EQUITY RESEARCH

PAC PARTNERS

BLACKSTONE MINERALS (BSX)

Ban Phuc Scoping Study

29 October 2020
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KEY POINTS

- **Blackstone Minerals (BSX) release a maiden resource and scoping study for the Ta Khoa project in Vietnam.** A maiden open-pitable resource of 58mt @ 0.48% Ni for 281kt of Ni has been released for the Ban Phuc DSS operation.
- **Scoping study demonstrates the value of Downstream Processing.** The downstream process sets BSX apart from peers. With the inclusion of this process, nickel payabilities are increased from typical 70-80% to +125%. On a 100% basis, the Ban Phuc project will, over a mine life of 8.5 years, produce 25tkpa (12.7ktpa of contained Ni metal) of an NCM (Nickel:Cobalt:Manganese) precursor product at an AISC of ~US$3.75/NCM lb. NCM precursor product currently sells for US$6.85/lb with US$6.96/lb allowed in the scoping study. The project has a pre-tax NPV_8 of ~US$665m and IRR of ~44% with expected pre-tax cashflows of ~$US180mpa.
- **Development Pathway laid out.** BSX has ~$27m cash in the bank after a recent institutional placement at $0.42/sh. This cash will fund the continuation of feasibility studies in conjunction with further resource definition and blue-sky exploration work.

INVESTMENT VIEW – BUY

We believe the scoping study to be a positive development. The study itself is more multifaceted than a typical resource project at similar stages and perhaps has added unexpected complexity and uncertainty regarding the relationship between the NCM price and the nickel price. The capex has come in higher than expectations, however production and payabilities of the NCM precursor product are significantly better than we had anticipated. We do see some risk around the downstream process given the flow sheet is a new concept when viewed in its entirety. We do take confidence in the backing of largest shareholder and future project partner EcoPro who are well experienced in the field.

We do not see Vietnam as being a jurisdiction risk, in fact it is likely if this project were located in Australia, it would not get off the ground. Production is slated for 2023-24 which correlates with the expected ramp up of nickel sulphide demand. This combined with the proximity to Chinese markets, cheap power and labour, and the foreign investment from battery manufacturers to build facilities in Vietnam will cement BSX as a valuable raw material supplier in the growing battery technology industry in South East Asia. We see upside beyond our valuation in the nickel price mid 2020's and the addition of higher-grade underground feed. Our valuation of $0.64/sh represents an upside of 76% on the current share price. **We maintain our Buy recommendation and increase our price target to $0.64/sh (previous $0.45/sh).**

NEAR TERM CATALYSTS

Resource and Exploration Drilling – BSX continue to diamond drill at the Ta Khoa project including the prospective Ban Chang and King Cobra, both of which have shown high grade massive sulphide mineralisation. Additional targets are continually being identified and thoroughly explored.

Pre-Feasibility Study – A detailed pre-feasibility study has commenced with further optimisation of the value chain. The PFS is slated for release 1H 2021. Following this a DFS will commence with the aim for completion by the end of 2021.

Financing/FID – A final investment decision will likely occur 1H 2022 with the project entering construction phase should suitable financing terms be negotiated.

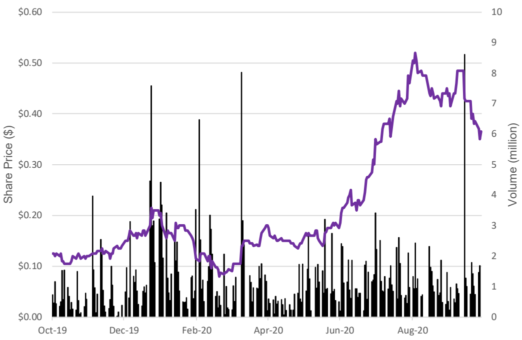
Recommendation	BUY
Previous Recommendation	Buy
Risk Rating	High
Current Share Price	$0.365
12 Month Price Target	$0.64/sh
Total Return (Capital + Yield)	76%
Market Capitalisation	$117m
Liquidity	$5.8m/month

Financial Forecasts & Valuation Metrics

Y/e June ($m)	2020A	2021F	2022F	2023F
Revenue	0.5	0.5	0.5	73.2
EBITDA	(6.8)	(14.2)	(14.2)	27.0
NPAT	(8.0)	(14.3)	(14.2)	12.2
EPS (cps)	(3.7)	(4.8)	(3.4)	2.5
EPS Growth %	na	na	na	na
EV / EBITDA (x)	(7.1)	(4.2)	(23.9)	12.9
PER (x)	(11.2)	(7.7)	(10.6)	14.7
Dividend Yield	0.0	0.0	0.0	0.0

Source: PAC Partners estimates

Share Price Performance



Source: Iress

Risks

Downstream Processing/Refining: The downstream process is based on a hydrometallurgical process to produce downstream nickel products directly from a nickel concentrate. While the flowsheet is based on conventional technology it is a new concept. This will inherently come with development/execution risk.

