MAGNUM
MINING AND EXPLORATION LIMITED

APPALACHIAN
IRON

West Virginia
Project

ASX Presentation
October 2022

Background on Appalachian Iron

- Appalachian Iron is a party to a license agreement with Molong Petroleum Machinery Company (an entity incorporated in China) (Molong). It has the right to elect to enter into a future formal process agreement to utilise all intellectual property, information and data relating to the HIsmelt iron ore process (HIsmelt Process), as well as Molong providing technical services and key equipment to Appalachian Iron in order to produce green pig iron in the United States.
- Appalachian Iron has been pursuing the development of a proposed pig iron project using the HIsmelt Process to produce green pig iron at a plant in West Virginia (West Virginia Project). The West Virginia Project is still in a conceptual stage, with Appalachian Iron having secured non-binding agreements for land access, pig iron offtake, raw materials supplies, HIsmelt technology, and engineering for the West Virginia Project.
- The West Virginia Project is a long-term project, where Magnum can potentially use the know-how, expertise and HIsmelt Process available to Appalachian Iron to assist in the development of this project, together with Magnum's Buena Vista Magnetite Project, to increase value for shareholders.

Magnum Acquisition of Appalachian Iron

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- Acquisition of Appalachian Iron Inc provides Magnum with right to enter into a formal license agreement for use of HIsmelt technology and to advance Appalachian Iron's other interests
- HIsmelt technology to be used to develop a green pig iron plant at the Buena Vista Magnetite Project
- Appalachian Iron has entered into a number of non-binding agreements for existing land access in the US, pig iron offtake and raw material supplies to further the development of an iron ore project in West Virginia
- Acquisition of Appalachian Iron has the potential to add further value to Magnum due to the transaction being based on performance shares that only vest when milestones are met

HIsmelt technology
Core principles

- The HIsmelt process represents a practical alternative to the blast furnace to produce pig iron
- HIsmelt is a direct smelting reduction iron-making process that directly smelts preheated ferrous materials (e.g. iron ore fines, C-fines, slags, etc) and reductants (e.g. non-coking coal, biochar, etc) as the system's source of reducing agents and heat
- The ferrous fines, reductants and fluxes are injected into the molten iron bath
- Fountain of molten metal erupts into the top space by rapid expulsion of CO, H_2, N_2 from molten bath
- Reaction gases CO and H_2 are combusted with oxygen from hot blast, generating heat
- Heat from the gas combustion top space and heated metal and slag which fall back into the bath, provide energy for sustaining reduction reactions and direct smelting of iron ore
- Slag coats and protects water cooled panels, minimizing energy loss

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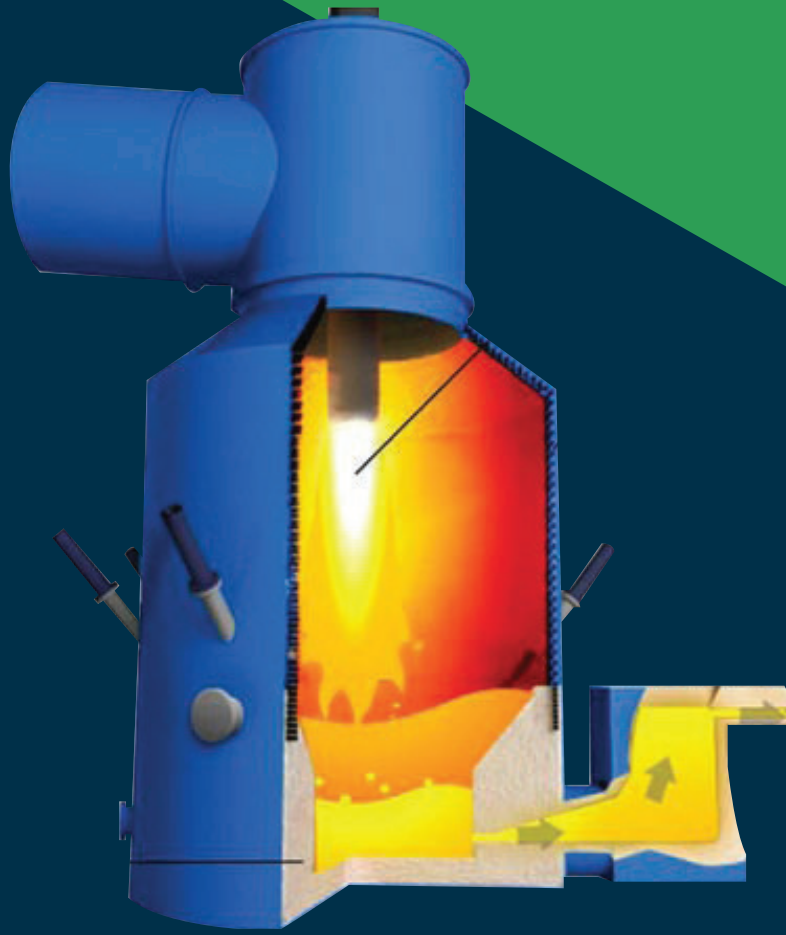

