Export Credit component of the project from USD 165 mn to USD 170 mn. Altech found the proposed debt package attractive, and along with KfW IPEX-Bank as the sole lender, planned to execute a formal loan facility agreement.

Optimistic IMC decision for Export Credit Cover: On December 15, 2017, Altech announced the positive decision of a German Government inter-ministerial committee (IMC), pertaining to the company's project finance export credit cover application. It also emphasized the fact that this "offer for cover" would be beneficial for the HPA project.

SMS approves USD 15 mn equity investment in Altech: On November 9, 2017, Altech announced the approval of an additional USD 11 mn equity investment by SMS. It would make the total commitment of USD 15 mn, subject to financial closure of targeted USD 185 mn of debt, which was to be accomplished during the first half of 2018. The involvement of SMS, Altech's lead EPC contractor as appointed on 16 May 2017, instilled confidence and support for the company.

Listing Information

Altech was listed on the Australian Securities Exchange (ASX- ATC) in Australia on 27 January 2010 as Australian Minerals and Mining Group. It was also listed on the Frankfurt Stock Exchange (FRA- A3Y) in Germany on 4 April 2017.

Contacts

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Major Shareholders

Equity Holder	No. of ordinary shares held	Percentage shareholding
SMS Investments SA	38,985,348	6.81%
MAA Group Berhad	33,056,478	5.77%
HSBC Custody Nominees (Australia) Limited	32,506,321	5.68%
JP Morgan Nominees Australia Pty Limited	22,487,273	3.93%
Lake Mcleod Gypsum Pty Limited	20,727,953	3.62%
Citicorp Nominees Pty Limited	19,787,160	3.46%
National Nominees Limited	8,811,648	1.54%
Mr. Lindsay George Dudfield & Mrs. Yvonne Sheila Doling Dudfield	7,245,497	1.27%
Mr. Si Fock Chang	6,500,000	1.14%
Mr. Daniel Lewis Tenardi <Tenardi Family A/C>	6,294,915	1.10%
Gwynvill Trading Pty Limited	6,100,000	1.07%
<i>Source: Company Website (as on February 04, 2019)</i>		

Management and Governance

Personnel	Designation	Current and total experience
Luke Frederick Atkins LLB	Non-Executive Chairman	Mr. Atkins is a lawyer and has significant experience in the areas of capital raisings, mining, exploration, and corporate governance. Formerly, he was the Executive Chairman of Bauxite Resources Ltd (BRL), where he successfully negotiated as third party to access funding, joint venture partnerships, land and infrastructure. He has held a number of executive and non-executive positions of private and public companies including a number of mining and exploration companies. He is also a Non-Executive Director of BRL.
Iggy Tan B.Sc MBA GAICD	Managing Director	Mr. Tan has more than 30 years of chemical and mining experience in various aspects including capital raisings, funding, construction, start-ups and operations. He holds an MBA from the University of Southern Cross, a BSc from the University of Western Australia and is a Graduate of the Australian Institute of Company Directors. He has been involved in commissioning and start-up of seven resource projects in Australia and overseas, including high purity technology projects, making him an accomplished project builder and developer. Previously, he had held positions of MD at Nickelore Limited, Galaxy Resources Limited and Kogi Iron Limited. At Galaxy, he played a key role in fund raising, construction and start-up of Mt Cattlin spodumene mine and the Jiangsu lithium carbonate plant, which resulted in Galaxy becoming the world's leading producer of high purity lithium carbonate. Currently, he is responsible for managing and implementing the next stage of the company's strategic business objectives, which include the commercialization of the HPA project.
Shane Volk BBus (Acc), GradDip (ACG), CSA	Company Secretary & Chief Financial Officer	Mr. Volk is a qualified Chartered Secretary and has a Bachelor of Business (Accounting) from the Royal Melbourne Institute of Technology. He has significant experience in accounting and corporate governance of Australian and international mining operations. He has worked previously in Papua New Guinea, Indonesia and Australia across various mining-related verticals such as exploration, operations, business development and corporate governance. Formerly, he was the CFO and company secretary for African Iron Ltd, Emerson Resources Limited, and Kogi Iron Limited.
Daniel Lewis Tenardi	Non-Executive Director	Mr. Tenardi has over 40 years of experience as mining executive for various commodities, including iron ore, gold, bauxite, and copper. He previously worked with Alcoa for around 15 years at its bauxite mines in Western Australia and Kwinana refinery. He gained a substantial amount of gold mining experience at Roche Mining at the Kalgoorlie Superpit and at Anglo Gold Ashanti's Sunrise Dam. Subsequently, he was part of executive management at Rio Tinto's Robe River Iron Associates and their East Pilbara Division and was later appointed as a Director of Robe River Iron Associates. He also held the positions of General Manager of Operations and Chief Operating Manager at CITIC Pacific Mining. He was the MD at Bauxite Resources Ltd, where he drove the rapid development of the company from its initial exploration phase, expansion of land holdings, to the commencement of trial shipments and securing strong key associations with Chinese partners.
Peter Bailey	Non-Executive Director	Mr. Bailey is a qualified engineer with over 40 years' experience in the mining and industrial mineral production industry, dealing with various industries including iron ore mining, bauxite mining, zinc-lead-copper mining, alumina refining and alumina chemicals industries, respectively. He has an electrical engineering degree from the University of London. In 1996, he was the President of Alcoa Bauxite and Alumina; 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. He became the President of Alcoa Worldwide Chemicals' industrial chemicals department in 1998. He played a key role in Alcoa's worldwide chemicals business, which comprised of 13 plants across eight countries. Subsequently, he was appointed as the CEO of Sherwin Alumina, an alumina refinery based in Texas, US.

<p>Tunku Khyra</p>	<p>Yaacob</p>	<p>Non-Executive Director</p> <p>Mr. Tunku holds a BSc in Economics and Accounting from City University, London. He is a Fellow of the Institute of Chartered Accountants in England & Wales and a member of the Malaysian Institute of Accountants. He started off as an Auditor with Price Waterhouse, London from 1982 to 1985 and subsequently joined Price Waterhouse Kuala Lumpur from 1986 to 1987. He later joined Malaysian Assurance Alliance Berhad in 1987 and retired as its Chief Executive Officer in 1999. He is the Executive Chairman of the Melewar Khyra Group of Companies. He sits on the Boards of Khyra Legacy Berhad, Mycron Steel Berhad, MAA Group Berhad, Melewar Industrial Group Berhad, Ithmaar Bank B.S.C. and several other private companies.</p>
<p>Uwe Ahrens</p>	<p>Alternate Director</p>	<p>Mr. Uwe holds a master's degree in Mechanical Engineering and Business Administration from the Technical University Darmstadt, Germany. He started his career from KOCH Transporttechnik GmbH in Germany and later he held a senior management position for 12 years, working mainly in Germany, US and South Africa. In 1997, he was the General Manager of KOCH in South East Asia based in Kuala Lumpur and became its Managing Director in 1999. Later, he joined Melewar Group in 2002 and is currently the chief technical officer of the Melewar group of companies, executive director of Melewar Industrial Group Berhad and managing director of Melewar Integrated Engineering Sdn Bhd. He also sits on the boards of several other private companies.</p>

