

Alpha HPA

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(3 pages)

## CARBON FOOTPRINT MODELLING HIGHLIGHTS HPA FIRST PROJECT GREEN CREDENTIALS

- **Carbon Footprint Model for the HPA First Project following MOU with CleanCo Queensland**
- **The Project represents a 59% reduction in CO<sub>2</sub> emissions over incumbent HPA manufacturing**
- **The HPA First Project likely represents the lowest CO<sub>2</sub> footprint for HPA processes globally**

The Board of Alpha HPA Limited ('Alpha' or 'the Company') is pleased to provide an update on its HPA First Project, representing the evaluation and intended commercialisation of the production of ~10,000tpa equivalent of high purity alumina (HPA) and related products using the Company's proprietary licenced solvent extraction (SX) and HPA refining technology.

### CARBON FOOTPRINT MODELLING

On 30 April 2021, Alpha announced a Memorandum of Understanding ('MoU') with CleanCo Queensland Limited ('CleanCo') under which Alpha and CleanCo will co-operate on a Renewable Energy Supply Agreement ('REA') for the HPA First Project. The MoU contemplates the supply of up to 100% renewable energy.

Alpha has now received an updated model of carbon-dioxide ('CO<sub>2</sub>') emissions for the proposed HPA First facility, under a range of renewable energy supply scenarios, from Project engineers Prudentia Process Consulting ('PPC'). The model accounts for all direct CO<sub>2</sub> emissions and also accounts for N<sub>2</sub>O as CO<sub>2</sub> equivalent emissions.

Key outputs of the model are shown in the table below, with the highlight outcome:

- Using 100% renewable energy, the HPA First Project represents a 59% reduction in CO<sub>2</sub> emissions, per unit of HPA produced, over the incumbent HPA manufacturing process (Alkoxide Process).

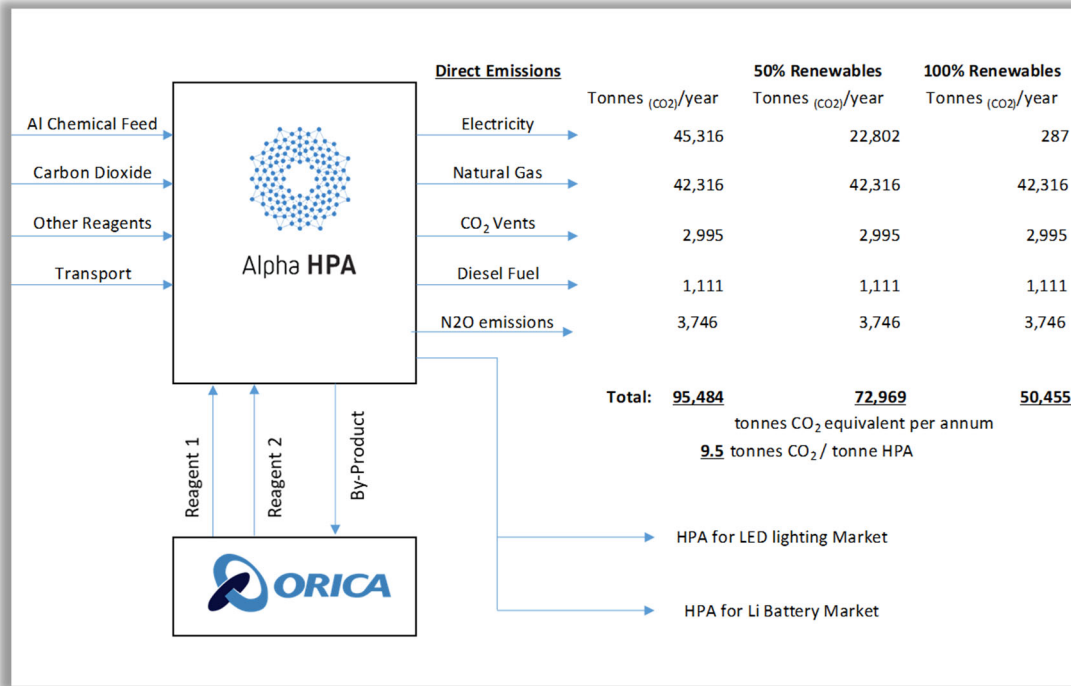
Item	Tonnes CO <sub>2</sub> per tonne HPA	CO <sub>2</sub> Reduction
Incumbent alkoxide process	12.44	
HPA First Project - process baseline	9.54	22.4%
HPA First Project - 50% renewable electricity purchase	7.29	41%
HPA First Project - 100% renewable electricity purchase	5.04	59%

The model has been constructed on a 100% high purity alumina production basis. The pending adoption of additional high purity products into the Project mix, inclusive of the 2 high purity Al-Precursors and boehmite, would further reduce the Project CO<sub>2</sub> emissions, due to the reduction in drying and calcination duty.

