



**Altech Chemicals**  
Limited

## ASX ANNOUNCEMENT AND MEDIA RELEASE

12 February 2021

# PRE-FEASIBILITY STUDY OF BATTERY MATERIALS HPA COATING PLANT IN GERMANY

### Highlights

- Pre-feasibility study to commence
- Battery materials HPA coating plant
- Utilising Altech's HPA coating technology
- Potential improvements to lithium-ion battery life, capacity and chargeability
- Option to acquire ~14Ha industrial site in Saxony, Germany
- €750b of European Union fiscal stimulus allocated to Next Generation "green" initiative

Altech Chemicals Limited (Altech/the Company) (ASX: ATC) (FRA: A3Y) is pleased to announce that its 75% owned German subsidiary, Altech Industries Germany GmbH (AIG), is to commence a pre-feasibility study on the construction of a battery materials high purity alumina (HPA) coating plant in Saxony, Germany. This follows the Company's strategy to focus on tailoring its high purity alumina into specialised products targeted at more efficient applications within the lithium-ion battery industry.

The AIG study will assess the commercial viability of constructing a battery materials coating plant at the Schwarze Pumpe Industrial Park in Saxony, Germany, where AIG has an option to acquire a ~14Ha site. The coating plant would use Altech's alumina coating technology to coat anode grade materials with HPA, which would be supplied to the rapidly growing European lithium-ion battery industry (see Figure 1). It is contemplated that the coating plant's HPA feedstock requirement would eventually be satisfied from Altech's proposed Malaysian HPA plant. The pre-feasibility work is set to commence in March 2021, and will be jointly funded by the AIG shareholders – Altech 75% and Altech Advanced Materials AG 25%.

On 22 December 2020, Altech announced the successful demonstration of its alumina coating technology to coat graphite particles typical of those used in anode applications within lithium-ion batteries (anode grade graphite), with a nano layer of high purity alumina (HPA). The demonstration showed that Altech's technology was able to deposit a uniform and consistent layer of alumina (approximately 2nm thick) onto anode grade graphite particles. The uniformity and consistency of an alumina layer on anode grade graphite is expected to be important to improve lithium-ion battery performance. Following the completion of the demonstration, Altech proceeded to produce a sufficient quantity of coated graphite to proceed to a first stage of battery test-work. On 25 January 2021, the Company commenced the performance testing of batteries containing the alumina coated graphite particles (see Figure 2).