Geopolitical Risk: Vietnam is a developing country and subject to emerging country risks. Tariffs and royalties in Vietnam have been historically onerous and there is no guarantee that in-country downstream processing will reduce these royalties sufficiently.

Access to Capital: BSX require ongoing capital to fund future exploration programs and feasibility studies. Sources of capital may not be available when required causing significant disruption to the business and any exploration programs that may be in place.

Commodity Price Risk: Geopolitical risks, competitive forces, economic conditions, and changes in commodity applications could see demand for BSX commodities be reduced.

Summary

COMPANY OVERVIEW

Perth based, Blackstone Minerals Limited (BSX) holds 90% interest in the Ta Khoa Nickel project in Northern Vietnam. A local and supportive Vietnamese industrial conglomerate, COXAMA, hold the remaining 10%.

BSX agreed to acquire the project in 2019 and began exploration activities thereafter. The project officially transferred to BSX in April 2020. Since acquisition, BSX has made a number of development steps including resource and exploration activities to identify new areas of nickel mineralisation which has led to the release of the maiden JORC resource for the Bang Phuc DSS deposit. A scoping study on the potential economic value and mining/processing scenarios accompanied the maiden resource announcement.

RESOURCE ESTIMATE

The maiden resource for Bang Phuc includes an indicated resource of 44mt @ 0.52% Ni and an inferred resource of 14mt @ 0.35% Ni for a total indicated + inferred resource of 58mt @ 0.48% Ni.

This resource is at the upper end of our initial assumptions of 30-50mt @ 0.5% Ni

Figure 1: Ban Phuc Maiden Mineral Resource Estimate

Category	Mt	Ni %	Cu %	Co %	Pd g/t	Pt g/t	S %	Ni t
Indicated	44	0.52	0.06	0.01	0.11	0.09	0.45	230,000
Inferred	14	0.35	0.01	0.01	0.03	0.03	0.13	51,000
Total	**58**	**0.48**	**0.05**	**0.01**	**0.09**	**0.08**	**0.37**	**281,000**

Source: BSX

BHP's profitable Mt Keith has a Ni DSS resource of 225mt @ 0.53% Ni

SCOPING STUDY

The accompanying scoping study shows the potential high value of the Ban Phuc deposit. The value in the project comes down to the strategy to build a downstream process to produce a precursor Nickel:Cobalt:Manganese (NCM) for use in the lithium-ion battery industry. This precursor product improves the payability of nickel from typical ranges of 70-80% upwards to 125-135%. The in-country downstream processing of the nickel concentrate also eliminates the overly high Vietnamese export tariffs (20%) on nickel concentrate which became an issue when the project was last in operation during the mid-2010's.

Figure 2: Ban Phuc Scoping Study Key Outcomes

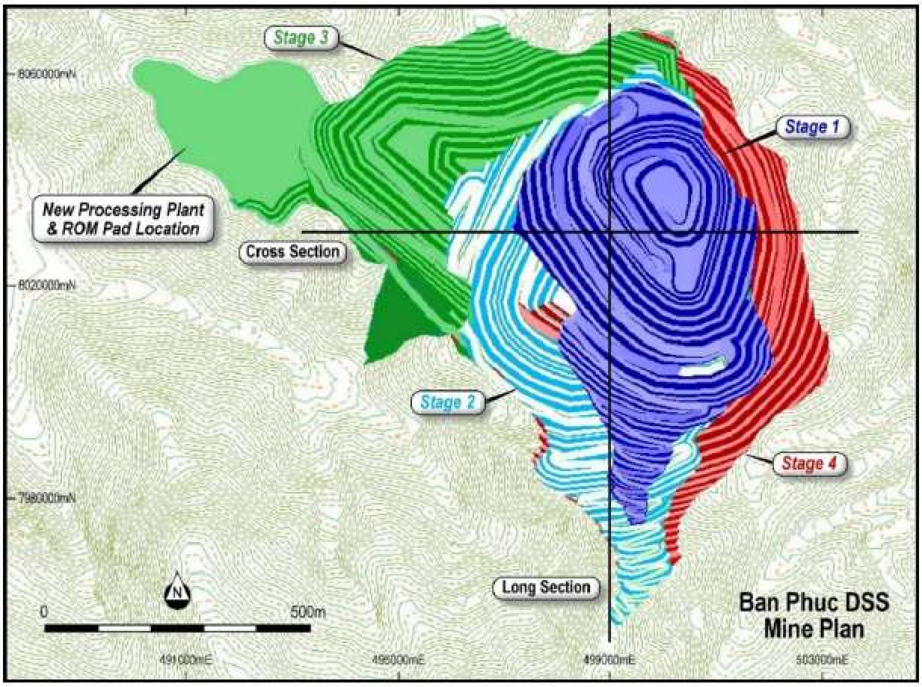
Item	Value
Production	4mtpa
Mine Life	8.5 Years
Head Grade	0.52% Ni
Recovery	65.9%
Mining Cost US$/milled tonne	$12.00-14.70/t
Processing Cost US$/milled tonne	$10.70-13.00/t
G&A Cost US$/milled tonne	$2.75-3.40/t
Downstream Refining US$/ milled tonne	$19.50-23.80/t
Royalty	~5.3%
Sustaining Capex $USm per year	~$3mpa
Capex $USm	$313.8m
Nickel Price US$/lb	$8.00
NCM Precursor Price US$/lb	$6.96
Discount Rate	8%
Pre-tax NPV US$m	**$550-780**
IRR	**38-50%**