SMELT REDUCTION VESSEL (SRV)
AT THE HEART OF TECHNOLOGY

HIsmelt technology
Commercialisation achieved

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40-year development path

1980s	Small Scale Pilot Plant (SSSP) in Germany - 10kt/yr design
1990s	HIsmelt Research & Development Facility (HRDF) in Kwinana, Australia, - 100kt/yr design
2000s	HIsmelt Kwinana Joint Venture (HKJV) in Kwinana, Australia owned by a consortium of Rio Tinto, Nucor, Mitsubishi and Shougang - 800kt/yr design
2012	Molong Petroleum Machinery purchased the Kwinana equipment from HKJV shareholders
2013	Start of construction of Molong HIsmelt plant in Yangkou, Shandong Province, China
2017	Molong purchased the technology IP from Rio Tinto
2022	2 HIsmelt plants operating in China with 3m tonnes produced to date, orders placed for 8 plants in Asia

KWINANA HISMELT PLANT

HIsmelt technology
Commercialisation achieved

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Operations at Molong, Australia

- Started up in 2016 for a capital cost of $250m with a design rate of 600kt/yr using hematite
- Currently producing at design rate of 50,000t per month @ 99% availability using Australian hematite
- Can be increased to 100,000t per month via higher purity feed e.g. C-Fines, and higher oxygen injection
- 524,000t produced in 2021, includes 1 month offline due to COVID
- Production cost lower than local blast furnaces
- Low levels of Si and P in pig iron - sold as high-purity pig iron (HPPI) to foundries with a $100/tonne premium vs BF pig iron

MOLONG HISMELT PLANT

HIsmelt technology
Key benefits

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Green, flexible, high purity and low cost

Environmental benefits	• Reduced CO_2 emissions as well as pm10, SOx, NOx, durans/furans and benzene compared to traditional blast furnace operations using sinter plans and coke ovens. Clear and defined path to zero carbon emissions. HIsmelt is the preferred smelter technology for the EU's ULCOS (Ultra Low CO_2 Steelmaking) program that aims to reduce CO_2 emissions of the steel industry by 90%
Greater raw material flexibility	• Ability to use lower grade raw materials which are not suitable for blast furnace or DRI shaft furnace operation, including high phosphorous, high alumina, and high titanium iron ores, C-fines (ultra-fine slag fines), mill-scale, steel works slags, dusts, sludges, non-coking coals and biomass. In addition, the raw materials are injected as powders and do not require agglomerating into pellets or briqueGes.
Lower operating costs	• Due to the elimination of front-end processes required for a BF operation (i.e. no coke ovens and sinter plants) and DRI shaft furnaces (no pellet plant) as well as ability to use a wide variety of cheap raw materials (see above).

HIsmelt technology
Key benefits

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Green, flexible, high purity and low cost

Significantly lower capital costs	• Due to the elimination of coke ovens, sinter and/or pellet plants. The construction of a HIsmelt plant is relatively simple as the HIsmelt technology uses many of the traditional ironmaking core plant ancillary facilities, such as hot blast stoves, injection systems and power plants. The capital costs of constructing a HIsmelt plant could be up to 60% less than constructing a similar sized BF or DRI plant (including coke ovens, pellet plants etc.).
Premium quality final product (pig iron)	• When compared to the traditional BF process, including significantly lower silicon, manganese and phosphorous content. The lower levels of impurities provide yield and fluxing benefits in the downstream steelmaking process for BOF and EAF producers. HIsmelt pig iron will demand higher value-in-use premium than DRI and BF pig iron.


Colado Rail Load Out
Huxley Rail Load Out
Reno
The Ponderosa
Port of West Sacramento
Stockton Port
Port of Richmond
Port of San Francisco
Buena Vista Project
• Fully Permitted Iron Ore Mine
• Easy Access to Union Pacific Railway & Highway
• Near High Voltage power lines and Natural Gas pipelines
• Close to all major West Coast ports for export
• Nevada is friendly to mining and industrial developments
0 30 60 90
Kilometres

Buena Vista
Resource Highlights

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Zero Carbon pig iron plant in the USA	• Magnum is working towards becoming the first green pig iron plant in the USA, with "Net Zero" carbon emissions
Low cost iron ore concentrate	• JORC compliant, indicated and inferred resource of 232M t @ 18.6% Fe1
Significant "green credentials"	• Anticipate the Plant will produce 2M tpa less CO_2 than a comparable BF plant due to the replacement of replacement of coal by locally sourced biochar • The unique flexibility of the HIsmelt process allows the plant to use hydrogen in future • Remediation and clean up of legacy steel wastes, which cannot be recycled/ removed profitably by any other operation • Generates excess renewable power from the biochar plants and HIsmelt plant

The Company confirms that it is not aware of any new information or data that materially affects the information included in the Maiden JORC 2012 Resource for the Buena Vista Magnetite Project announced on 23 March 2021 and that all material assumptions and technical parameters underpinning the estimates in the announcement of the 'Maiden JORC 2012 Resource for the Buena Vista Magnetite Project' dated 23 March 2021 continue to apply and have not materially changed.

Nevada Iron + Appalachian Iron

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Access to HIsmelt Technology	• HIsmelt technology to be used to develop a green pig iron plant at the Buena Vista Magnetite Project.
High Demand Product	• HIsmelt technology to be used to develop a green pig iron plant at the Buena Vista Magnetite Project and also potentially at the West Virginia Project. Benefit to west and east coast of United States.
Increase in size and scale	• Appalachian Iron has entered into a number of non-binding agreements for existing land access in the US, Pig Iron offtake and raw material supplies to further the development of an iron ore project in West Virginia.

NEVADA IRON
The Green Steel Company

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For more information