



# **BLACK IRON INC.**

## **BLACK IRON INC. GROWTH REPORT**

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**TSX: BKI; OTC: BKIRF : C\$0.375**

**February 22, 2021**

**Market Capitalization: C\$93.7 Million**

**Shares Outstanding: 260 Million**

**Fully Diluted Shares Outstanding: 342 Million**

### **Company Description and Overview**

Black Iron Inc. is the developer of the compelling Shymanivske iron ore pellet feed project located in Ukraine which is ranked by highly regarded market intelligence groups CRU and Wood Mackenzie as the top ranked undeveloped iron ore project globally. Iron ore has been the highest price appreciating mainstream commodity over the past year as governments globally spend billions on major infrastructure projects to stimulate their economy as part of COVID19 recovery. The company will produce an ultra-high quality iron ore pellet feed that ranks in the top 4% for iron content globally and which is in strong and growing demand by international steel mills. Indeed, both economic factors and the imposition of increasingly restrictive global environmental regulations dictate that higher-grade iron ores will be highly prized by steel producers for many years to come.

Furthermore, Black Iron's operating and capital costs will likely be very competitive. Unlike nearly all other start-up iron ore mines, all necessary infrastructure is in place and readily accessible. Black Iron has already signed letters of intent (LOI) for necessary capacity of power and water for processing, rail for haulage, and deep draft port facilities for shipping product to international markets.

Furthermore, and perhaps most important, Black Iron is in serious negotiations with "more than a handful" of large steel mills and global commodity traders, including the giant commodity producer and trader Glencore (LSE: GLEN), whereby the chosen mill/trading company would make an equity-like investment in Black Iron. In exchange, the winning bidder would receive the rights to the entire four million-tonne annual Phase 1 output over the 17-year life of the mine at a slight discount to market prices. The cash from the steel mill/trading company would fulfill an important part of the estimated US\$452 million in capital expenditures required to build Phase 1 of the mining facility, reducing Black Iron's need to access the capital markets and at the same time essentially validating its business plan.

Black Iron is involved in similar negotiations with three construction companies, which would similarly make an equity or equity-like investment in Shymanivske of ~US\$65 million in return for the right to build Phase 1 of the mine. The company has also signed a non-binding US\$100 million royalty agreement with a well-known institutional investor and received expressions of interest from major European banks for US\$260 to US\$300 million of debt. Black Iron management believes it can finalize all these agreements before the end of 2021 to then start construction soon afterwards once all required permits are received.

### **Shymanivske's Compelling Economics**

Black Iron's infrastructure and low operating and capital cost advantage has been recognized by international industry analysts, such as CRU and Wood McKenzie, as the top-rated undeveloped iron ore project globally. This cost advantage translates into excellent financial returns under very conservative assumptions, including a US\$62 per-tonne long-term iron ore price for 62% Fe-content iron ore delivered (CFR) to China. (Note that the current benchmark 62% Fe iron ore price is in the US\$164 per-tonne range.) The Shymanivske Project should generate an after-tax internal rate of return (IRR) of 34% over its mine life, as well as an after-tax net present value (NPV) of US\$1.4 billion, versus an upfront capital construction cost of US\$452 million, equivalent to a

profitability index (i.e., NPV / construction cost) of about 3x. A profitability index of one or greater is generally considered to be a good project, and two or more is labelled great. An index level above 2.5x is rarely seen.

More importantly, demand for the company’s iron ore pellet feed promises to increase significantly over the short, medium and longer terms (see Figure 1), which in turn could allow BKI to realize annual operating cash flow of around US\$360 million in a few years. Producing iron ore companies are typically valued using a 4.5-7.0x EBITDA multiple (see page 17), resulting in a potential enterprise value for Black Iron of around US\$2 billion. Since Black Iron’s current enterprise value is only about US\$70 million, there is substantial potential upside for the share price to rerate as investors become aware of this great investment opportunity.

**Figure 1: Projected Worldwide Iron Ore Pellet Demand Growth**



Source: CRU and Vale estimates.

