

# Sapphire Rollout Accelerated

A4N-ASX | ALPHA HPA LIMITED | MATERIALS | COMMODITY CHEMICALS

PRICE  
A\$0.86/sh

TARGET PRICE  
A\$1.40/sh  
(FROM A\$1.30/sh)

RECOMMENDATION  
SPECULATIVE BUY  
(UNCHANGED)

ANALYST  
STEVEN CLARK  
SCLARK@EUROZHARTLEYS.COM

## Event

A4N recently raised gross proceeds of A\$40m at \$0.73/sh via a strategic placement to AustralianSuper (A\$20m), Orica Ltd (ORI-ASX) and other existing holders. Proceeds from the placement will accelerate the development of the company's downstream expansion into synthetic sapphire glass production, providing the requisite A\$30m in matched equity funding under the Queensland Critical Minerals and Battery Technology Fund loan facility.

## Summary

**Sapphire pivot in focus:** The acceleration of A4N's phased entry into sapphire glass production does not come as a surprise to us given the previously guided 10x uplift in revenue per unit of alumina and ~50% increase in FCF margins from the conversion of HPA to sapphire glass relative to 4N+ HPA equivalent production. Guidance on the economics of sapphire production has been limited to date (we suspect due to commercial sensitivities), although A4N has now provided base and upper case EBITDA guidance for each phase of sapphire production at steady state. Sapphire growth feedstock requirements are loosely guided at a ratio of 3-4ktpa of sintered HPA tablets per 1k sapphire growth units (termed Nova Phase production), which would generate annual base case EBITDA of A\$800m (upper case: >A\$1.0bn) from 30-40% of original full-scale plant HPA equivalent output; for comparison, A4N's Mar'20 DFS outlined annual steady state EBITDA of A\$250m under an upper case pricing scenario. For illustrative purposes, the incorporation of Nova Phase production (diversion of ~4ktpa of Stage 2 HPA sales to Nova Phase feedstock) into our valuation from FY29E onwards lifts our valuation to +\$3.50/sh on base case EBITDA margins.

**What's in it for Ebner?** Synthetic sapphire glass production will utilise i) Ebner-Fametec's proprietary sapphire growth technology (which is not being sold into the open market) and ii) sintered HPA tablets produced by A4N as feedstock. We note Arctic Sapphire AS (a wholly owned subsidiary of Ebner-Fametec) is in the process of rolling out 100 sapphire growth units in Sulitjelma, Norway, which will leverage Norwegian hydropower as part of a net-zero sapphire crystal growth offering, prompted by increasing micro-LED demand and supply disruption. Ebner's collaboration with A4N provides access to HPA feedstock for sapphire growth with a relatively more attractive carbon footprint than incumbent HPA feedstock supply. The Alpha Sapphire collaboration also provides geographical diversification of supply (as required by cornerstone LED sector end users) with renewable energy access via the commercialisation of A4N's technology in Queensland, which has cumulatively received A\$78m in government grant funding to date, in addition to A\$30m in concessional debt funding specifically for the downstream expansion into sapphire glass growth. Alpha Sapphire is similarly progressing on aggressive timelines, with the commissioning of the initial sapphire growth units in Gladstone expected in MarQ'24.

## Action

**Speculative Buy rating maintained, Price Target lifted to A\$1.40/sh (1.0x NAV, prev. A\$1.30/sh).** Subsequent to our last published valuation, we have i) revised our Stage 2 full-scale plant parameters and funding assumptions ahead of the pending DFS release, ii) adopted the midpoint of base and upper case sapphire growth EBITDA margins and guided timelines, and iii) ascribed a nominal valuation to Nova Phase sapphire production for a net +\$0.11/sh uplift in valuation. The delivery of binding product offtake agreements, project financing, and FID for the full-scale plant remain pivotal catalysts, particularly with the Phase C and Nova Phase sapphire growth unit rollouts being reliant on additional feedstock capacity.