Source: BSX

MINING

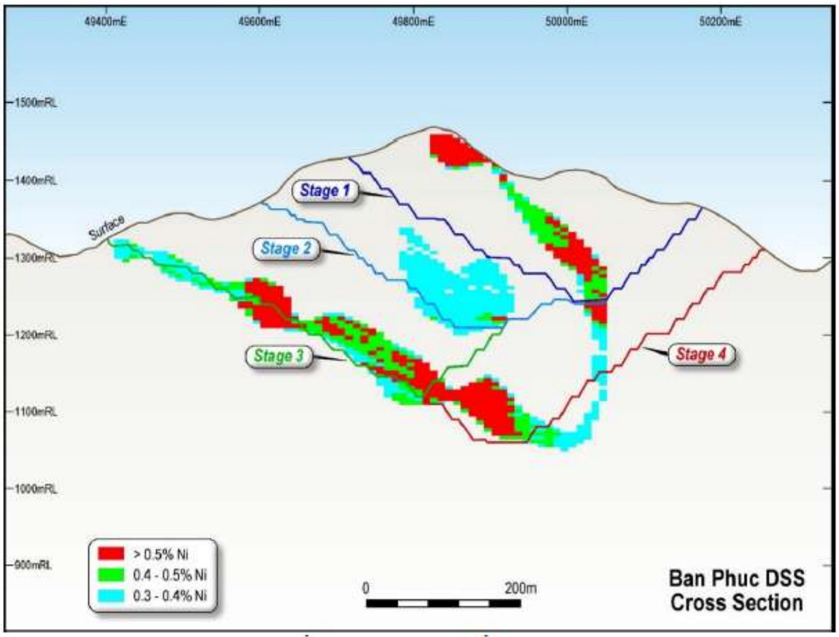
Mining will be a bulk open pit with a stripping ratio of 6.1:1. A 25mt pre-strip will be required before first ore is processed which will take 18 months. The pit will be mined in four stages.

Figure 3: Staged Open Pit Design



Source: BSX

Figure 4: Cross Section of Open Pit and Ore Body

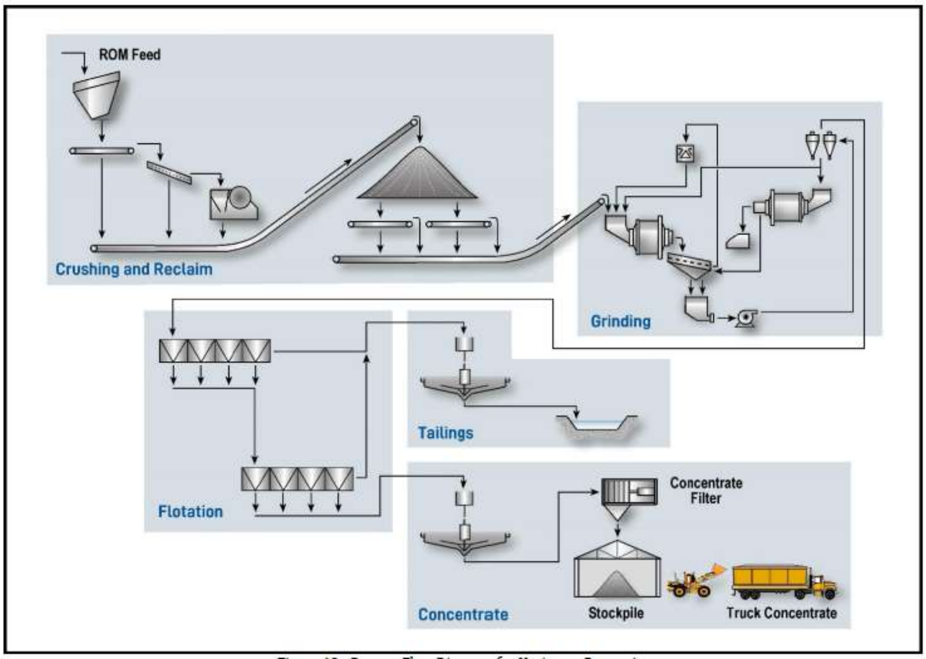


Source: BSX

PROCESSING

A base case processing throughput of 4mtpa has been modelled. Processing will consist of a conventional crush/grind/float to produce a nickel concentrate at ~6-8% nickel content. Concentrate will then be transported via on road trucks to the downstream processing facility located 2-300km away on the coast. Nickel recoveries through the plant have been estimated at 65.9%.