Iron ore pellet feed is sold to iron ore pelletization companies, which in turn compress or mold the feed into the shape of a pellet with a diameter of 0.25 to 0.625 inches. The pellets, which usually include additives like the fluxing agent limestone and the binding agent bentonite, are inserted into blast furnaces or direct reduction furnaces to make steel.

## Geologic Details and Environmental Advantage of Shymanivske's Ore

Shymanivske is located in the KrivBass iron ore district in central Ukraine, 330 kilometers southeast of Kiev, and is surrounded by seven operating iron ore mines, including two which are literally next door owned by ArcelorMittal and Metinvest. See Figure 2.

**Figure 2: Shymanivske Project Location**



Source: *The Northern Miner*.

Like the nearby open pit iron ore mines owned by ArcelorMittal and Metinvest/Evraz Steel, the Shymanivske resource is primarily a magnetite/quartzite deposit. Magnetite and hematite are the two main types of iron ore found in the world. Hematite ore deposits typically have a higher iron grade than magnetite deposits but increasingly contain more contaminants that weaken steel. Consequently, hematite ore, which generally can be shipped without further processing to increase the iron grade of the product, has comprised about 96% of Australia's iron ore exports since the early 1960s. Pure hematite is about 70% iron.

However, this hematite-based direct shipping ore (DSO) is depleting, causing many buyers to turn toward magnetite ores which are purified. For example, despite an increasing degree of processing, the average grade of iron ore produced in Australia's Pilbara Basin is now around 59%, down from 62% or more fifteen years ago. Declining worldwide iron ore grades are a significant economic issue, particularly as the problem worsens. Low-grade producers (55-56% iron content) in regions in India and Iran at times cannot sell their product at any price.

Lower iron content, and higher levels of impurities such as silica, alumina and phosphorus that make steel weak in direct-shipped ore can be counteracted by blending with higher-quality ores as produced in Canada and Ukraine. Silica and alumina are melted out in the blast furnace to make slag (waste) using expensive metallurgical coking coal, which is then separated from nearly pure iron used in a second process to make steel. Removing phosphorus entails a more expensive acid leaching process.

Magnetite ores generally have a higher iron content post a process called concentrating in which silica, alumina and phosphorus are removed to produce a purer iron product. Furthermore, magnetite ores release latent heat during exothermic reactions in the blast furnace, reducing fuel requirements. Magnetite ore deposits are generally large and low grade but produce high-grade products. Also, the heat transfer process in the furnace is done in part through conduction, or direct contact. In contrast, the heat transfer process for hematite fines is accomplished primarily by hot air convection, a less efficient thermodynamic process. As a result, the use of magnetite ore versus a like amount of hematite fines reduces greenhouse gas (GHG) emissions by about 30%.

