



AUSTRALIAN **BAUXITE** LIMITED

**ASX ANNOUNCEMENT**

**11 December 2017**

ASX: ABX

**ALCORE**

**AlF<sub>3</sub> for Aluminium smelters & lithium batteries. Corethane Gas for cheap energy.**

## **Update on ALCORE project to refine Aluminium Fluoride from bauxite**

### **Highlights**

- Engineering firm appointed to design and cost the Engineering Validation Plant (“EV Plant”)
- Trade financing proposals suggests the 50,000tpa production plant can be largely financed
- Discussions with governments and agencies are still progressing
- Unexpected strong interest in co-products Corethane and silica fume.

Bauxite producer, Australian Bauxite Limited (ABx) is reporting progress on the ALCORE project in accordance with the schedule announced to the ASX on 13<sup>th</sup> November 2017.

The ALCORE project is the development of bauxite beneficiation and refining technology to produce from bauxite Aluminium Fluoride which is used in aluminium production and in lithium ion batteries. ALCORE will also produce Corethane which is a hydrocarbon that can substitute for natural gas and will provide energy for the proposed ALCORE production plant.

The current ABx group available cash is A\$2.05 million. ABx has unused lines of credit for working capital if required and has no current plans for capital raisings.

### **Recent Progress**

#### **1. Engineering Validation Plant (“EV Plant”)**

ABx has commissioned an engineering, design and costing study by **Turnkey Innovative Engineering Pty Ltd** for the Engineering Validation Plant (EV Plant) which is the first stage of the ALCORE project, designed to generate large tonnage bulk samples of the products that will be tested and validated by ALCORE’s prospective customers, especially for high density Aluminium Fluoride, Corethane and Silica Fume.

Turnkey (“TKIE”) is a sophisticated, leading-edge chemical engineering firm that is well regarded because of its recent successful work on new technology for the manufacture of lithium carbonate from a brine project in Argentina.

TKIE has agreed to provide in Q1 2018, the engineering report, design and a lump-sum quotation for the construction and commissioning of the EV Plant which is to be constructed in mid 2018.

The chemical process, which was patented on 5<sup>th</sup> June 2017, has been established in Turnkey’s chemical engineering systems and technical officers are now reviewing the plant equipment schedules and the experience of the technologists who developed the ALCORE process.

#### **2. Financing Plans**

Financing plans are scheduled to be finalised and announced in March 2018 once the EV Plant engineering report has been received and assessed.

ABx has been approached by three parties involved in the Aluminium Fluoride industry to discuss future sales. All three are interested in providing finance for the Stage 2 construction of the 50,000 tonne per year production plant, subject to offtake agreements. One has expressed interest in providing part-finance for the Stage 1 EV Plant, should it be required.

A third party is seeking access to the EV Plant for the purification of graphite on terms that may supply one-third of the cost of the EV Plant during its 12 to 18 months of testwork.

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Discussions are continuing with Federal and State Government ministries and with a government authority. These discussions will continue into 2018.

### 3. Expressions of Interest in Coproducts Corethane and Silica Fume

ABx has been approached by two major companies seeking negotiations for access to two of the major co-products from the ALCORE production plant, namely Corethane and Silica Fume.

In addition, ABx has made presentations to two other possible customers for Corethane and to one large electricity generation company with spare gas turbine capacity.

**Corethane** is a high-efficiency fuel for gas turbine electricity generators and can also be used to provide high-energy, low emission heat for several industrial applications. It can be used as a chemical reductant in the manufacture of metals, including ultra-pure silicon metal for electronics.

**Silica Fume** is a rapidly growing industry, being an amorphous, micro-fine form of silica (SiO<sub>2</sub>) that is increasingly used in making high strength concrete (complementing ABx's existing marketing of its cement-grade bauxite) and CO<sub>2</sub>-free geopolymer cements. Silica fume from the ALCORE process is an ultra-pure micron-sized powder with many other applications, including high purity glass, silicon metal and photovoltaic solar panels.

### 4. Expressions of Interest in Gas Turbine Electricity Production using Corethane

ALCORE officers and ABx management are in discussions with a state-of-the-art developer of robust gas turbines that are already generating electricity from fuels far less refined than Corethane. Robust turbine technology would allow ALCORE's production plant to make its own electricity immediately if required, thus minimising start-up risks.

ABx CEO, Ian Levy said; "This is an exciting time for ABx's business development. We are pushing ahead on all fronts as hard as possible and we are sincerely grateful for the offers for funds from supportive shareholders who appreciate the massive value addition to our normal bauxite business that will arise from an ALCORE development.