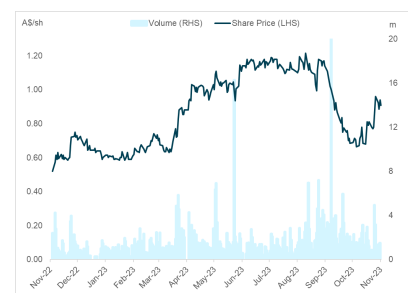
A4N-ASX		
Share Price	0.86	A\$/sh
Price Target	1.40	A\$/sh
Valuation	1.39	A\$/sh
SOI (diluted)	946	m
Market Capitalisation	813	A\$m
Enterprise Value	768	A\$m
Cash (Nov-23e)	46	A\$m
Debt (Nov-23)	Nil	A\$m

Production Forecasts	FY24E	FY25E	FY26E
4N+ HPA (kt)	-	-	3.6
5N+ Al-Precursors (kt)	0.25	0.35	0.35

Assumptions	FY24E	FY25E	FY26E
HPA Price (US\$/kg)	25.0	25.0	25.0
OpEx (US\$/kg)	0.0	0.0	7.0
AUD/USD (x)	0.71	0.73	0.74

Key Financials	FY24E	FY25E	FY26E
Revenue (A\$m)	11	66	227
EBITDA (A\$m)	(11)	38	149
NPAT (A\$m)	(20)	7	76
Operating CF (A\$m)	(17)	2	69
EPS (A\$/sh)	(0.02)	0.01	0.08
EV/EBITDA (x)	na	23.5	7.4
EV/EBIT (x)	na	29.1	8.2

## Performance

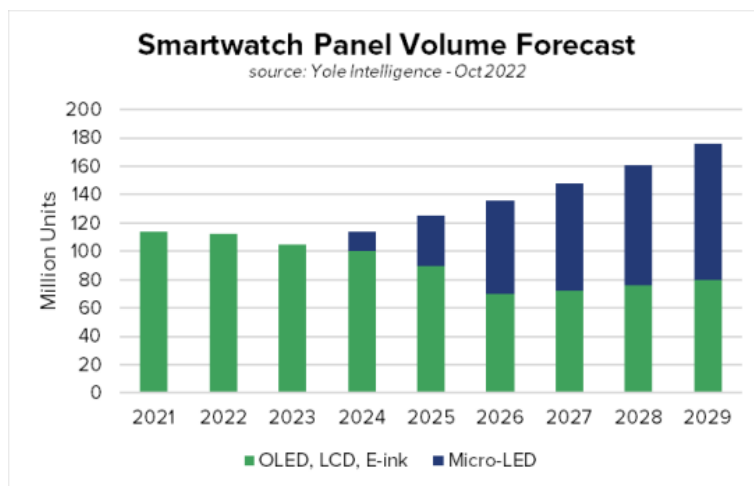


Source: IRESS

## Synthetic Sapphire Glass and Growth Units

Synthetic sapphire glass (crystalline form of HPA) is produced from high purity alumina feedstock in specialised growth furnaces. Major applications of synthetic sapphire include optics (i.e. watch faces), power electronics and LED lighting substrates, with the increasing adoption of mini and micro LEDs within smartwatch displays and consumer electronic device displays guided as a key driver of demand growth.

Figure 1: Forecast adoption of micro-LEDs into smartwatch panel displays



Source: Yole Intelligence, adapted from A4N

Ebner-Fametec has developed a proprietary crystal growth technology capable of producing large-sized sapphire crystals at higher sapphire utilisation rates and lower energy intensity relative to incumbent peers (>80% of incumbent production is accounted for by Russian and Chinese entities). Each sapphire growth unit utilising Ebner's sapphire growth technology is capable of producing ~4,000kg of synthetic sapphire per annum.

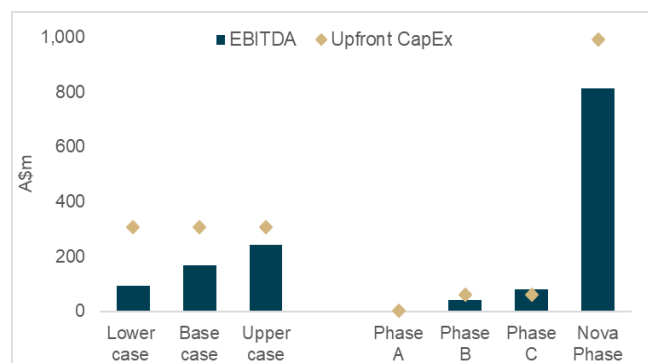
Previously executed agreements between A4N and Ebner-Fametec provide for the staged entry by A4N into the production and sale of synthetic sapphire glass utilising Ebner-Fametec's sapphire growth technology and A4N's HPA tablets as feedstock. Guidance on the staged rollout of growth units under these agreements is outlined in Figure 2 below, while an additional large-scale expansion contemplating sapphire growth capacity of 1,000 units ('Nova Phase') has been incorporated into the existing LOI between A4N and Ebner-Fametec.