### **Black Iron's High Grade Iron Ore: A Significant ESG Competitive Advantage**

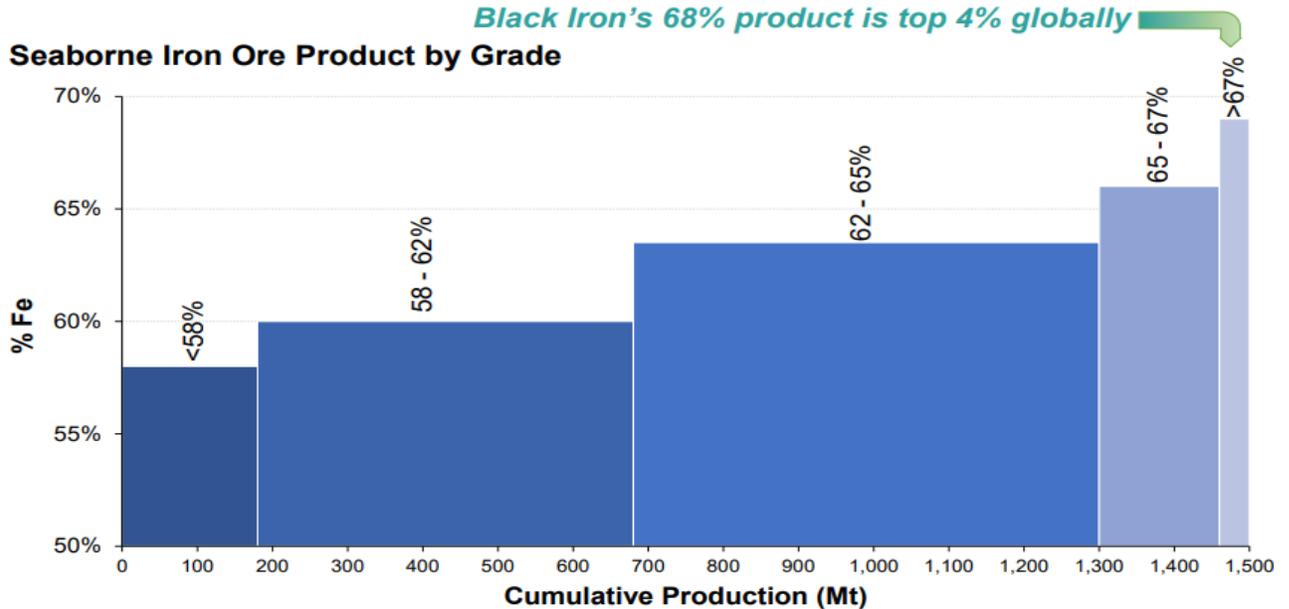
The company's product would rank in the top 4% of worldwide iron ore in terms of iron, or Fe, content. Only about 60 million tonnes of iron ore with 67%+ Fe content are produced worldwide in a 2.5 billion-tonne iron ore market. See Figure 3 and 4.

The introduction of high-grade iron ore (65%+ Fe content) into the steelmaking process reduces the quantities of both iron ore feedstock and coke required to produce steel and increases blast furnace productivity, which in turn lowers the overall cost to convert the ore to steel. Carbon dioxide (CO<sub>2</sub>) emissions levels are likewise reduced. The reason: the higher silica and alumina levels in the baseline 62% grade increase blast furnace slag volume, thereby lowering hot metal yields, increasing coke consumption and pollution, and limiting steel production rates. In recent years, Chinese steel producers have

increasingly utilized high quality iron ore to produce more steel (but less carbon-intensive steel) at higher profit margins and in a more efficient manner. Steel producers receive a 25 kg CO<sub>2</sub>-equivalent reduction for each one percentage point increase in Fe-content iron used in its processes above a 63% Fe-content iron ore.

**Figure 3: Black Iron’s Iron Ore Ranks Would Rank in the Top 4% by Quality of All Iron Ore Produced Globally**

**68% IRON PRODUCT IS ULTRA PREMIUM & REDUCES ENVIRONMENTAL EMISSIONS**



Source: CRU 2017.

**Figure 4: 2019 Global Iron Ore Production**

Country	Production	Share
Australia	930 million tons	37.2%
Brazil	480 million tons	19.2%
China	350 million tons	14%
India	210 million tons	8.4%
Russia	99 million tons	3.96%
Rest of World	431 million tons	17.24%
Total	2.5 billion tons	100%

Source: U.S. Geological Survey.

Emissions considerations -- and the economic impact of emissions -- are almost certain to grow in importance, as effluents increase on almost a daily basis. Competitive pressures dictate that the average blast furnace size will continue to increase. More stringent environmental regulations will follow, which in turn will increase demand for higher-grade raw material that Black Iron plans to produce. High-grade sales currently comprise just over one-third of all iron ore sales.

