The Manager Companies - ASX Limited
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ASX Announcement
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PROJECTS UPDATE

HPA FIRST PROJECT STAGE 1

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- Rotary dryer installed and under commissioning
- Rolls crusher commissioned
- Boehmite and alumina tri-hydrate circuit under commissioning
- Jet mill delivered and installation commenced
- Sinter oven delivered and installation commenced
- Al-nitrate production reaching ~258 tonnes at target 5N (99.999%) purity

HPA FIRST PROJECT STAGE 2

- Stage 2 DFS near complete
- Project Finance process nearing completion

ALPHA SAPPHIRE

- Successful sapphire growth testing at Ebner-Fametec's Austrian facility
- First two sapphire growth units shipped and en route to Gladstone
- Successful development of custom, circular HPA tablet
- Phase B site selection advanced

PRODUCT MARKETING

- HPA sales to South Korean Semiconductor sector brought forward
- First nano-alumina sales to Japan semiconductor sector
- Increased US end-user focus following:
  - Alpha HPA's attendance at the US-Australia Critical Minerals delegation
  - The Australia-United States Climate, Critical Minerals, and Clean Energy Transformation Compact (the Compact)
- Certification of Product Carbon Footprint (PCF) by CarbonChain
- 3rd party research confirmation of safety benefits of Ultra-Coat process

PROJECTS UPDATE

Alpha HPA Limited (**Alpha** or **the Company**) (ASX: A4N) is pleased to provide an update on project activities for both the HPA First Project and Alpha Sapphire.

The Company's Stage 1, Precursor Production Facility (PPF) in Gladstone, QLD is currently in small scale commercial production for its 5N purity aluminium nitrate (Al-nitrate) precursors and is now finalising the commissioning of additional process equipment to provide expanded capacity for the production of the full range of Alpha's high purity aluminium products.

Alpha is also now in the final stage of the Definitive Feasibility Study (DFS) and financing arrangements for Stage 2 of the HPA First Project, representing the full commercial scale implementation of Alpha's proprietary aluminium purification process technology.

Alpha's Managing Director, Rimas Kairaitis said, "*Alpha continues to be delighted with progress across the business as we push to capture the value of our unique technology and the constructive geostrategic and decarbonisation macro-thematics across the high technology sectors and supply chains we intend to service.*"

HPA FIRST PROJECT STAGE 1 – PPF

HPA circuit expansion

Alpha is now in the final stages of deploying the $15.5 million grant awarded under the Critical Minerals Development Program (CMDP) to install a small-scale commercial high-purity aluminas (HPA) circuit within Stage 1 and expand the capability of the Stage 1 PPF to include Alpha's full high purity aluminium product range.

All major equipment orders have been delivered and installed, with commissioning activities underway.

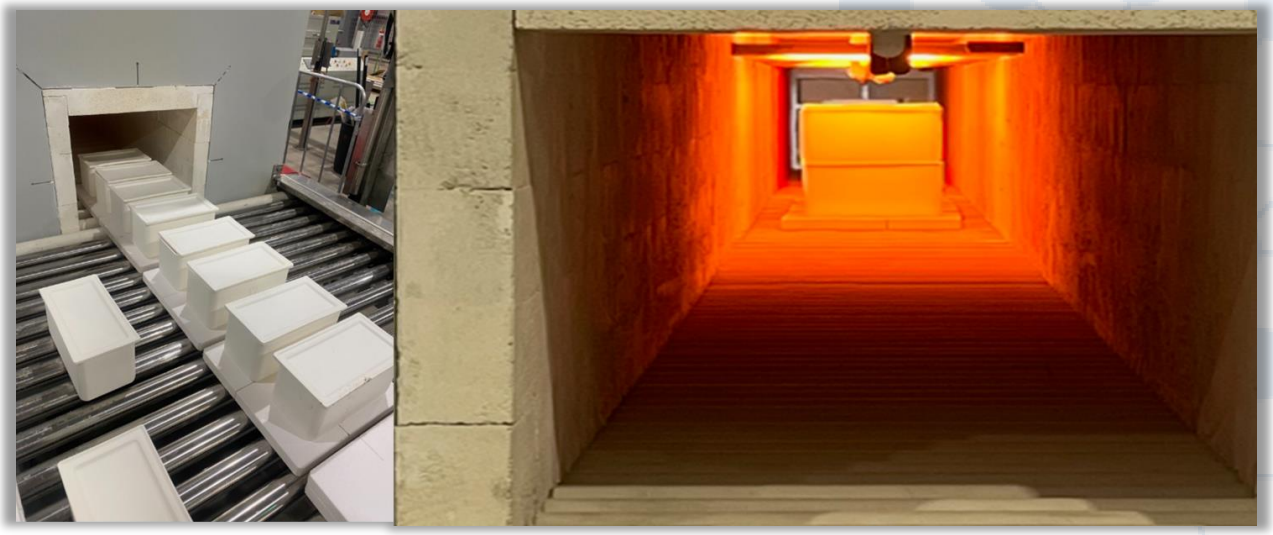
The HPA circuit is on track to be fully commissioned by the end of calendar 2023 and will facilitate:

- the expansion of Stage 1 PPF production capacity of aluminium nitrate and aluminium sulphate;
- between 15-40 tpa additional capacity of HPA production;
- Nano HPA production to service end-users in the semi-conductor/chemical mechanical polishing (CMP) sector;
- the capability to produce up to an additional 10tpa of high purity boehmite;
- the capacity to produce 15-25tpa of high purity alumina-trihydrate (ATH); and
- the production of HPA tablets for synthetic sapphire glass growth.

HPA circuit commissioning – production now at ~30kg/day

Alpha has made good progress on the commissioning of both the HPA rotary kilns and HPA tunnel kiln calcination circuits, which are now operating at circa 30kg HPA production per day (combined). The Company will continue to work to advance production rates, with the intention of maximising saleable HPA and to provide HPA tablet feedstock for synthetic sapphire production by both Ebner-Fametec and Alpha Sapphire.

HPA rotary kilns – in final commissioning



HPA tunnel kiln – in final commissioning

Rotary dryer installed and under commissioning

The HPA dryer unit has been installed, and commissioning commenced. This will be utilised by both the HPA and ATH production circuits.

HPA dryer installed into Stage 1 and under commissioning

Sinter oven delivered and installation commenced

The HPA tablet sinter oven, a key piece of equipment to accelerate production capacity of HPA tablets for sapphire glass, has also now arrived on site and is undergoing installation and electrical connection.

Sinter oven for HPA tablets – under electrical installation

Jet mill delivered and installation commenced

The jet mill, being the final piece of major equipment outstanding for the HPA circuit, has now been delivered and is undergoing installation.

Jet mill unit (LHS) installed into the soundproof enclosure (RHS)

Boehmite and alumina tri-hydrate circuit under commissioning

The high purity boehmite (Al-O-OH) and high-purity alumina trihydrate ($Al(OH)^3$) circuit (Area 1270) is now fully installed and undergoing commissioning.

This circuit includes the spray drying equipment, which will be used to manufacture spherical boehmites and spherical gamma alumina.

Area 1270 (high-purity boehmite and alumina trihydrate) circuit – under commissioning. Spray drier on LHS

Stage 1 production

Stable production of high purity Al-nitrate precursor has continued, with cumulative Al-nitrate production having now reached approximately 258 tonnes at the target 5N (99.999%) purity level.

To date approximate 25 tonnes of Al-Nitrate have been despatched as test samples or converted to high-purity aluminas and alumina tri-hydrate for sales and testwork orders.

Approximately 50% of the Al-nitrate production will be dedicated to conversion into HPA once the Stage 1 HPA circuit is fully commissioned. The remainder is being allocated for sales once final contracts are concluded.