Figure 1 – Announced Lithium-ion battery cell production in Europe

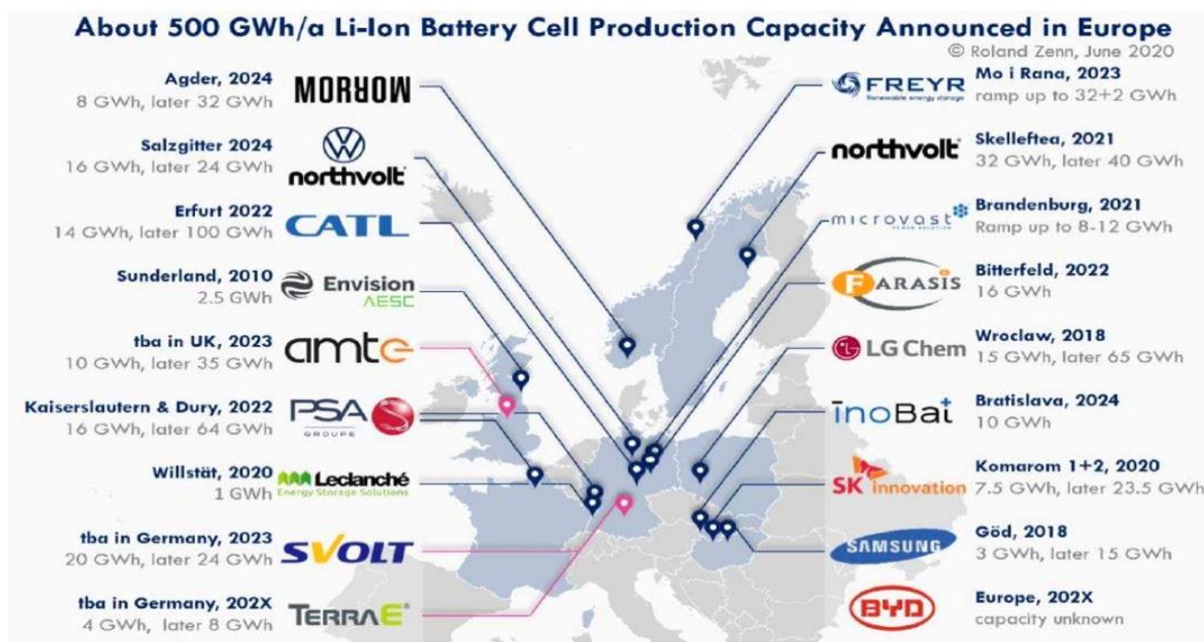
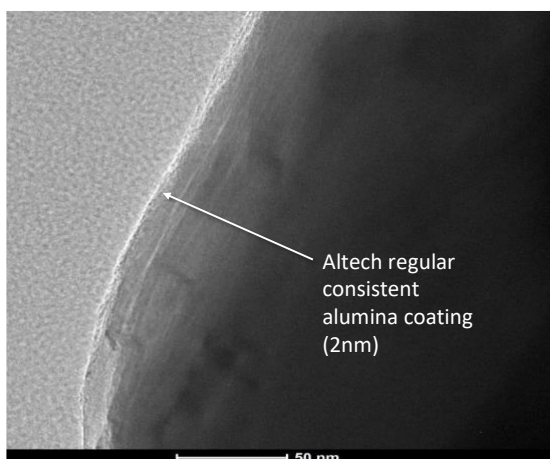


Figure 2 – Electron Microscope images of alumina coated graphite particles

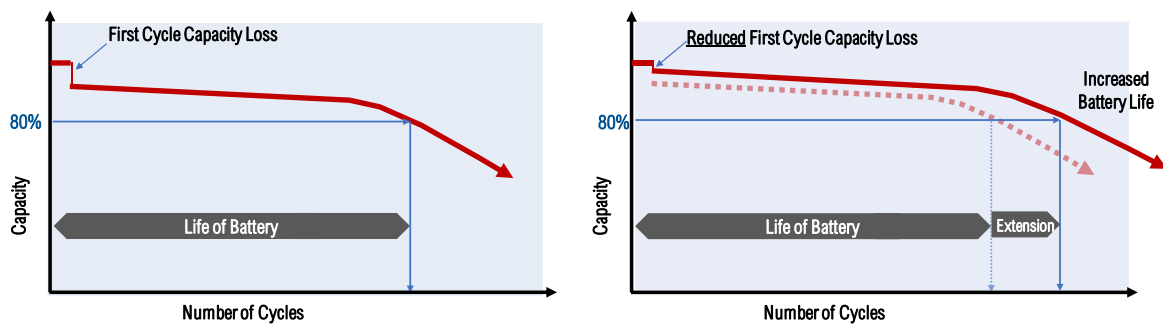


### Background

HPA is commonly applied as a coating on the separator sheets used within a lithium-ion battery, as alumina coated separators improve battery performance, durability and overall safety. However, there is an evolving use for alumina within the anode component of the lithium-ion battery because of the positive impacts that alumina coated graphite particles have on battery life and performance.

Lithium-ion battery anodes are typically composed of graphite. In a lithium-ion battery, lithium ion losses initially present as inactive layers that form during the very first battery charge cycle, the losses then compound with each subsequent battery usage cycle. Typically around 8% of lithium ions are lost during the very first battery charge cycle. This “*first cycle capacity loss*” or “*first-cycle irreversibility*” is a long recognised but as yet poorly resolved limitation that has plagued rechargeable lithium-ion batteries. Figure 3 shows the potential increase in battery life, if the *first cycle capacity loss* can be reduced or eliminated thereby allowing more lithium ions to participate in battery operation during its life-cycle.