### **Black Iron’s Pellets Will Likely Be Used in the Environmentally-Friendly Direct Reduction Iron Process Versus More Heavily Polluting Blast Furnaces**

Aside from the iron content, the type of iron ore input for blast furnaces can affect their operations. Pellets, which are generally of uniform size and melt at the same rate, improve efficiency and reduce GHG emissions versus sinter or lump iron ore. More specifically, the use of pellets cuts net life cycle energy costs by around 17% compared with sintered ore. (Pellet size can also be tailored to meet customers’ specific requirements.) As a consequence, pelletizing capacity is increasing dramatically in China; according to MySteel, about 100 tonnes-per-year of new pelletizing capacity is under construction and expected to enter service over the next three years.

Most Middle East steel makers use the direct reduction (DR) process primarily because of the availability of cheap natural gas. The direct reduction of iron ore fines and pellets refers to a single-stage process which reduces iron oxides to metallic iron at temperatures below the melting point of iron. The resulting product is called direct reduced iron. For example, Bahrain Steel imports large quantities of 67%+ Fe content iron ore pellet feed so that it can produce high-quality DR grade iron-oxide pellets.

Bahrain Steel's pelletization plants have a design capacity of about 12 million tonnes per year, but its capacity utilization rate is only slightly above 50% because it cannot source sufficient suitable iron ore. We note that Black Iron's close geographic proximity to the Middle East will allow the company to deliver product to that region at low shipping costs.

By contrast, in the two-stage blast furnace process, iron ore or sinter first reacts with hot coke to produce pig iron. In the second stage, alloying metals are added to produce steel. Sintering -- the compacting and forming of a solid mass of material by heat or pressure without melting into a liquid -- is the most pollutive part of steelmaking, and this is avoided by using pellets.

### **Baseline 62%-Fe Content Iron Ore Price Has Exploded Over the Last 11 Months**

Iron ore has staged a dramatic rally over the past 11 months; the benchmark 62% iron content material approximately doubling over that span. See Figure 5. A slow recovery in Brazilian iron ore exports due to a tailings dam mining accident, and a high COVID-19 infection rate in that country, accounts for a portion of this price increase. A much larger factor: giant 2020 and 2021 stimulus programs implemented to counteract COVID-19-induced economic slowdowns across many countries, most notably China, spurred massive infrastructure construction programs. In turn, steel and iron ore demand spiked. Steel production in China surpassed 1 billion tonnes in 2020 (see Figure 6), and that country imported a record 1.17 billion tonnes of iron ore during the year, up nearly 10% from 2019. Factoring in its own production, China consumes about 60% of all iron ore produced globally. (Note that China's steel production reached about 1.1 billion tonnes in 2020 despite the government's shuttering of 150 million tonnes of production over 2016-2020 for environmental reasons.)

