

South Star Mining Corp.
(TSXV: STS / OTCQB: STSBF)

Receives Mining License / Advancing to Production Next Year

BUY

Current Price: C\$0.10

Fair Value: C\$0.52

Risk: 5

Sector / Industry: Junior Resource

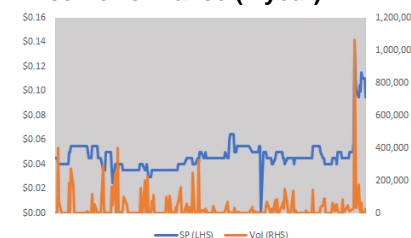
[Click here for more research on the company and to share your views](#)

Highlights

- On January 6, 2021, STS announced receipt of a three-year mining license for its 100% owned Santa Cruz graphite project in Brazil.
- **STS has all the required permits to advance to construction, commissioning, and production.**
- Management intends to develop the project in two phases: a Phase-1/5,000 tonne per year (“tpy”) pilot plant operation (with a CAPEX estimate of US\$7.3M) in the first two years, followed by a larger 25,000 tpy Phase 2 operation (US\$27.2M CAPEX).
- **The company has a pre-approved C\$7.5M loan commitment (at an attractive rate of 5.3% p.a.) from the Brazilian Development Bank to fund Phase 1 CAPEX.** The bank is conducting their due diligence. STS is also in discussions with multiple investor groups to identify the best financing package. Management expects to secure financing, and move to construction planning by March 2021, and commence production by Q2-2022.
- Per a Pre-Feasibility Study (“PFS”), completed in early 2020, the project returned a base-case After-Tax Net Present Value (“AT-NPV”) at 5% of US\$81 million, with a high After-Tax Internal Rate of Return (“AT-IRR”) of 35%. **STS’ market capitalization is just \$4M, reflecting a P/NAV of under 4%.**
- Flake graphite prices were up 6% last month, on rising demand for electric vehicle batteries. **We estimate the demand for natural graphite for batteries to increase at least 5x this decade.**
- On an Enterprise Value to Resource basis, STS is trading at \$13/t versus the comparables’ average of \$27/t.

Sid Rajeev, B.Tech CFA, MBA
Head of Research

Price Performance (1-year)



	YTD	12m
Ret.	122%	122%
TSXV	4%	60%

Company Data

52 Week Range	\$0.03 - \$0.16
Shares O/S	42,905,430
Market Cap.	\$4.3M
Current Yield	N/A
P/E (forward)	N/A
P/B	0.8x

Key Financial Data (FYE - Dec 31)		
(C\$)	2019	2020 (9M)
Cash	\$110,795	\$127,872
Working Capital	-\$20,129	-\$347,819
Mineral Assets	\$5,735,914	\$5,735,914
Total Assets	\$5,876,953	\$5,878,502
Net Income (Loss)	-\$2,012,841	-\$207,887
EPS	-\$0.05	-\$0.01

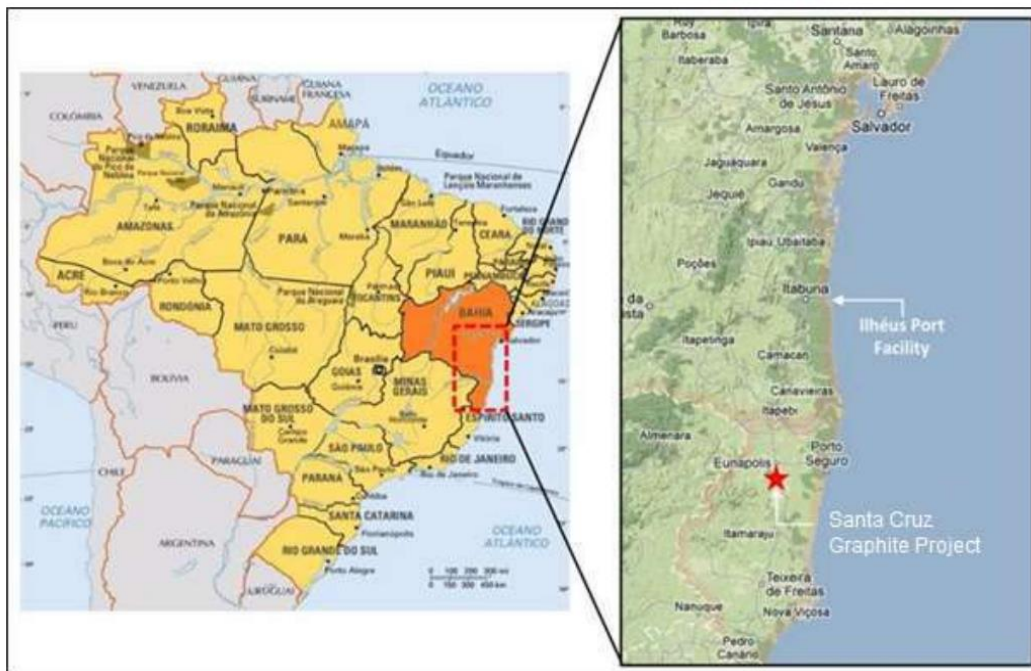
*See last page of this report for important disclosures, rating and risk definition. All figures in C\$ unless otherwise specified.

