



AUSTRALIAN **BAUXITE** LIMITED

**ASX ANNOUNCEMENT**

**26 March 2018**

ASX: ABX

**ALCORE**

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

## **ABx backs the ALCORE project to refine Aluminium Fluoride from bauxite**

**Highlights:** Australian Bauxite's ongoing R&D and bauxite beneficiation program is bearing fruit.

- Engineering and cost study completed on 28 February for the Stage 1 ("EV Plant") has been accepted by the Board of Directors of Australian Bauxite Limited
- Cost estimate of Stage 1 has reduced by more than 50% to between \$5.5 and \$6.5 million depending on success rates and testing of co-products including Corethane and/or graphite
- Further cost reductions are possible and are being pursued aggressively
- Cost reductions arose from:
  1. Simplification of the technology to make it robust (patent appl<sup>n</sup> 5<sup>th</sup> June 2017)
  2. Lower cost of modern high-technology alloys that suit the reagents being used
  3. Suppliers routinely manufacture the reactors used in ALCORE

Now that an updated design and budget has been achieved, and subject to regulatory, statutory and shareholder approvals as required, the following is being undertaken:

- Discussions with governments and agencies are progressing at the highest levels
- Companies that showed strong interest in both the Aluminium Fluoride and the main co-products Corethane and silica fume will be consulted
- \$1 million of funding has already been promised by a party that will provide services to ALCORE, subject to acceptance of the budget which is based on maximum cost-efficiency
- Parties interested in investing in and/or supporting ALCORE will be consulted with a view to determining the optimum investment structure
- An advisory committee will be assembled to recommend the investment structure terms, with a priority to avoid significant capital raising by ABx which has always been ABx policy
- The Stage 1 project has commenced with quotations for construction and securing the site in Berkeley Vale, NSW and the required approvals to do this Stage 1 testwork
- Funding arrangements for Stage 1 will be finalised by 30 June 2018
- Funding proposals under consideration include an **e**BOOT method whereby an engineering firm would part-fund Stage 1 **e**valuations of the ALCORE process and if satisfied, will **B**uild, **O**wn, **O**perate & **T**ransfer the large bauxite refinery production plant to ALCORE

Bauxite producer, Australian Bauxite Limited (ABx) has made significant progress with its ALCORE project which is the development of bauxite beneficiation and refining technology to produce the high-value Aluminium Fluoride used in aluminium smelters and Lithium Ion batteries. ALCORE will also produce Corethane ultra-pure hydrocarbon that can substitute for natural gas, diesel, heating and industrial applications. ALCORE's progress is meeting the schedule announced to the ASX on 13<sup>th</sup> November & 11<sup>th</sup> December 2017.

ABx CEO, Ian Levy said; "ALCORE is looking more exciting at every stage and would increase the profits from our very clean type of bauxite by a factor of 10 to 30 times. It's a game-changer."

The current ABx group available cash is A\$1.58 million. ABx has sales revenues pending and unused lines of credit for working capital if required and has no current plans for capital raisings.

## Recent Progress

### 1. Stage 1: Engineering Validation Stage (“EV Plant”) designed and costed

ABx received its commissioned engineering, design and costing study on schedule on 28 February 2018 for Stage 1 of the ALCORE project, designed to generate bulk samples to be tested and validated by ALCORE’s prospective customers for:

- a. High density Aluminium Fluoride (AlF<sub>3</sub>)
- b. Corethane (ultra pure hydrocarbon fuel) and
- c. Silica Fume.

The Stage 1 EV Plant which is to be constructed in mid-2018 and work has commenced.

The chemical process was patented on 5<sup>th</sup> June 2017.

### 2. Financing Plans

Financing plans are to be finalised before the end of the fiscal year 30 June 2018 but \$1.2 million has already been offered by sophisticated investors and a party that will supply services to ALCORE, subject to documentation of the final plans, now that the budget has been updated.

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.

