PURE ALUMINA
ACN 072 692 365

24 May 2019

ASX Code: PUA, PUAOC

Investor Presentation for A$30 million capital raise to acquire Polar Sapphire and construct a 1,000 tonne per annum high purity alumina operation

Pure Alumina Limited (ASX: PUA) provides the following investor presentation to support its previously disclosed capital raising of A$30 million. The funds from this capital raising, if completed, would be deployed to acquire Canadian private company Polar Sapphire Limited and, using their proprietary technology, construct a 1,000 tonne per annum high purity alumina operation. The acquisition is subject to all conditions precedent being satisfied and approvals being received.

PURE ALUMINA

polar sapphire

A COMBINATION TO CREATE A NEW COMMERCIAL LOW COST PRODUCER OF HIGH PURITY ALUMINA

Disclaimer

Forward-looking Statements

This announcement contains forward-looking statements which are identified by words such as ‘anticipates’, ‘forecasts’, ‘may’, ‘will’, ‘could’, ‘believes’, ‘estimates’, ‘targets’, ‘expects’, ‘plan’ or ‘intends’ and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward-looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of the Company, the directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward-looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.

PURE ALUMINA

Investment Highlights

Pure Alumina is raising capital to acquire Polar Sapphire (**"Polar"**) and to fund a commercial-scale factory

1. One of the world's highest quality, lowest cost HPA suppliers
2. CapEx substantially lower than other potential HPA suppliers – near term cash flow positive
3. Rapid market growth and order backlog
4. Compelling valuation and lower risk proposition vs industry peers

Team

Highly qualified team with extensive industry experience and proven track record of building cleantech companies

Scott Nichol
Founder, CEO

Experience:
- Experienced cleantech/advanced material manufacturing entrepreneur
- COO - Jaco SolarSi
- Founder, President, CTO - 6N Silicon (purifying silicon for solar cells)

Education:
- MBA, Western University
- P. Eng, Materials Engineering, McMaster University

Dan Smith
VP of Operations

Experience:
- Experience scaling new technologies to production scale
- Broad manufacturing and management
- 6N Silicon – designed, managed construction, commissioned and procured equipment for 100,000 sq. ft. manufacturing facility

Education:
- P. Eng, Mechanical Engineering, Queen's University

Iman Zargaran
R&D Manager

Experience:
- 10+ years of materials development experience
- Technical Project Manager - PNFCO (nano-materials)
- Engineering Cooridinator - Pishgaman Catalyst Alvand (alumina)

Education:
- Master's, Materials Engineering, University of Tehran
- P. Eng, Materials Engineering,

David Leavy
VP of Finance

Experience:
- 25+ years experience in the banking and mining industries
- CFO of multiple mining companies during project development

Education:
- B.Econ, Murdoch University
- M. App. Fin., Macquarie University

The Acquisition – Polar Sapphire

Polar Sapphire, a private Canadian company, has perfected its unique patented HPA production technology over 6 years.

- Polar's innovative process produces 99.999% (5N) HPA (Al_2O_3) - the highest commercial grade of HPA, commanding a price premium.
- Polar can also produce 3N and 4N HPA using lower cost feedstock
- Polar's technology is proven – its Toronto pilot plant has capacity to produce HPA at 145 tonnes/year
- Commercial production is only a modest 2.4 times scale up – low risk – many current components already operate at commercial scale

Sapphire Boule made from Polar Sapphire Technology

The Acquisition – Polar Sapphire

Polar's modular production process has key advantages over existing methods of HPA production

- Polar's modular system has many advantages compared to other methods of producing HPA including:
  - significantly lower CapEx and Operating Costs,
  - flexibility to produce multiple grades at once; and
  - rapid expansion
- Polar has passed the rigorous qualification process of multiple sapphire producers and is now receiving orders exceeding current capacity
- Polar's 5N process has a significantly lower capital intensity than other Kaolin HPA projects and its operating costs are in line or better than most 4N HPA cash costs

Quality testing of a Polar Sapphire Boule

Key Acquisition Terms

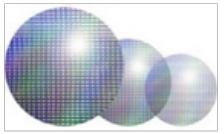
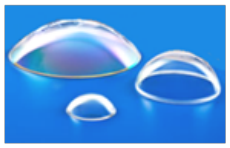
PUA acquires all of the outstanding equity in Polar Sapphire in exchange for:

- C$13.75m in PUA Shares
- C$12m in cash
- 3 board seats in PUA

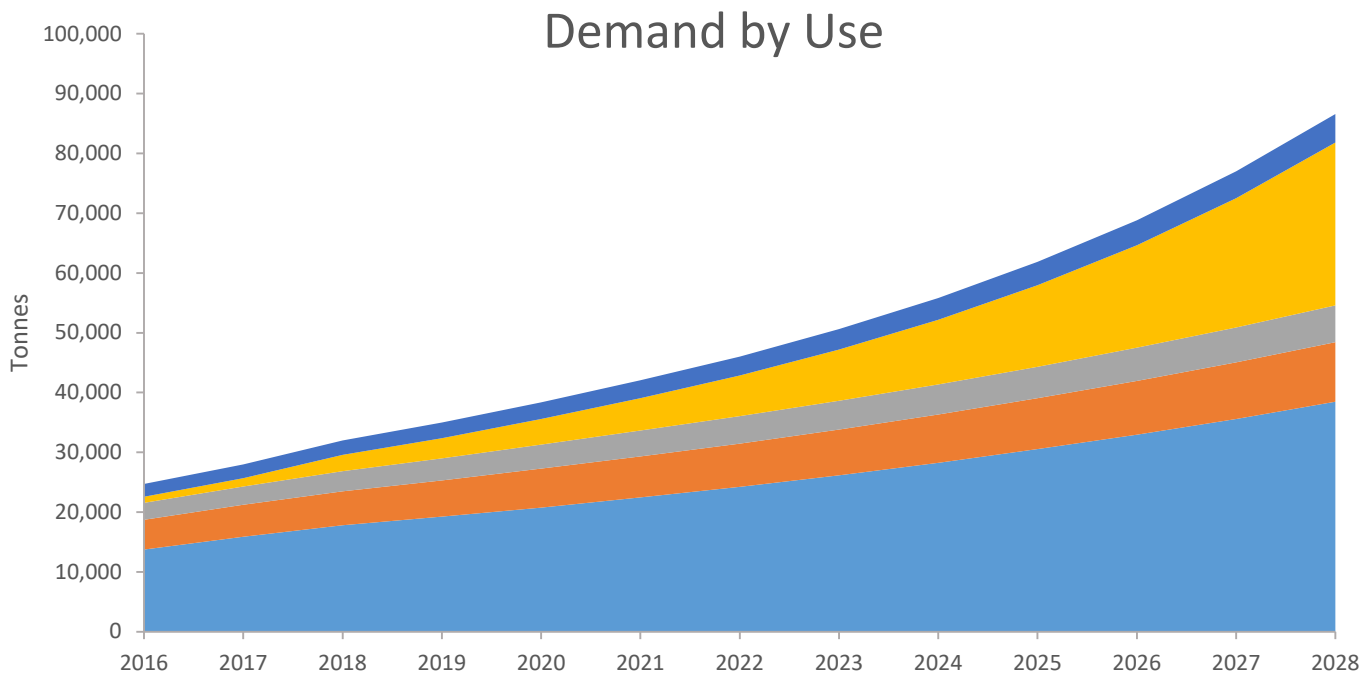
Conditions Precedent Include:

- Raising a minimum of A$30m of equity
- Completion of due diligence
- Progress on sale of PUA gold assets
- Other standard CPs
- All management and employees of Polar are continuing with the combined group

HPA Applications

LEDs (5N & 4N grade)		• Used to produce sapphire boules, which are turned into sapphire wafers (substrates) for LEDs
Semiconductors (5N & 4N grade)		• Ceramic materials, dielectric components for semiconductor wafers, wafer polishing • Potential to displace quartz tooling
Phosphor (for Plasma Displays) (4N grade)		• Used in plasma displays (e.g. TVs and computers) to control the characteristics of phosphorous material
Other Sapphire (Non-LED) (5N & 4N grade)		• High-strength, scratch-resistant glass for smart phones, watches • Lasers, optical components windows, buttons
Lithium-Ion Battery Separators (4N & 3N grade)		• Used to coat separators to prevent excessive and abnormal heat generation
Other (6N to 3N grades)		• HPA has other applications in the industrial, chemical, defense, and medical sectors

Rapid HPA Growth from Multiple Sectors



	CAGR 2018-2028
Others	7.0%
Batteries	26.0%
Phosphor	6.2%
Semiconductor	5.8%
LED	8.0%

Total: 10.5%

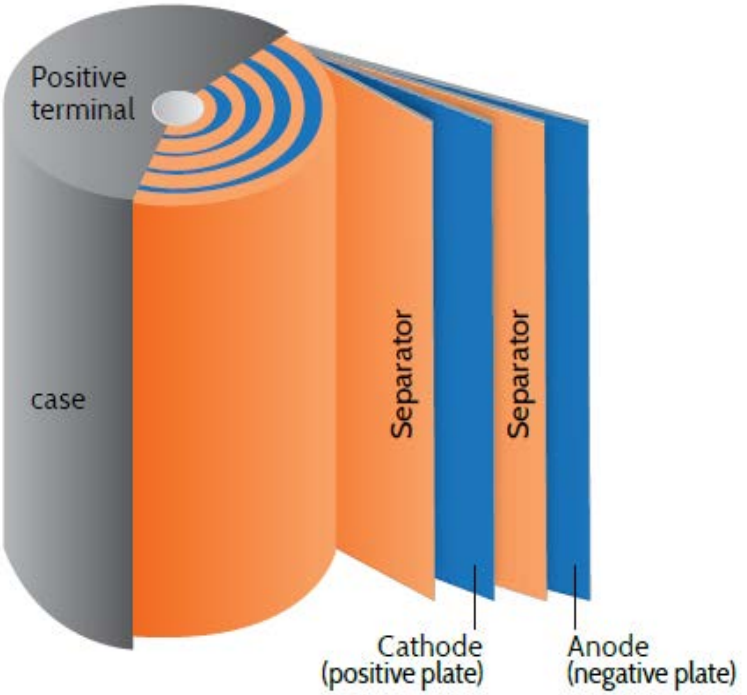
Demand for HPA has risen eight-fold since 2003 and is forecast to triple by 2030

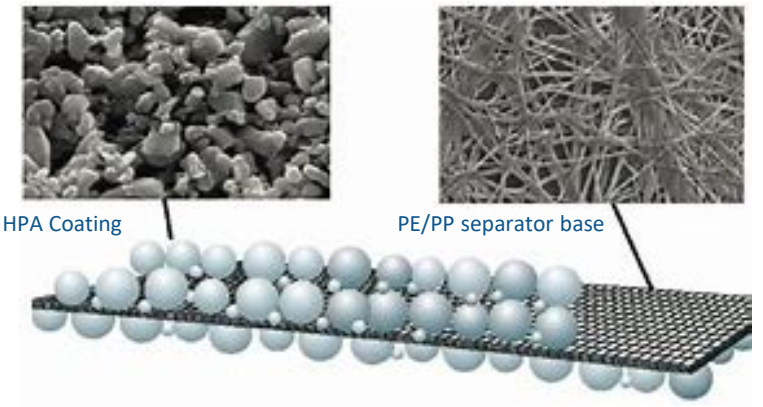
- LED's consume >50% of HPA demand and is growing strongly. LED's currently have ~20% of the lighting market with saturation expected above 80%.
- Lithium batteries are an emerging HPA market and forecast to become the largest HPA market within 10 year as electric vehicle and power storage markets take off.
- PUA plans to sell into market growth rather than cannibalizing competitors market share

Source: Roskill 2017

Coated Battery Separators

- Lithium batteries generate significant heat that, if unmanaged, may result in thermal runaway e.g. Samsung Galaxy Note 7
- Demand for larger batteries and greater energy density e.g. EV batteries, increases the thermal management issue
- Coating battery separators with HPA has been found to significantly improve safety and efficiency:
  - provide greater thermal stability to the battery,
  - significantly improves impedance (Macmullan number <3) allowing for high power capability,
  - improve battery life cycle and lowers self-discharge