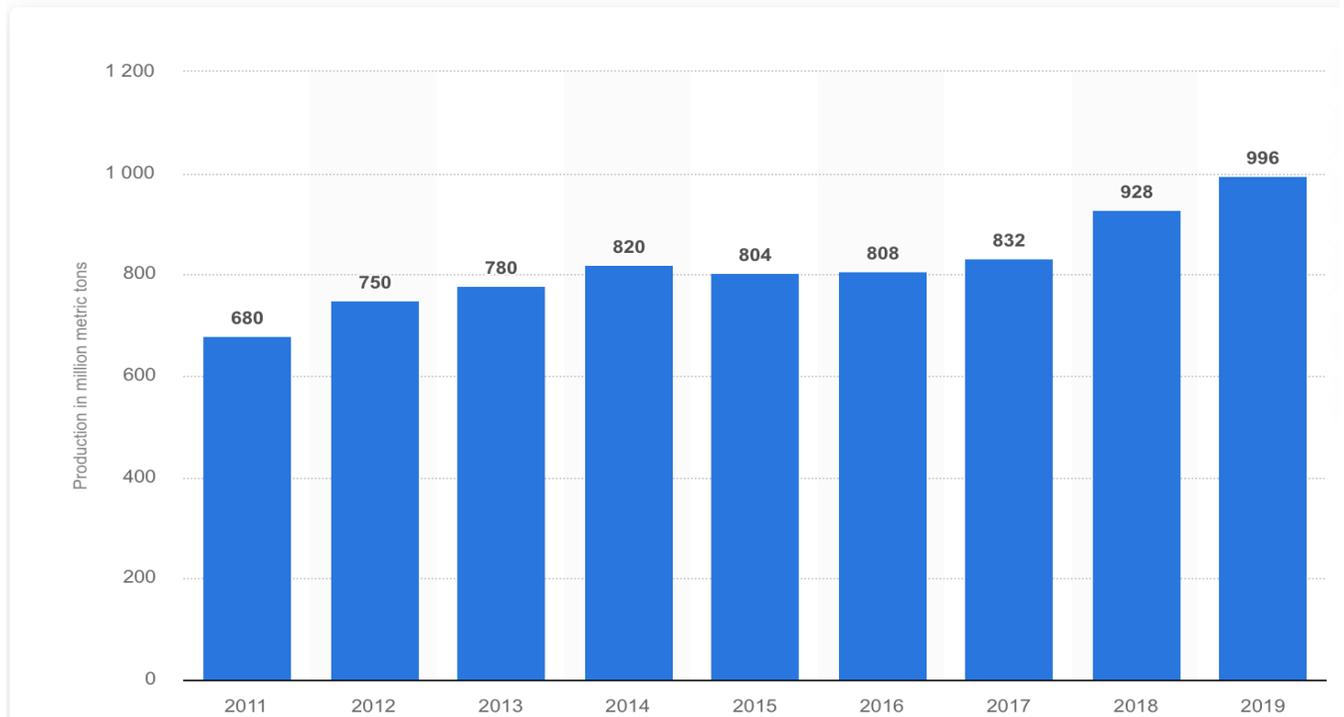
**Figure 5: Three Year Graph of Iron Ore Prices, in U.S. Dollars Per Tonne**



Source: Markets Insider.

**Figure 6: Crude Steel Production in China, 2011 - 2019**

*(in million metric tons)*



Source: Statista.

Planned global steelmaking activities -- and therefore iron ore demand -- is projected to continue to grow. Platts, the widely respected industry publication, estimates that Chinese steel production will rise at a 1-2% annual rate over the next few years. In addition, steel production capacity is expected to be added in other Southeast Asian nations. For example, Vietnam's Hoa Phat plans to add blast furnaces.

Iron ore capacity is likewise expected to increase. For example, Fortescue plans to start production at the Iron Bridge magnetite project and add capacity at its Port Hedland mine. However, the effect of these additions could be blunted by increasingly common social and environmental problems at mines across the globe (particularly in recent years in both Australia with indigenous groups and Brazil on tailings management). In short, the current overall iron ore supply-demand situation could remain constant for some time.

A positive short-term factor, with potentially longer-lasting implications, for non-Australian iron ore producers is Australia's deteriorating relationship with China's government. During 2020, Australian Prime Morrison called for an investigation into the origins of COVID-19, and China bristled at this call. In turn, China has limited imports of Australian coking coal and may attempt to do the same regarding Australian iron ore. Indeed, iron ore from Sierra Leone is beginning to arrive at Chinese ports.

Probably even more important for Black Iron, economic and environmental considerations increasingly favor higher grades of iron ore (see pages 5-8), and Black Iron's product would be among the highest quality ores produced in the world. Moreover, the introduction of Shymanivske's Phase 1 four million-tonne annual output would have little overall impact on the global supply calculus, as it would comprise less than 0.4% of China's annual imports.

### **High Quality Iron Ores Command a Significant Premium to Baseline Prices**

Figure 7 shows the prices of 65% iron content ore, baseline 62% iron content ore, and the difference between the two (called the premium that 65% iron content ore commands over the baseline variety). The premium is currently about US\$24 per tonne, or about US\$8 per tonne per percentage point. This implies that Shymanivske's 68% iron content ore would currently command about a US\$56 premium, equivalent to an all-in price of about US\$220 per tonne.

Over the past two years, the premium per tonne has averaged around US\$5-6 per extra percent of iron content. As steel demand is expected to remain strong for some time and environmental considerations continue to grow in importance, we think the required premium could grow.