"However, there are a lot of moving parts yet to be finalised and ABx will remain frugal with shareholders' funds until the ABx Board of Directors is satisfied that we have arrived at the best possible deal for our supportive shareholders.

**Focus on sales:** "In the short-term, sales of bauxite remains our highest priority, because there are significant opportunities arising in the traditional bauxite markets during 2018 when many major bauxite supply contracts are up for renewal. Considerable progress is also being made on the feasibility study for the Binjour project and staff have conducted significant R&D laboratory work on the special low-iron bauxite from ABx's Penrose project in NSW, 90km inland from Port Kembla.

"We should acknowledge the ability of our staff and Directors to remain focussed on the main game for our shareholders whilst also evaluating the exciting new medium-term developments. We can walk and chew gum at the same time without tripping up or breaking a tooth."

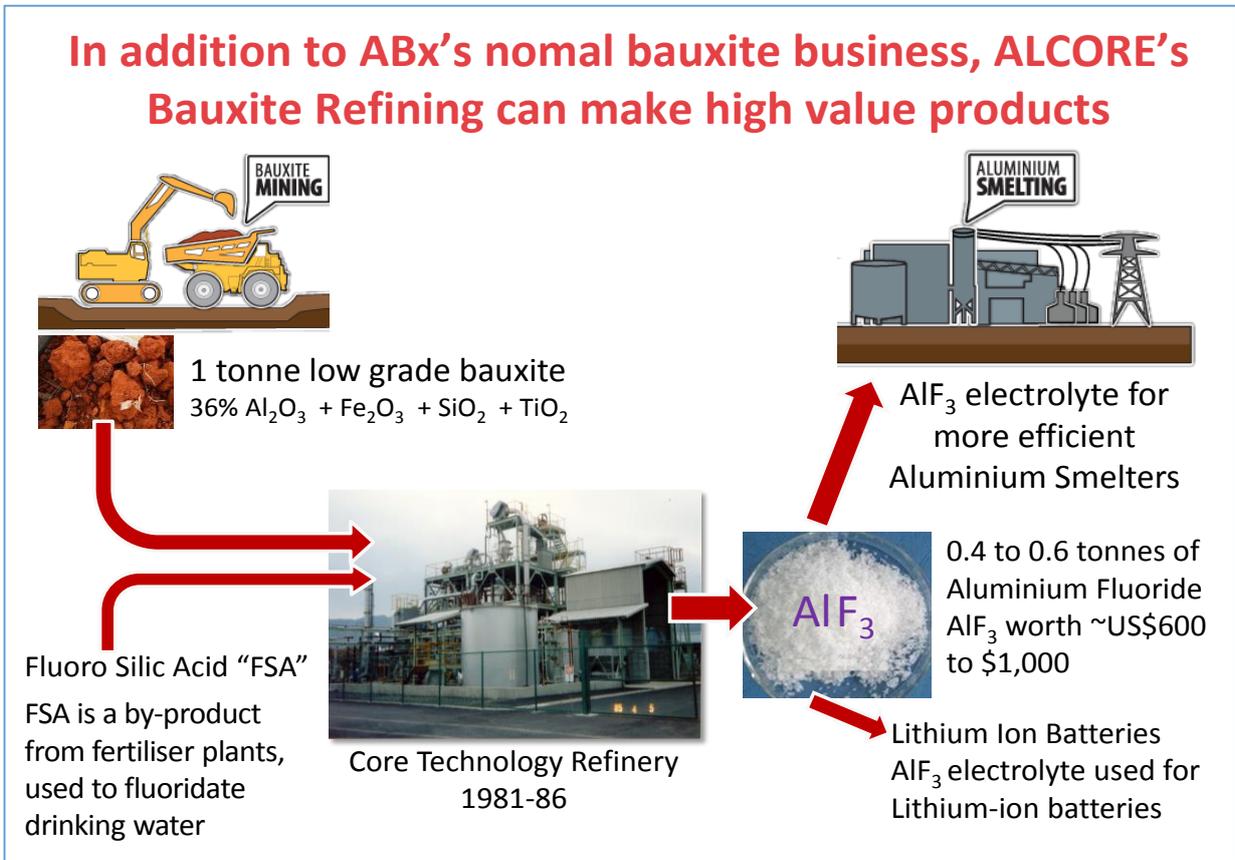
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Figure 1: Summary of the ALCORE process inputs and AlF<sub>3</sub> markets