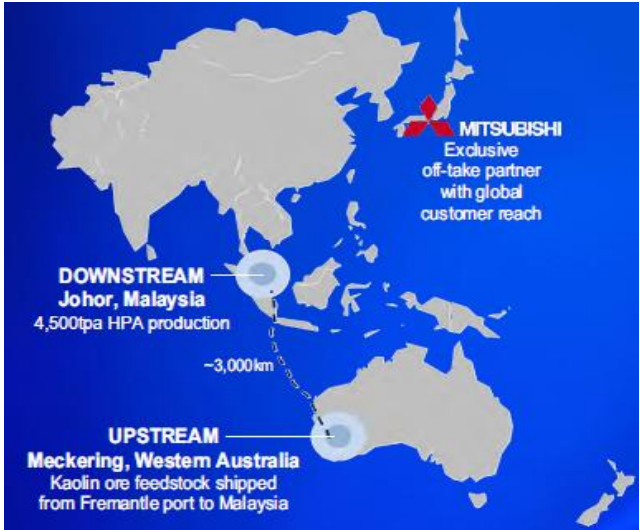
Assets and Projects

Listed on ASX, Altech is an HPA processing company with the objective of becoming one of the world’s leading suppliers of 99.99% (4N) HPA (Al₂O₃). It is the first fully integrated HPA production company globally and is in the advanced stage of commencing construction of a new HPA plant and starting production. It owns the Meckering Kaolin Deposit in Western Australia and intends to build the HPA plant at a secured site in Johor, Malaysia.

The company has completed a BFS and FIDS for the construction and operation of a 4,500 tpa HPA (4,000 tpa previously) plant at Tanjung Langsat, Malaysia. The plant will produce HPA directly using kaolin clay feedstock sourced from Meckering. Altech will employ “off-the-shelf” plant and equipment to extract HPA using a hydrochloric acid- based process.

Along with completion of the plant process flow sheet optimization, Altech has appointed German EPC contractor SMS group GmbH (SMS).

Company’s Asset Portfolio

Altech Kaolin Deposit and Processing Plant	Project overview
 <p>DOWNSTREAM Johor, Malaysia 4,500tpa HPA production</p> <p>~3,000km</p> <p>UPSTREAM Meckering, Western Australia Kaolin ore feedstock shipped from Fremantle port to Malaysia</p> <p>mitsubishi Exclusive off-take partner with global customer reach</p>	<div style="background-color: #4a7c9c; color: white; padding: 10px; border-radius: 5px;"> High Purity Alumina (HPA) </div> <p style="text-align: right;">Malaysia</p> <ul style="list-style-type: none"> •Target Commodity: High Purity Alumina (HPA) •Interest - 100%
<p>Source: Company filings</p>	<p>Source: Company filings</p>

Project

Company’s interest in the project: 100%-owned kaolin deposit at Meckering, Western Australia.

Asset Summary: Altech aspires to be one of the world’s leading suppliers of 99.99% (4N) HPA. The company owns a site where a 4,500 tpa HPA plant will be built in Malaysia. The HPA plant will procure the required feedstock from the company-owned Meckering Kaolin (clay) deposit via road transport to the port of Fremantle and then shipped to Malaysia.

Target Commodity: HPA

Location: Located over private freehold farmland which is 140km east of Perth and 8km south-east of Meckering in Western Australia, the kaolin deposit will supply the feedstock required for the proposed HPA processing plant in Malaysia to produce 99.99% (4N) HPA.

The plant site at Tanjung Langsat Industrial Complex is situated 40km to the south-east of the city of Johor Bahru, Malaysia.

Meckering Kaolin Deposit

Geological interpretation: The kaolin deposit will be open pit mined and an initial 30-year mine life has been designed. It is anticipated that around 1.2MMT of the 12.7MMT kaolin mineral resource will be mined in 30 years over 10 discrete mining campaigns.

Kaolin’s prospective Indicated Mineral Resources is 11MMT @ 82.7% ISO brightness (JORC 2012). The updated Mineral Resource is 11MMT of Kaolin clay containing 45% minus 45-micron clay with a brightness of 82.7% (ISO standard), which has been classified as Indicated. The estimates of mineral resources are done using an 80% brightness cut-off and a 30% minus 45-micron cut-off and is in accordance with JORC 2012.

The Meckering Kaolin deposit has low impurities, particularly iron and sodium, which makes it an ideal feedstock for hydrochloric acid processing to HPA.

Mineralization: In October 2016, the company announced a maiden ore reserve (JORC 2012) of 1.2MMT @ 30% Al₂O₃ in the minus 300-micron fraction with a cut-off grade of 25% Al₂O₃. This is considered to be sufficient HPA plant feedstock supply for an initial 30-year mine-life. The Ore Reserve is within the mineral resource which is 12.7MMT at 30% Al₂O₃. The currently known mineral resource could support the HPA processing operation for >250 years.

The tables below highlight the mineral resource estimation and ore reserves for the HPA project:

Resource estimate	Tonnage (MMT)	Minus 300µm Al ₂ O ₃ (%)
Measured	1.5	30.0
Indicated	3.3	30.0
Inferred	7.9	29.1
Total	12.7	29.5

Ore Reserve estimate	Tonnage (MMT)	Yield % of minus 300	Minus 300 µm Al ₂ O ₃ (%)
Proved	0.45	69	30.1
Probable	0.75	71	30.0
Total	1.22	70	30.0

Ore Movement and Loading Facility

The conventional open pit mined ore will be stockpiled on the ROM stockpile situated adjacent to the container loading facility. The loading facility is located just south of the mining operation. The mine is planned to include a small site office, crib room and toilet facilities. Raw kaolin is to be transported from the ROM stockpile with a front-end loader put through a trommel screen designed to reject material over 12mm. Undersize material is to be stored in a loading shed.

Meckering screening/loading facility site layout



Source: Company filings

The container loading facility is anticipated to run for 3,120 hours per year (h/y), based on 5 day, 12hour shift operation. Overall, 43,538 t/y of raw material are planned to be loaded into sea containers.

The container loading facility is planned to be a two-man operation, and it is to operate at 2,210 h/y, based on a 5 d/w at 12-hour per shift and 96% capacity utilization. Around 36 containers, each with capacity of approximately 22 tons of Kaolin will be loaded and transported per week.

Malaysian HPA Processing Plant

Standard sea containers will be shipped to Tanjung Pelepas port, Johor, Malaysia. Once they arrive at Tanjung Pelepas, the loaded containers will be either stored at the port or will directly be moved to Altech’s proposed HPA plant site.

The proposed HPA plant site is to be established within the Tanjung Langsat Industrial Complex of Johor, Malaysia as per the 30-year lease agreement with a 30-year renewal option with Johor Corporation.

The Tanjung Langsat Industrial Complex is located approximately 40km to the south-east of the city of Johor Bahru. The strategic position of the company's HPA plant site was chosen for its proximity to hydrochloric acid and quicklime plants – all required consumables for the HPA plant. Additionally, the location has access to reticulated natural gas, high voltage power and access to processing water.