Figure 5: Processing Flow Sheet



Source: BSX

REFINING (DOWNSTREAM)

The downstream process will convert the nickel concentrate to an NCM precursor product via a hydrometallurgical process. This will be achieved via pressure oxidation followed by a two-stage neutralisation process, ending in a precipitation to create an intermediate MHP (Mixed Hydroxide Precipitate). Composites of the ore at Ban Phuc have successfully been processed into a concentrate and leached via the POX process with nickel extractions above 95%.

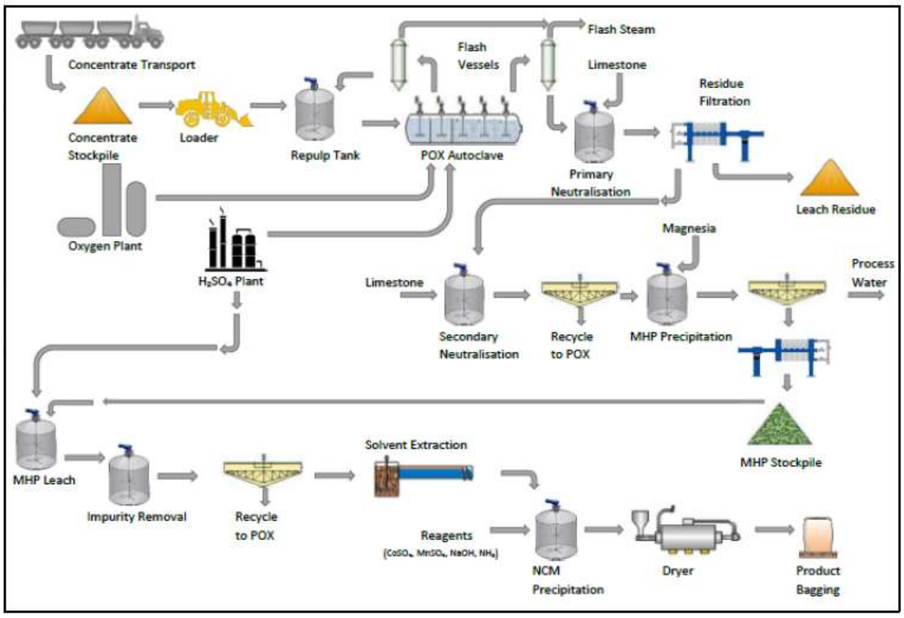
The intermediate MHP product can be sold as a standalone product if required and is a logical intermediate step. To create the NCM precursor, the MHP is leached again to remove impurities followed by solvent extraction to separate the cobalt and any copper or zinc from the solution. The raffinate following the cobalt extraction contains elevated levels of magnesium so undergoes further solvent extraction to strip the magnesium leaving behind a concentrated nickel sulphate. To create the specific NCM811 precursor, the addition of specific concentrations of cobalt and manganese are added prior to precipitation, thickening, and drying.

The targeted NCM811 precursor product comprises 50.8% nickel, 6.38% cobalt, 5.95% manganese and 36.8% hydroxide. There is not sufficient cobalt within the Ban Phuc resource so the addition of third-party cobalt and manganese will be required.

Downstream processing is the point of difference for BSX when compared to peers. The NCM product has higher payabilities than nickel concentrate and eliminates the export tariffs currently imposed by the Vietnamese Government, it also maximises profit margins through the use of cost-effective labour and power as well as reducing double handing and logistic costs. Without the downstream process in-country, the project would not be viable at current nickel prices.

It is worth noting, the downstream process proposed by BSX of directly converting nickel concentrate into nickel sulphate is not currently in use globally that we are aware of. Traditionally, the nickel concentrate is smelted into a matte before further leaching and refining (Figure 7). While individually, each step of the process is nothing new, the combination of the steps into a single flow sheet does remain an execution risk.