**ALCORE Bauxite Refining Process : all by-products saleable**

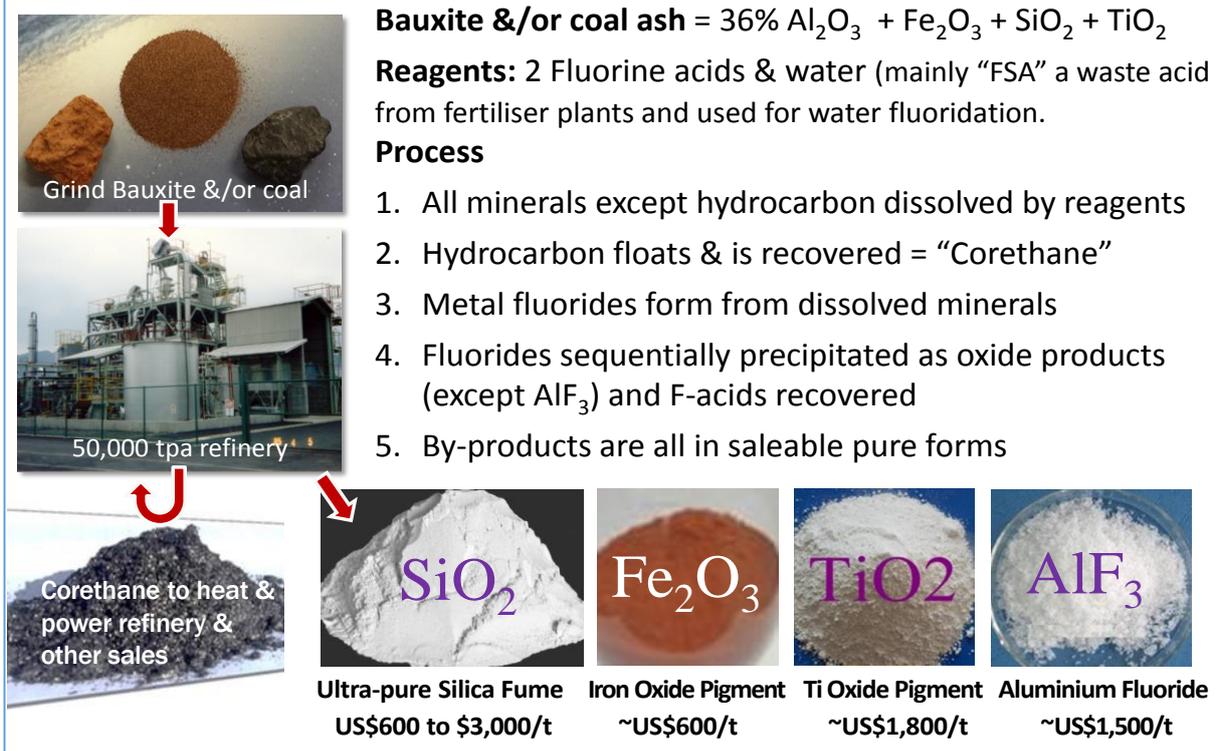


Figure 2: Summary of the ALCORE process inputs, AlF<sub>3</sub> products and coproducts, including Corethane Gas

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**Why Bell Bay in Northern Tasmania or Townsville in Northern Queensland?**

1. Large resources of clean-chemistry bauxite;
2. Available key chemical reagents, all of which are by-products from fertiliser plants and nearby zinc refineries;
3. Skilled workforces experienced in high-technology refineries and/or smelter operations;
4. Nearby coal supply for production of Corethane Gas for reliable energy security; and
5. Nearby export ports with ample available capacity for efficient shipping.

Figure 3 below shows these advantages, using Bell Bay in Tasmania as a more specific example.



**Figure 3: Summary of the advantages of an ALCORE process plant located at Bell Bay, Tasmania.**

- Ample bauxite resources controlled by ABx located along major transport corridors leading directly to Bell Bay;
- Zinc refinery & fertiliser plant at Hobart that produce reagent by-products, especially fluoro-silic acid (FSA) that is the main make-up reagent to provide the fluorine to make aluminium fluoride  $\text{AlF}_3$ ;
- Bell Bay's two smelters, including an aluminium smelter that may be a customer for ALCORE's  $\text{AlF}_3$  production;
- Tasmania has an experienced workforce accustomed to the disciplines needed to operate industrial & chemical plants;
- Coal is available from Fingal Valley coal to produce Corethane Gas that can provide electricity and heat for the bauxite refining plant, and can supply coal for producing extra tonnages of Corethane Gas if needed;
- Bell Bay power station has gas turbines connected to the national grid with spare turbine capacity. Northern Tasmania has many industries requiring low-cost heating that may be supplied by Corethane Gas if needed;
- Bell Bay Port is an efficient export port with available industrial land sites and spare port capacity for exports.