Discussions are continuing with Federal and State Government ministries and with a government authority. These discussions will continue in 2018 and become quite specific once the Stage 1 process makes its first samples of final products.

ABx presented its plans to the Bell Bay Manufacturing Precinct Sub-committee in Tasmania in December 2017 and that committee has expressed support for the ALCORE development to government authorities.

### 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 geopolymers. 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 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.

### **OTHER BUSINESS MATTERS**

ABx remains focussed on its bauxite project businesses .

#### **Emphasis on bauxite sales continues for ABx**

In the short-term, sales of bauxite remains ABx's highest priority and there are significant opportunities arising in the traditional bauxite markets during 2018 when many major bauxite supply contracts are up for renewal and political instability in other countries are reminding customers of Australia's reputation for reliable supply.

#### **Binjour Project in QLD Under Economic Assessment**

Considerable progress is also being made on the feasibility study for the Binjour project located inland from Port of Bundaberg, central Queensland. Three major bulk samples were collected in December 2017 and physico-chemical tests were conducted in 5 laboratories in Queensland, Western Australia and India. And independent expert's report on the characterisation of Binjour bauxite was produced for presentations to prospective customers.

#### **Research and Development on White Bauxite From Penrose Quarry**

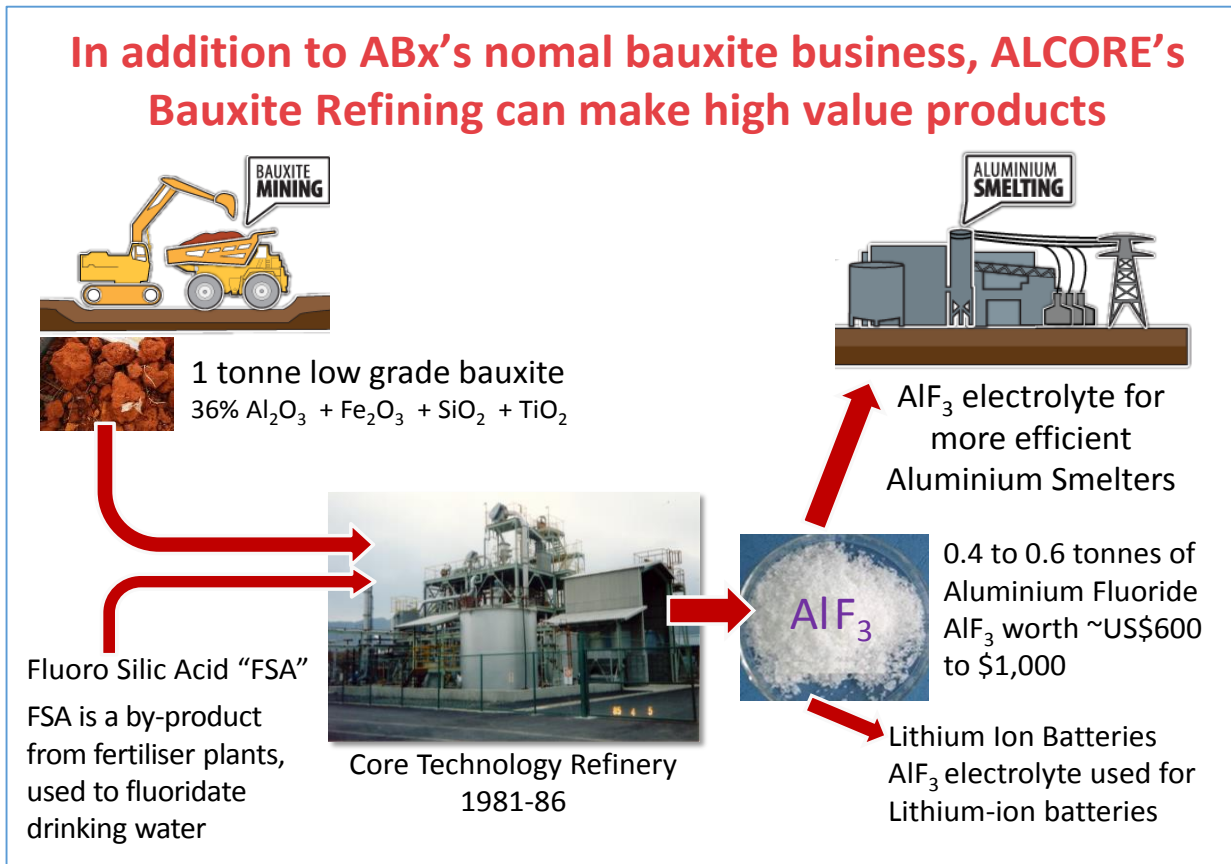
Staff have conducted significant R&D laboratory work on the special low-iron bauxite from ABx's Penrose project in NSW, located 90km inland from Port Kembla. A prospective customer has visited Australia to progress a business plan for exploiting this project on a low-tonnage, high value basis which would be an ideal development for this project located in a state owned pine plantation where harvesting will commence in the next few years.