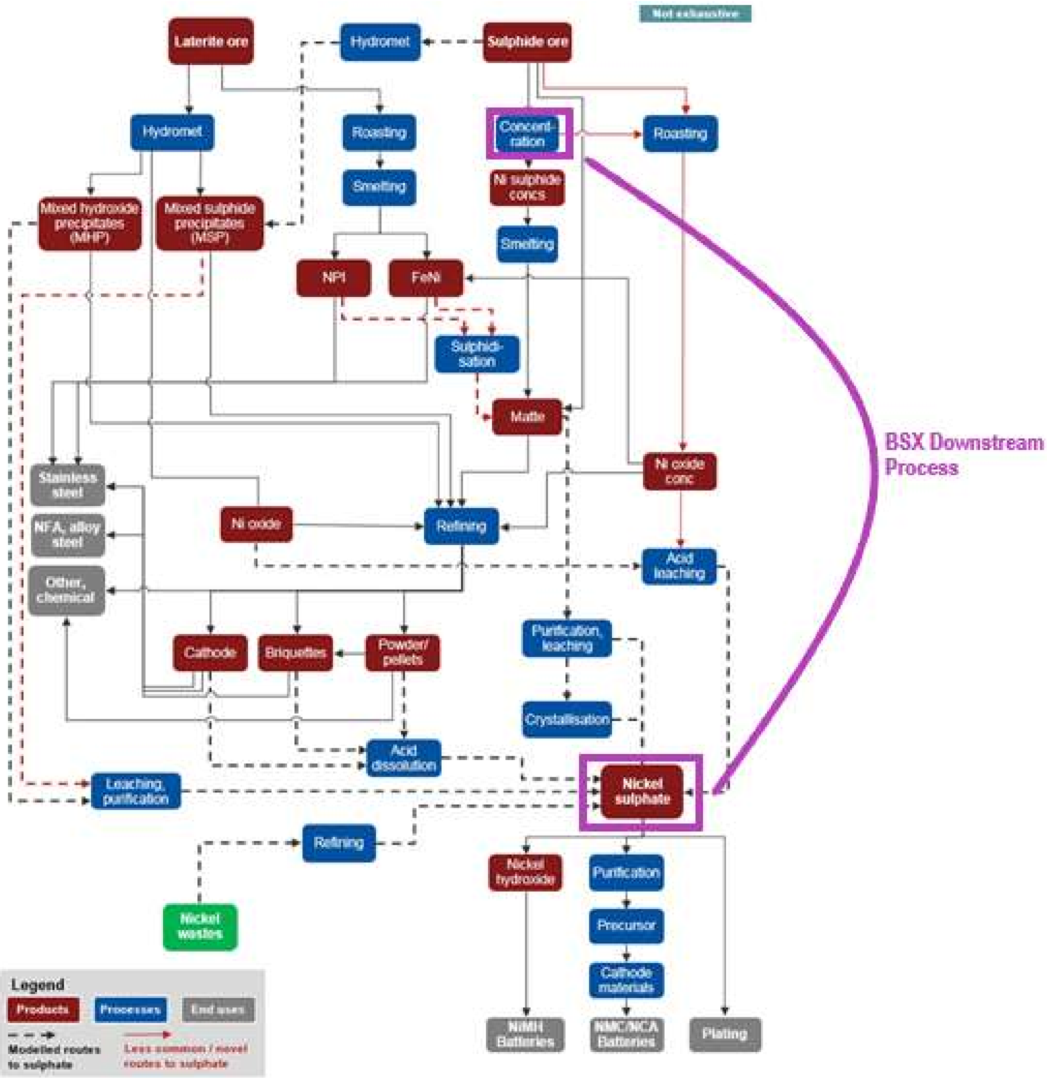
Figure 6: Downstream Flowsheet



Source: BSX

Figure 7: Nickel Value Chain

IGO looked to develop a similar process at Nova, however, the project was shelved after more attractive nickel payabilities' where offered from existing buyers.



Source: CRU, Modified by PAC Partners

FINANCIALS

The scoping study estimates an initial capex of US$313.8m with the refining/downstream costs being 35% of the total cost and 13% is contingency.

Capex is higher than the US$230m we initially contemplated

Figure 8: Capex Estimate Breakdown

Item	Capex US$m
Mining	59.2
Infrastructure	15.5
Processing	53.2
Refining (Downstream)	108.9
Project Execution	19.5
Owners Costs	16.9
Contingency	40.6
Total	**313.8**

Source: BSX

Operating costs have been estimated at US$44.95-US$54.90 per tonne of ore milled. Refining being the largest operating cost at US$19.50-US$23.80/t or ~43% of the total costs. The refining costs includes the purchase of cobalt and manganese sulphate. On a nickel unit rate, C1 costs are estimated at US$5.95-$US7.30/lb and an AISC of US$6.60-US$8.07/lb.

Figure 9: Operating Costs

LOM Operating Costs	US$/Ni lb	US$/NCM lb
Mining	1.60-1.95	0.8-1.0
Processing	1.40-1.75	0.7-0.9
Refining	2.60-3.15	1.3-1.6
G&A	0.35-0.45	0.2-0.2
C1 Cash Costs	5.95-7.30	3.1-3.7
Royalties	0.55-0.65	0.3-0.3
Sustaining Capex	0.10-0.12	0.1-0.1
All-in Sustaining Cost	**6.60-8.07**	**3.40-4.10**

Source: BSX

On face value, an AISC of nearly US$8/lb is hard to get excited about, however, this number is misleading and does not show the true value of the project. The critical aspect is the production and sale of the NCM precursor product.

Given the NCM product contains 50.8% nickel, BSX will produce nearly 2x as much NCM as it does nickel metal. (25ktpa vs 12.7ktpa). This is where costs in regard to the nickel metal tonnes become misleading. NCM contains cobalt and manganese which increase the payability of the end product. Essentially the equivalent nickel price received will be ~1.75x the prevailing nickel price. It therefore makes more sense to report costs and revenue in terms of NCM.