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## Generalised economics

1.  $\text{AlF}_3$  prices have risen strongly from US\$800 to above US\$1,600 per tonne in 5 years (extra demand from Li ion batteries)
2. Aluminium smelters use 30kgs of  $\text{AlF}_3$  per tonne of aluminium (ie. 3%)
3. Global demand exceeds 1.5 million tonnes of  $\text{AlF}_3$  per year
4. ALCORE to target Australasian aluminium smelters as main customers
5. Lithium Ion Battery market will be a significant upside for ALCORE
6. ALCORE production is ~30% cheaper in operating costs than traditional  $\text{AlF}_3$  production – and has a lower capital cost due to simpler process
7. Payback of major production plant capital cost less than 3 years
8. Upside is additional production plants to supply SE Asia, India & Middle East

Figure 4: Economic factors affecting an ALCORE process plant.



## Environmental Benefits

**No smoke-stack, no emissions, no waste products, value adding**

1. Alcore Production Process uses waste acids from zinc refineries and fertiliser plants for reagent make-up.
2. Reagents are all recycled except for fluoro-silicic acid “FSA” make-up to supply additional fluorine to make  $\text{AlF}_3$
3. No emissions, particulates or waste generated
4.  $\text{AlF}_3$  improves aluminium smelting efficiency - saves electricity
5. Lithium Ion Battery recharge rates improved by  $\text{AlF}_3$
6. Can be self-sufficient for heating & electricity (co-product Corethane gas)

Figure 5: Environmental benefits of an ALCORE process plant.

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## Technology well developed. It's time has come.

Two previous refining plants were successful but not focussed on  $AlF_3$  and other products



**2,300 tpa EV Plant  
Cooma NSW 2001-05  
Graphite Purification**



**50,000 tpa Corethane Refinery mid 1980s  
US Military Base in Japan 1981-87  
Corethane for gas turbines (Abrams M1 Tanks)**

**ABx has driven the focus of technology on  $AlF_3$  over the past 18 months**

**Patent application lodged 5<sup>th</sup> June 2017**

### About Australian Bauxite Limited

ASX Code **ABX** Web: [www.australianbauxite.com.au](http://www.australianbauxite.com.au)

Australian Bauxite Limited (ABx) has its first bauxite mine in Tasmania & holds the core of the Eastern Australian Bauxite Province. ABx's 22 bauxite tenements in Queensland, New South Wales & Tasmania exceed 1,975 km<sup>2</sup> & were selected for (1) good quality bauxite; (2) near infrastructure connected to export ports; & (3) free of socio-environmental constraints. All tenements are 100% owned, unencumbered & free of third-party royalties.

ABx's discovery rate is increasing as knowledge, technology & expertise grows. The Company's bauxite is high quality gibbsite trihydrate (THA) bauxite that can be processed into alumina at low temperature.

ABx has committed a large proportion of its expenditure into Research and Development to find ways to capitalise on the main strengths of its bauxite type, mainly highly clean, free of all deleterious elements and partitioned into layers, nodules, particles and grains of different qualities that can be separated into different product streams using physical, chemical and geophysical methods.

ABx has declared large Mineral Resources at Inverell & Guyra in northern NSW, Taralga in southern NSW, Binjour in central QLD & in Tasmania, confirming that ABx has discovered significant bauxite deposits including some of outstandingly high quality.

ABx's first mine commenced at Bald Hill near Campbell Town, Tasmania in December 2014 – the first new Australian bauxite mine for more than 35 years.

ABx aspires to identify large bauxite resources in the Eastern Australian Bauxite Province, which is a globally significant bauxite province. ABx has created significant bauxite developments in 3 states - Queensland, New South Wales and Tasmania. Its bauxite deposits are favourably located for direct shipping of bauxite to both local and export customers.

**ABx endorses best practices on agricultural land, strives to leave land and environment better than we find it.**

**We only operate where welcomed.**

#### Directors & Officers

Paul Lennon	Chairman
Ken Boundy	Director
Ian Levy	CEO & MD
Henry Kinstlinger	Company Secretary
Leon Hawker	Chief Operating Officer
Jacob Rebek	Chief Geologist
Paul Glover	Logistics & Exploration Manager

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