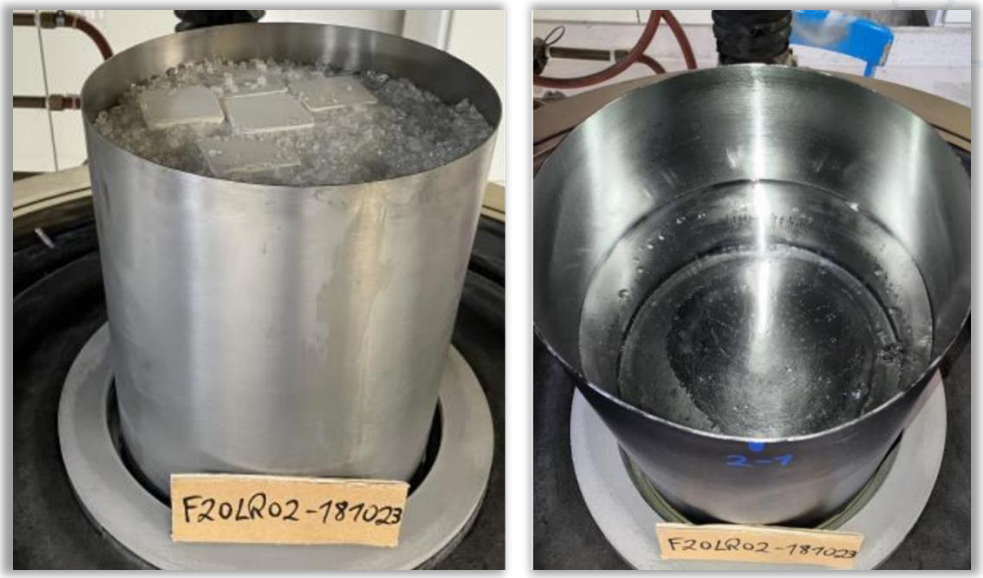
Over December 2023 – February 2024, Alpha will pause production of Al-Nitrate to allow for the Stage 1 PPF crews to focus on training and production from the newly installed HPA circuit.

Successful sapphire growth testing at Ebner-Fametec's Austrian Facility

Ebner-Fametec's Austrian facility has reported further successful sapphire growth testing with the most recent HPA tablets delivered from the HPA First Project.

The most recent sapphire growth results recorded a clean, c-axis boule with good colour and low imperfections. This boule is now being processed into sapphire blanks and wafers for final end user testing.

Alpha is currently finalising 2 x 100kg despatches of additional HPA tablets for follow-on testing in the multi-growth sapphire units in Austria.



Pre-melt crucible packed with Alpha HPA tablets (LHS). Completed, single crystal sapphire boule (RHS). (scale approx. 20cm diameter)

First two sapphire growth units shipped and en route to Gladstone

Ebner-Fametec have completed manufacture and shipped the first two sapphire growth units (Phase A), which are now en route to Gladstone. These units are due to arrive in Brisbane mid-January, on schedule for installation in the Stage 1 PPF in Gladstone by early February.

First two sapphire growth units packed a ready for shipping to Gladstone

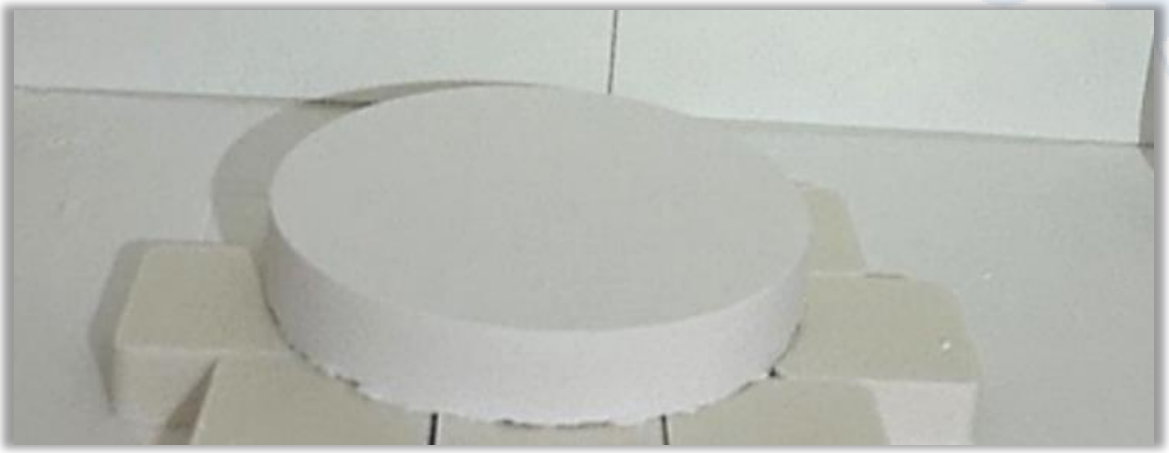
The Phase A units will be installed in the Stage 1 PPF facility to allow for on-site qualification of Alpha Sapphire crystals with key end-users, ahead of the commencement of the Phase B roll-out, being the next 48 sapphire growth units.