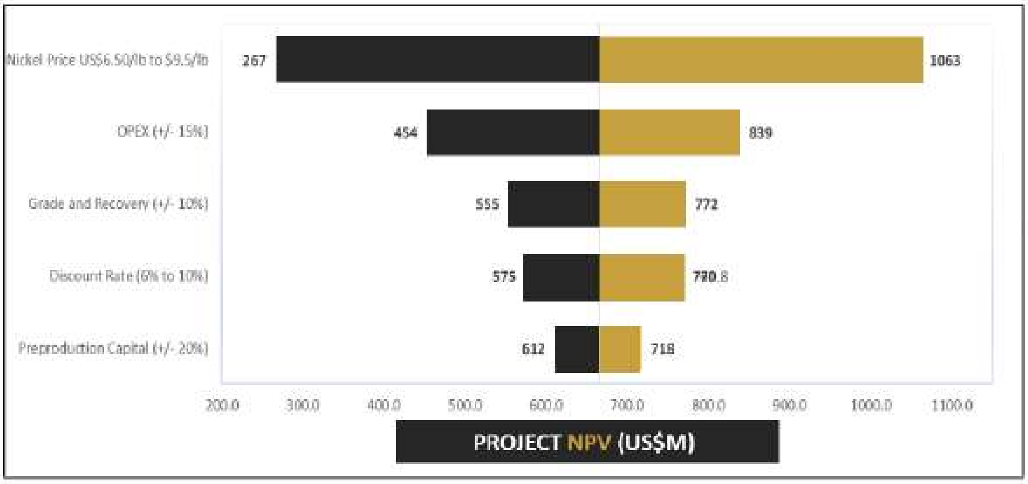
On an $/NCM lb basis, BSX expect to produce NCM at an AISC of US$3.40-4.10/lb. NCM precursor is traded on the Shanghai Metals Markets and a benchmark index has recently been included. https://www.metal.com/Ternary-precursor-material/202005200002 The current price used in the scoping study is US$15,344/t or US$6.96/lb. The current benchmark price is ~US$15,100/t or US$6.85/lb.

Using scoping study estimates this assumes a margin per pound of NCM to be $3.56-2.86/lb or -51-41%. A healthy margin.

The estimated base case pre-tax NPV is US$550-780m using a discount rate of 8%. Capital payback period is 2.5 years, and the IRR is 38%-50%. Estimated pre-tax annual cashflows are

US$155-210mpa. The project is most sensitive to the nickel price (which directly impacts the NCM price) as seen in Figure 10 and 11.

Figure 10: Sensitivity Analysis



Source: BSX

Figure 11: Sensitivity Analysis

		Nickel Price (US$/lb)						
	NPV (US$m)	6.5	7.0	7.5	8.0	8.5	9.0	9.5
Discount Rate	6%	330	476	623	770	917	1,063	1,210
	7%	297	437	576	716	855	994	1,134
	8%	267	400	532	665	798	930	1,063
	9%	240	366	492	618	744	870	997
	10%	214	334	454	575	695	815	935

Source: BSX

UPSIDE

We see potential upside in expanding production to the 6mtpa scenario alluded to in the scoping study. We also see benefit of a staged project construction utilising the existing plant on site to produce small volumes of product (~0.45mtpa) and generate early cashflows. By-products from PGE's as well as copper are not included in the scoping study and could add to the bottom line if they can be extracted economically.

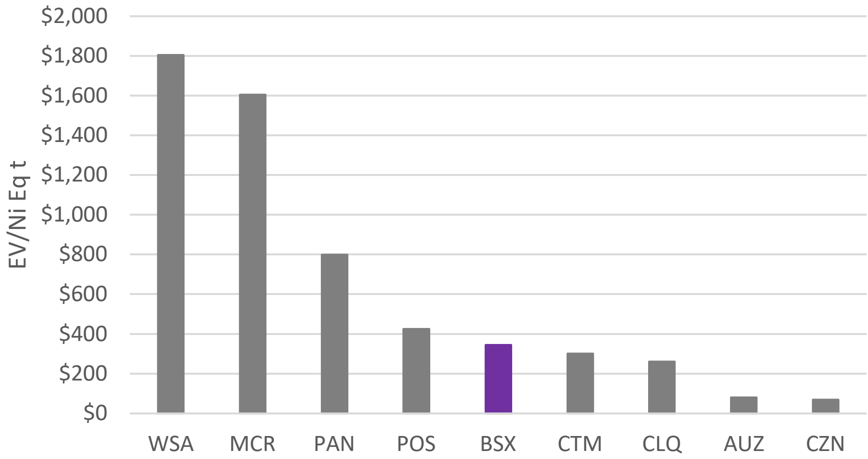
The addition of high-grade underground material from the numerous massive sulphide prospects located in proximity to the processing plant will also provide incremental tonnes and significantly increase the project NPV.