Alpha's Managing Director, Rimas Kairaitis, commented: "Alpha is committed to continuing to work towards best practice environmental outcomes. The Company is already very focused on the delivery of our high purity products to key de-carbonising technologies, including LED lighting and e-mobility. Our disruptive process is capable of substantial CO<sub>2</sub> benefits on its own, however the addition of renewable energy has substantially improved the de-carbonising credentials of the HPA First Project. We believe the modelled carbon footprint likely benchmarks our Project as the lowest emitting HPA process globally."

## CO<sub>2</sub> modelling methodology and assumptions

The carbon footprint for the process was estimated by calculating the direct carbon dioxide emissions from burning natural gas and diesel fuel, carbon dioxide directly discharged through process vents and emissions associated from the receipt of electricity. The consumption/ usage of natural gas, diesel fuel, electricity and process losses through vents was determined during a feasibility study involving pilot plant testwork, engineering and vendor input for the proposed process equipment. The emissions factors for each energy use were obtained from the National Greenhouse and Energy Reporting ('NGER') guidelines. The impact of N<sub>2</sub>O emissions has been included on a CO<sub>2</sub> equivalent basis, allowing for catalytic conversion of Project exhaust streams.

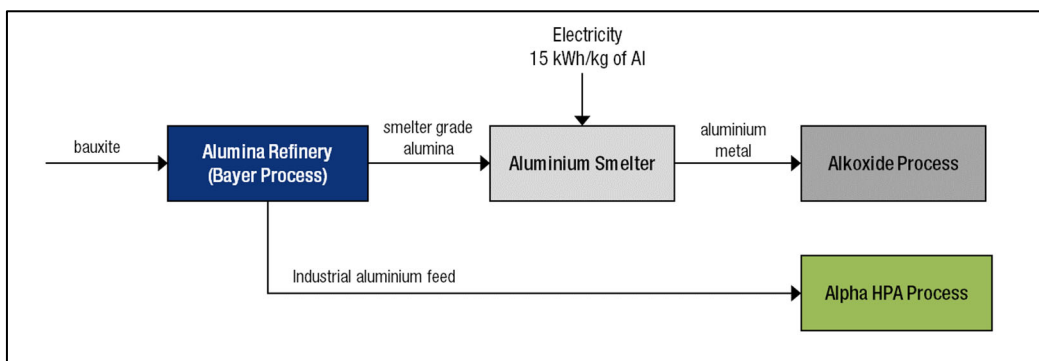


HPA First Project – CO<sub>2</sub> emissions model

## Incumbent HPA Manufacture – Alkoxide Process

The alkoxide process is considered the dominant incumbent process for the manufacture of HPA. The feedstock for the process is high purity aluminium metal, which is synthesised to HPA by producing aluminium alkoxide with the addition of alcohol, converting to hydrated alumina by hydrolysis and then HPA is obtained by high temperature calcination.

The carbon dioxide generation of the alkoxide process can be reasonably estimated using the additional CO<sub>2</sub> emitted to generate the aluminium feedstock, i.e.:



HPA First Project Feed vs Alkoxide Feed – CO<sub>2</sub> emissions

An estimate of the additional carbon dioxide generated by the alkoxide process compared to the Alpha process using the QLD emissions factor of 0.79 (kgCO<sub>2</sub>-e/kWh) is provided below:

$$0.79 \text{ (kgCO}_2\text{-e/kWh)} \times 15.75 \text{ kWh/kg} = 12.44 \text{ kg CO}_2\text{/ kg of Al}$$

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### **About the HPA First Project**

The Company's HPA First Project represents the evaluation and intended commercialisation of the production of ~10,000tpa equivalent of high purity alumina ('HPA') and related products using the Company's proprietary licenced solvent extraction and HPA refining technology. The technology provides for the extraction and purification of aluminium from an industrial feedstock to produce 4N (>99.99% purity) alumina for the intended use within the lithium-ion battery and LED lighting industry. Alpha completed a Definitive Feasibility Study ('DFS') in March 2020 following a successful pilot plant campaign in 2019. Alpha has since upscaled its Brisbane facility to demonstration scale and has now recorded over 2,000 operating hours delivering an expanded range of high purity product to over 35 end-users globally.

The Company is now in the mature phases of project permitting, market outreach and project financing processes, with the expectation of positioning the HPA First Project to Final investment Decision.