Figure 3 – Illustration of potential impact of reduced “first cycle capacity loss”



First cycle capacity loss in a lithium-ion battery is because of the consumption of lithium ions within the battery during the initial battery charging cycle. This forms a layer of material on the anode termed a “solid electrolyte interphase” (SEI). Currently the graphite particles used in lithium-ion battery anodes are uncoated, however manufacturers are now seeking to coat anode graphite particles with a very thin layer of alumina. Tests have demonstrated that alumina coated graphite particles have the potential to reduce first cycle capacity loss. In turn, this innovation can measurably increase battery energy retention, extend battery life and improve overall battery performance.

Altech has launched development of its nano-layer alumina coating technology which is expected to improve Coulombic Efficiency (CE) (especially the CE in first cycle), cycling stability, high-rate performance and fast charging capability. The initiative also offers another potential avenue to secure a portion of future HPA production at a predetermined floor price, which would support project financial close.

The Schwarze Pumpe Industrial Park is located in north-eastern Saxony and is well serviced by existing infrastructure including reticulated electricity and natural gas, rail and roads. The industrial park is 120 km from Berlin and only 78 km from Dresden. Saxony is a state which hosts production sites for Volkswagen, BMW, Porsche and Daimler. The region is a leading engineering training ground and has excellent research facilities like the Fraunhofer Institute for Electronic Nano-systems which are very focussed on ceramic (HPA) nano technology in energy storage.

### **European Union’s COVID-19 Recovery Plan**

In late 2020, the European Union (EU) announced a €1.85 trillion European Recovery Plan (ERP) aimed to help kick start the European economy post COVID-19. The plan’s near term priority is to repair the immediate economic and social damage brought by the coronavirus pandemic, kickstart economic recovery and prepare for a better future for the next generation. However, €750 billion (or 41%) of the ERP budget is allocated to Next Generation EU, a new initiative to accelerate the twin green and digital transition for Europe, within which the European Commission will focus on unlocking investment in clean technologies and value chains, such as renewable and energy storage technologies – including batteries. Specifically, the plan commits to support finance for one million new electric vehicle (EV) charging points throughout Europe and the implementation of an Action Plan on Critical Raw Materials applicable to e-mobility, batteries and renewable energy. Altech believes that HPA, as a critical input into lithium-ion battery manufacture, would fall within the scope of the EU action plan. Also, a draft of the ERP included a €20 billion EU-wide purchasing facility for clean vehicles and a €40-60 billion clean automotive investment fund, to accelerate investments in zero emissions drive trains. Although this level of detail was not included in the final high-level EU ERP communique – it is indicative of strong EU fiscal support for the European EV and renewable energy storage sectors.

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Germany however has been more specific in providing details of the EV industry fiscal support that it has incorporated in its economic stimulus package post COVID-19. As part of Germany's €130 billion coronavirus stimulus package announce in June 2020:

- €2.5 billion will be spent on battery cell production and charging infrastructure;
- there is a 50% increase (to €9,000/vehicle) on the cash subsidy for EV purchases; and
- it has been mandated that all service stations must offer electric car charging points to help remove refuelling concerns and boost consumer demand for EV's.

The European and German initiatives are expected to provide a significant boost to EV demand along with the broader stimulus plan which included taxes to penalise ownership of large polluting combustion-engine sports utility vehicles. Germany's announcement follows a French initiative announced by President Macron to boost electric car sales within that country. Europe has a very clear commitment to battery-powered vehicles and placing electric mobility as a principal technology of the future.

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*Wir sprechen Deutsch.*

**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 (Al<sub>2</sub>O<sub>3</sub>) 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%. (Refer to ASX Announcement "Positive Final Investment Decision Study for 4,500TPA HPA project" dated 23 October 2017 for complete details. The Company confirms that as at the date of this announcement there are no material changes to the key assumptions adopted in the study).

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.

**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.

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