In November 2016, a local site office was opened for the Malaysian subsidiary Altech Chemicals Sdn Bhd., located within the Tanjung Langsat Industrial Complex. The site office serves as the temporary base for visiting EPC engineers working on the HPA project's detailed design along with various contractors involved in soil survey drilling (as part of the civil engineering design requirements) at the HPA plant site, throughout the year.

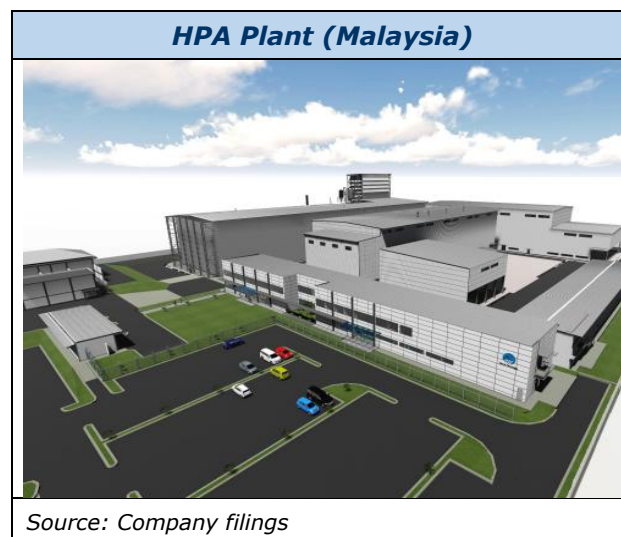
Currently, the company has finalized the site layout and building design for its HPA plant in Malaysia. The layout incorporates results from the recently completed site geotechnical survey and feedback from pre-construction consultation meetings between SMS group GmbH, local authorities, and Malaysian permitting consultant – WKL & Associates. The final design is the basis for the submission of a development order application and the commencement of Stage 1 construction.

The company has also completed its initial site establishment activities with the site being fully fenced and secured. A development order building application was submitted and has now been issued. The other developments that have taken place are:

- Erection of the construction office
- Installment of the security post
- Establishment of the vehicle wash down bay along with sediment control
- Completion of the site weather monitoring station
- Installment of temporary ablutions
- Establishment of the site safety induction process
- Completion of removal of top soil from the site and bulk earthworks; site levelling is in progress. A foundation piling rig has been mobilized to site for piling tests
- Workshop foundation piling is expected to commence shortly and preparations for

the reinforced concrete works are in progress. Workshop steel (70 tons) has been purchased and has arrived at a near fabrication shop in preparation for sandblasting and off-site fabrication.

In conclusion, Stage 1 work has been moving steadily on track. The site is gradually progressing from the establishment phase into the construction phase. Work is being conducted in accordance with the highest safety standards and there have been no safety incidents to report.

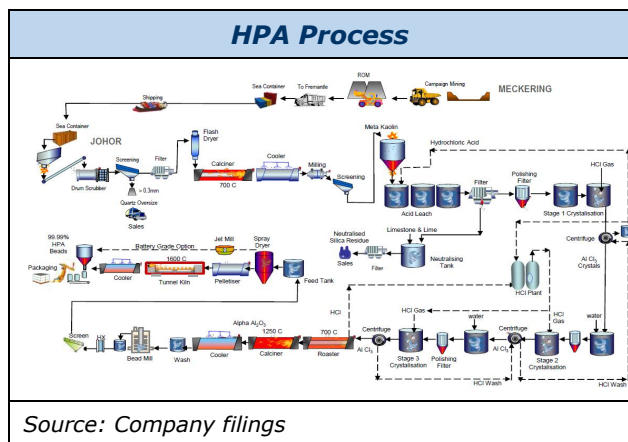


Altech's HPA Process: Altech's HPA process utilizes hydrochloric acid leach. The process has the following steps:

- simple recovery of acid
- natural low-impurity ore feedstock
- calcination to alpha HPA
- micronization to product requirement

This processing technique is advantageous as it allows for simple recovery of acid which is re-usable at the front-end of the process therefore reducing operating costs.

This process is a conventional, proven and robust chemical process and has been in existence since the early 1980s. This process is suitable for Altech's aluminous clay deposit. The raw material contains lower levels of impurities; hence the high-quality feedstock aids the production of a very pure alumina product, providing the company a competitive advantage among peers.



Altech’s process exhibits strict control over product characteristics such as purity, size and crystal structure. The company’s design philosophy involves minimizing technology risk by utilizing proven off-the-shelf equipment avoiding prototypes, for example:

- Conventional leaching technology
- Use of standard rotary kilns
- Off-the-shelf evaporative crystallizers used in the chemical industry

The design of the process is carried out in a way to meet all stringent environmental standards and limits associated with Malaysian standards.

FIDS: On 29 June 2015, a BFS was completed and this was recently updated to a FIDS in October 2017. The successful completion of the FIDS provided vital support in achieving construction finance and ongoing capital requirements.

All the major aspects, such as final capital cost estimate, a fixed-price lump-sum EPC contract value for construction of the HPA plant by the consortium led by SMS and a fixed-price lump-sum EPC contract value for construction of the Meckering Kaolin container loading facility by Perth-based Simulus Engineering Pty Ltd are covered under FIDS estimates.

Altech has accomplished the significant milestone of extensive lender due diligence process, thereby de-risking the project considerably.

FIDS financial metrics are extremely robust as they have considered the fact that the company has managed to get the final fixed-price lump-sum EPC contract that includes completion guarantee, throughput and process/quality guarantees, as a remarkable outcome.

- Pre-tax NPV_{7.5} USD 505 mn
- Internal Rate of Return (IRR) 22%
- Payback (full rate) 3.9 years
- EBITDA USD 76 mn per annum
- Capital cost USD 298 mn
- Total target debt of USD 185 mn
- Production costs – USD 9.90/kg
- Avg. sale price – USD 26.9/kg
- Gross Margin – 63%

German government-owned KfW IPEX-Bank has found the capital and operating costs assumed in FIDS to be reasonable. Altech’s project finance debt is being funded by German government-owned KfW IPEX-Bank, with the below details:

- Target total debt of USD 190 mn
- USD 170 mn export credit finance
- 50% of plant – German suppliers
- Low interest, long tenure
- Export Credit Approval date 20 December 2017

Off-take agreement with Mitsubishi: The off-take agreement is a follow-on step to a previous deal with Mitsubishi, which dealt with the sales and distribution of Altech’s HPA within Japan only. After the prior deal, further discussions led to the appointment of Mitsubishi as the exclusive buyer and global distributor for all of Altech’s HPA production.

Signing an exclusive off-take agreement with Mitsubishi Australia Ltd. as the exclusive off-taker, backed by the Mitsubishi Corporation, has positive implications:

Firstly, it is considered to be a **strong vote of confidence for the project from Mitsubishi.**

Along with this, Mitsubishi maintains long-term relationships with customers from around the world in virtually every industry, including energy, metals, machinery, chemicals, food and general merchandise. Hence, this association provides **support in making projects and partnering** toward realization of the targets and the objective of becoming the world’s largest and lowest-cost producer of HPA.