Figure 2: Sapphire growth unit guidance

		Phase A	Phase B	Phase C
Total sapphire growth units	x	2	50	100
Base case EBITDA	US\$m	1.0	25.8	51.6
Upper case EBITDA	US\$m	1.4	34.6	69.3
EBITDA per growth unit (base case)	US\$m	0.5	0.5	0.5
EBITDA per growth unit (upper case)	US\$m	0.7	0.7	0.7
EH modelled CapEx	A\$m	2.4	60	60

Source: Company reports, Euroz Hartleys estimates

Figure 3: 2020 DFS parameters (left) vs sapphire growth (right)



Source: Company reports, Euroz Hartleys estimates

We estimate notional upfront CapEx requirements of A\$1.2m per growth unit, with the Phase A and B rollouts fully funded by the QCMETF debt facility (A\$30m) and available cash reserves (A\$30m). Free cash flow from Phase B is guided to fund the subsequent rollout of an additional 50 growth units under Phase C, although external funding alternatives could see Phase C units installed at an earlier date given current cash reserves of ~A\$46m (Nov'23e).

Stage 1 PPF production capacity is guided to wholly or substantially meet feedstock requirements for 50 growth units (Phase B), which based on feedstock requirements of 3-4tpa of HPA feedstock for each growth unit, implies dedicated Stage 1 PPF HPA tablet production capacity of ~150-200tpa. We currently do not model any additional CapEx for Stage 1 PPF HPA tablet production capacity.

## Synthetic Sapphire Growth Timelines

First equipment deliveries for the initial two sapphire growth units under the Phase A rollout are due in late CY23, with installation and commissioning guided to commence in early CY24. A4N is currently evaluating external sites (required to be located in Queensland under the QCMETF debt facility) suitable for the Phase B and C rollouts, in addition to sources of renewable energy linked with a suitable site.

Steady state production is guided as being achievable post-FY25 for Phase B and post-FY26 for Phase C growth units. An additional dedicated site will be required for Nova Phase sapphire production.

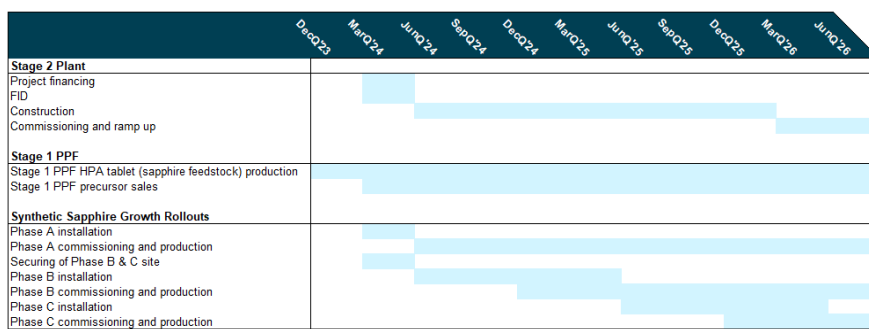
Given the early stage of the ramp-up of the ~400tpa Stage 1 PPF (cumulative 5N+ Al-nitrate production to date: 200t) and installation of HPA circuits, the ultimate HPA production capacity of the Stage 1 PPF is yet to be determined.

The HPA circuit of the Stage 1 PPF is on track to be fully commissioned and in production by the end of CY23, with the company recently highlighting that the commissioning of the tunnel kiln component of the HPA calcination circuits (required for the manufacture of sintered HPA tables for sapphire glass growth) has indicated the potential for a 2-3x throughput benefit over design rates.

We currently assume no additional CapEx is required for the Stage 1 PPF to meet HPA feedstock requirements for Phase B sapphire production, while noting market-sourced HPA feedstock may provide an alternative in the event of constrained feedstock availability.

A summary of our currently modelled timelines for the Stage 2 HPA First Project and Alpha Sapphire business are outlined below; delays to financing and FID for the Stage 2 project present as a key risk to our valuation and earnings forecasts, and may have a flow-on impact on modelled timelines for Phase C sapphire production.