Successful development of custom, circular HPA tablet

Alpha has now successfully developed the equipment design and manufacturing process for a custom, circular, sintered HPA tablet as feed stock for the Ebner-Fametec sapphire furnaces.

The larger, approximately 1kg tablets have been successfully manufactured at the Stage 1 facility in Gladstone and sintered to an ultra-high density of 3.7 – 3.8 g/cm^3. By providing a custom, high density feedstock, these tablets are expected to improve materials handling, crucible charging and increase the yield per sapphire crystal run.

Manufacture of these tablets will now be scaled up and tested in sapphire growth units at Ebner-Fametec in Austria to confirm quality and implied higher sapphire yield.



Sintered high-density circular HPA tablet – custom designed for the Ebner-Fametec growth units

Alpha Sapphire, Phase B site selection

Alpha has advanced the formal site selection process for the installation for the Phase B site location which will be expandable accommodate Phase C and the accompanying sapphire processing equipment to produce sapphire blanks. The team is focused on existing warehouse and office properties and has included engineering evaluations to ensure suitable sites can accommodate the sapphire growing equipment.

The site evaluation is being conducted in parallel with discussions on securing a competitive source of renewable energy linked with a suitable site for the Phase B and C roll-out of the Alpha Sapphire business unit (100 sapphire growth units in total).

HPA FIRST PROJECT STAGE 2 – FULL SCALE

Stage 2 DFS near complete

The Definitive Feasibility Study (DFS) for full scale, Stage 2 of HPA First Project is now in final draft and due for release in the coming weeks.

The updated DFS incorporates an updated production profile of Alpha's high purity aluminium products and represents the final financial case under negotiation with Project lenders (see below).

Project Finance process nearing completion

Alpha and its advisors continue to progress a Project Finance debt facility to be jointly funded by the following Australian Government financing agencies ('Lenders'):

- The Northern Australia Infrastructure Facility (NAIF), and;
- Export Finance Australia (EFA)

Following receipt of the Letter of Support (LOS) from EFA and the Strategic Assessment Phase (SAP) approval from the NAIF (refer ASX: 4 October 2023), Alpha is now in the final stages of due diligence and approvals with the Lenders in respect of a debt facility.

PRODUCT MARKETING

Alpha continues to service a wide range of product orders across a number of high-technology sectors, namely:

- **Lithium-ion battery (LiB) sector:** With a focus on cathode coating & dopants and anode coatings
- **LED Lighting sector:** With a focus on HPA for synthetic sapphire substrates and LED phosphors
- **Semi-conductor sector:** With a focus on materials for Chemical Mechanical Polishing (CMP) and thermal interface materials for semi-conductor packaging

Alpha is utilising capacity in both the Stage 1, Precursor Production Facility (PPF) in Gladstone, QLD and the Company's product development facility in Brisbane to service various stages of its expanding market outreach, which includes:

- servicing existing sales orders;
- delivering into tonnage scale orders for end-user production testwork;
- servicing technical qualification, usually involving multiple test orders; and
- delivering initial orders to demonstrate product suitability.

HPA sales to South Korean Semiconductor sector brought forward

Since July 2023 Alpha has been delivering small scale sales of a bespoke HPA powder to an end-user in the South Korean semiconductor sector at between 40-50kg per month @ >US$30/kg. These sales have been completed under a Letter of Intent (LOI) which includes sales expansion to:

- 1 tonne per month from January 2024; and
- up to 1,000tpa by 2026.

