

ALCORE Economic Assessment

Potential Cost Advantage Over Fluorspar Process

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ALCORE has conducted an indicative economic assessment on its world-first proprietary process to produce hydrogen fluoride from aluminium smelter bath

Indicative operating cost of producing hydrogen fluoride using the ALCORE process is US\$1,000-\$1,600/t. Based on current hydrogen fluoride prices, this would place ALCORE in the lowest quartile for hydrogen fluoride production cost and represent a 30-60% operating margin

Hydrogen fluoride is used for critical applications such as lithium-ion batteries, semiconductor manufacture and metal production, and is mainly sourced from fluorspar. Australia imports all its fluorine products

ABx Group Limited (ASX: ABX) (**ABx** or the **Company**) is pleased to provide indicative operating costs for its ALCORE process, a world-first proprietary process to produce hydrogen fluoride from aluminium smelter bath, a by-product of aluminium smelting.

Most hydrogen fluoride is produced from fluorspar, which is facing increasing supply constraints and higher prices. The ALCORE process has the potential to strengthen Australia's domestic fluorine supply chain while improving supply security and delivering attractive operating economics, as illustrated in Figure 1.

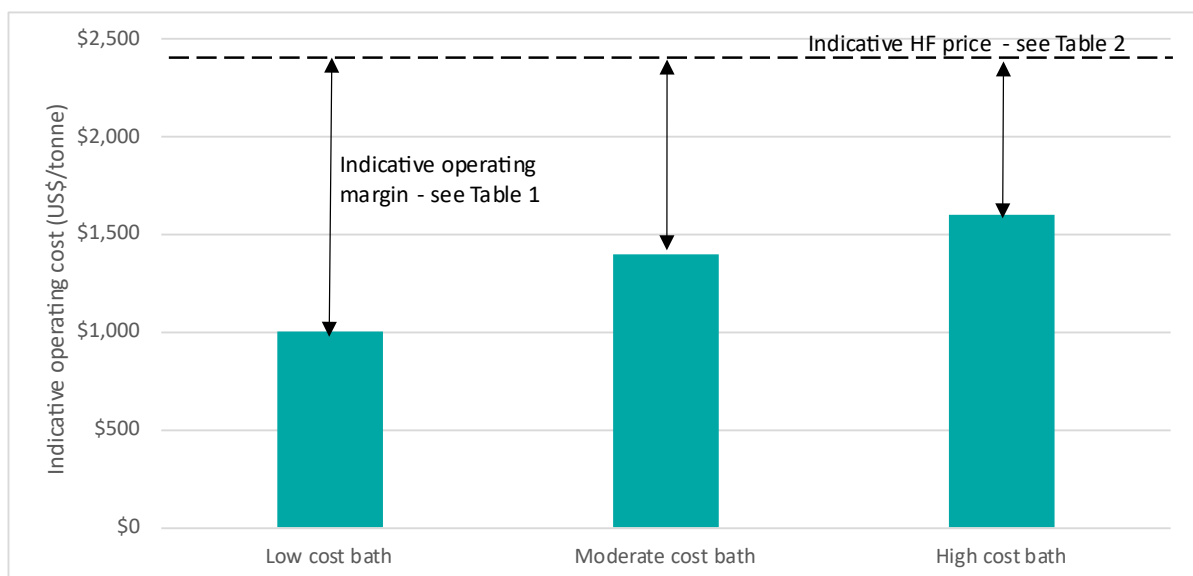


Figure 1: Indicative operating cost and margin for producing anhydrous hydrogen fluoride (AHF) from aluminium smelter bath using the ALCORE process

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Dr Mark Cooksey, Managing Director and CEO of ABx Group, commented:

"This economic assessment indicates the ALCORE process has the potential to underpin an alternative strategic fluorine supply chain in Australia. By producing hydrogen fluoride from aluminium smelter bath rather than imported fluorspar, ALCORE can improve domestic supply security while also delivering attractive operating economics. This view is supported by ALCORE's ongoing engagement with participants across the global fluorine industry."

Chris Potgieter, Director BFluor Chemicals, said:

"We have been deeply involved in the fluorspar, hydrogen fluoride and fluorochemical industries for several decades. The ALCORE process is an exciting opportunity to produce hydrogen fluoride at a competitive and potentially lower cost. Furthermore, hydrogen fluoride is the entry point into the entire fluorochemical value chain. ALCORE could provide a catalyst for a fluorochemical industry in Australia. The import replacement possibilities are significant, such as providing aluminium fluoride for the aluminium industry in a circular economy eco-system."