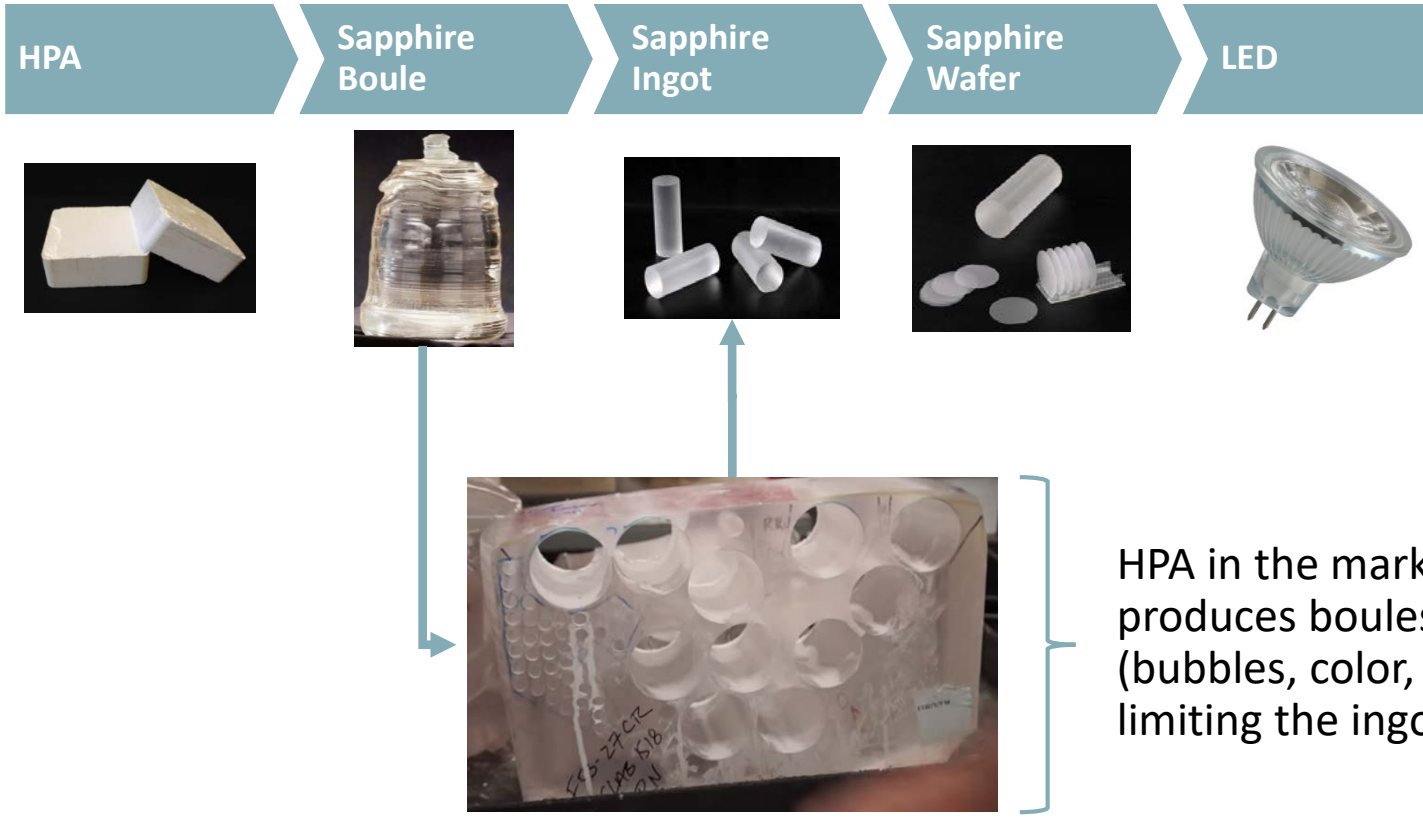




Polar's HPA – Value Proposition

Polar Sapphire HPA produces higher quality boules with fewer defects, increasing ingot yields and revenue for customers by up to 25%

HPA in the LED Supply Chain



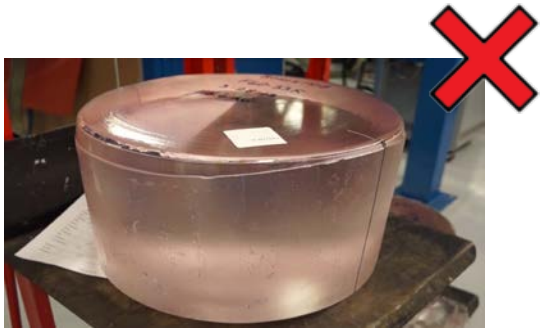
HPA in the market today produces boules with defects (bubbles, color, clarity), limiting the ingot yield/boule

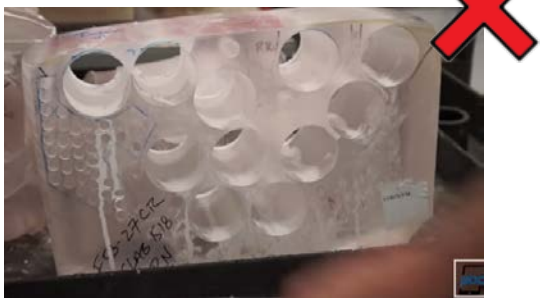
Polar is Solution to Existing Issues

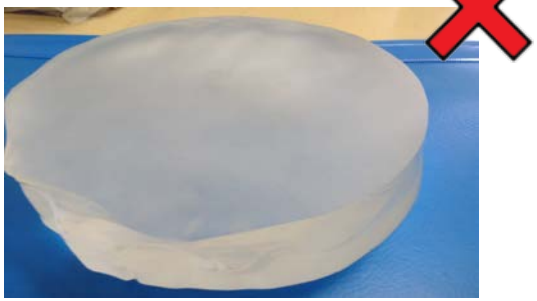
Polar HPA has increased value in use while solving current HPA issues

Competitors HPA

HPA in the market today produces boules with defects (bubbles, colour, cloudy), limiting the ingot yield/boule







Sapphire for LED's

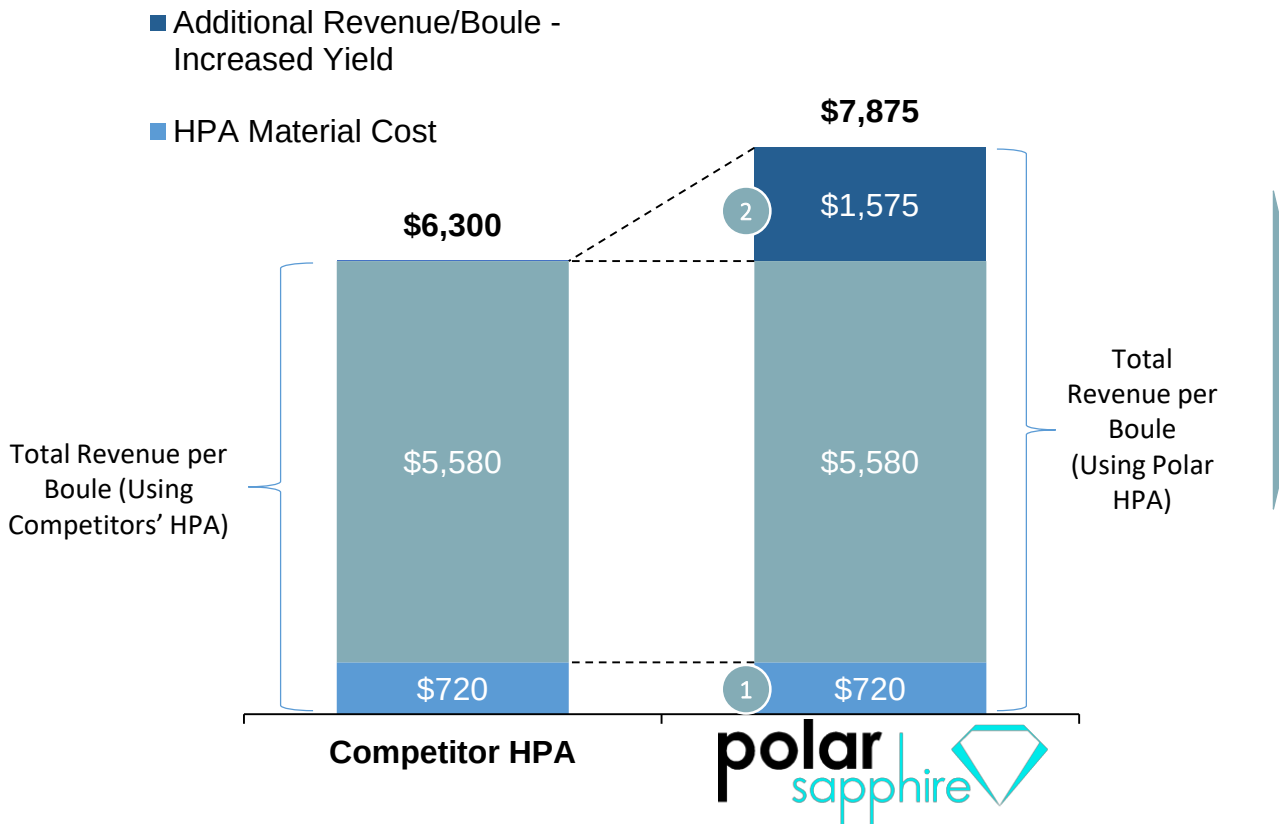
- Increased clarity
- Increased Yield
- Fewer defects