In consideration of the positive progress on the Stage 1 HPA circuit commissioning, sales of this custom HPA product have been brought forward to include a 220kg order in early December.

First nano-alumina sales to Japan semiconductor sector

Following multiple product qualification rounds, Alpha has now delivered a 50kg sale order of its nano-HPA product to a Japan based end-user. The nano-HPA is used in the production of ultra-pure aluminium nitride (AlN) as a key thermal interface material in semi-conductors. This is a demanding specification, with attractive pricing at >US$35/kg.

This order will facilitate a final, larger scale production run, and if successful is expected to generate a multi-tonne production order starting in 2025.

USA marketing

Alpha recently completed a USA marketing trip off the back of the Company's participation in the Australian Critical Minerals Delegation to Washington DC.

The delegation coincided with a State visit by the Australian Prime Minister and with the recent announcement of the Australia-United States Climate, Critical Minerals, and Clean Energy Transformation Compact (**the Compact**).

Key end-user visits substantially advanced a number of large volume negotiations with key USA based end users, most notably:

- the accelerated testing and potential >1,000tpa supply of custom HPA's to a key supplier to the US semiconductor sectors;
- the larger volume supply of custom high purity alumina hydroxides to a manufacturer of high purity catalysts; and,
- the potential supply of a high purity alumina hydroxide precursor to an existing manufacturer of high purity aluminas to the technical ceramics sector.

A number of further test orders were generated from the trip which are now being manufactured between Alpha's Stage 1 facility in Gladstone and the Brisbane product development centre.

Certification of Product Carbon Footprint (PCF) by CarbonChain

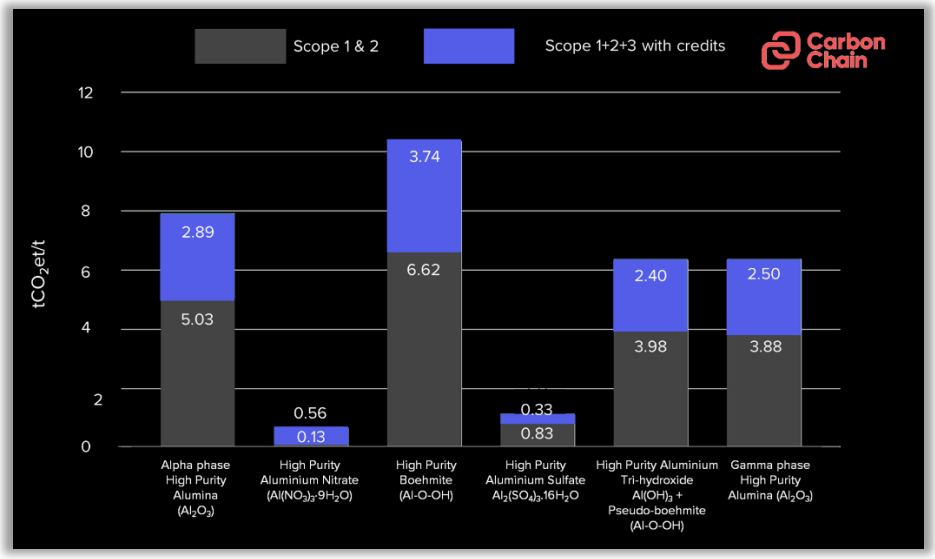
Alpha has now completed third party modelling of cradle-to-gate, product carbon footprint (PCF) analysis of each of its high purity aluminium products.

The modelling is inclusive of Scope 1, 2 & 3 emissions and credits received for the recycling of key reagents.

The PCF results by each product are represented graphically below.

Alpha considers each of these are likely to be sector leading in each product category. The very low carbon footprint results are enabled by:

- Alpha not using any (high embodied carbon) aluminium metal as process feedstock, unlike competing processes
- Alpha using 100% renewable electricity; and
- Alpha recycling close to 100% of its process reagents.