Obtains mining license for three years

Mining License for Phase 1

On January 6, 2021, the company announced receipt of a three-year trial mining license for Phase 1 pilot plant operations (5,000 tpy of concentrate) for the Santa Cruz graphite project in Bahia, Brazil. **The project is in the second largest flake graphite producing district in the world.**

Project Location



Source: Company

The project received a four-year environmental license in October 2020, for Phase 1 operations, and has all the required permits to advance to construction, commissioning, and production.

Management intends to develop the project in two phases:

- **A Phase 1 pilot plant** operation (US\$7.3M in CAPEX) including 5,000 tpy of 95% Cg concentrate in the first two years. The objective of this program is to test and optimize flowsheet, develop commercial relationships, and optimize product mix.
- **A larger Phase 2 operation** (US\$27.2M in CAPEX), with production ramping up to 13,500 tpy of 95% Cg concentrate in year 3, and to 25,000 tpy in years 4 to 11.

Phase 1 construction is expected to take approximately 12 months. STS expects to start the licensing and permitting process for Phase 2 in Q3-2022.

Project Financing

Management is almost exclusively focused on attaining project financing and/or off-take agreements to fund Phase 1's US\$7.3M CAPEX.

Pre-approved financing at 5.3% p.a.

In October 2020, the company announced that the Brazilian Development Bank (BNB) has pre-approved C\$7.5M in debt financing, at a very attractive rate of 5.3% p.a. The bank is expected to complete their due diligence this quarter. Note that the final terms are subject to change, and the financing is not guaranteed. In the meantime, STS is in discussions with multiple investor groups to identify the best financing package. **Management expects to secure financing, and move to construction planning by March 2021.**

We note that a key advantage of the Santa Cruz graphite project is its **at/near surface mineralization**, with significant quantities of large, extra-large, and jumbo graphite flakes. There is no need for crushing or blasting, and the strip ratio is relatively low (life of mine ratio of 1.6). A PFS completed in early 2020, had returned an after-tax NPV5% of US\$81 million, with a **high after-tax IRR of 35%**, and a payback period of four years.

Resource Estimate and PFS

2019 Resource	Tonnage	C (%)	In-situ Graphite (t)
Measured	3,947,550	2.40%	94,740
Indicated	10,955,570	2.25%	246,500
M&I	14,903,100	2.29%	341,240
Inferred	7,911,450	2.32%	183,550
2020 Reserve	Tonnage	C (%)	In-situ Graphite (t)
Proved	3,989,635	2.49%	99,340
Probable	8,318,795	2.35%	195,490
Total	12,308,430	2.40%	294,830
2020 PFS (US\$) - Open Pit			
Mine Life (years)	11		
Ore Tonnage (Mt)	12		
Average Grade (% Cg)	2.40%		
Throughput			
Annual Production (tonnes) - 95% C	5,000 tpy in Years 1 & 2, 13,500 tpy in Year 3, and 25,000 tpy in years 4-11		
Strip Ratio	1.60		
Recovery	82%		
Product Price (\$/t)	\$1,287		
Operating Cost (\$/t sold)	\$396/t		
Initial CAPEX (\$M)	\$34.5		
AT FCF per year			
AT NPV @ 5% (\$M)	\$81		
AT IRR	35%		
AT Payback (years)	4		