Powder for Battery Separators

Competitive Advantage

Polar HPA generates 25% more revenue for producers than competitor HPA

Revenue/Sapphire Boule with Competitor HPA vs. Polar HPA (USD $/Boule[1])



- Full value of Polar Sapphire HPA is ~USD $77/KG:
  1. $24/KG (**$720/30 KG boule**) – price charged by competitors for HPA
  2. $53/KG (**$1,575/30 KG boule**) – additional revenue, given 25% increase in **ingot yield per boule from Polar Sapphire HPA**

1.One sapphire boule is ~30 KG

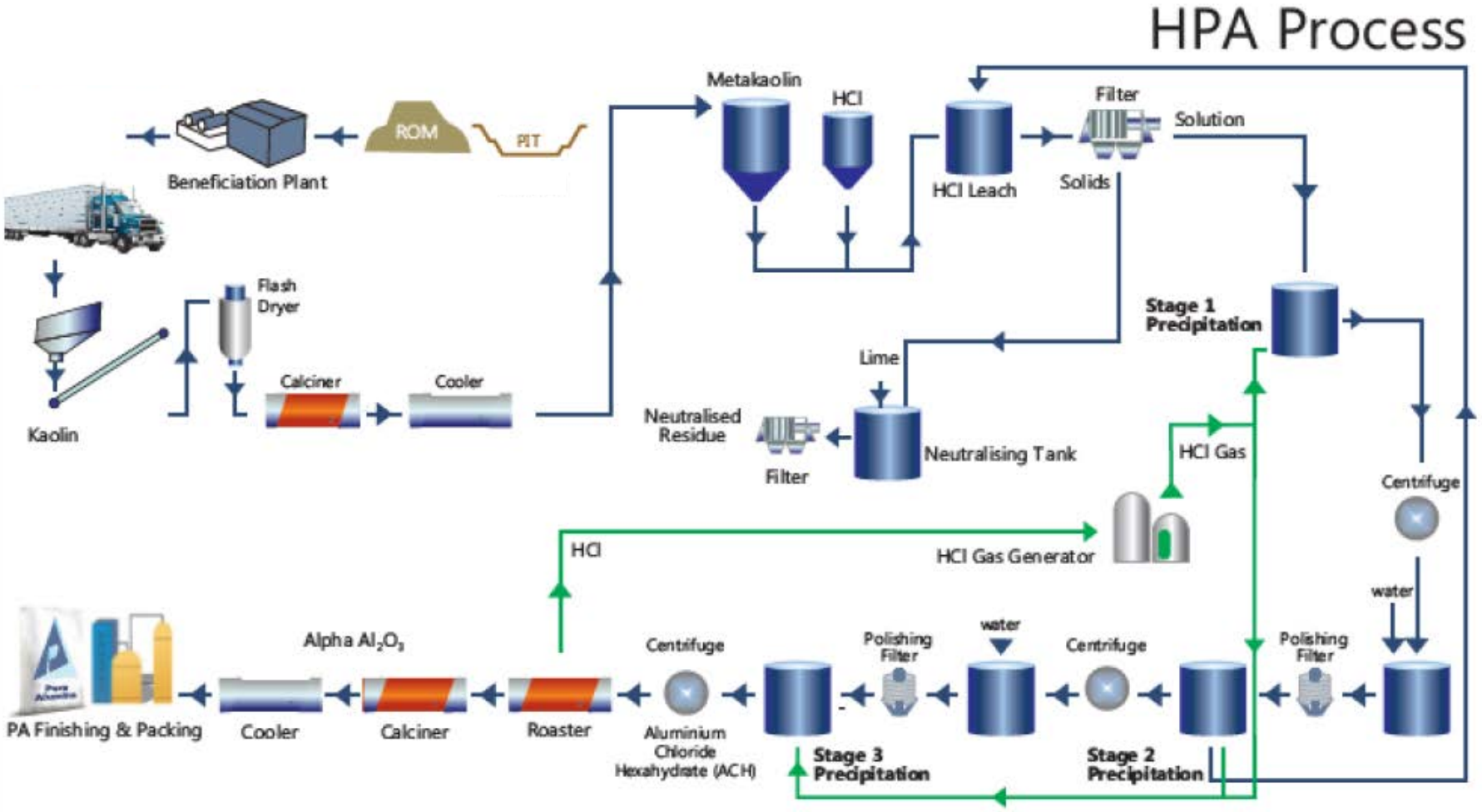
Business Model

Polar's proprietary low-energy process generates one of the world's highest-purity, lowest production cost alumina

- Simple process uses aluminium to produce high quality 5N HPA, which few can compete with.
- Polar forecast cost of production $7/kg, equivalent to competitor 4N cost
- Low cost ensures strong sustainable margins
- PUA will look to reduce input costs further by implementing this technology into its current Kaolin process

