



AUSTRALIAN BAUXITE LIMITED

ALCORE Limited
AlF₃ for aluminium smelters, recycling & lithium-ion batteries

ASX: ABX

ASX ANNOUNCEMENT

12 April 2021

Alcore AlF₃ Production from Aluminium Smelter Wastes

Aluminium Fluoride from Dross Waste

Alcore has produced several AlF₃ samples using a two-stage process, with a chemical composition comparable to typical commercial AlF₃ specifications

This is a significant achievement given the level of impurities in the dross.

Updated Economic Assessment

The baseline conservative scenario for Alcore's operating costs is A\$1,080 per tonne of AlF₃, and using dross reduces this to A\$800/t of AlF₃.

This compares very favourably to the median long-term average China export price of US\$1,175/t (A\$1,525/t). Prices have increased by over US\$200/t AlF₃ in the last 6 months.

Australian Bauxite Limited (ASX: ABX) (**ABx**) provides the following update for its 87%-owned subsidiary **ALCORE** Limited (**Alcore**), in particular work being undertaken to produce aluminium fluoride (**AlF₃**) from aluminium smelter wastes, and the improving economic assessment.

AlF₃ is a strategically important mineral because it is an essential ingredient for aluminium smelting. It is also being investigated for advanced lithium-ion batteries. Australasian aluminium smelters rely entirely on imported AlF₃, and AlF₃ imports by Australian smelters from China alone in the last 12 months totalled more than 20,000 tonnes averaging US\$1,180 per tonne.

Aluminium Fluoride from Dross Waste

Dross is a waste by-product that forms on the top of molten aluminium in casting furnaces. It consists of aluminium oxide, aluminium metal and aluminium nitride, and typically some cryolite and other impurities. Aluminium metal can be physically recovered, but the non-metallic component is sold at a loss, often as an additive for steelmaking. Many smelters have significant stockpiles of dross that are an ongoing cost, environmental and community relations issue.

Alcore has been investigating dross as a feed material for its production of AlF₃, as it can be obtained at very low cost and increases the recycling of aluminium smelter wastes.

Alcore has developed a two-stage process to produce AlF₃ from a combination of dross and aluminium hydroxide. This was achieved after developing a detailed understanding of the process chemistry through advanced testwork and characterisation. This process is proprietary to Alcore and will deliver economic and strategic benefits.

Alcore has produced several AlF₃ samples using this process (see Figure 1), with a chemical composition comparable to typical commercial AlF₃ specifications (see Table 1). This is a significant achievement given the level of impurities in the dross. In particular:

- **Silicon:** Alcore's AlF₃ product has very low silicon (Si) when conditions are optimised (see Sample 3), despite the raw dross containing more than 2% Si
- **Sodium:** Consistently 0.10-0.15% sodium (Na) in the Alcore AlF₃ product, despite the raw dross containing about 4% Na
- **Calcium:** Consistently 0.05-0.06% calcium (Ca) in the Alcore AlF₃ product, despite the raw dross containing about 0.9% Ca

Discussions with potential customers suggest that these levels of impurities are acceptable given the benefits provided by using dross (substantively lower cost and reduced waste disposal).

Physical properties (bulk density) are also similar to Alcore AIF₃ produced from 100% aluminium hydroxide.

Development work is continuing to increase the proportion of dross used and improve the AIF₃ yield.

Updated Economic Assessment

The above results from processing dross and ongoing discussions with potential customers have allowed Alcore to update its projected costs and financial metrics for its initial 10,000 t/y AIF₃ commercial plant. The economic improvement is significant (see Table 2).

The baseline conservative scenario is for Alcore's operating costs to be A\$1,080 per tonne of AIF₃, but using dross reduces this to A\$800/t of AIF₃. This compares very favourably to the median long-term average China export price of US\$1,175/t (A\$1,525/t). Prices have increased by over US\$200/t AIF₃ in the last 6 months to over US\$1,300/t (A\$1,700/t).

Table 1: Recent Alcore AIF₃ products from combination of dross and aluminium hydroxide (chemical analyses by CSIRO).