AT-NPV5% of US\$81M and AT-IRR of 35%

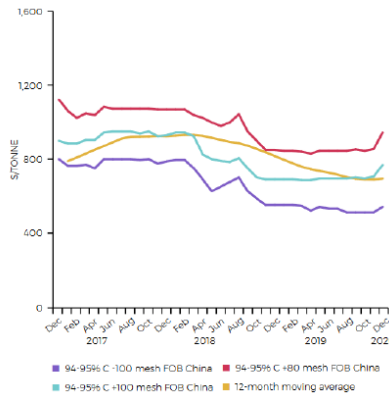
Source: Company

Outlook on Graphite

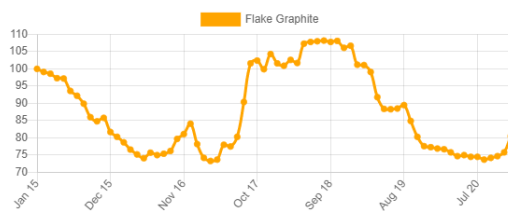
The following charts show flake graphite pricing at different mesh levels. Flake graphite prices were up 6% last month on rising demand for electric vehicle batteries.

Flake graphite prices up 6% MoM

Flake Graphite Prices



Benchmark Flake Graphite Price Index



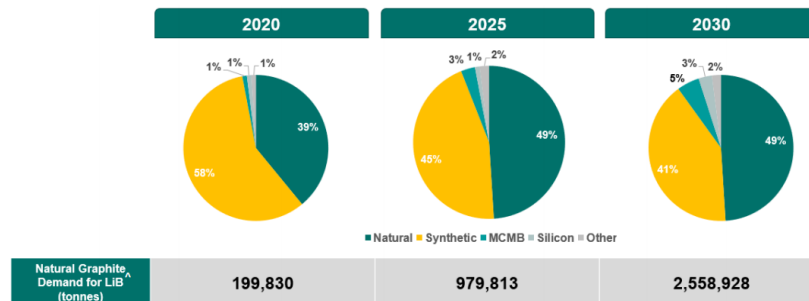
	1M	Y-O-Y	YTD	TODAY	LAST
GRAPHITE INDEX	6.2%	4.2%	4.7%	80.5	75.8

Source: Benchmark Intelligence

Demand for flake graphite in batteries to increase 10x by 2030

Based on a consensus global electric vehicle sales forecast of 25-30M by 2030, and an average of 50 kg graphite used per vehicle, we estimate graphite demand to increase by 1 Mt tonnes per year over the next decade. This compares to the current demand for graphite from batteries of only 0.2 million tonnes. Benchmark Intelligence estimates the demand for natural graphite for batteries will increase 10x to 2.6 Mt by 2030.

Demand for Natural Graphite

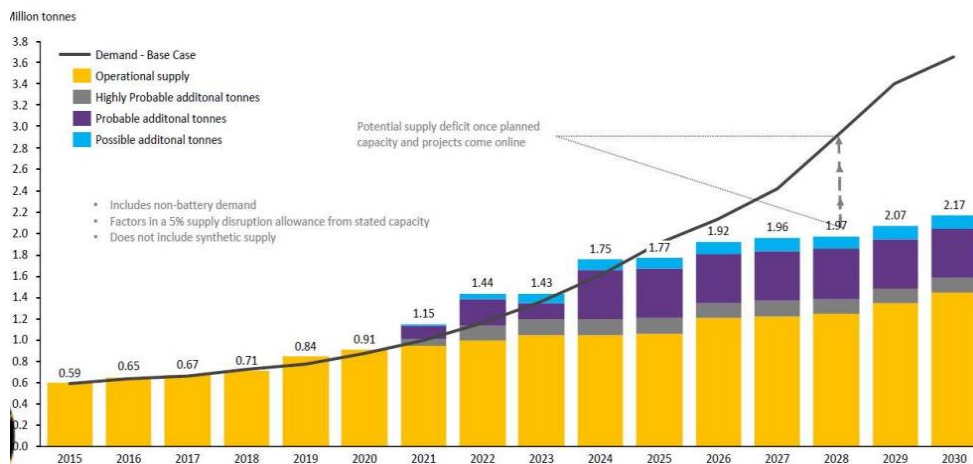


[^] LIB = Lithium-Ion Batteries
Source: Benchmark Minerals Intelligence

Source: Syrah

The market is expected to be in a supply deficit starting 2025.