#### **For further information please contact:**

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



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

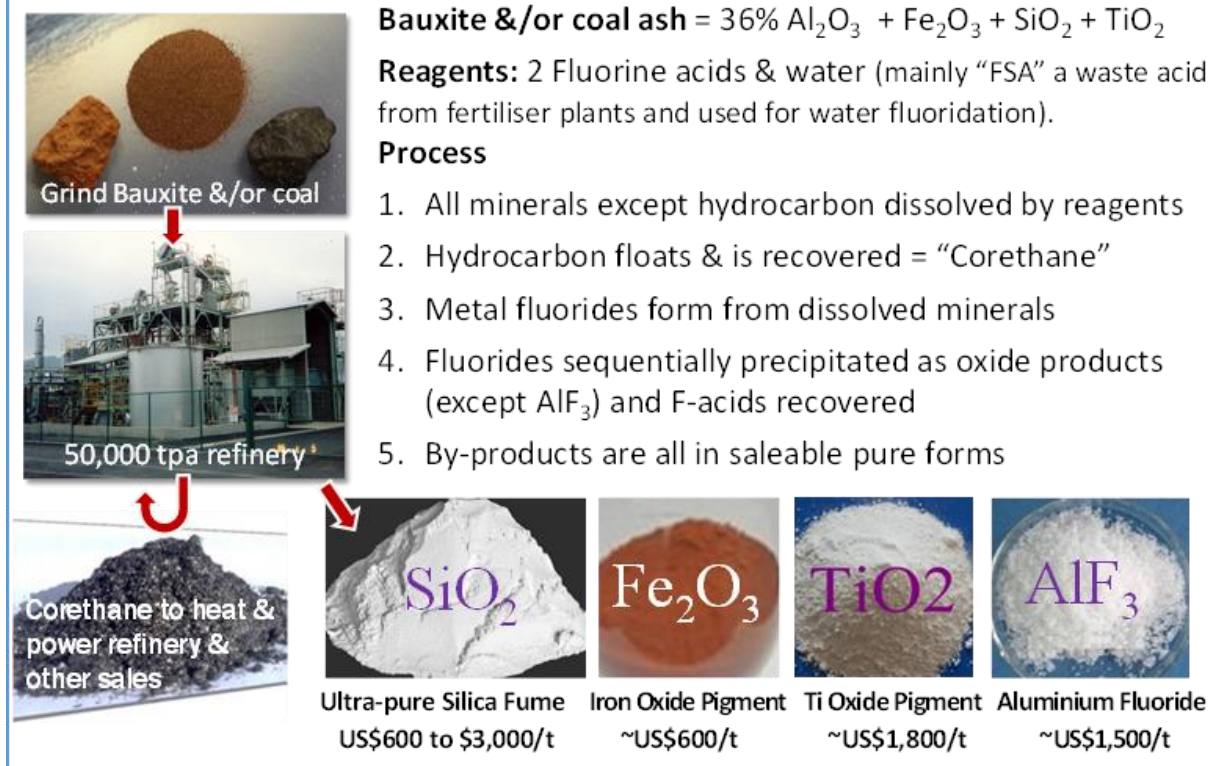


Figure 2: Summary of the ALCORE process inputs, AlF<sub>3</sub> products and coproducts, including Corethane Gas