This alliance was a major step towards **securing project financing on favorable terms.** A signed purchase commitment for 100% of production in the initial 10 years reduces the commercial risk of the project. This assisted in demonstrating to banks and other potential

project financiers that every ton of HPA produced in the first 10 years will be purchased. With this, Altech achieved a significant de-risking milestone.

The off-take sales agreement with Mitsubishi is scheduled to commence on the date of first shipment of the final HPA product.

Approvals granted: Below are the approvals received by Altech:

A. Meckering approvals: All the statutory WA state Government approvals required for the commencement of mining at the Meckering kaolin mine have been obtained during 2017.

- In December 2016, the company submitted a mining proposal and mine closure plan for Mining Lease M70/1334 which was approved by the WA Department of Mines, Industry Regulation and Safety (DMIRS) in March 2017.
- Altech also submitted a works approval application pertaining to the kaolin screening and loading facility and consequently was granted by the DWER in August 2017.
- Altech also submitted a works approval application pertaining to the kaolin screening and loading facility and consequently was granted by the DWER in August 2017.
- Altech has to consider the Native Title and Aboriginal heritage aspects of the proposed mine however; the Mining Lease M70/1334 does not contain any registered sites under Section 5(b) or 5(c) of the Australian Aboriginal Heritage Act 1972 (AHA) and it is not required to request approval by the Minister for Aboriginal Affairs under Section 18 of the AHA in order to proceed with the works.

B. Johor approvals: The approvals granted to the company are:

- The Department of Environment, Johor (DOE) has approved the Preliminary Site Assessment for the HPA plant at a production rate of 4,500 tpa, signifying the proposed location of the HPA plant at Tanjung Langsat and the related proposed activity are compatible with gazette structures, local plans, surrounding land use, set-back

provisions or buffer zones and waste disposal requirements.

- The DOE has also advised that an Environment Impact Assessment (EIA) is not required for the HPA plant, as the processing capacity of the plant is less than 100 tons per day.
- International environmental standards, along with the standards of the Malaysian Environmental Quality Act (EQA) 1974, are to be met as per the proposed HPA plant's design.

Project Schedule: The project schedule for the HPA process plant in Malaysia is:

- 18 months are reserved for construction of the Meckering screening/container loading plant. This duration also includes six months for equipment procurement and delivery.
- 24 months are set aside for construction of the HPA plant in Malaysia with five months for commissioning.
- The schedule also includes a total of 20 months for equipment procurement, manufacture and delivery.
- Approximately 30 months have been allotted for activities such as installation of underground utilities, site infrastructure and landscaping at the plant site.

As per the FIDS, full production of 4,500 tpa HPA at a grade of 99.99% Al₂O₃ (4N) is expected to be achieved in Year 3 of operations, while HPA production is scheduled to commence in 2020.

The major project phases are;

- Engineering Phase – Project Months 1 to 14
- Procurement Phase – Project Months 5 to 25
- Construction Phase – Project Months 7 to 31
- Commissioning & Start-up Phase – Project Months 25 to 39

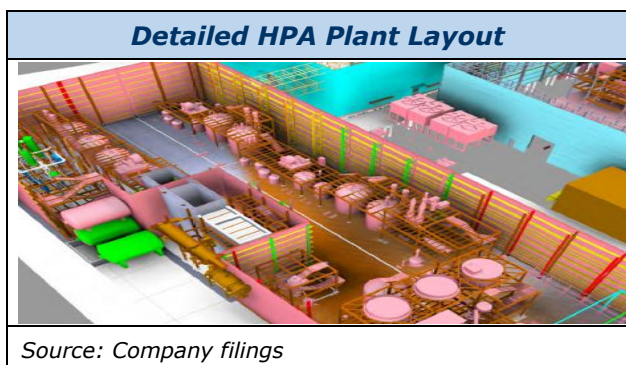
An Altech team is planned to manage the plant operations.

Recent developments:

A. Detailed Design of HPA Plant and Stage 1 construction: Altech dedicated 2018 towards significant detailed design and engineering work on the Malaysian HPA plant, as well as commencement of its HPA plant's stage 1 construction.

The detailed design work for the HPA plant generated the final construction cost and EPC

contract value which was incorporated into the company's application for German-government export credit agency (ECA) project dealing with debt finance cover.



Stage 1 is progressing as planned with the completion of site office, security post and safety systems. Top soil has been removed along with bulk earthworks and levelling is in progress.

B. Patent granted for kaolin to HPA production process: On October 16, 2018, Australian Patent Office granted the Certificate of Grant for an Innovation Patent, for the company's process of producing HPA from kaolin.

C. Due diligence update on mezzanine debt: On January 29, 2019, Altech provided an update on the mezzanine debt term sheet stating that the review of its HPA project concluded with a positive report on the project's technical aspects and project flowsheet. Advisian, the mezzanine lender's technical advisor, conducted an extensive and thorough review of the HPA project over six months. After extensive analysis, test work/data review and discussions with Altech and SMS group representatives, the report stated that the company had suitable proposed mitigation steps to manage the identified technical risk areas and the report was currently being reviewed by the mezzanine debt provider. Following this, on February 19, 2019, Altech announced that that the proposed mezzanine debt provider completed its assessment of the independent technical advisor's report, and that it planned to proceed towards preparation for the internal approval process of a proposed mezzanine debt facility. Finally, on March 8, 2019, the company announced that it had officially mandated Macquarie Bank as the preferred mezzanine lender for its proposed Malaysian HPA plant.

D. EPC Contracts to SMS group: On May 16, 2017, Altech announced appointment of German

engineering firm SMS group as EPC contractor for the construction of its Malaysian HPA plant.

SMS provided a fixed-price lump-sum EPC contract value via a consortium led by SMS for the construction of the Malaysian HPA plant.

Further, SMS had agreed to clear and concise guarantee with liquidated damages provisions and throughput and process/quality guarantees supported by a substantial performance bond to Altech. Also, SMS had proposed process and final product guarantees based on its prior experience with Kaolin-HPA hydrogen chloride processing, hence strengthening Altech's export credit project finance cover application and significantly mitigating project risk. This SMS EPC contract also facilitates entire coverage of the capital costs of the Malaysian HPA plant.

E. Works Approval granted for Meckering Kaolin deposit: On August 25, 2017, DWER granted approval for Altech's application for the proposed kaolin screening and loading facility at the Meckering kaolin deposit (M70/1334).

This allowed the construction of the proposed Kaolin screening and loading facility infrastructure, to be positioned within Altech's granted mining lease, approximately 86 Ha in size, adjacent to the proposed ROM stockpile.