Supply-Demand Forecasts for Natural Flake



Source: Benchmark Intelligence

New demand can be filled by synthetic graphite and flake graphite. Comparing the cost to convert flake graphite to end products used in batteries (also known as spherical graphite), and manufacturing synthetic graphite, we believe flake graphite will be preferred until natural graphite pricing is below US\$3k per tonne. This implies that prices have to more than double from current levels for battery manufacturers to prefer synthetic products.

Financials

(in C\$)	2019	2020 (9M)
Cash	\$110,795	\$127,872
Working Capital	-\$20,129	-\$347,819
Current Ratio	0.87	0.29
Debt	-	-
Monthly Burn Rate (G&A)	-\$67,455	-\$14,406
Cash spent on Properties	-\$1,032,557	-\$165,547
Cash from Financing Activities	\$393,900	\$280,000

Data Source: Financial Statements

On January 28, 2021, the company announced its plans to raise **\$1.3M at \$0.10 per unit**. Each unit will consist of a common share and one full warrant (exercise price of \$0.15 per share for three years).

STS has 2.6M options (weighted average exercise price of \$0.39 per share) and 6.70M warrants outstanding (weighted average exercise price of \$0.11 per share). **2.60M options are in the money**, implying a potential to raise \$0.15M.

Long-term price forecast of US\$1,300/t

Working capital deficit of \$0.4M at the end of Q3-2020; pursuing a \$1.3M financing

Valuation

The following table shows STS and comparable junior resource companies focused on graphite projects. Note that none of the projects are directly comparable as there are significant variations in the characteristics (flake size, distribution, grade, etc.) of each project.

STS is trading at \$13/t vs the comparables average of \$27(\$7.5 at the time of our previous report in March 2020)

Based on \$27/t, we arrived at a comparables valuation of \$0.22 per share vs our previous estimate of \$0.08

Lowering our discount rate from 15% to 12.5% due to receipt of a mining license, while maintaining all the other key inputs for our Discounted Cash Flow (DCF) model

Despite a lower discount rate, our value per share estimate declined from \$0.99 to \$0.81 due to share dilution since our previous report

Company	Location	Stage	Enterprise Value (\$,mm)	In-Situ Graphite		Grade	% Large Flake (+80 mesh)	EV / Resource*
				M&I (Mt)	Inferred (Mt)			
1 ZEN Graphene Solutions	Ontario	PEA	\$254	0.97	0.45	3.6%	n/a	\$213.4
2 Nouveau Monde Mining	Quebec	FS	\$469	5.08	1.29	4.1%	35%	\$81.9
3 Westwater Resources, Inc.	Alabama, U.S.	PEA	\$162	1.88	2.03	2.5%	29%	\$56.0
4 Leading Edge Materials	Sweden	Production-Ready	\$45	0.82	0.16	9.3%	40%	\$49.8
5 Magnis Energy	Tanzania	Feasibility	\$273	6.48	2.86	5.4%	55%	\$34.5
6 SRG Mining	Republic of Guinea	FS	\$53	1.88	0.16	4.1%	57.00%	\$27.0
7 Lomiko Metals	Quebec	Resource	\$19	0.59	0.62			\$21.1
8 Focus Graphite	Quebec	Feasibility	\$38	1.77	0.37	14.9%	34%	\$19.4
9 Northern Graphite	Ontario	Feasibility	\$24	1.21	0.40	1.7%	77%	\$17.0
10 South Star	Brazil	PFS	\$6	0.34	0.18	2.3%	63%	\$13.2
11 Graphite One	Alaska	PEA	\$49	1.13	8.80	5.8%	59% - 94%	\$8.9
12 Syrah Resources	Mozambique	Production	\$562	28.71	100.00	11.0%	20%	\$7.1
13 NextSource Materials Inc.	Madagascar	Feasibility	\$52	6.29	2.37	6.3%	46%	\$7.0
14 Mason Graphite	Quebec	Feasibility	\$67	11.29	3.04	5.0%	29%	\$5.2
Average (excl. outliers)				2.37	1.75	5.8%	44%	\$26.8