ALCORE process economics – substantial cost savings

The ALCORE engineering team has calculated indicative operating costs for a nominal acidspar¹ plant and a nominal ALCORE plant. These are based on published literature on the acidspar process and from information obtained from ongoing engagement with leading global engineering companies with extensive experience in the fluorspar industry.

Indicative operating cost estimates for three scenarios for the ALCORE process are listed in Table 1, each for a different assumed bath cost. Two scenarios for the acidspar process are also shown, again for two different assumed acidspar costs. Additional assumptions are listed in Table 2. G&A is included, but depreciation and contingency are not included.

Even assuming a relatively high cost of aluminium smelter bath, the indicative operating cost of producing anhydrous hydrogen fluoride (AHF)² using the ALCORE process is still US\$400/t lower than using the acidspar process, based on a current acidspar price of US\$520/t. The economics of the ALCORE process are even more favourable if the aluminium smelter bath can be secured at lower cost, as indicated by ALCORE's discussions with numerous aluminium smelters.

The estimates of US\$1,000-1,600/t would place ALCORE in the lowest quartile for AHF production cost.³ Furthermore, if the acidspar price continues to rise, as forecasts suggest,⁴ then the economics of the acidspar process will become even less favourable.

Because the ALCORE process has been designed to use aluminium smelter bath, and bath is much lower cost than acidspar, the use of bath can lead to a significantly lower operating cost for the ALCORE process, and hence a significantly higher operating margin.

¹ See page 4 for description of fluorspar grades and markets

² 100% hydrogen fluoride is known as anhydrous hydrogen fluoride (AHF). Water is added to AHF to produce hydrofluoric acid

³ Project Blue, Fluorspar supply & demand outlook, Fluorine Forum 2025, Baveno, Italy, 22-24 October 2025

⁴ Tivan, Speewah Fluorite Project Feasibility Study, 20 March 2026

Commercial strategy

The above analysis highlights the significant potential commercial advantages of the ALCORE technology. ALCORE has the option to solely produce AHF for sale, or to convert some or all of the AHF to downstream fluorine chemicals such as aluminium fluoride.

ALCORE is engaging with Australian and global fluorine industry participants to identify the optimum commercial strategy, secure offtake agreements, and attract investment.

Table 1: Indicative operating cost estimates for ALCORE process and acidspar process. See Table 2 for other assumptions

Process	Raw Material	Raw Material Scenario	Raw Material Cost (US\$/t)	Basis for Raw Material Cost	Indicative Operating Cost (US\$/t)	Indicative Operating Margin	
						US\$/t	%
ALCORE	Aluminium smelter bath	Low cost	Commercial in confidence	Discussions with potential suppliers	\$1,000	\$1,400	58%
		Moderate cost			\$1,400	\$1,000	42%
		High cost			\$1,600	\$800	33%
Acidspar (competitors)	Acidspar	Low cost	\$520	US price 2026 Q1 ⁵	\$2,000	\$400	17%
		High cost	\$900	2030 price forecast ⁶	\$2,700	-\$300	-13%

Table 2: Other assumptions used in Table 1

Parameter	Value	Basis for assumption
Plant Capacity	20,000 t/y	ALCORE strategy
Hydrogen fluoride price	US\$2,400/t	Average Europe price for 12 months from May 2025 to April 2026 ⁷
Sulfuric acid price	US\$160/t	Average Europe price for 10 months from July 2025 to April 2026 ⁸
Revenue from aluminium-sodium sulfate (for ALCORE process)	\$0/t	Simplification
Revenue from calcium sulfate (for acidspar process)	\$0/t	Simplification
USD:AUD exchange rate	0.70	Median 2016-2025

⁵ IMARC Group, <https://www.imarcgroup.com/fluorspar-pricing-report>

⁶ Tivan, Speewah Fluorite Project Feasibility Study, 20 March 2026

⁷ Intratec, <https://www.intratec.us/>

⁸ IMARC Group, <https://www.imarcgroup.com/sulfuric-acid-pricing-report>

National benefit to Australia

Australia produced AHF from imported fluorspar until 1995. Since then, Australia has been 100% reliant on imports for AHF and all fluorine chemicals. This creates vulnerabilities, such as its significant aluminium smelting industry, which creates over \$3 billion per year in total value-added,⁹ being dependent on imported aluminium fluoride.

The lack of domestic AHF production is also a significant barrier to the establishment and growth of other industries. The high cost of imported AHF and fluorine chemicals makes it very difficult for Australian companies needing these materials to be competitive. The establishment of an ALCORE plant in Australia will address this strategic vulnerability.