Product Properties	AIF ₃	Fe	Si	Na	Ca	P	Bulk density
Raw Dross	0	0.187%	2.47%	3.94%	0.860%	0.163%	-
Commercial AIF ₃ specifications	>90%	<0.035%	<0.13%	<0.44%	<0.064%	<0.015%	>0.7
Alcore Sample 1	96%	0.052%	0.435%	0.148%	0.053%	0.096%	0.66
Alcore Sample 2	99%	0.064%	0.491%	0.145%	0.054%	0.097%	0.63
Alcore Sample 3	>99%	0.053%	0.007%	0.116%	0.057%	0.049%	0.84
Alcore Sample 4	98%	0.061%	0.566%	0.116%	0.051%	0.115%	0.71

Table 2: Economic assessment for first Alcore 10,000 t/y AIF₃ plant.

Aluminium Source	Market Scenario	AIF ₃ price (US\$/t)	FX rate USD:AUD	AIF ₃ price (A\$/t)	Operating cost (A\$/t AIF ₃)	NPV (A\$m)	IRR
Aluminium hydroxide	Baseline	\$1,175	0.75	\$1,570	\$1,080	\$21	29%
Dross	Baseline	\$1,175	0.75	\$1,570	\$800	\$47	58%
Aluminium hydroxide	Optimistic	\$1,400	0.70	\$2,000	\$830	\$85	115%
Dross	Optimistic	\$1,400	0.70	\$2,000	\$610	\$105	158%

Note: this table summarises the economic assessment for an initial 10,000 t/y plant. If and when Alcore generates sufficient international sales to justify a 60,000 t/y plant, the economics improve substantially. At 60,000 t/y, Alcore could provide security of supply of AIF₃ to the entire Australasian aluminium smelter industry.

Current Alcore activities

1. Conducting engineering validation in partnership with international engineering companies, which is likely to include a pilot plant for critical process steps, to:
 - Confirm process and product performance at a larger scale
 - Produce larger samples for evaluation by aluminium smelters
2. Conducting process verification experiments in the laboratory to:
 - Increase the yield and quality of AlF_3 produced from bauxite and aluminium smelter waste
 - Optimise the recovery of fluorine from aluminium smelter waste, including the separation and recovery of by-products with potential commercial value

Government & Industry

Discussions continue with governments, agencies, engineering experts and major companies in the aluminium industry.

Alcore considers AlF_3 to be a strategically important mineral product for the Australasian aluminium smelting industry, and the Alcore process will contribute to the improving environmental performance of aluminium smelters worldwide.

ABx Strategy

Alcore is technologically the most advanced process being developed by the ABx Group as part of ABx's strategy to seek value-enhancing of the entire aluminium supply chain, from upgrading ABx's bauxite through to aluminium metal production and recycling.



Figure 1: Alcore AlF_3 sample produced from combination of dross and aluminium hydroxide.