Figure 4: Conceptual modelled timelines for key project milestones



Source: Euroz Hartleys estimates

## Full-Scale Plant Valuation

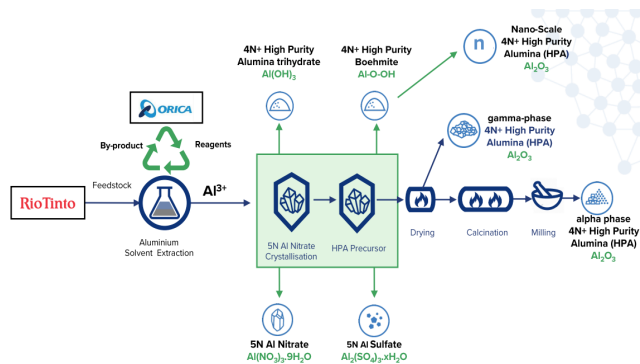
The scope of the full-scale plant (10ktpa HPA equivalent capacity) and associated product suite has evolved materially subsequent to A4N's Mar'20 DFS release. A4N's current product suite now includes higher 5N+ purity (and higher margin) aluminium materials required as essential components in the production of LED lighting, semiconductors and lithium-ion battery cathode/anode coatings at a lower operating cost and capital intensity.

A4N's 5N+ Al nitrate, 5N+ Al sulphate, 4N+ Al trihydrate and 4N+ boehmite offerings do not require the drying, calcination and milling phases of the original flowsheet (Fig. 5), which we expect to translate into material revisions to the originally contemplated scope and output of the HPA First Project.

Our valuation is highly sensitive to 1) ultimate product mix, 2) allocation of Stage 2 plant capacity and 3) modelled weighted average selling price. In the absence of binding offtake agreements, we have revised our assumed HPA equivalent production capacity upwards to 12.0ktpa, while maintaining a weighted average selling price of US\$25/kg (upper case per the Mar'20 DFS).

A4N has recently released pricing forecasts published by CM Group as part of an independent analysis of ex-China markets for qualified and approved 4N+ HPA and related products specifically targeted by A4N. As detailed in Fig. 6, firmer pricing estimates for 4N+ products allude to unit pricing levels that are either comparable to or higher than the upper case pricing scenario (US\$25/kg) outlined in the original HPA First Project DFS from the commencement of production from the Stage 2 facility. We await confirmation of the below unit pricing being achievable at scale upon execution of binding offtake agreements ahead of revisiting our pricing assumptions.

Figure 5: Current process flowsheet and core product offering



Source: Company reports

Figure 6: CM Group pricing forecast for +4N purity materials to ex-China market (US\$/kg, real 2023)

Calendar Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<b>High Purity Alumina (HPA)</b>										
HPA Spec 1 - Unmilled	10 - 28	15 - 20	25 - 30	30 - 40	30 - 40	30 - 40	30 - 40	30 - 40	30 - 40	30 - 40
HPA Spec 2 - Milled	20 - 30	20 - 30	30 - 35	35 - 45	35 - 45	35 - 45	35 - 45	35 - 45	35 - 45	35 - 45
HPA Spec 3 - Custom	45 - 60	45 - 60	45 - 80	45 - 80	45 - 80	45 - 80	45 - 80	45 - 80	45 - 80	45 - 80
<b>High Purity Alumina (HPA) Pucks</b>										
Standard	15 - 25	20 - 25	30 - 35	35 - 40	35 - 40	35 - 40	35 - 40	35 - 40	35 - 40	35 - 40
High Density	30 - 60	30 - 60	45 - 55	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
<b>Gamma Alumina</b>										
Gamma Spec 1	15 - 25	15 - 25	20 - 25	25 - 30	25 - 30	25 - 30	30 - 35	30 - 35	30 - 35	30 - 35
Gamma Spec 2	8 - 15	12 - 18	20 - 25	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35
Gamma Spec 3 - Milled	10 - 20	15 - 25	15 - 25	25 - 30	25 - 30	25 - 30	25 - 30	25 - 30	25 - 30	25 - 30
Spherical Gamma	n/a									
<b>Alumina Trihydrate (ATH)</b>										
ATH - Milled	7 - 12	12 - 18	20 - 25	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35	25 - 35
ATH - Unmilled	5 - 10	7 - 10	12 - 15	15 - 20	15 - 20	15 - 20	15 - 20	15 - 20	15 - 20	15 - 20
<b>Nano Alumina</b>										
NAP - Spec 1	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60

Source: Company reports

Noting industry cost inflation seen since the Mar'20 DFS, we have lifted forecast Stage 2 upfront CapEx to A\$500m incl. contingency (prev. A\$308m) with updated funding assumptions, and inflated operating costs (inclusive of by-product credits) by +20% from the Mar'20 DFS to US\$7.0/kg. The balance of our 20-year DCF model assumptions remain aligned with Mar'20 DFS parameters (including ramp-up profile), overlaid with our price deck (US\$25/kg LT average selling price) and FX (LT AUD:USD: 0.74) assumptions.