We also see upside in the long-term nickel price. Given the expected surge in demand for NCM precursor products, we take the view of considerable upside to the scoping study assumed price of US$6.96/NCMlb in the mid-late 2020's.

PEERS

With the release of a maiden resource, we can look at comparisons with ASX listed peers. On an EV/Ni resource tonne basis, BSX trades in line with peer group of development peers at $345/Ni tonne. The most logical peer is Centaurus Metals (CTM) which is in a similar development timeline with BSX and trades at $302/Ni tonne.

Figure 12: ASX Listed Peer Group



Source: IRESS

BSX is valued in line with nickel sulphide developer peers POS, and CTM

Investment View, Valuation and Catalysts

COMPANY VALUATION

EcoPro has access to debt on favourable terms and we estimate debt will fund the majority of the project.

We adjust our pre-scoping study assumptions to match the study parameters, taking the midpoint of the provided estimate ranges. The scoping study is based on a 100% project basis which will not all be attributable to BSX. We assume the mining/processing remains at 90% BSX ownership with the 10% Vietnamese partner funding their share of development costs. We assume the downstream process will ultimately be a 50:50 joint venture between BSX and EcoPro. On an approximate basis, we estimate BSX to hold a ~66% interest in the project cashflows. (assuming a 40/60 split between mining & processing/downstream refining cashflows) We assume a 3-year tax holiday is available as per our previous assumptions.

We run our own DCF using a 10% discount rate and maintain a flatline basis on the nickel price. We use BSX assumptions of US$6.96/lb of NCM precursor. We assume project financing will be split in line with our ownership structure above and assume BSX contribution will be funded via an 80/20 debt to equity split. We assume equity is raised at $0.40/sh for an expected fully diluted share base of 489.5m. We apply a 30% development risk. We use a 0.7 FX rate.

We see upside in the addition of higher-grade ore from underground operations. Given the early stages of exploration, we do not have enough clarity to model potential underground additions and allow a nominal value-add of $20m. We also see upside in exploration success given the prospective nature of the region for high grade nickel sulphides.

Upside in the development of a high grade underground at Ban Chang as well as other regional prospects

Figure 13: Valuation

Valuation	$m	$/sh
Ban Phuc DSS	$269	$0.55
Ban Phuc Underground value add	$20	$0.04
Ta Khoa Exploration	$15	$0.03
Other Projects	$5	$0.01
Corporate	-$21.5	-$0.04
Cash	$27	$0.06
Total	**$314**	**$0.64**

Source: PAC Partners

INVESTMENT VIEW – BUY. PT $0.64/SH

We believe the scoping study to be a positive development. The study itself is more multifaceted than a typical resource project at similar stages and perhaps has added unexpected complexity and uncertainty regarding the relationship between the NCM price and the nickel price. The capex has come in higher than expectations, however production and payabilities of the NCM precursor product are significantly better than we had anticipated. We do see some risk around the downstream process given the flow sheet is a new concept when viewed in its entirety. We do take confidence in the backing of largest shareholder and future project partner EcoPro who are well experienced in the field.

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UPCOMING CATALYSTS

Resource and Exploration Drilling – Ongoing

BSX continue to diamond drill at the Ta Khoa project including the prospective Ban Chang and King Cobra, both of which have shown high grade massive sulphide mineralisation. Additional targets are continually being identified and thoroughly explored.

Pre-Feasibility Study – 1H 2021

A detailed pre-feasibility study has commenced with further optimisation of the value chain. The PFS is slated for release 1H 2021. Following this a DFS will commence with the aim for completion by the end of 2021. More detail surrounding the potential EcoPro Joint Venture will also offer more certainty to the project.

Financing/FID – 1H 2022

A final investment decision will likely occur in 1H 2022 with the project entering construction phase should suitable financing terms be negotiated.

Risks

Emerging companies are usually subject to normal key person and funding risks.

Downstream Processing/Refining Risk

The downstream process is based on a hydrometallurgical process to produce downstream nickel products directly from a nickel concentrate. While the flowsheet is based on conventional technology it is a new concept. This will inherently come with development/execution risk.

Geopolitical Risk

Vietnam is a developing country and subject to emerging country risks. Royalties in Vietnam have been historically onerous and there is no guarantee that in-country downstream processing will reduce these royalties sufficiently.

Reliance on Key Personnel

The board and the geology team's ability to identify, understand and test the mineralisation of the projects will be critical to the exploration success or failure of BSX.

Access to Capital

BSX require ongoing capital to fund future exploration programs, feasibility studies and project financing. There is no certainty that capital will become available to BSX at satisfactory commercial terms.

Development Risk

BSX is undergoing scoping studies with a view of progressing these to a PFS/DFS level. Should these studies return favourable results BSX will enter into project finance and construction stages which carry a level of financing and development risk.

Commodity pricing and demand

As with all resource projects, geopolitical risks, competitive forces and changes in commodity application with technological improvements could see demand and or prices for BSX focused commodities be reduced.