### 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.

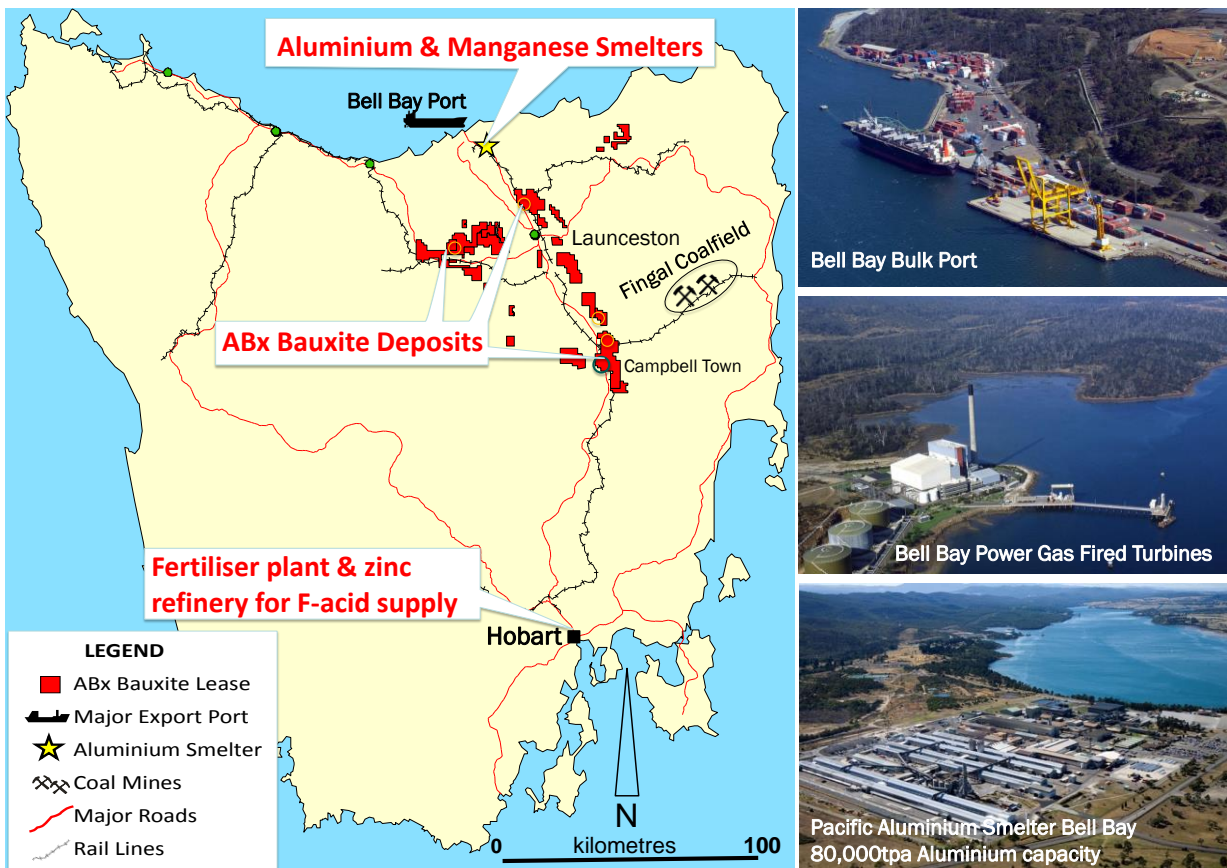


Figure 3: Summary of the advantages of an ALCORE process plant located at Bell Bay, Tasmania.

- 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.



## 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.

## 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