Figure 7: Model assumptions

		Mar'20 DFS	EHe new	EHe old
High purity aluminium product capacity	ktpa	10.0	12.0	10.0
Weighted avg. selling price	US\$/kg	15-20-25	25	25
Upfront CapEx	US\$/kg	308	500	308
Unit OpEx (net of by-product credits)	US\$/kg	5.9	7.0	5.9
LT AUD:USD	x	0.68	0.74	0.74
Risk-weighting factor	%	n/a	85%	85%

Source: Euroz Hartleys estimates

## SOTP Valuation

Our revised SOTP valuation is outlined in Figure 8. Upward revisions to our Stage 2 capital hurdle, associated dilution assumptions and gross operating costs have delivered a net decrease in our Stage 2 plant valuation, which has been partially offset by the upward revision of Stage 2 plant capacity to 12.0ktpa (prev. 10.0ktpa).

We now ascribe a notional value of A\$400m to Nova Phase sapphire production (prev. nil) and have reduced our risk weighting of Alpha Sapphire Phases A, B & C in recognition of the accelerated rollout of the initial Phases of sapphire production in collaboration with Ebner-Fametec.

Despite the infancy of the Alpha Sapphire business, there is very clear potential for materially higher earnings from Stage 2 plant output via the Alpha Sapphire business unit, and as such, we see it appropriate to ascribe value to Nova Phase production; in our view, it would be more conceivable for Alpha Sapphire to emerge as the primary offtaker of Stage 2 HPA output in contrast to an alternative end user given guided EBITDA margins from sapphire growth.

Our funding and equity dilution assumptions for the full scale HPA First Project are outlined in Figure 9, and are subject to review pending the release of the revised DFS for the full scale plant and share price performance.

Figure 8: Revised SOTP valuation

	Risking %	Equity %	Unrisked A\$m	Risked A\$m
Gladstone Stages 1 & 2	85%	100%	1,028	874
Alpha Sapphire (Phases A, B & C)	90%	100%	249	224
Alpha Sapphire (Nova Phase)			400	400
Corporate Overheads			(54)	(54)
Cash (Nov-23e)			46	46
Undrawn Grant Funds			62	62
Listed Investments			3	3
Unpaid Capital			11	11
<b>Total</b>			<b>1,745</b>	<b>1,566</b>
<b>A\$/sh valuation</b>			<b>1.54</b>	<b>1.38</b>
<b>Issued capital assumptions</b>				
Fully diluted share capital (m)		946		
Additional shares to be issued (m)		190		
Shares on issue (fully diluted)		1,136		
<b>Price Target (1.0x risk-weighted NAV, rounded and fully diluted)</b>				<b>1.40</b>

Source: Euroz Hartleys estimates

Figure 9: Funding assumptions for full-scale plant production

Full Scale HPA First Project Plant		
<b>CapEx</b>		
Revised project CapEx estimate (incl. contingency)	A\$m	500
<b>Available government grant funding</b>		
Federal Modern Manufacturing Initiative grant (attributable)	A\$m	41
Queensland Government Grant	A\$m	22
<b>Total grant funding</b>	<b>A\$m</b>	<b>62</b>
<b>Debt funding</b>		
Concessional government debt (NAIF, EFA)	A\$m	300
<b>Equity funding</b>		
Balance of capital hurdle	A\$m	140
Assumed discount to current share price	%	15%
Placement price	A\$/sh	0.74
Additional shares issued	m	190

Source: Euroz Hartleys estimates

Net proceeds from A4N's recent A\$40m placement and recently finalised A\$30m QMBCTF loan facility fully funds the Phase B rollout of 50 sapphire growth units based on our CapEx estimate of A\$60m. Additional external capital will be required for the Phase C rollout in the event that it is not funded from Phase B free cash flow (contingent on timelines pursued for the rollout of an additional 50 growth units).

