



28 February 2020

GREEN CREDENTIALS OF ALTECH HPA PRODUCTION PROCESS

Highlights

- Comparative study completed on greenhouse gas reduction and energy savings
- 46% reduction of greenhouse gases per tonne of HPA
- 41% reduction in energy consumption per tonne of HPA
- Reduction of 77 Mt of CO₂ pa from transition to LEDs lighting
- HPA supports the lithium-ion battery and renewable energy sectors

Altech Chemicals Limited (Altech/the Company) (ASX: ATC) (FRA: A3Y) has increasingly been requested by potential institutional investors and investment banks, especially in Europe, if it can demonstrate the green credentials of its disruptive kaolin-alumina high purity alumina (HPA) production process. The current industry standard of producing HPA is the “*alkoxide process*” (bauxite – refinery – smelter – alkoxide), with high grade aluminium metal used as feedstock.

In response to these requests, the Company has undertaken a detailed “mine to gate” study and compared the greenhouse gas emissions and energy consumption from the two HPA production methods. The results of the study are that Altech’s single step kaolin-alumina HPA production process will release 46% less greenhouse gas per tonne of HPA compared to the *alkoxide process*.

Altech’s process will have a comparative carbon footprint of 6.6 tonne CO₂ per tonne of HPA versus 12.3 tonne CO₂ per tonne of HPA for the *alkoxide* production method. In addition, Altech’s HPA production process will deliver a 41% reduction of energy consumption per tonne of HPA with estimated energy consumption of 45 GJ per tonne of HPA, versus 77 GJ per tonne of HPA for the conventional bauxite – refinery – smelter – alkoxide HPA process.

The results of the study are unsurprising to Altech, as the current industry standard of producing HPA is to re-process high grade aluminium metal which involves dissolving the metal in alcohol, hydrolysing, then calcining back to alumina (see figure 1). This *alkoxide process* is highly energy intensive as the aluminium metal that is used as feedstock is produced via the Bayer refining process where bauxite is mined then initially processed into smelter grade alumina. The smelter grade alumina is then fed to an energy-intensive aluminium refinery to produce aluminium metal ingots or powder. Current HPA producers cannot use smelter grade alumina to produce HPA due to the sodium impurities that remain from the Bayer process and are driven downstream in the production process to purchase high grade aluminium metal as feedstock. The production of aluminium metal consumes significant amounts of energy – and is high in greenhouse gas emissions.

Altech’s direct process involves the extraction of high purity alumina from a kaolin (alumina silicate) ore feedstock using a hydrochloric acid process, rather than from expensive aluminium metal. The first advantage of Altech’s process is that its kaolin feedstock is extremely “clean” with very low levels of iron compared to bauxite which generates large amounts of red mud waste. The second advantage is that nearly 100% of the hydrochloric acid used in the chemical process is recycled and reused in the process plant. The third advantage is that all heating in the plant uses clean natural gas as fuel.

Finally, the HPA plant in Malaysia is designed to international environmental standards and to satisfy the equator principles for lenders. Since the senior debt funding will be provided by KfW IPEX-Bank, under export credit cover (ECA), the emission standards from the process follow very stringent international standards.

For these reasons Altech's HPA production process is considered to be highly disruptive to established HPA producers and estimated at one third to half the cost of the conventional production process.

A comparison of the HPA production processes is illustrated below.

Figure 1 - Current industry standard to produce HPA (Alkoxide Process)

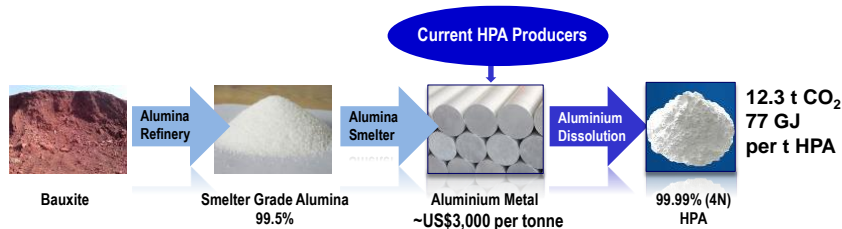


Figure 2 – Altech's Kaolin-Alumina Process



HPA Critical to LEDs and Lithium-ion Batteries

HPA is a critical ingredient required for the production of synthetic sapphire. Synthetic sapphire is used in the manufacture of substrates for LED (light emitting diodes) lights. LEDs are proving to be the environmentally friendly lighting of the future with potential electricity savings of eighty (80%) percent compared to incandescent lighting. The forecast production of LED units is expected to increase from 0.8 billion units to 4.1 billion units by 2025. With this growth, Altech has estimated a reduction of 77 million tonnes of CO₂ per annum, just from new LEDs displacing traditional incandescent lighting. Without HPA and synthetic sapphire, this reduction of CO₂ would not be possible within the currently estimated timeframe.