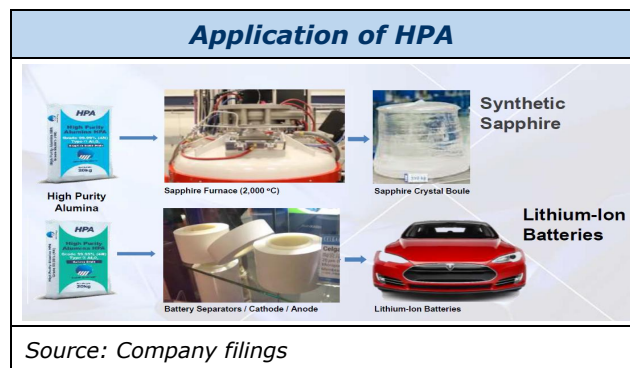
F. Altech finalizes 4,500 tpa HPA plant design: The company finalized the upgraded design for the increase in capacity of the planned Malaysian HPA plant from 4,000 tpa to 4,500 tpa.

Altech completed the optimization of the plant process flow sheet, while working with its appointed German EPC contractor SMS. Most of the changes encompassed the newly introduced flexible finished product line capable of producing HPA for both the synthetic sapphire industry (up to 4,500 tpa of high-density pellets) and the lithium-ion battery industry (up to 1,500 tpa of powder at sub-micron particle size).

According to the plan, both the products will be bagged via an automated bagging machine.

- **Sapphire Grade 4N HPA:** Altech's proposed synthetic sapphire grade HPA product is 4N (99.99%) HPA (Al_2O_3) in the form of high-density beads of around 3mm-4mm each in size. The target loose bulk density of Altech's high-density beads is around 2.2 tons per cubic meter (t/m^3).

- Lithium-ion battery grade 4N HPA:** The objective is to produce ultra-fine HPA used in the lithium-ion battery sector. The demand of lithium-ion batteries with separator sheets coated with 99.99% (4N) HPA is going high as a result of advances in the electric vehicle industry.



Source: Company filings

G. Successful AUD 17 mn share placement:

In Q4 2017, the company completed an AUD 17.2 mn share placement. The placement was underwritten by SMS group with a USD 4.0 mn (AUD 5.1 mn) subscription, and an AUD 3.0 mn subscription from major Malaysian shareholder, the Melewar Group.

The proceeds will continue to be utilized for the development of its HPA project. It includes payments for land at the project sites in WA and Malaysia, detailed engineering design, working capital and general corporate purposes.

H. SMS commits further USD 11 mn equity support: SMS group approved an additional equity investment of USD 11 mn in Altech.

As of November 2017, Altech had a total of USD 15 mn equity support from the SMS group. It demonstrated SMS group's strong assurance and commitment to Altech and its HPA project.

I. Altech raised ~AUD 20 mn equity: The company raised equity capital worth ~AUD 20 mn in H1 2019 for its plant construction funding. The company is expected to raise further equity to support the project financing. However, the equity amount to be raised will depend on the amount of mezzanine debt being secured, the outcome of the JV and project sell down option, plus final financing costs, reserve accounts, working capital and any lender mandated contingency. The equity component of the project

finance is being pursued in two distinct work streams, JV or partial project sell down and/or a placement of shares by the company.

On the JV front, several funds, PE and industrial groups have commenced due diligence and investment modelling.

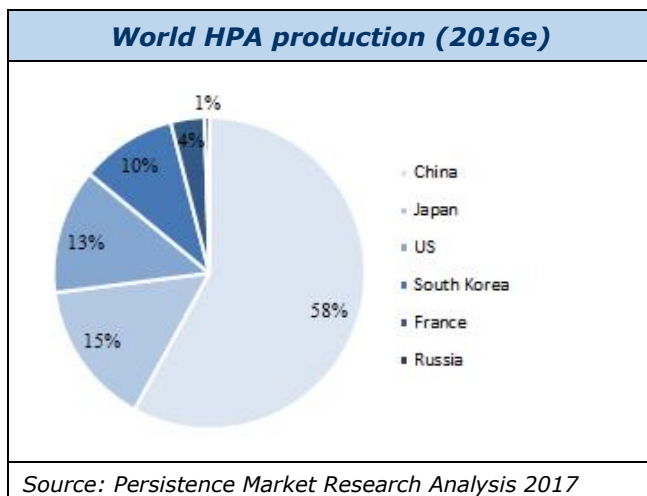
Technologies and Markets

High Purity Alumina (HPA)

Chemistry and Properties: HPA, a high-end product of the non-metallurgical alumina market, is a high-value, white, granular chemical.

Production: HPA is commercially produced by treating aluminum with specific chemicals or by use of others aluminous feed stock. Various production processes include alkoxide process, thermal decomposition process, choline hydrolysis process and modified Bayer process. The product types include 4N HPA – 99.99% Purity; 5N HPA – 99.999% Purity; and 6N HPA – 99.9999% Purity.

Total global production of HPA amounted to 25.4 Kilo Tons (KT), with China accounting for 58%, followed by Japan, US and South Korea with 15%, 13% and 10%, respectively. Top seven HPA producers contribute to nearly 63% of the global market volume.



Applications: HPA is used as a base material in manufacture of sapphire substrates with various applications such as scratch-resistant artificial sapphire glass, LEDs, semiconductor wafers, and lithium-ion battery separator coatings. HPA is also used as an input in manufacture of automotive sensors, ceramics, abrasives, dental implants.

Demand: Increasing demand from application in electronics industry coupled with that from some of the other relatively smaller applications such as lithium-ion battery, sapphire glass for optical applications such as lenses, optical windows, mobile screens are some of the factors that are expected to fuel growth of the HPA market. A large

portion of surge in HPA demand is driven by the lithium-ion battery sector. As per the information provided by Altech, there has been a shift by lithium-ion battery manufacturers to the use of HPA coated battery separators during the June-ended quarter.

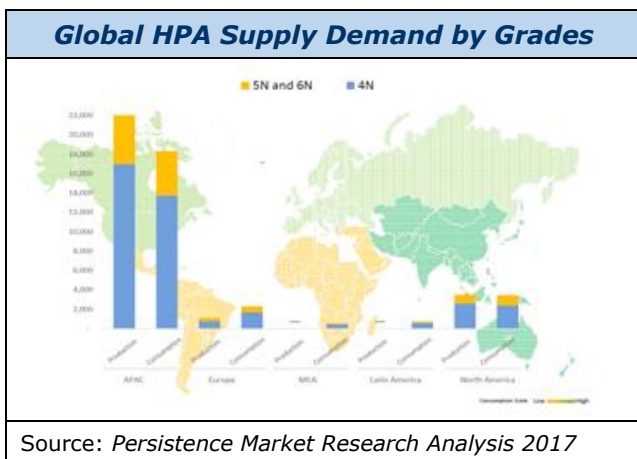
As per Persistence, the total HPA demand by 2025 would be 62,519 tpa whereas Petra Capital and CRU estimated the HPA demand 122,000 tpa and 92,900 tpa, respectively. The average estimate of total HPA demand is 92,473 tpa by 2025, which is approximately equivalent to 20 proposed Altech plants producing 4,500 tpa.