Blackstone Minerals Limited

BSX.AX

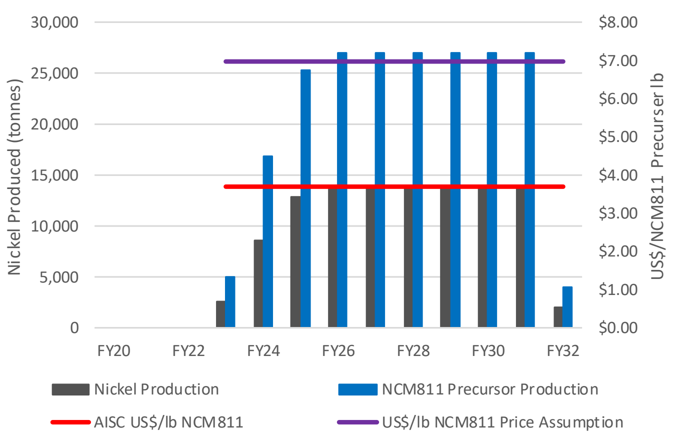
29/10/2020

Price Information

Price ($/Share)	$0.365
Mkt Cap ($m) (dil)	$116.9
Enterprise Value ($m)	$89.9
Target Price ($/Share)	$0.64
Recommendation	BUY
Total Return	76%

Valuation	**$m**	**$/sh**
Ban Phuc DSS	269.4	0.55
Ban Phuc UG	20.0	0.04
Exploration Upside	15.0	0.03
Other Projects	5.0	0.01
Corporate	(22.6)	(0.05)
Cash	27.0	0.06
Total	**313.8**	**0.64**

Nickel Production (100% Project Basis)



Resources & Reserves

Resources	**Tonnes (m)**	**Ni %**	**Ni Tonnes**
Indicated	44	0.52%	228,800
Inferred	14	0.35%	49,000
Total	**58**	**0.48%**	**277,800**

Year End - Jun	**FY20A**	**FY21F**	**FY22F**	**FY23F**
KEY METRICS				
EPS Growth (%)	na	na	na	na
PER (x)	(11.2)	(7.7)	(10.6)	14.7
Dividend Yield (%)	0.0	0.0	0.0	0.0
EV/EBITDA (x)	(7.1)	(4.2)	(23.9)	12.9
EV ($m)	68.4	85.6	483.9	499.3
ROE (%)	(48.6)	(61.9)	(27.8)	15.2
ROA (%)	(35.0)	(42.2)	(7.6)	3.6
ROIC (%)	(33.1)	(46.3)	(4.4)	8.0
PROFIT & LOSS ($m)				
Revenue	0.5	0.5	0.5	73.2
EBITDA	(6.8)	(14.2)	(14.2)	27.0
Depreciation & Amortisation	(0.2)	(0.2)	(0.2)	0.0
EBIT	(7.0)	(14.4)	(14.4)	27.0
Net Interest Expense	0.0	0.1	0.2	(14.8)
Income Tax	0.0	0.0	0.0	0.0
NPAT Reported	(8.0)	(14.3)	(14.2)	12.2
NPAT Adjusted	(7.0)	(14.3)	(14.2)	12.2
PER SHARE DATA (cps)				
Shares on Issue (m)	213.9	300.2	414.0	489.5
EPS Reported	(3.7)	(4.8)	(3.4)	2.5
EPS Adjusted	(3.3)	(4.8)	(3.4)	2.5
DPS	0.0	0.0	0.0	0.0
BALANCE SHEET ($m)				
Cash	6.8	16.8	17.0	25.6
Debtors & Inventory	2.3	2.3	2.3	2.3
PP&E	19.4	19.4	315.2	318.8
Intangibles	0.0	0.0	0.0	0.0
Total Assets	28.6	38.5	334.5	346.7
Borrowings	0.0	0.0	250.0	250.0
Creditors	7.7	7.7	7.7	7.7
Total Liabilities	7.7	7.7	257.7	257.7
Net Assets	20.8	30.8	76.8	89.0
BALANCE SHEET RATIOS				
Gearing - Debt/Equity (%)	na	na	315.0	260.5
Interest Cover (x)	na	na	na	1.8
NTA per Share (cps)	0.1	0.1	0.2	0.2
CASH FLOW ($m)				
EBITDA	(6.8)	(14.2)	(14.2)	27.0
Interest & Tax	0.0	0.1	0.2	(14.8)
Working Capital Change	(0.2)	0.0	0.0	0.0
Operating Cash Flow	(6.5)	(14.1)	(14.0)	12.2
Maintenance Capex	0.0	0.0	0.0	(0.5)
Free Cash Flow	(6.5)	(14.1)	(14.0)	11.6
Capex	(0.4)	(0.2)	(296.0)	(3.1)
Equity Issues	13.1	24.3	60.2	0.0
Proceeds from Borrowings	0.0	0.0	250.0	0.0
Other	0.2	0.0	0.0	0.0
Net Cash Flow	6.5	10.0	0.2	8.5

CONTACT INFORMATION

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