* Resource = 100% of M&I + 50% of Inferred

Source: FRC / Various Company Websites and Technical Reports

DCF Valuation Summary

Production	2.5 Mt in 2022, 5 Mt in 2023, 12.5 Mt in 2024, and 24 Mt in 2025+
Mine Life (in years)	15
Average Product Price (US\$/t)	\$1,300
Average Operating Costs (US\$/tonne - produced)	\$500
Capital Cost (in US\$, millions)	\$37
Discount Rate	12.5%
Long-term CS:US\$	1.27
Fair Value (after-tax @ 12.5%) - C\$	\$45,349,125
Working Capital (C\$)	\$944,805
Number of Shares*	57,075,430
Value Per Share (C\$)	\$0.81

*calculated based on the treasury stock method

Valuation Sensitivity	Discount Rate (%)			
	5.0%	10.0%	12.5%	15.0%
\$1,000	\$0.85	\$0.40	\$0.26	\$0.16
\$1,100	\$1.18	\$0.62	\$0.45	\$0.31
\$1,200	\$1.50	\$0.84	\$0.63	\$0.46
Weighted Average Graphite Price (US\$/t)	\$1.83	\$1.06	\$0.81	\$0.62
\$1,300	\$2.16	\$1.28	\$0.99	\$0.77
\$1,400	\$2.49	\$1.50	\$1.18	\$0.92
\$1,500	\$2.82	\$1.72	\$1.36	\$1.08

- Working capital and share count include the current \$1.3M financing.

Source: FRC

The average of our DCF and comparables valuations is \$0.52 vs our

previous estimate of \$0.53. The valuation declined solely due to share dilution. We are maintaining our BUY rating.

Risks

We believe the company is exposed to the following key risks (not exhaustive):

- The value of the company is highly dependent on flake graphite prices.
- Financing, and potential for share dilution.
- The project might not be advanced to production within management's expected timeframe.
- Development risks.
- Exchange rate risks.

As with most junior resource companies, we continue to rate STS' shares a risk of 5 (Highly Speculative).

Fundamental Research Corp. Equity Rating Scale:

Buy – Annual expected rate of return exceeds 12% or the expected return is commensurate with risk

Hold – Annual expected rate of return is between 5% and 12%

Sell – Annual expected rate of return is below 5% or the expected return is not commensurate with risk

Suspended or Rating N/A— Coverage and ratings suspended until more information can be obtained from the company regarding recent events.

Fundamental Research Corp. Risk Rating Scale:

1 (Low Risk) - The company operates in an industry where it has a strong position (for example a monopoly, high market share etc.) or operates in a regulated industry. The future outlook is stable or positive for the industry. The company generates positive free cash flow and has a history of profitability. The capital structure is conservative with little or no debt.

2 (Below Average Risk) - The company operates in an industry where the fundamentals and outlook are positive. The industry and company are relatively less sensitive to systematic risk than companies with a Risk Rating of 3. The company has a history of profitability and has demonstrated its ability to generate positive free cash flows (though current free cash flow may be negative due to capital investment). The company's capital structure is conservative with little to modest use of debt.

3 (Average Risk) - The company operates in an industry that has average sensitivity to systematic risk. The industry may be cyclical. Profits and cash flow are sensitive to economic factors although the company has demonstrated its ability to generate positive earnings and cash flow. Debt use is in line with industry averages, and coverage ratios are sufficient.

4 (Speculative) - The company has little or no history of generating earnings or cash flow. Debt use is higher. These companies may be in start-up mode or in a turnaround situation. These companies should be considered speculative.

5 (Highly Speculative) - The company has no history of generating earnings or cash flow. They may operate in a new industry with new, and unproven products. Products may be at the development stage, testing, or seeking regulatory approval. These companies may run into liquidity issues and may rely on external funding. These stocks are considered highly speculative.

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