**Figure 7: Prices of 65% and 62% Fe Content Iron Ore and the Difference, or Premium, Between the Two, in U.S. Dollars Per Tonne**



Source: *Bloomberg*.

### **Shymanivske Construction and Funding Plan**

Black Iron intends to build the Shymanivske facility in two phases, each phase representing four million tonnes of annual output. Phase 1 and Phase 2 construction costs are projected to be US\$452 million and US\$364 million, respectively. Black Iron hopes to begin Phase 1 construction in early 2022. The construction time for each phase should be roughly two years, implying Phase 1 iron ore production could commence in early 2024. The company plans to raise funds for Phase 1 construction obligations, plus a potential ~US\$50 million overrun facility that may be required by senior debt lenders, through four different means. Details of each financing source is described below and summarized in Table 1.

**Table 1: Shymanivske Phase 1 Projected Construction Costs and Funding Sources, in Millions of US Dollars**

Uses:	US\$m	Sources:	US\$m
Capex	450	Senior Debt	280 - 350
Working Capital	10	Royalty	100
VAT	30	EPC / equity	0 - 65
Financing Costs	15	Offtake / equity	TBD
<b>Total</b>	<b>505</b>	<b>Total</b>	<b>505</b>
+ Cost Overrun Reserve (COR) (IF REQUIRED)	0-70		
<b>Total (with COR)</b>	<b>505 - 575</b>	<b>Total (with COR)</b>	<b>505 - 575</b>

Source: *Black Iron Inc.*

- Offtake Agreements.** Black Iron is negotiating with several steel mills and global traders for an offtake agreement, which would include their making an investment in Phase 1. In return, the winning bidder would receive rights to purchase Shymanivske’s premium grade iron ore output at a slight discount to market rates. A number of steel mills and traders submitted expressions of interest in such an arrangement in October 2020. Black Iron has continued discussions -- and hosted site visits -- with a final group that made the most economic proposals. These finalists, which number “more than a handful” and include Glencore, have structured their proposals to include such elements as an equity investment, convertible debt, and working capital and cost overrun facilities. Black Iron plans to announce an offtake agreement by early April 2021 with likely one entity which would agree to purchase all Phase 1 output.

Whether the potential steel mill/global trader investment is made at the Black Iron corporate level or the Shymanivske project level remains subject to negotiations. If that investment were to be made at the project level, and if it

funded 20% of the project's costs, the steel mill/global trader's total investment in Phase 1 of the project would be approximately US\$90 million (20% x US\$452 million). At this hypothetical project ownership level, it would receive 20% of Shymanivske's iron ore at cost — about US\$33 per tonne — and would pay near-market prices for the remaining Phase 1 iron ore (which is currently around US\$220 per tonne).

- **Construction Company.** In October 2020, Black Iron announced it signed non-binding agreements with three construction companies. The tentative accords specify that about US\$65 million of the compensation to be received by the builder will be in the form of an equity or a convertible debt investment, or perhaps a deferred revenue accord where the construction company withholds about US\$65 million of construction invoices until Shymanivske begins production. Only one construction company will be chosen to build the facility. This selection is to be made a month or two after an offtake agreement is reached.
- **Royalty Funding Source.** In late December 2020, Black Iron signed a non-binding agreement with a well-known US-based institutional investor whereby the investor would provide US\$100 million of construction funds in exchange for a perpetual 6.75% royalty on Phase 1 iron ore production. The two parties still must negotiate a definitive agreement. (Black Iron granted 30 million warrants to a third party which facilitated the transaction. One-third of those warrants will vest when a binding accord is reached, and the balance vests when the institutional investor funds its investment.)
- **Senior Debt.** Black Iron has received term sheets from several senior lenders. Given strong conditions in the credit markets, the terms of the debt will likely include 8-10 year maturities, including a two-year grace period before any cash interest payments must be paid. Black Iron has also entered into discussions with some export credit agencies that would provide guarantees. Such a guarantee could potentially allow the maturity to reach a full ten years, as well as the debt to carry a slightly lower interest rate.