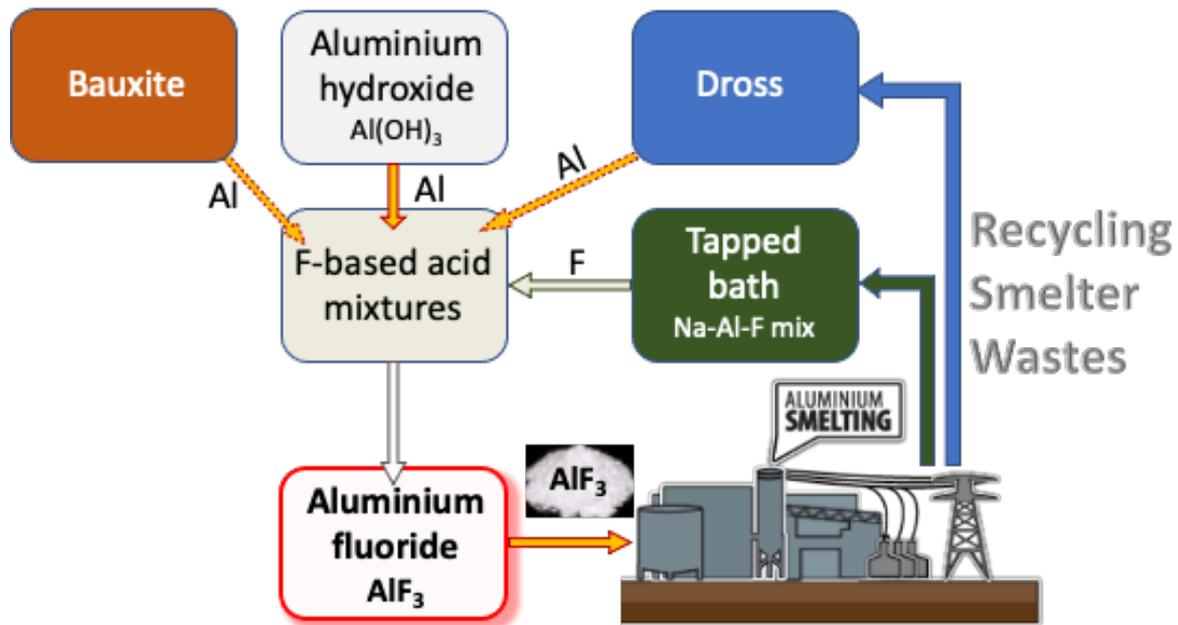


Figure 2: Summary of the Alcore strategy.

This announcement has been approved for release by the Board of Australian Bauxite Limited.

For further information please contact:

Mark Cooksey, CEO
 ALCORE Limited
 Mobile: +61 447 201 536

Ian Levy, CEO
 Australian Bauxite Limited
 Mobile: +61 407 189 122

Disclaimer Regarding Forward Looking Statements

This ASX announcement (Announcement) contains various forward-looking statements. All statements other than statements of historical fact are forward-looking statements. Forward-looking statements are inherently subject to uncertainties in that they may be affected by a variety of known and unknown risks, variables and factors which could cause actual values or results, performance or achievements to differ materially from the expectations described in such forward-looking statements.

ABx does not give any assurance that the anticipated results, performance or achievements expressed or implied in those forward-looking statements will be achieved.



ASX: ABX

About Australian Bauxite Limited

ASX Code ABX Web: www.australianbauxite.com.au

Australian Bauxite Limited (ABx) has its first bauxite mine in Tasmania & controls the Eastern Australian Bauxite Province. ABx's 1.1 bauxite tenements in Queensland, New South Wales & Tasmania totalling 662 km² are all 100% owned, unencumbered & free of third-party royalties. ABx's bauxite is 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 which is very 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 in northern NSW, southern NSW, Binjour in central QLD & in northern Tasmania. 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 and has created significant bauxite development projects 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.

About ALCORE Limited:



Australian Bauxite Limited (ABx)'s 87%-owned technology subsidiary ALCORE Limited was created to fund and manage the AIF₃ Project, involving the construction of a production plant to produce aluminium fluoride (AIF₃) and valuable co-products using new Australian technology. Alcore intends to convert aluminium smelter waste (and low grade bauxite) worth less than \$50 per tonne into a suite of valuable products worth more than \$800 per tonne. Alcore's testwork commenced on 1 July 2019 at its high-technology Research Centre in Berkeley Vale, Central Coast NSW and is currently focussed on producing AIF₃ test samples for pre-qualified aluminium smelter customers. Its processes can also produce Corethane, which is pure hydrocarbon powder to provide thermal and electrical power with low CO₂ emissions when used as a gas-substitute or as a diesel substitute for fuel security purposes and is ideally suited for use as a sulphur-free bunker fuel. Corethane is also useable as a chemical reductant instead of imported coke and coals.

AIF₃ is an essential ingredient in aluminium smelters and is currently 100% imported. Alcore will be the first Australian producer of this strategically important mineral product and will provide security of supply to the large aluminium smelting industry in Australia. Alcore will produce AIF₃ from smelter waste materials and thereby maximise the recycling by Australian aluminium smelters.

Directors of ABx

Paul Lennon	Chairman
Ian Levy	CEO & MD
Ken Boundy	Director
Henry Kinstlinger	Company Secretary
Dr Mark Cooksey	CEO Alcore Limited

Officers

Leon Hawker	Chief Operating Officer
Jacob Rebek	Chief Geologist
Paul Glover	Marketing, Exploration & Relationships
Nathan Towns	Operations Manager