Increasingly HPA is used in lithium-ion battery manufacturing as both an important coating for separators and as a coating directly onto battery anodes and cathodes to prevent shrinkage, combustibility and improved battery safety and life. Lithium-ion batteries are the key source of energy storage to support the electric vehicle and renewable energy sectors. HPA is positioned to be a critical ingredient in growing the renewable energy sector.

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About Altech Chemicals (ASX:ATC) (FRA:A3Y)

Altech Chemicals Limited (Altech/the Company) is aiming to become one of the world's leading suppliers of 99.99% (4N) high purity alumina (Al₂O₃) through the construction and operation of a 4,500tpa high purity alumina (HPA) processing plant at Johor, Malaysia. Feedstock for the plant will be sourced from the Company's 100%-owned kaolin deposit at Meckering, Western Australia and shipped to Malaysia.

HPA is a high-value, high margin and highly demanded product as it is the critical ingredient required for the production of synthetic sapphire. Synthetic sapphire is used in the manufacture of substrates for LED lights, semiconductor wafers used in the electronics industry, and scratch-resistant sapphire glass used for wristwatch faces, optical windows and smartphone components. Increasingly HPA is used by lithium-ion battery manufacturers as the coating on the battery's separator, which improves performance, longevity and safety of the battery. With global HPA demand approximately 19,000t (2018), it is estimated that this demand will grow at a compound annual growth rate (CAGR) of 30% (2018-2028); by 2028 HPA market demand is forecast to be approximately 272,000t, driven by the increasing adoption of LEDs worldwide as well as the demand for HPA by lithium-ion battery manufacturers to serve the surging electric vehicle market.



German engineering firm SMS group GmbH (SMS) is the appointed EPC contractor for construction of Altech's Malaysian HPA plant. SMS has provided a USD280 million fixed price turnkey contract and has proposed clear and concise guarantees to Altech for plant throughput and completion. Altech has executed an off-take sales arrangement with Mitsubishi Corporation's Australian subsidiary, Mitsubishi Australia Ltd (Mitsubishi) covering the first 10-years of HPA production from the plant.

Conservative (bank case) cash flow modelling of the project shows a pre-tax net present value of USD505.6million at a discount rate of 7.5%. The Project generates annual average net free cash of ~USD76million at full production (allowing for sustaining capital and before debt servicing and tax), with an attractive margin on HPA sales of ~63%.

The Company has been successful in securing senior project debt finance of USD190 million from German government owned KfW IPEX-Bank as senior lender. Altech has also mandated Macquarie Bank (Macquarie) as the preferred mezzanine lender for the project. The indicative and non-binding mezzanine debt term sheet (progressing through due diligence) is for a facility amount of up to USD90 million. To maintain project momentum during the period leading up to financial close, Altech has raised ~A\$39 million in the last 24 months to fund the commencement of Stage 1 and 2 of the plant's construction; Stage 1 construction commenced in February 2019 with Stage 2 now underway.

In July 2019 Altech announced the sale of an option to Frankfurt stock exchange listed Youbisheng Green Paper AG (since renamed Altech Advanced Materials AG (AAM)), whereby AAM can acquire up to a 49% interest in Altech's HPA project for USD100 million. AAM has commenced the process of securing the funds to enable it to exercise its option, which once complete is anticipated would be a catalyst for project financial close.

Forward-looking Statements

This announcement contains forward-looking statements which are identified by words such as 'anticipates', 'forecasts', 'may', 'will', 'could', 'believes', 'estimates', 'targets', 'expects', 'plan' or 'intends' and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward-looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of the Company, the directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward-looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.