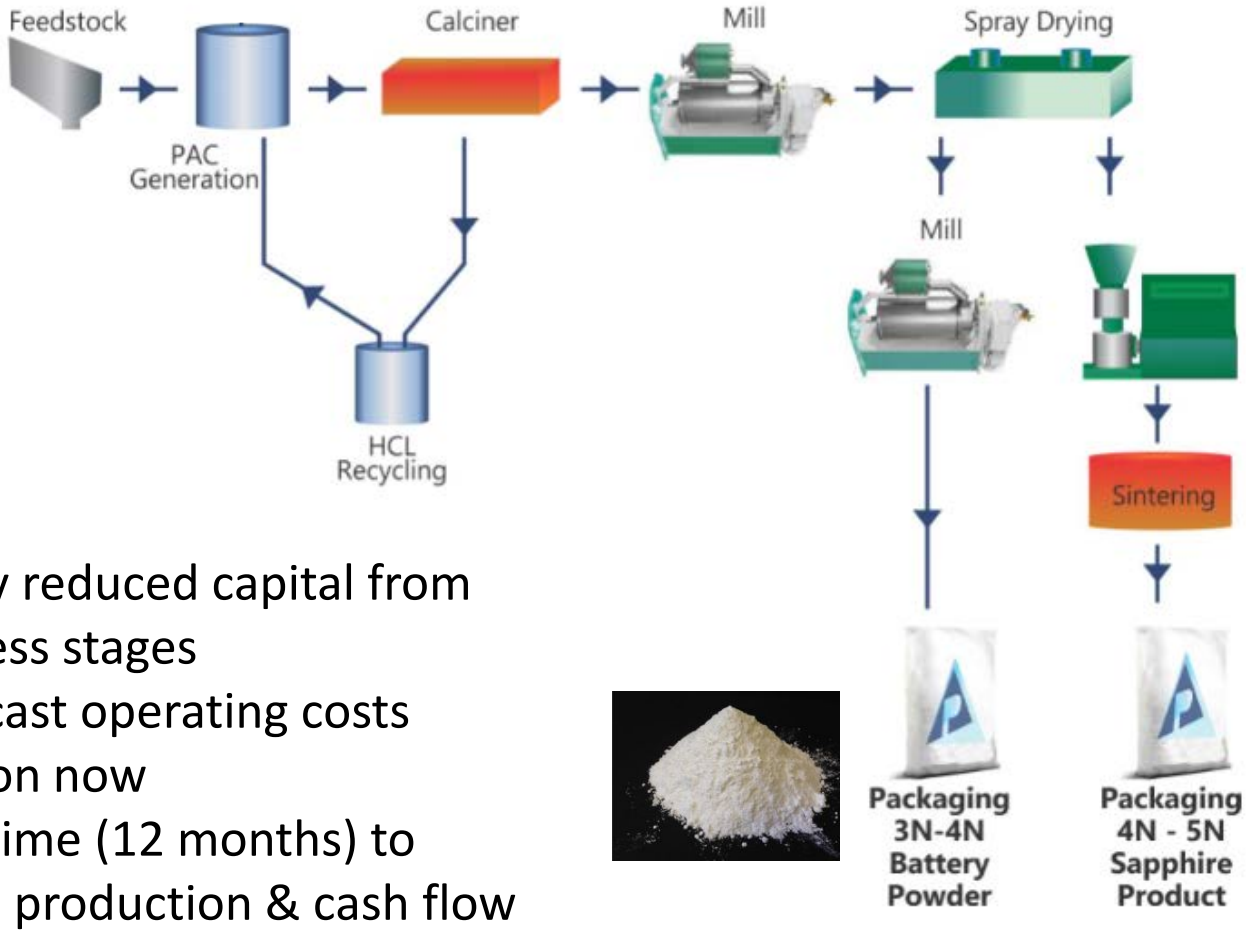
Kaolin Based HPA Manufacturing Process

Capital intensive and complex



Polar's HPA Manufacturing Process

Simple cheaper process



- Significantly reduced capital from fewer process stages
- Lower forecast operating costs
- In production now
- Short lead time (12 months) to commercial production & cash flow
- Low scale-up risk

Polar's Unique IP is Patented

Polar's proprietary HPA process is protected by 2 patents

- The patents are granted in the USA
- Patent applications have been lodged in other jurisdictions and are pending
- Patent protection significantly mitigates risk of competition

Competition – Peer Comparison

Polar Sapphire's proprietary process outperforms competing processes across all relevant parameters

	Purity	Energy Use	OpEx	CapEx	Sapphire Yield	Pollution
polar sapphire	High	Low	Low	Low	High	Low
Kaolin-Based Process (Standard Equipment)	Medium	Medium	Medium	High	Medium	Low
Aluminium Alkoxide Hydrolysis Process (React with Alcohol)	Medium	High	High	High	Medium	Medium
Ammonium Al Sulfate Process (React with Ammonia)	Low	High	Low	High	Low	High

Best
Average
Poor

Assessment of Process Performance by Parameter

Polar Outperforms Peers

Polar is **already in production** at a **lower capital cost**

Company	Altech Chemicals (ATC)	Alpha HPA (A4N)	FYI Resources (FYI)	Polar Sapphire
Mkt Cap (A$m)	$84m	$62m	$13m	NA
Production (tpa)	4,500	10,200	8,000	5,000
Initial capex (US$m)	$298	$149	$179	$12 per 1,000t
Capital Intensity (US$/t)	$66,222	$14,563	$22,344	$12,000
COGS (US$/kg)	$9.9-$10.5	$12.9	$6.5	$6-$8
Stage of Development	Construction	PFS complete	BFS ongoing	Pilot
Time to Production	2.5 years from financing	June 2022	Not announced	**In production**

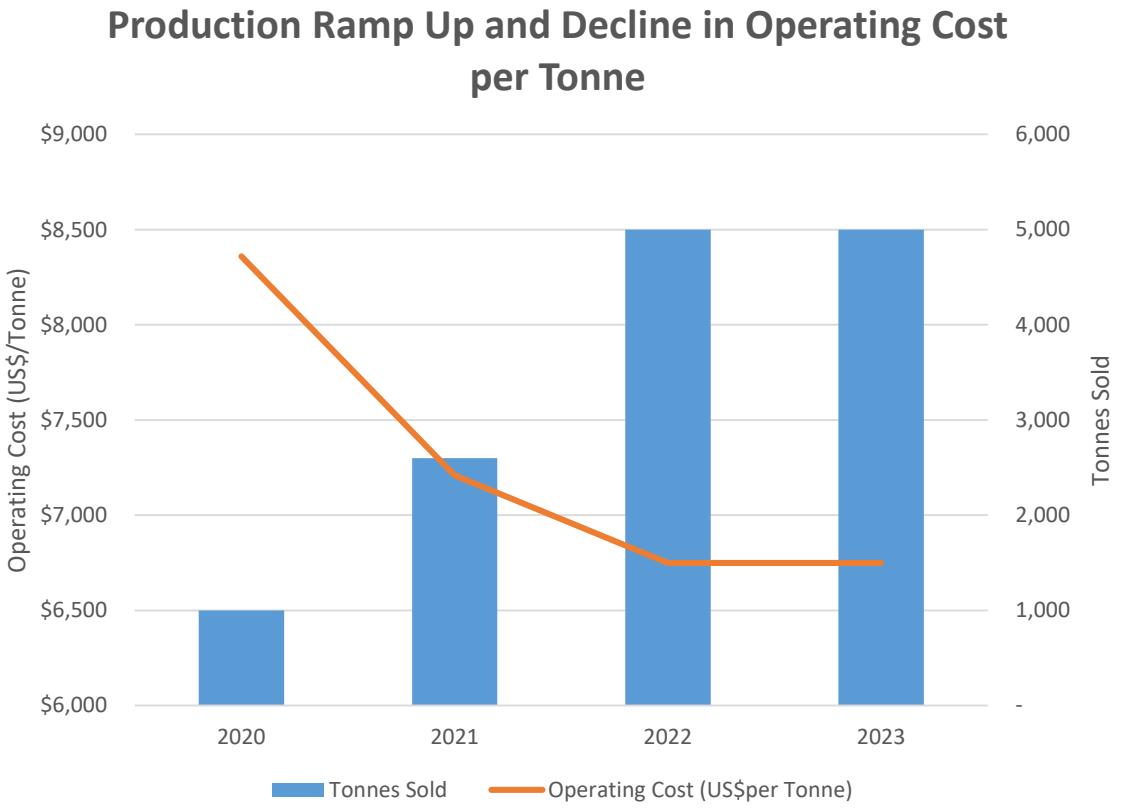
The Transaction Timeline

The indicative transaction timeline is:

- Sign non-Binding Heads of Agreement ✓
- Sign Binding Agreement ✓
- Due Diligence ✓
- Roadshow and Capital Structure — May
- Transaction approvals inc. ASX — June
- Shareholder meeting — July
- Transaction Completion — July/Aug

Sapphire Crystal Boule made from Polar HPA

Strategy Post Transaction



Note: Potential expansion and cost reduction are current expectations only and may change with market conditions

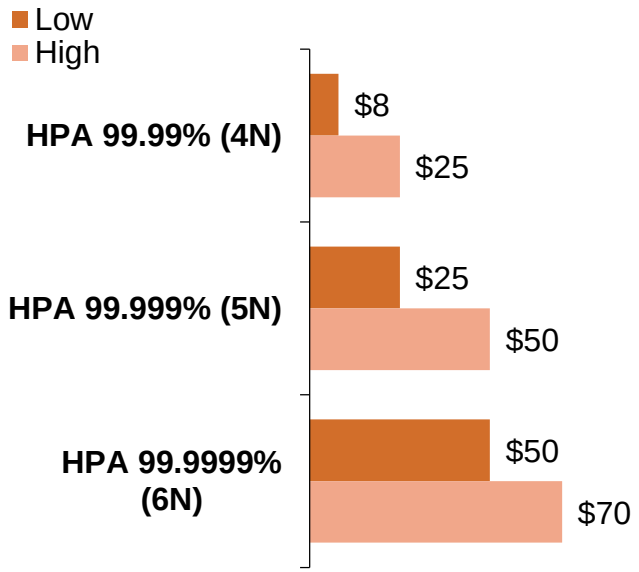
- **Forecast is based on continued expansion of production**
- **Sales volumes are uncertain and may not achieve expectations**

Financial Projections

HPA prices can vary significantly by purity, geography, and customer; Polar is using conservative price assumptions

Pure Alumina is using a conservative price of $20/kg

HPA Price Range by Purity Level (USD $/KG)



Polar – Impact of Pricing per 1,000t of HPA Production

	PRICE	EBITDA
$	10.00	$3.25m
$	15.00	$8.25m
$	**20.00**	**$13.25m**
$	25.00	$18.25m
$	30.00	$23.25m
$	35.00	$28.25m
$	40.00	$33.25m
$	45.00	$38.25m
$	50.00	$43.25m

1. All figures in USD
Source: Benchmark Minerals; Persistence Market Research; Altech Chemicals; Polar Sapphire Analysis

Experienced Board

Tom Eadie – Chairman
- 20+ years as Geologist and mining executive

Scott Nichol – Managing Director
- Founder and creator of Polar Sapphire Technology
- 10+ years experience in C-suite roles in manufacturing and solar energy

Martin McFarlane – Non-Executive Director
- 25+ years of resources experience, 8+ years in battery materials
- B.Eng, B.Bus

Wayne Maddever – Non-Executive Director
- Experienced director and manager of technology start ups, Polar founding Director
- pH.D in Metallurgical and Materials Science

Robert Boston – Non-Executive Director
- 15+ years of mining experience and experienced lawyer
- B.Comm, B.LLB, Grad Dip App.Fin, Dip Man

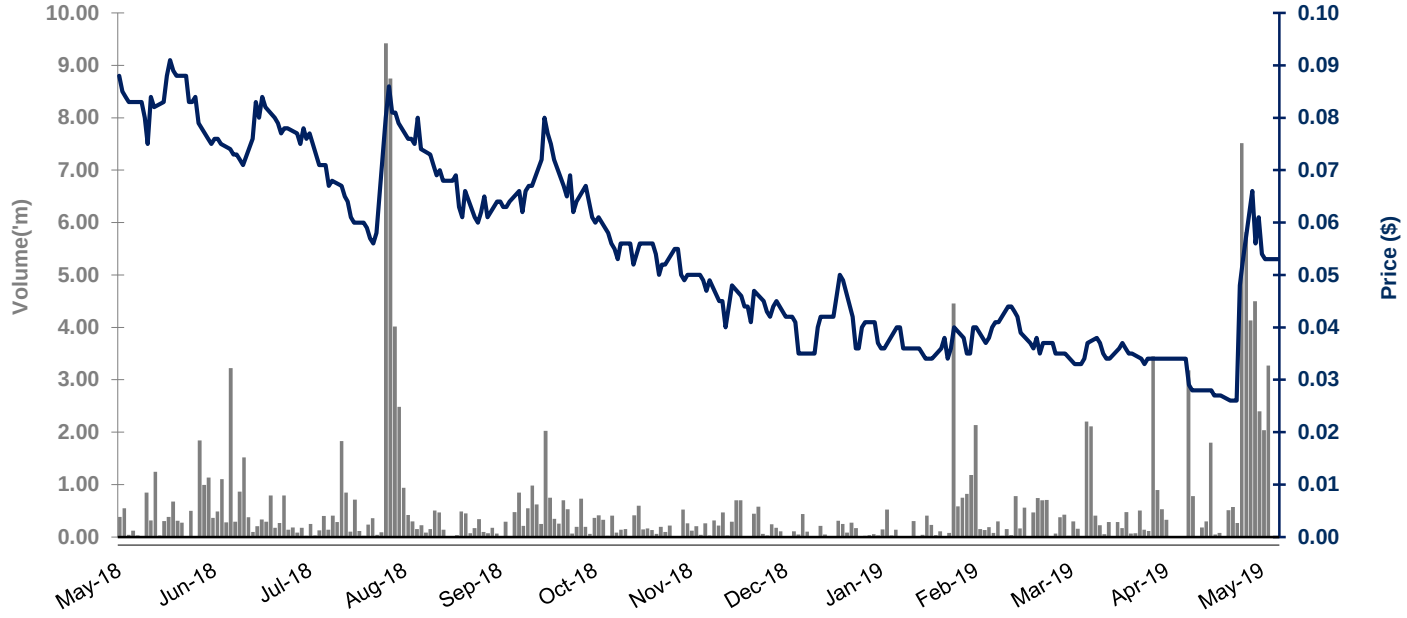
Tom Rand – Non-Executive Director
- Partner at Arctern Ventures, largest investor in Polar.
- Sits on the board of a number of cleantech companies

Corporate Snapshot

ASX Code: PUA	
Ordinary Shares	~171.1m
Listed Options	42.2m
Unlisted Options	29.2m
Market cap (@$0.053)	$9.0m
52 week high-low (A$)	$0.096-$0.026
Cash (31 December 2018)	$258,000

Top Shareholders	%
Tolga Kumova	**9.2%**
Thea Management Pty Ltd (Chairman)	**4.9%**
Regal Funds Management Pty Limited	**4.3%**
Charles Bass	**3.1%**
Sacco Developments Australia Pty. Ltd.	**2.7%**
Board and Management (ex Chairman)	**2.2%**
Top 20	**42.1%**