Fluorine chemicals – critical for the modern economy

High value fluorine chemicals are widely used in many applications in modern economies. Notable examples include:

- Lithium-ion battery (LiB) chemicals, such as lithium hexafluorophosphate (LiPF₆). Most LiBs use LiPF₆ in the electrolyte
- A range of chemicals for semiconductor manufacture
- Uranium hexafluoride, used in fuel rods in nuclear reactors
- Fluorocarbons, such as refrigerants and polymers
- Rare earth fluorides, essential for converting rare earth oxides to rare earth metals
- Aluminium fluoride, an essential chemical for aluminium smelting.

Fluorspar – the major source of fluorine

Fluorspar (calcium fluoride, CaF₂) is the major source of fluorine worldwide. It is mined and upgraded using crushing, grinding and flotation to products such as:

- Acidspar (>97% CaF₂): used to produce fluorine chemicals
- Metspar (60-96% CaF₂): used in steel and cement production

Global production of acidspar is highly concentrated in China (79% of global production) and Mexico (11%).¹⁰ The global market is currently approximately balanced, but a significant supply deficit is forecast by 2035. Acidspar exports from China have reduced by 80% since 2010. The price of acidspar has increased at 6% per year in nominal terms for the past 35 years.¹¹

Given the importance of fluorine chemicals, their dependence on acidspar, and acidspar supply concerns, fluorspar has been designated a critical mineral by the US, Europe, Japan, Canada and Australia.¹²

⁹ Australian Aluminium Council, Economic Contribution of the Australian Aluminium Industry, 20 September 2024

¹⁰ Project Blue, Fluorspar supply & demand outlook, Fluorine Forum 2025, Baveno, Italy, 22-24 October 2025

¹¹ Tivan, Speewah Fluorite Project Feasibility Study, 20 March 2026

¹² Australia has designated fluorine, rather than fluorspar, as a critical mineral

Hydrogen fluoride – the bridge between fluorspar and fluorine chemicals

Although fluorspar is a critical mineral, it cannot be used directly to produce fluorine chemicals. The intermediate is anhydrous hydrogen fluoride (AHF), which is produced by the reaction of acidspar and sulfuric acid, known as the acidspar process. The AHF is reacted with other minerals and chemicals to produce fluorine chemicals. This is illustrated in Figure 2.

AHF and hydrofluoric acid are also used directly in many applications, including:

- Production of high purity quartz, required for the production of polysilicon for solar panels
- Purification of natural graphite, used in lithium-ion batteries
- Etching and cleaning processes in semiconductor manufacture

The prices for AHF in the USA, Europe and China for the past 3 years are summarised in Table 3. The typical price in China is around US\$1,600/tonne, while typical prices in the USA and Europe are higher at US\$2,300-2,500/tonne. In the last six months, the price in China has risen to be similar to the USA and Europe.

The goal is lower cost production of AHF.