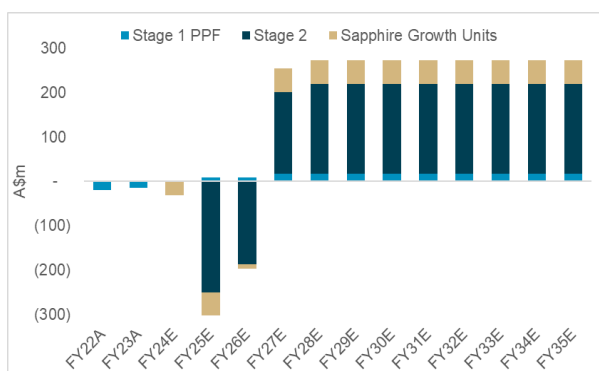
We will look to incorporate further value for sapphire production at Nova Phase upon de-risking of the Alpha Sapphire business, noting the introduction of additional Ebner furnaces is guided as a relatively modular and repeatable process at scale. Notionally, the incorporation of 1,000 sapphire growth units from FY29E onwards at comparable unit capital costs and EBITDA margins as guided for Phases B and C provides a material uplift to our valuation (+\$3.50/sh).

Figure 10: A4N Financial Summary

Market Statistics			Profit & Loss						
Share Price	0.86	A\$/sh	Yr End 30 June (A\$m)	FY23A	FY24E	FY25E	FY26E		
Issued Capital			(+) Sales revenue	0	11	66	227		
Fully Paid Ordinary	934	m	(+) Interest income	0	-	-	-		
Options	12	m	(+) Other revenue	2	-	-	-		
<b>Diluted Fully Paid Ordinary</b>	<b>946</b>	<b>m</b>	<b>Total Revenue</b>	<b>2</b>	<b>11</b>	<b>66</b>	<b>227</b>		
Market Capitalisation	813	A\$m	(-) Costs of production	(0)	(12)	(30)	(80)		
Enterprise Value	767	A\$m	(-) Corporate overheads	(8)	(10)	(10)	(10)		
Cash (Nov-23e)	46	A\$m	(-) D&A	(1)	(3)	(7)	(15)		
Debt (Nov-23)	Nil	A\$m	(-) Other	(8)	-	-	-		
<b>Substantial Shareholders</b>			<b>EBITDA</b>	<b>(15)</b>	<b>(11)</b>	<b>26</b>	<b>137</b>		
Norman Seckold	7.9%		<b>EBIT</b>	<b>(16)</b>	<b>(14)</b>	<b>19</b>	<b>122</b>		
Orica	5.3%		(-) Interest Expense	(0)	(6)	(23)	(23)		
			<b>NPBT</b>	<b>(16)</b>	<b>(20)</b>	<b>(4)</b>	<b>99</b>		
			(-) Minority Interest	-	-	-	-		
			<b>NPBT (ex-min.)</b>	<b>(16)</b>	<b>(20)</b>	<b>(4)</b>	<b>99</b>		
			(-) Tax	-	-	-	(28)		
			<b>Net Profit</b>	<b>(16)</b>	<b>(20)</b>	<b>(4)</b>	<b>71</b>		
Valuation			Cash Flow						
			Yr End 30 June (A\$m)	FY23A	FY24E	FY25E	FY26E		
Gladstone Stages 1 & 2	Risking	Equity	Net Profit	(16)	(20)	(4)	71		
Alpha Sapphire (Phases A, B & C)	85%	100%	(+) Working Capital Adj.	1	(1)	(10)	(22)		
Alpha Sapphire (Nova Phase)	90%	100%	(+) D&A	1	3	7	15		
Corporate Overheads			(+) Tax Expense	-	-	-	28		
Cash (Nov-23e)			(-) Tax Paid	-	-	-	(28)		
Undrawn Grant Funds			(+/-) Other	3	-	-	-		
Listed Investments			<b>Operating Cashflow</b>	<b>(11)</b>	<b>(17)</b>	<b>(8)</b>	<b>64</b>		
Unpaid Capital			(-) Capex & Development	(14)	(30)	(310)	(280)		
<b>Total</b>	<b>1,566</b>	<b>1.38</b>	(-) Exploration	-	-	-	-		
			(+/-) Other	6	76	-	-		
			<b>Investing Cashflow</b>	<b>(8)</b>	<b>46</b>	<b>(310)</b>	<b>(280)</b>		