CarbonChain PCF modelling across Alpha's high purity aluminium product range

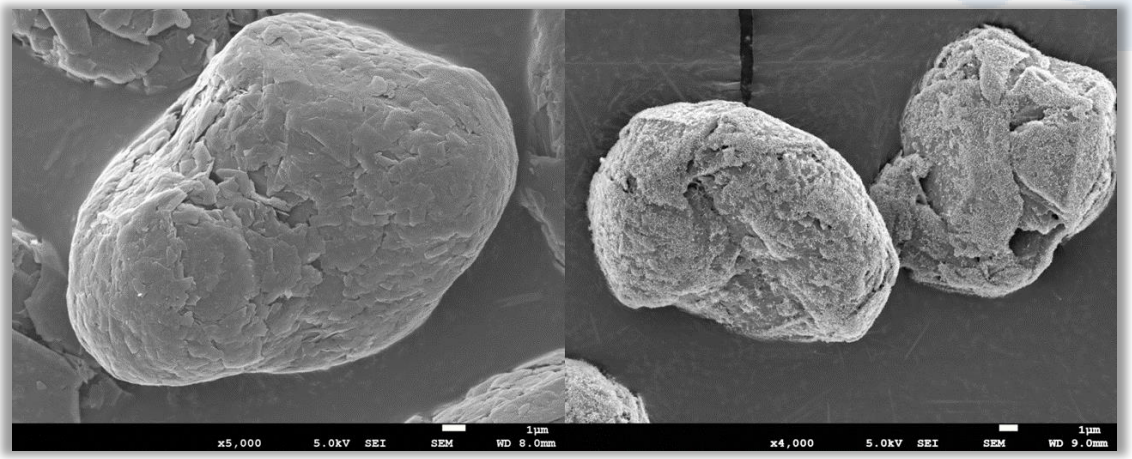
Third party research confirmation of safety benefits of Ultra-Coat process

As detailed in Alpha's recent quarterly report (ASX: 30 October 2023), Alpha has enjoyed very wide engagement across the LiB anode sector for the testing of Al-oxide coated graphite anode materials using ultra high purity Al-Nitrate precursors (Alpha's 'UltraCoat' process), with testing underway with 13 different end-users. The UltraCoat process provides for higher capacity, faster cycling LiB cells, and replaces the traditional carbon-pitch coat which represents the incumbent graphite anode coating process.

In significant part, the interest is being driven by the well described benefits of the process with respect to improved electrochemical performance.

More recently, Alpha has also been able to validate the very significant safety benefits of the Al-oxide coating. A key technical paper published by the leading anode manufacturer (BTR New Materials Group) confirms the process provides a **100% reduction in thermal runaway (battery fires) under nail-penetration testing**.

The Nail penetration test is the industry standard test for battery safety under short circuit/trauma.



SEM imagery showing raw graphite anode particles (LHS) and Ultra-coated particles (RHS)

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About the HPA First Project

The Company's HPA First Project represents the commercialisation of the production of high purity aluminium materials using the Company's proprietary, exclusively licensed solvent extraction and HPA refining technology. The disruptive, low-carbon process technology provides for the extraction and purification of aluminium from an industrial feedstock to produce 4N (>99.99% purity) and 5N (>99.999% purity) aluminium materials for sale into high technology markets including the semiconductor, lithium-ion battery and LED lighting sectors.

Alpha completed a Definitive Feasibility Study in March 2020 following a successful pilot plant campaign in 2019.

Alpha is now in production at its HPA First Project Stage 1, Precursor Production Facility. The Stage 1 facility is being expanded to produce the full range of Alpha's high-purity aluminium materials with $15.5M grant funding from the Australian Government.

The Company is now in the mature phases of market outreach and project financing with respect to the full scale Stage 2 HPA First Project, with the expectation of positioning Stage 2 to Final Investment Decision.

Since the Definitive Feasibility Study in March 2020 there have been material upward capital expenditure and operating cost pressures on all new major projects, including in Queensland, Australia and worldwide. These increased capital expenditures will also impact Stage 2 of the HPA First Project. As per the marketing update to ASX dated 18 October 2023, the Company has also noted an improved pricing environment for its high purity aluminium materials.