Share Price Performance and Volume to 21 May 2019



Polar Sapphire – Capital Structure

Existing shareholdings of Polar Sapphire prior to the proposed acquisition by Pure Alumina

Shareholder	Total Common Shares	Issued Fully Diluted %
Scott Nichol (founder, CEO)	1,800,000	37.0%
Daniel Smith (founder, COO)	100,000	2.1%
YiYi Ventures (private company)	166,666	3.4%
ArcTern Fund I	2,166,666	44.5%
ArcTern SPV VI, L.P.	506,952	10.4%
Others	124,999	2.6%
Total - Shares	4,865,283	100%

- All current shareholders in Polar Sapphire will remain significant shareholders in Pure Alumina
- Supportive shareholder base with high level of knowledge about technology and operations

Investment Highlights

1. One of the world's highest quality, lowest cost HPA suppliers
2. CapEx substantially lower than other potential HPA suppliers – near term cash flow positive
3. Rapid market growth and order backlog
4. Compelling valuation and lower risk proposition vs industry peers

Appendix

PURE ALUMINA

Manufacturing Process and Products

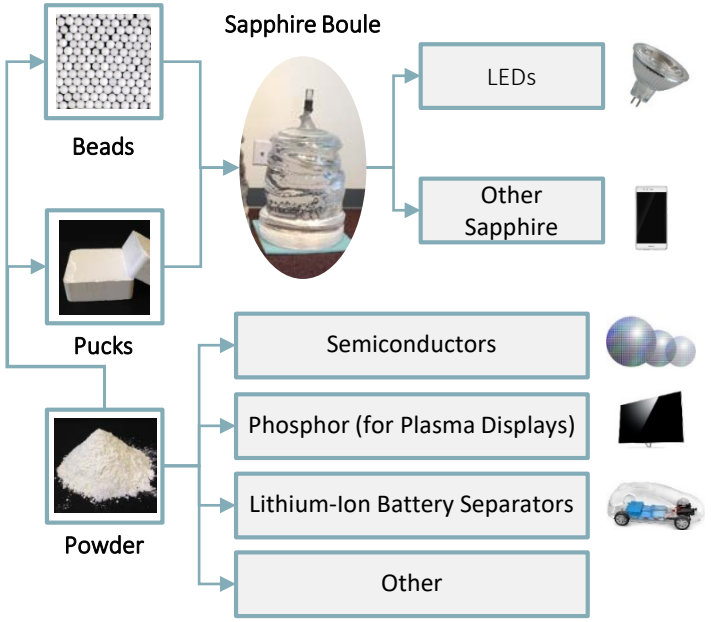
Polar Sapphire's unique HPA production process is protected by patents and custom-made equipment

Polar HPA Manufacturing Process

1. Dissolve aluminum/ore in HCl acid to make PAC
2. Heat and calcinate PAC into alumina powder
3. Mill powder
4. Spray dry powder
5. Press powder into pucks
6. Sinter pucks

- 2 patents granted in US
- Patents pending in China and Canada
- Patents cover manufacturing process
- All equipment is custom-made, and process cannot be replicated with standard equipment

Polar HPA Products and Applications



Execution Plan

Polar Sapphire will initially focus on the large and growing market for HPA in sapphire production (for LEDs and other applications)

Sapphire Market (LEDs and Other Applications)

- Secure letters of intent (LOIs) or contracts with 2-3 potential customers for at least 1 MT/day
- Customers will be offered discounted price on initial orders, incentivizing them to confirm yield benefits at scale and qualify Polar Sapphire HPA with end-users (after which full price will be charged)
- Continue to grow customer pipeline and work with existing companies in pipeline to convert from testing to commercial orders
- Build commercial-scale factory (5,000 MT/year) to satisfy demand, beginning with 3 lines and ramping up to 15 lines, with expansion beyond this based on demand

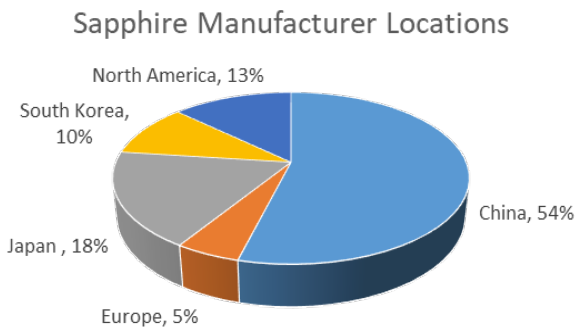
Lithium-Ion Battery Separators

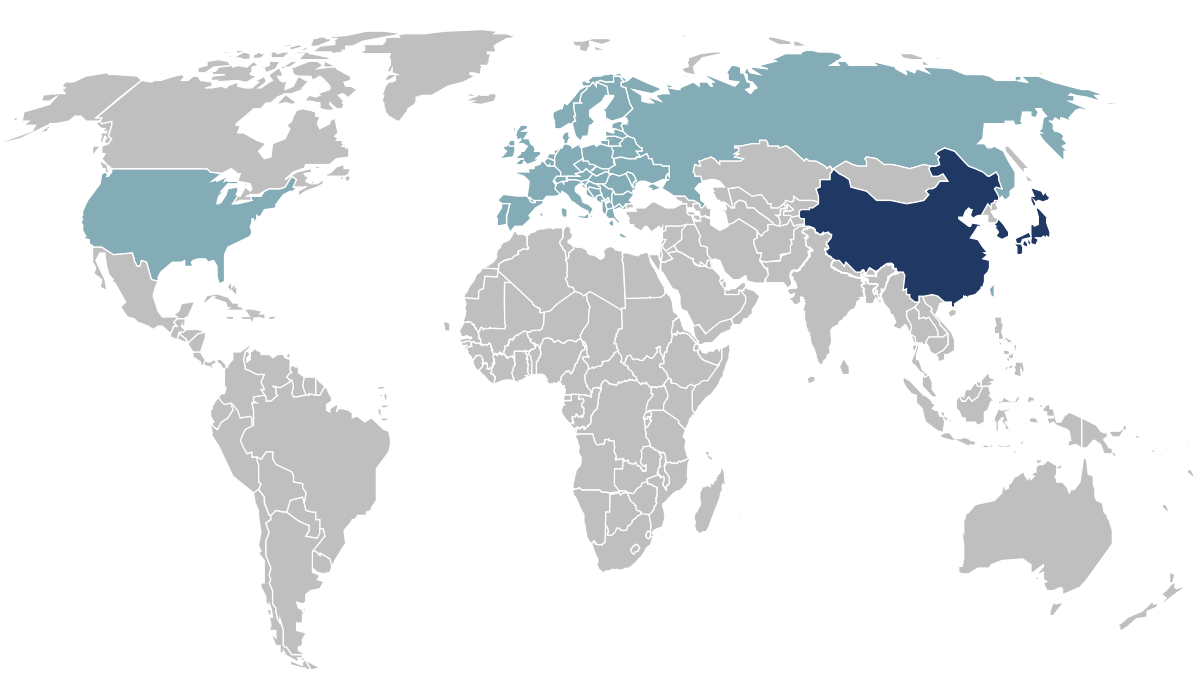
- Research into the development of battery grade HPA for use in lithium ion battery separators is underway
- Technical assistance agreement signed with major separator manufacturer to fast track the development process
- Discussions with separator manufacturers are underway, with initial samples for testing currently being prepared
- Potential to secure grant funding from Canadian government sources to fund R&D