			(+) Equity Issues	23	178	-	-		
			(+) Loan Drawdown	-	330	-	-		
			(-) Loan Repayment	-	-	-	-		
			(-) Other	-	-	-	-		
			<b>Financing Cashflow</b>	<b>23</b>	<b>508</b>	<b>-</b>	<b>-</b>		
			<b>BoP Cash Balance</b>	<b>17</b>	<b>21</b>	<b>558</b>	<b>240</b>		
			(+/-) Net Cashflows	4	537	(318)	(216)		
			(+/-) FX Adj.	-	-	-	-		
			<b>BoP Cash Balance</b>	<b>21</b>	<b>558</b>	<b>240</b>	<b>24</b>		
Production Forecasts			Balance Sheet						
			Yr End 30 June (A\$m)	FY23A	FY24E	FY25E	FY26E		
4N+ HPA Production (kt)	FY23A	FY24E	FY25E	FY26E	Assets				
5N+ AI Precursor Production (kt)	0.0	0.0	0.0	3.6	Cash	21	558	240	24
4N+ HPA Price (US\$/kg)	0.15	0.25	0.35	0.35	Current Receivables	2	2	13	45
Operating Costs (US\$/kg)	25.0	25.0	25.0	7.0	Other Current Assets	2	-	-	-
					Non-Current Assets	43	42	290	530
					<b>Total Assets</b>	<b>67</b>	<b>602</b>	<b>543</b>	<b>599</b>
					<b>Liabilities</b>				
					Borrowings	-	330	330	330
					Current Accounts Payable	5	5	6	16
					Other Liabilities	6	-	-	-
					<b>Total Liabilities</b>	<b>11</b>	<b>335</b>	<b>336</b>	<b>346</b>
					<b>Net Assets</b>	<b>56</b>	<b>266</b>	<b>207</b>	<b>253</b>
Ratio Analysis									
Yr End 30 June (A\$m)	FY23A	FY24E	FY25E	FY26E					
Operating CF (A\$m)	-11	-17	-8	64					
CFPS (A\$/sh)	-0.01	-0.02	-0.01	0.07					
Earnings (A\$m)	-16	-20	-4	71					
EPS (A\$/sh)	-0.02	-0.02	-0.00	0.08					
Enterprise Value (A\$m)	721	580	898	1,114					
EV/EBITDA (x)	na	na	34.5	8.1					
EV/EBIT (x)	na	na	47.7	9.1					
Net Debt (A\$m)	-20.6	-227.6	90.1	306.1					
ND/(ND + Equity) (%)	-58%	-588%	30%	55%					
EBIT Margin (%)	-767%	-134%	28%	54%					
ROE (%)	-28%	-7%	-2%	28%					
ROA (%)	-23%	-3%	-1%	12%					
Dividends (A\$/sh)	0.0	0.0	0.0	0.0					
Div. Payout Ratio (%)	0%	0%	0%	0%					
Div. Yield (%)	0%	0%	0%	0%					
Div. Franking (%)	100%	100%	100%	100%					

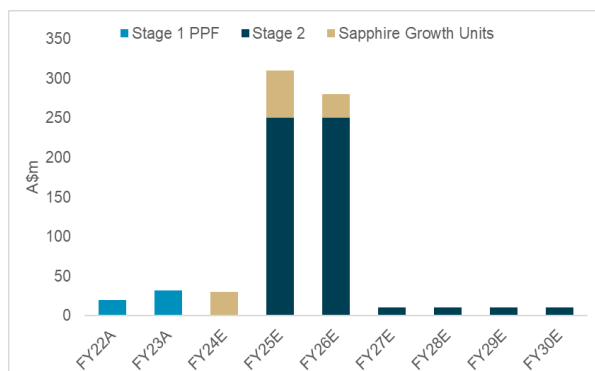
Source: Euroz Hartleys estimates

Figure 11: Free cash flow forecasts



Source: Euroz Hartleys estimates

Figure 12: CapEx assumptions



Source: Euroz Hartleys estimates

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The companies and securities mentioned in this report, include:

Alpha HPA Limited (A4N-ASX) | Price A\$0.86 | Target price A\$1.40 | Recommendation Speculative Buy;

*Price, target price and rating as at 14 November 2023 (\* not covered)*

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