Total HPA Demand forecast by 2025

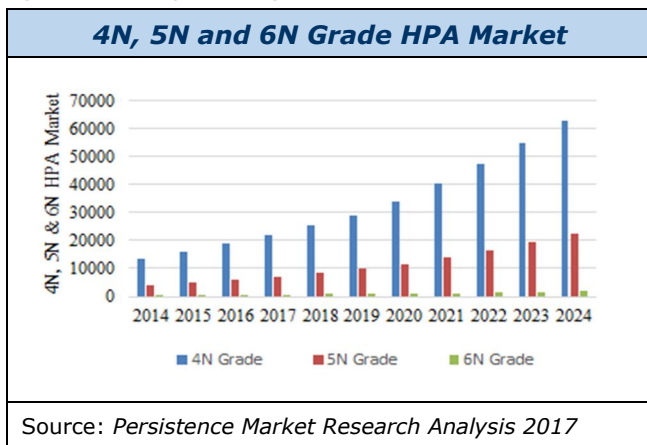
Organisation	Total HPA Demand tpa 2025	Equivalent Number of Altech Plants
Persistence	62,519tpa	14 x
Petra Capital	122,000tpa	27 x
CRU Consulting	92,900tpa	20 x
Average	92,473tpa	20 x

Supply: Global sales of HPA, valued at USD 970.8 mn in 2016, and are projected to increase at a CAGR of 11.2% to be valued at USD 2,267.4MM by 2024.

Asia Pacific dominated the overall market in 2015 with over 72% share. North America ranked second, accounting for over 14% market share, followed by Europe with 9% in 2015. Meanwhile, Asia Pacific is anticipated to be the fastest growing region, both in terms of value and volume, during the forecast period.



In 2015, 4N was the largest product segment, accounting for 74.2% share of the overall market, while the remaining 23.3% and 2.5% market shares were held by 5N and 6N product segments, respectively.



LEDs: LED was the leading segment in 2015, accounting for 57% market share and was estimated to reach 61% share of the overall market by 2024. This segment's growth has been attributed to increasing demand for synthetic single crystal sapphire, used as a base substrate in the manufacture of LEDs. APAC region accounted for 42.4% share in overall global LED lighting market in 2015.

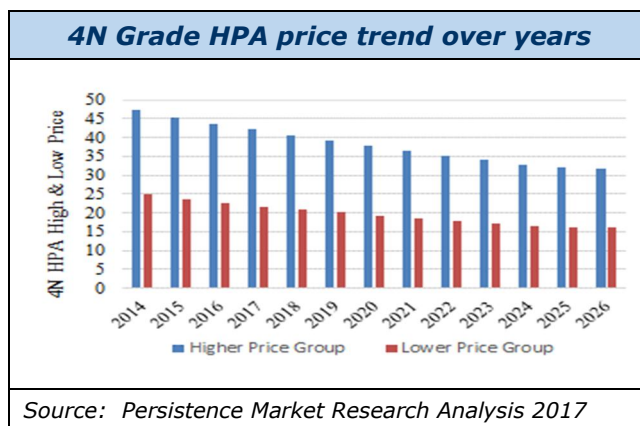
Semiconductors: Consumption of HPA for semiconductor application is expected to reach 17,271T, valued at USD 450.8 mn by 2024. Global semiconductor market is expected to register a steady YoY growth of around 6% to 7%.

Phosphor: Sales of HPA for phosphor applications is expected to be valued at USD 183.2 mn by 2024 end with CAGR of 7.2%.

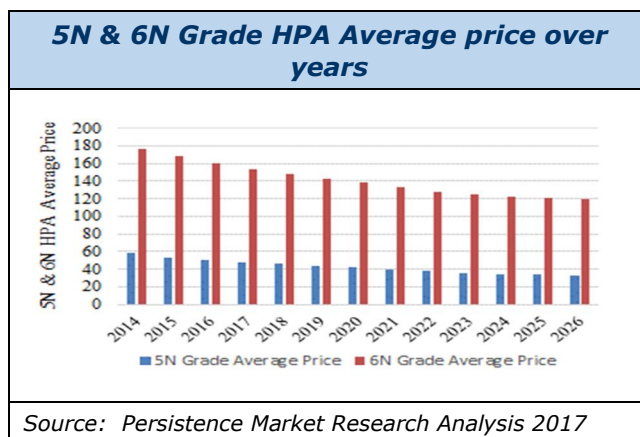
Market Trends: Commodity Prices: Pricing of HPA depends upon the product density, particle size distribution, and degree of purity. Processing costs are significantly higher for highly pure HPA.

Prices of smelter grade alumina range from around USD 0.4 per kg to USD 0.5 per kg, whereas those of 4N grade HPA are around USD 45 per kg.

Average price per kilogram for 4N grade HPA declined drastically from USD 60 and USD 33 in 2008 to USD 45.6 and USD 23.6 for high and low price groups respectively by 2015 end. Prices for 4N grade HPA product ranged from USD 40 per kg to USD 45 per kg of HPA as of mid-2017.



Weighted average price of 5N and 6N grade HPA stood at USD 51.0 per kg and USD 160 per kg in 2016.



Significant reduction in prices of HPA has been attributable to increased supply, capacity additions, existing capacity ramp-ups and proliferation of local companies, especially in China, offering relatively lower priced products and improvement and emergence of lower-cost alternative feedstock-based production processes.

Project Risk Profile Analysis

Based on our analysis of the project stage, resource characteristics and management expertise, we believe that the HPA project has a LOW to MEDIUM Risk Profile.

HPA Project – LOW to MEDIUM

Project Stage Risk – LOW to MEDIUM

- Meckering kaolin deposit has an ore reserve (JORC 2012) of 1.2MMT @ 30% Al₂O₃ with a cut-off grade of 25% Al₂O₃. It has mineral resources estimation of 12.7MMT @ 30% Al₂O₃ – which could support a long-life HPA processing operation.
- BFS on the kaolin deposit, released in March 2015, also suggested the economic feasibility of the mine. The financial and technical outcomes of the BFS have also been confirmed in the FIDS in October 2017.
- The HPA project is currently at the construction stage of its processing plant. There is an execution risk on production and commissioning.

Based on the above factors, we consider the HPA project to have a LOW to MEDIUM project risk.

Financing/Capex Risk – LOW to MEDIUM

- The company is continuously putting efforts to bring in sufficient investment to commence construction and production.
- The company has estimated its final capital costs to be USD 297.6 mn under FIDS in the near term.
- For the financing of the above capital, the company plans to have total debt of USD 190 mn from KfW IPEX-Bank – with USD 170 mn export credit finance and USD 20 mn at commercial terms.
- USD 15 mn of equity support from SMS group will also act as a strong catalyst to begin their operations. Further, the company has also raised equity worth ~AUD 20 mn in H1 2019.
- The off-take agreement with Mitsubishi for secured sales of 100% of 4,000 tpa HPA production (intent for 4,500 tpa) for the first 10 years of HPA operations is critical for the company to enter the market.

Based on the above factors, we consider the HPA project to have a LOW to MEDIUM financing risk profile.

Based on the above factors, we consider the HPA project to have a LOW to MEDIUM financing risk profile.

A delay in equity financing would significantly impede the company's production plans for starting up the production on time and further finance could be required for working capital requirements.