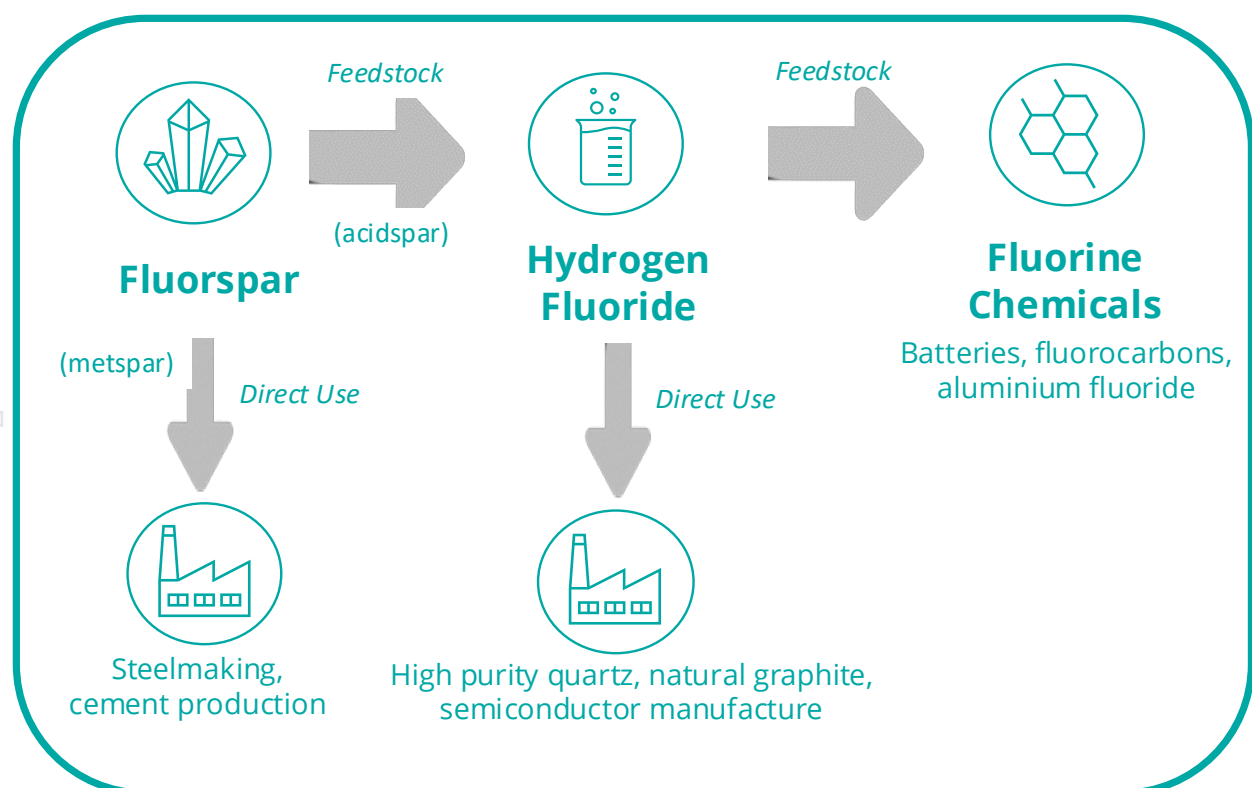


Figure 2: Simplified fluorine value chain. Hydrogen fluoride is the bridge between fluorspar and fluorine chemicals

Table 3: Anhydrous hydrogen fluoride (AHF) price for 3 years to March 2026 (US\$/tonne) (source: www.intratec.us)

	USA (import, CIF, USA)	Europe (domestic, exw, Germany)	China (domestic, exw, China)
Minimum	\$2,260	\$2,290	\$1,330
Median	\$2,510	\$2,350	\$1,575
Maximum	\$2,960	\$2,610	\$2,090

Aluminium smelter bath – an alternative to acidspar as a source of fluorine

Most modern aluminium smelters produce excess ‘bath’ as a by-product, solid granules that contains about 50% fluorine. Throughout the 100+ year history of the aluminium smelting industry, excess bath from an operating smelter was sold to new smelters, which required bath to commence operations. This was the only meaningful market for excess bath.

Over the past decade, two factors have led to an increasing global surplus of bath:

- Raw material changes and technology changes in aluminium smelting, which have led to increased bath production per tonne of aluminium produced
- Reduced rate of new smelter construction, because the growing demand for aluminium is being increasingly met using recycling.

Aluminium industry forecasts suggest that the global bath market surplus will increase, with bath production anticipated to far outstrip demand.¹³ Aluminium smelter bath has become a by-product with almost no market. All the major global aluminium producers are eager for alternative applications for excess bath, to avoid the unpalatable options of on-site storage or landfill.

ALCORE process – a solution to acidspar supply constraints and surplus aluminium smelter bath

ALCORE has developed a world-first proprietary process to produce AHF using aluminium smelter bath as an alternative to acidspar. Simplified process flowsheets for the acidspar process and ALCORE process are shown in Figure 3.

ALCORE Project Status

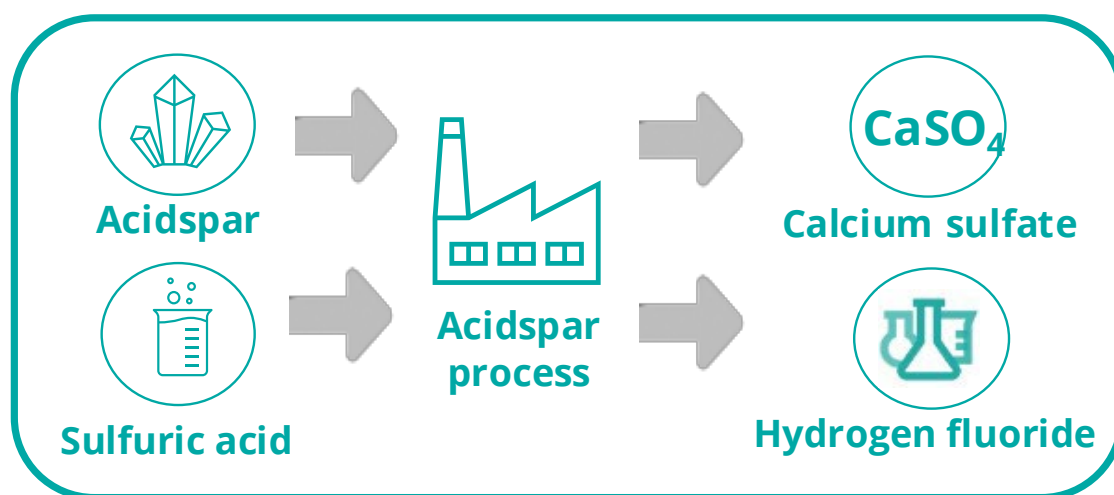
The ALCORE process has been operated at pilot scale in a batch reactor. A continuous pilot plant is being constructed, the outcomes of which will be:

1. Selection of reactor designs and process conditions for the commercial plant
2. Production of saleable hydrogen fluoride for evaluation by customers

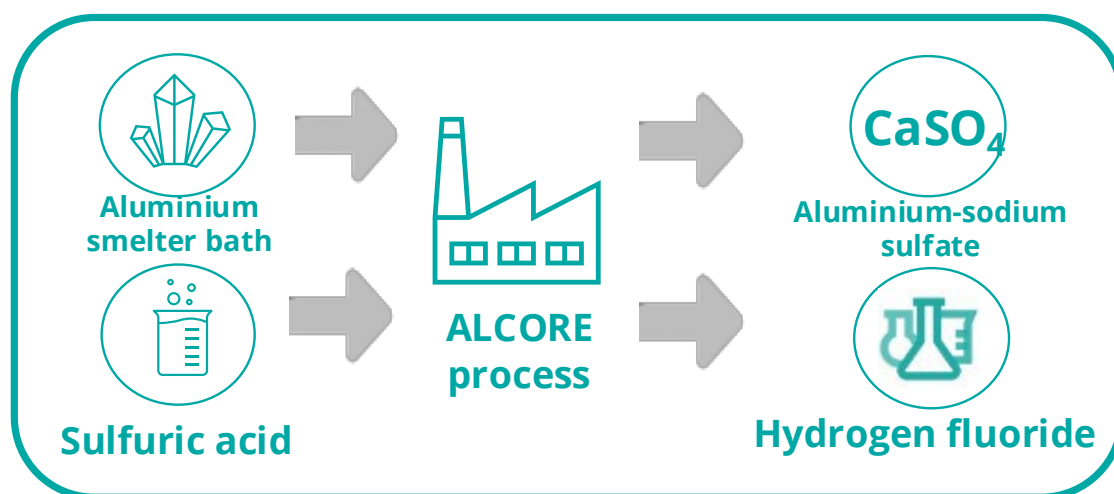
¹³ BathCo, Excess bath material – sustainable solutions to an environmental liability, 39th ICSOBA conference, 22-24 November 2021.

ALCORE has secured the support of Rio Tinto¹⁴ and the Tasmanian Government¹⁵ to locate the pilot plant in an existing industrial facility adjacent to the Bell Bay aluminium smelter in northern Tasmania.

The establishment of the pilot plant is proceeding well,¹⁶ and further updates will be provided shortly.



(a) AHF production from acid spar



(b) AHF production from aluminium smelter bath using the ALCORE process

Figure 3: Simplified process flowsheets for AHF production from acid spar and aluminium smelter bath

This announcement is approved for release by the board of ABx Group Limited.

Go to the ABx [Investor Hub](#) to watch a video of this announcement and ask any questions of management.

¹⁴ ASX Announcement, 15 January 2025

¹⁵ ASX Announcement, 19 December 2024

¹⁶ ASX Announcement, 27 March 2026

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About ABx Group Limited

ABx Group Limited (ABx) is a uniquely positioned Australian company delivering materials for a cleaner future.

The three priority projects are:

- **Heavy rare earths:** Supplying light and heavy rare earths from Tasmania into Western supply chains
 - Maiden mixed rare earth carbonate produced and positive customer feedback received
 - Processing Options Analysis conducted in partnership with external experts
- **Clean fluorine chemical production:** Producing industrial chemicals from aluminium smelter by-product (ALCORE)
 - Continuous pilot plant under construction in Bell Bay, Tasmania
- **Near-term bauxite production:** Mining bauxite resources for the aluminium, cement and fertiliser industries
 - Agreements executed with Good Importing International for bauxite projects in Queensland and New South Wales, and \$2.7 million initial payment has been received
 - Approvals well advanced for DL130 bauxite project in northern Tasmania

ABx endorses best practices on agricultural land and strives to leave land and environment better than we find it. We only operate where welcomed.

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.