### **All Necessary Infrastructure Is In Place**

Unlike many start-up mines, the infrastructure surrounding Black Iron's project is in place -- saving the company hundreds of millions of dollars -- and Black Iron has already signed LOIs for the necessary capacity on those facilities. Note the following key points:

- Paved roads between the mine site and the city of Kryvyi Rih (population 750,000) already exist. In addition, the city, which is surrounded by seven iron ore mines, has a highly skilled and inexpensive work force. For example, the annual wage of a skilled electrician in the area is only about US\$10,000. In contrast, in the booming Pilbara iron ore and met coal mining region of Australia, the annual salary requirements of a truck driver approaches US\$200,000.
- Black Iron's iron ore project sits only two kilometers away from Ukraine's main state-owned rail line. Black Iron has signed an LOI for 10 million tonnes per annum of capacity on that line, more than enough to handle the 4 million tonnes per year from Phase 1 of the Shymanivske Project plus an additional 4 million tonnes contemplated from a Phase 2 expansion.
- Similarly, Black Iron has LOIs in place for 9.5 million tonnes per year of shipping capacity at Port Yuzhny, a port on the Black Sea located 430 kilometers away that loads cape-sized vessels necessary to compete in global seaborne iron ore markets.
- Finally, Black Iron has LOIs for 140 megawatts of electric power and sufficient natural gas supply to operate the project.
- We note especially that the rail and power LOIs allow Black Iron to avoid the crushing per-kilometer construction costs of about US\$3 million and US\$1 million that many mining projects face to build new rail and power lines, respectively. Most development iron ore projects are several hundreds of kilometers from power lines, rail and/or port facilities.

### **Issues Related to Property Required to Construct Shymanivske**

Black Iron intends to build its processing and tailings facilities, plus a stockpile for waste rock, on land owned by Ukraine's government. The land is currently used for weapons training by the Ministry of Defense. As part of the negotiations, Black Iron plans to repatriate some adjacent land owned by a communal enterprise to construct a new training facility and build new apartments for military use. These costs are fully reflected in estimated Phase 1 construction costs of US\$452 million. While no definitive timetable has been set, Black Iron believes the Ministry of Defense could approve the land transfer sometime this summer.

## **President of Ukraine Very Supportive of Project**

In June 2020, Ukraine's President Volodymyr Zelenskyy issued constructive comments regarding Black Iron, saying the project "is very important for Canada, for Black Iron, and it is important for us." President Zelenskyy was elected to the country's top office on March 31, 2019; he beat Ukraine's incumbent president in a runoff election by a resounding 73% to 24% margin.

## **Experienced, Shareholder-Focused Management Team**

Founder and CEO Matt Simpson leads an experienced Black Iron management team. We particularly note that Mr. Simpson was previously mine General Manager for Rio Tinto's Iron Ore Company of Canadian mine, which is the largest iron ore mine in North America. Also, COO Les Kwasik has 40+ years of mining experience, having built nine mines including two in the former Soviet Union during his career. Black Iron insiders collectively own about 14% of the stock.

## **Shymanivske's Preliminary Economic Assessment Details**

Based on a very conservative steady-state price of US\$62 per tonne for baseline 62% Fe content iron ore (a ~60% discount to current prices of US\$164), coupled with a US\$35 premium for Black Iron's 68% iron-content product (a premium approximately in line with both historic and current market conditions), Black Iron is expected to generate average annual EBITDA of around US\$360 million over Shymanivske's anticipated 17-year mine life. Its after-tax net present value (NPV), after factoring in a 10% discount rate, is estimated to be US\$1.4 billion.