Operational Risk – LOW

- Altech owns 100% of the kaolin deposit in Western Australia. It is well connected to the road network and is 140 km from the Fremantle port.
- The financial metrics from the FIDS are extremely robust. Project NPV is USD 505 mn at a discount rate of 7.5%, payback (at full rate) is 3.9 years and annual EBITDA is USD 7.6 mn at full production. IRR is estimated to be 22% with a gross margin on sales of 63%.
- Altech's mining permit M70/1334 was approved on 14 March 2017. The approval for construction of the Kaolin screening and loading facility was granted in August 2017 and could move ahead, subject to finance.
- Altech exercised the option to purchase Meckering freehold land over granted mining lease M70/1334.
- Furthermore, the project has no known regulatory or environmental interferences which will hamper the development.

Considering the above factors, we believe that the project has attractive operational characteristics. As such, we believe the project to have a LOW operational risk profile.

Key Personnel Risk – LOW

- The current management has experience in exploration, project development, mining operations and also in financing and construction.
- The management team have also been involved in the development of industrial and mining projects in Malaysia and other jurisdictions.

Considering the diversified experience of the management, we consider the project to have a LOW-Key Personnel Risk profile.

Risk Parameters – Definition

Project Stage Risk

The following are the various stages of a project:

- **Early stage exploration:** In this stage, the exploration location is decided using a combination of various techniques such as samplings, drilling, geophysics, and other extensive geological and exploration services.
- **Pre-feasibility study:** A preferred base-case option is identified from the possible options available to the company. The preferred base-case option provides some level of confidence in the production capacity, ore grades, metal recovery, capital and operating costs, project schedule, and project risks/opportunities. A financial analysis is also carried out to assess the economic viability of the project.
- **Feasibility study:** This includes a collection of more detailed information, additional designs, and project-specific cost information to refine the project cost and schedule. It also addresses information gaps, issues of concern, risks, and opportunities identified in the advanced exploration stage.
- **Detailed engineering:** Detailed designs based on the project scope, concept designs, and the purchase of key plant equipment are completed.
- **Site construction:** Site construction starts as per the field engineering designs and is expected to confirm adherence to appropriate quality-control practices.
- **Commissioning and start of operations:** After the completion of construction, operability testing, and acceptance, the owner is asked to confirm if the project construction and performance are as per the design and meet the required plant performance and safety requirements. The final operating control programs are then completed, installed, and tested for functional efficiencies.

High risk: We consider a project to have high risk when it is in the initial stages of development and is yet to report a resource estimate on the prospect.

Medium risk: On the completion of a pre-feasibility report having initial evaluations of mine characteristics and other operational estimates like

capex and opex, project stage risk is reduced from high to medium.

Low risk: As the project advances to site construction and commissioning, the project stage risk is reduced further to the low risk category.

Project Financing Risk

Initial stages of project development, including exploration and resource estimation, require higher levels of capital investment. Investments in the exploration stage can be riskier as the economic viability of deposit is not established. The risk level of the capital reduces as it advances through various exploration stages.

Initial stages of exploration and development of the project attract high-risk-capital investors. As the project stages proceed, the company has varied options such as equity (IPO) and debt financing, among others.

High risk: Companies in the initial stages of project development, without proper estimates on fund requirement and clear view on financing options, are considered to have high financing risk.

Medium risk: When a company has established reasonable estimates on fund requirement and has visibility on early funding for planned project milestones, it is estimated to have medium financing risk.

Low risk: When the company's fund requirements are clearly stated and has already secured adequate funding, the company has low financing risk.

Operational Risk

Following are the various parameters considered to measure operational risk:

- **Geopolitical and Regulatory factors:** The locations of projects and their regulatory environments are key factors in acquiring licence and the subsequent development of the project. Obtaining necessary approvals can be time consuming, the delay of which could result in monetary losses, and operational delay.
- **Environmental factors:** The potential for environmental damage caused by mining activity and the likely cost to be covered by the company contribute to the economic viability of the project.

- **Mining technique:** The development plan for the mines, including the extraction methodology and the corresponding capex estimates, together define the operational efficiency of the project. The high quality of ore reserves (grade) and the ease for extraction provide higher return on investment and reduce the operational risk involved.
- **Geotechnical and other factors:** Mining machinery transportation, implementation of new technology for operations, and availability of power supply in areas with complicated geological and climatic conditions determine operational risks. Other risks include chances of flooding, pit slope, rim slide and accidents caused by the use of mining transport equipment in adverse weather conditions.

We consider a project based on all the above parameters and assign high/medium/low risk profiles in comparison with peers. Also, as the company moves to advanced stages, operational risk is reduced considerably.

High risk: The company has a high operational risk profile with assets that are in an early stage of

development and located in countries with regulatory uncertainties.

Medium risk: As the company progresses toward the acquisition of necessary licenses and environmental clearances, regulatory risks are reduced. Also, depending on the resource grade and the possible methodologies of extraction, an operational risk profile is assigned in comparison with peers.

Low risk: A company that is in the advanced stages of development has attractive project characteristics such as ore grade, capex, opex. NPV and IRR too have low operational risk profile.

Key Personnel Risk

We consider a project to be of a lower risk profile if the management team is highly qualified, has good experience in the resource sector and has lower dependability on a few people. It is desirable that the company has independent directors on its board and does not rely heavily on a few individuals.

Value

The Fair Market Value of Altech Chemicals Limited's shares stands between AUD 137.8 mn and AUD 321.0 mn.

The Fair Market Value for one of Altech Chemicals Limited's publicly traded shares stands between AUD 0.29 and AUD 0.68.

Altech Chemicals Ltd. Balance Sheet Forecast

CONSOLIDATED BALANCE SHEET	<i>All figures in 'AUD thousands, unless stated differently</i>				
	<i>High bracket estimates</i>				
<i>year ending June 30</i>	2019E	2020E	2021E	2022E	2023E
Total Current Assets	278,657	56,491	93,432	142,094	208,007
Total Non-Current Assets	249,639	464,959	399,457	330,995	275,232
TOTAL ASSETS	528,296	521,450	492,889	473,089	483,239
Total Current Liabilities	1,533	1,601	20,684	13,449	16,112
Total Non-current Liabilities	478,928	478,928	470,477	436,439	389,726
TOTAL LIABILITIES	480,460	480,529	491,161	449,889	405,837
Total Shareholders' Equity	47,835	40,921	1,728	23,200	77,402
TOTAL LIABILITIES and EQUITY	528,296	521,450	492,889	473,089	483,239

CONSOLIDATED BALANCE SHEET	<i>All figures in 'AUD thousands, unless stated differently</i>				
	<i>Low bracket estimates</i>				
<i>year ending June 30</i>	2019E	2020E	2021E	2022E	2023E
Total Current Assets	278,666	56,518	67,908	77,834	101,097
Total Non-Current Assets	249,639	464,959	399,457	330,995	275,232
TOTAL ASSETS	528,305	521,477	467,365	408,828	376,329
Total Current Liabilities	1,533	1,601	18,974	12,619	15,226
Total Non-current Liabilities	478,928	478,928	470,477	436,439	389,726
TOTAL LIABILITIES	480,460	480,529	489,451	449,058	404,951
Total Shareholders' Equity	47,845	40,948	(22,086)	(40,230)	(28,623)
TOTAL LIABILITIES and EQUITY	528,305	521,476	467,365	408,828	376,329

Important information on Arrowhead methodology

The principles of the valuation methodology employed by Arrowhead BID are variable to a certain extent, depending on the sub-sectors in which the research is conducted. However, all Arrowhead valuation researches possess an underlying set of common principles and a generally common quantitative process. With Arrowhead commercial and technical due diligence, the company researches the fundamentals, assets and liabilities of a company, and builds estimates for revenue and expenditure over a coherently determined forecast period.