Customer Pipeline

Estimated to be ~70 sapphire manufacturers (main customers) globally, with the majority located in China

- Estimated to be ~70 sapphire manufacturers globally
- Most sapphire manufacturers are located in Asia (China, South Korea, and Japan); 50% est. to be in China
- Other manufacturing locations include Taiwan, Europe, and US



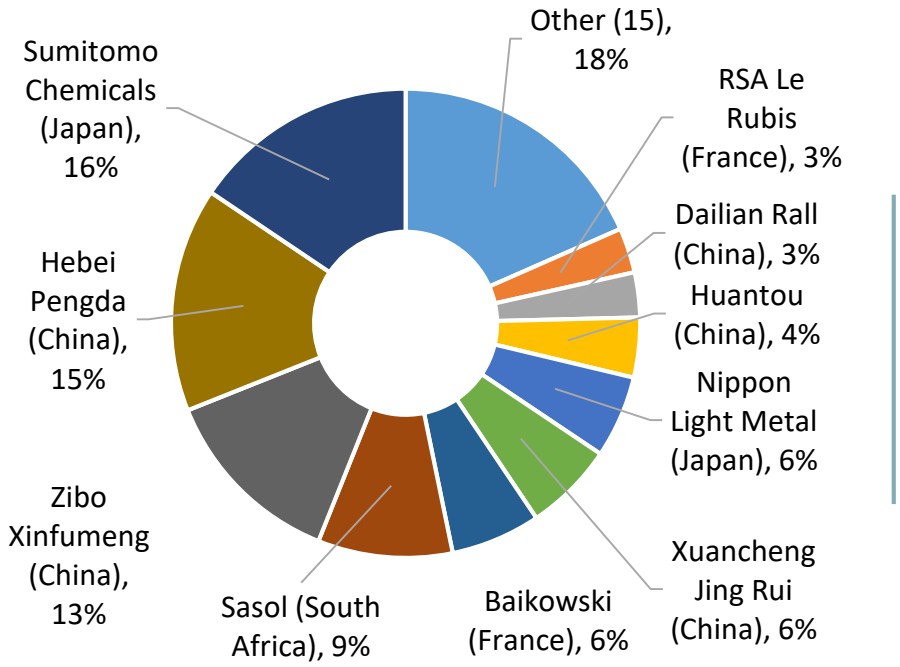


Source: Benchmark Minerals; **Polar Sapphire Analysis**

Competition – Current HPA Producers

There are ~25 HPA producers globally, with the majority of production in Asia

HPA Producers
(Market Share by Volume, Global, 2015)



HPA Producers (Tons/Year, Global, 2015)

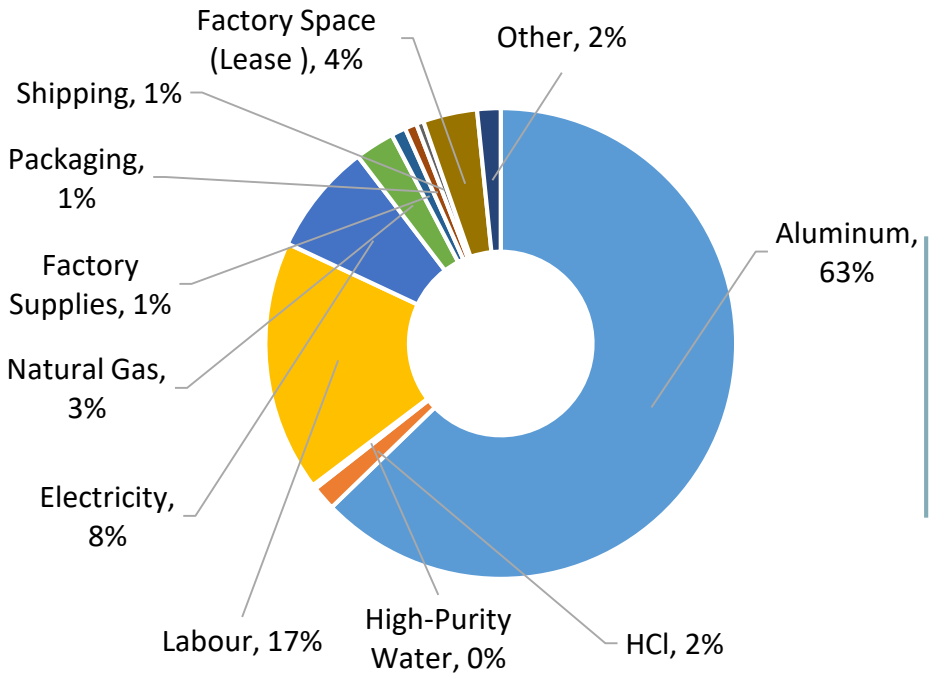
Company	Country	Tons/Year
Sumitomo Chemicals	Japan	3,020
Hebei Pengda	China	3,000
Zibo Xinfumeng	China	2,500
Sasol	South Africa	1,800
Xuancheng Jing Rui	China	1,200
Baikowski	France	1,200
Nippon Light Metal	Japan	1,100
Huantou	China	800
RSA Le Rubis	France	600
Dailian Rall	China	600
Other (15)	N/A	3,570

Source: Technavio

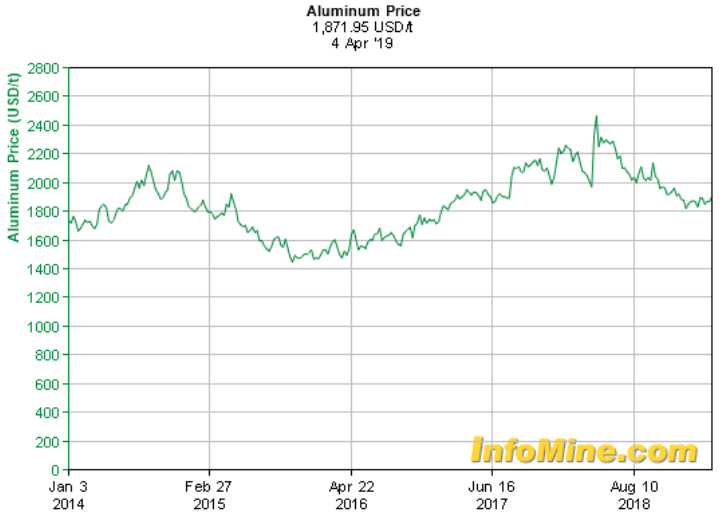
Polar's HPA – Production Cost

Aluminium metal represents the majority of Polar's production cost

Polar HPA Production Cost Breakdown (3 MT/Day Production Rate)



Historical Aluminum Prices (USD $/Tonne)



Source: Polar Sapphire Analysis; http://www.infomine.com

Sapphire Boule Production Cost

HPA represents ~10% of the total sapphire boule production cost