Integral to the projected level of cash flow is a low operating cost of US\$33 per tonne to mine, process, rail, and load ships (FOB). Low labor expenses, an attractive Ukrainian currency exchange rate, and moderate infrastructure costs factor into this cost structure. Phase 1 operating costs are therefore approximately equal to the premium that Black Iron should realize on sales of its high-grade ore. Phrased differently, from an economic perspective, Black Iron's business model and prospects are equivalent to that of a company selling baseline 62% Fe content iron ore with zero operating costs.

## Black Iron's Share Price Could Be Re-Rated Substantially Higher If Accords Are Finalized

On a worldwide basis, established iron ore companies trade at EV/EBITDA multiples of 4.5-7.0 times. See Table 2.

**Table 2: Selected Financial Information of Major Iron Ore Producers**

*(in millions of US dollars)*

	<u>Stock Market Capitalization</u>	<u>Net Debt</u>	<u>Enterprise Value</u>	<u>EBITDA</u>		<u>EV-to- EBITDA</u>
Cleveland Cliffs	\$8,490	\$4,428	\$12,918	\$1,140	(A)	11.3
Ferrexpo (B)	\$2,755	\$174	\$2,929	\$566	(D)	5.2
Vale (E)	\$93,467	\$6,095	\$99,562	\$13,284	(F)	7.5
BHP (G)	\$185,647	\$12,040	\$197,687	\$22,071	(D)	9.0
Rio Tinto (H)	\$112,216	\$4,826	\$117,042	\$20,587	(D)	5.7

**(A)** Annualization of company's 4Q 2020 preliminary results of US\$280-\$290 million.

**(B)** Iron pellet producer which has operated in the Ukraine for more than 40 years.

**(D)** Over the twelve months ended 6/30/20.

**(E)** Produces iron ore, iron ore pellets and nickel.

**(F)** Over the twelve months ended 9/30/20.

**(G)** Produces iron ore, copper, coal, nickel, zinc, potash, and oil and gas.

**(H)** Produces iron ore, aluminum, copper, diamonds, gold, industrial minerals, and uranium.

With these valuations as a baseline, the key question is estimating the fair value of the company if it reaches definitive offtake, construction, royalty and senior debt agreements for Phase 1 of Shymanivske over the next months. The signing of all these accords would fully fund the construction of the project. The key accord is likely the offtake agreement. Its finalization, coupled with the likely significant stature and financial strength of the chosen counterparties, would dramatically increase the likelihood of project completion in investors' eyes.

**If the signings occur, Phase 1 construction would likely begin in early 2022 and take about two years. Steady state operations and cash flow would then begin in 2024. To be conservative, we assume that in this scenario, the market could value Black Iron in line with other companies (4.5-7.0 times steady state EBITDA) in 2025.**

**If we then apply a giant 50% annual discount rate to Black Iron's potential US\$2 billion 2025 enterprise value (EV) in this scenario, and employ a simple present value calculation, it seems plausible that the fair value of the company in a few months -- if it reaches the accords noted above -- could be around US\$400 million ( $US\$2 \text{ billion} / (1 + 0.50)^4$ ). Black Iron's current EV is only around US\$70 million.**

**Phrased differently, the signing of definitive offtake and constructive accords in the next few months could translate into a dramatic re-rating of the company's share price. We do note that in the calculation noted above, for each five percentage-point decrease in the discount rate used, Black Iron's potential current EV would be increased by around US\$50 million, and vice versa.**

Jim McFadden, CFA, MBA

*Jim has worked as an equity analyst and hedge fund portfolio manager on Wall Street for more than 25 years -- first as an Institutional Investor-ranked utilities analyst for Bear Stearns, Goldman Sachs and Drexel Burnham; and then as a long-short equity portfolio manager for Amaranth Advisors and the Bass Brothers. In addition, Jim ran the equity portion of JP Morgan's North American proprietary trading desk.*

*A Chartered Financial Analyst (CFA), Jim holds an MBA in Finance from The Wharton School of the University of Pennsylvania (graduated "With Distinction"), as well as an undergraduate civil engineering degree from the University of Notre Dame (Magna Cum Laude), and a master's degree in aeronautical engineering from the Air Force Institute of Technology.*

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