Elements of past performance such as price/earnings ratios, indicated as applicable, are mainly for reference. Still, elements of real-world past performance enter the valuation through their impact on the commercial and technical due diligence.

Arrowhead BID Fair Market Value Bracket

The Arrowhead Fair Market Value is given as a bracket. This is based on quantitative key variable analyses such as key price analysis for revenue and cost drivers or analysis and discounts on revenue estimates for projects, especially relevant to projects estimated to provide revenue near the end of the chosen forecast period. Low and high estimates for key variables are produced as a valuation tool.

In principle, an investor comfortable with high brackets of our key variable analysis will align with the high bracket in the Arrowhead Fair Value Bracket, and, likewise, in terms of low estimates. The investor will also note the company's intangibles to analyze the strengths and weaknesses, and other essential company information. These intangibles serve as supplementary decision factors for adding or subtracting a premium in investor's own analysis.

The bracket should be taken as a tool by Arrowhead BID for the reader of this report and the reader should not solely rely on this information to make his decision on any particular security. The reader must also understand that while on the one hand global capital markets contain inefficiencies, especially in terms of information, on the other, corporations and their commercial and technical positions evolve rapidly. This present edition of the Arrowhead valuation is for a short-to medium-term alignment analysis (one to twelve months). The reader should refer to important disclosures on page 32 of this report.

Information on the Altech Chemicals Limited valuation

ATC Valuation Methodology: The Arrowhead fair valuation of Altech is based on the NPV of its HPA project.

Time horizon: The Arrowhead fair valuation for Altech is based on an NPV method. The time period chosen for the valuation is the life of mine of 30 years. HPA production is expected to commence from FY 2020 with a ramp-up plan towards its full utilization in three years. The later years are heavily discounted and have a marginal effect on valuation, which are included primarily to present a full project cycle situation.

Underlying business plan: Altech is currently focused on bringing its HPA project into production to generate revenues.

Prudential nature of valuation: This Arrowhead Fair Value Bracket estimate is a relatively prudential estimate, as it is based on the company's current HPA project.

Key variables in Altech Chemicals Limited revenue estimations

Variable 1 – Hypothesis for production

We have considered production to be in line with company estimates, with a ramp up plan to be start with third year of production onwards.

The company targets to produce only the 4N grade from FY 2023 onwards.

HPA (Smelter Grade) and HPA 99.9 (3N) Production (tons)	2021	2022	
Low	275	75	
High	300	80	
HPA 99.99 (4N) Production (tons)	2021	2022	2023
Low	2,200	3,600	4,250
High	2,400	3,840	4,500

Variable 2 – Commodity Price

We have estimated the commodity prices based on current FIDS report. As per FIDS, the lower estimate is to be weighted average HPA price of USD 26,900/ton over the 30-year project life, and we have assumed higher to be maximum at USD 35,000/ton.

(USD/ton)	Price of HPA Smelter Grade	HPA 99.9	HPA 99.99
Low	300	5,000	26,900
High	400	6,000	35,000

Variable 3 – Exchange rate

We have estimated the USD/AUD exchange rate based on current FIDS report for both low and high estimates as 0.71.

Valuation (NPV)

FCFF (High) Time Period

	2019E	2020E	2021E	2022E	2023E	2024E
Net Cash from operating activities	(7,401)	(3,250)	47,774	82,766	118,990	131,685
Capital Expenditure	(212,083)	(211,986)	(12,415)	(701)	(701)	(1,001)
Free Cash Flow	(219,484)	(215,235)	35,359	82,065	118,289	130,684
Discount Factor	0.98	0.90	0.83	0.76	0.70	0.64
Present Value of FCF	(215,060)	(193,817)	29,262	62,413	82,677	83,943

FCFF (Low) Time Period

	2019E	2020E	2021E	2022E	2023E	2024E
Net Cash from operating activities	(7,391)	(3,232)	26,874	51,706	78,066	86,027
Capital Expenditure	(212,083)	(211,986)	(12,415)	(701)	(701)	(1,001)
Free Cash Flow	(219,475)	(215,218)	14,459	51,005	77,365	85,026
Discount Factor	0.98	0.90	0.83	0.76	0.70	0.64
Present Value of FCF	(215,051)	(193,801)	11,965	38,791	54,073	54,615

*In the model, the valuation is continued for extended years

<i>in AUD 000s, unless otherwise stated</i>	Low	High
Implied Equity value	137,490	320,783
Shares Outstanding (000s) ^v	470,696	470,696
Fair Value Bracket (AUD)	0.29	0.68
Current Market Price (AUD)	0.14	0.14

Analyst Certifications and Important Disclosures

Analyst Certifications

I, Natasha Agarwal, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security and the subject company.

I, Auditya Sankaranarayanan, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security and the subject company.

Important Disclosures

Arrowhead Business and Investment Decisions, LLC received fees in 2017 and 2018 from Altech for researching and drafting this report and for a series of other services to Altech, including distribution of this report, investor relations and networking services. Neither Arrowhead BID nor any of its principals or employees own any long or short positions in Altech. Arrowhead BID's principals have a mandate for investment banking services from Altech and expect to receive compensation for investment banking activities from Altech in 2018 or 2019.

Aside from certain reports published on a periodic basis, the large majority of reports are published by Arrowhead BID at irregular intervals as appropriate in the analyst's judgment.

Any opinions expressed in this report are statements of our judgment to this date and are subject to change without notice.

This report was prepared for general circulation and does not provide investment recommendations specific to individual investors. As such, any of the financial or other money-management instruments linked to the company and company valuation described in this report, hereafter referred to as "the securities", may not be suitable for all investors.

Investors must make their own investment decisions based upon their specific investment objectives and financial situation utilizing their own financial advisors as they deem necessary.

Investors are advised to gather and consult multiple information sources before making investment decisions. Recipients of this report are strongly advised to read the information on Arrowhead Methodology section of this report to understand if and how the Arrowhead Due Diligence and Arrowhead Fair Value Bracket integrate alongside the rest of their stream of information and within their decision-making process.

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Notes and References

- i Arrowhead Business and Investment Decisions (ABID) Fair Value Bracket. See information on valuation on pages 28-31 of this report and important disclosures on page 32 of this report*
- ii Bloomberg as on April 03, 2019*
- iii Bloomberg as on April 03, 2019*
- iv 3-month average volume from Bloomberg as on April 03, 2019*
- v Bloomberg as on April 03, 2019*