

CHINA-BASED BATTERY GRADE HIGH-PURITY MANGANESE FEASIBILITY STUDY PRESENTATION

MAY 2024

ASX: FRB

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Firebird is not aware of any new information or data that materially affects the information included in its announcement dated 21 November 2023, and all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

For full details refer to ASX announcements 10/3/22, 30/1/23, 23/3/23, 26/6/23, 30/8/23, 1/9/23, 18/10/23, 21/11/23, 13/12/23, 29/1/24, 13/3/24 and 7/5/24

JORC Compliance Statement

This announcement contains references to Exploration Results and Mineral Resource Estimates, which have been extracted from previous ASX announcements as referenced. For full details of Exploration Results and Mineral Resource Estimates in this release that have been previously announced, refer to those announcements.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the said announcements, and in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed.

CAUTIONARY STATEMENT- DMS CONCENTRATE SCOPING STUDY

The Updated Scoping Study announced to the ASX on 30th August 2023 has been undertaken for the purpose of initial evaluation of a potential development of the Oakover Manganese Project. The Scoping Study is a preliminary technical and economic study of the potential viability of the Oakover Manganese Project as a manganese producer. The Scoping Study outcomes, production target and forecast financial information referred to in this release are based on low accuracy level technical and economic assessments that are insufficient to support estimation of Ore resources.

The Scoping Study has been completed to a level of accuracy of +/- 35% in line with a scoping level study accuracy. While each of the JORC modifying factors was considered and applied, there is no certainty of eventual conversion to Ore Reserves or that the production target itself will be realised. Further exploration and evaluation work and appropriate studies are required before the Company will be in a position to estimate any Ore Reserves or to provide any assurance of an economic development case. Accordingly, given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study. Given that the results of the Scoping Study are subject to the qualifications above (including assumptions as to accuracy), any results reported in this release should be considered as approximates and subject to variances having regard for the assumptions referred to in this release. The Company has reasonable grounds for disclosing a Production Target, given that approximately 99% of the Life-of-Mine (LOM) Production Target is in the Indicated Mineral Resource category, and 1% is in the Inferred Mineral Resource category. The production target stated in this announcement is based on Firebird's current expectations of future results or events and should not be relied upon by investors when making investment decisions. Further evaluation work and studies are required to establish sufficient confidence that the production target will be met. Firebird confirms that the financial viability of the Oakover Manganese Project is not dependent on the inclusion of Inferred Resources in the Scoping Study.

The Company considers all the material assumptions in this Study to be based on reasonable grounds. These include assumptions about the availability of funding. While Firebird considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Scoping Study will be achieved. To achieve the range of potential outcomes indicated in the Scoping Study, funding of in the order of \$123 million (excluding working capital and finance costs) will likely be required. Investors should note that there is no certainty that Firebird will be able to raise that amount of funding when needed. However, the Company has concluded it has a reasonable basis for providing the forward-looking statements included in this announcement and believes that it has a "reasonable basis" to expect it will be able to fund the development of the Project. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Firebird's existing shares. It is also possible that Firebird could pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the project. If it does, this could materially reduce Firebird's proportionate ownership of the project. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.

The Mineral Resources underpinning the production target in the Scoping Study have been prepared by a competent person in accordance with the requirements of the JORC Code (2012).. For full details of the Mineral Resources estimate, please refer to Firebird's ASX release dated 10th March 2022 and 23 March 2023. Firebird has confirmed that it is not aware of any new information or data that materially affects the information included in that release. All material assumptions and technical parameters underpinning the estimates in that ASX release continue to apply and have not materially changed.

BUILDING A LOW-COST, HIGH-PURITY MANGANESE SULPHATE PLANT





Unique, Low-Cost, Speed-to-Market Strategy

Successfully executing a high-purity manganese sulphate strategy to supply into the rapidly expanding LMFP battery market. Recent investor site visit in China successfully demonstrated the compelling opportunity for Firebird to establish itself as a key, low-cost, near-term producer



Sustainable Economics and Perfect Timing

Firebird to become of one of the lowest-cost battery grade MnSO4 producers, placing the Company in a competitive position in all market environments, at a time when the LMFP market is forecasted for exponential growth and become a >US\$20 billion market by 2030. Stage two of operations will be led by flagship Oakover Project, which is underpinned by an 18-year Life of Mine, ~A\$741.3 M NPV and IRR of 73.1%, with pay back in 16 months ¹



Management, Board and In-Country Team with Sector Leading Credentials

Led by a Board and Management team with proven abilities of building companies through the lifecycle and into production. Assembled a proven and high-quality team in China, who are leaders in the development and production of high-purity manganese



Well-Funded and Supported

Strong cash position of \$6.1m (31 Mar 2024) to fund key workstreams across China strategy and at Oakover. Firebird has attracted a strong investor register supported by highly-reputable investor Canmax Technologies Co., Ltd who has a 9.7% holding in the Company

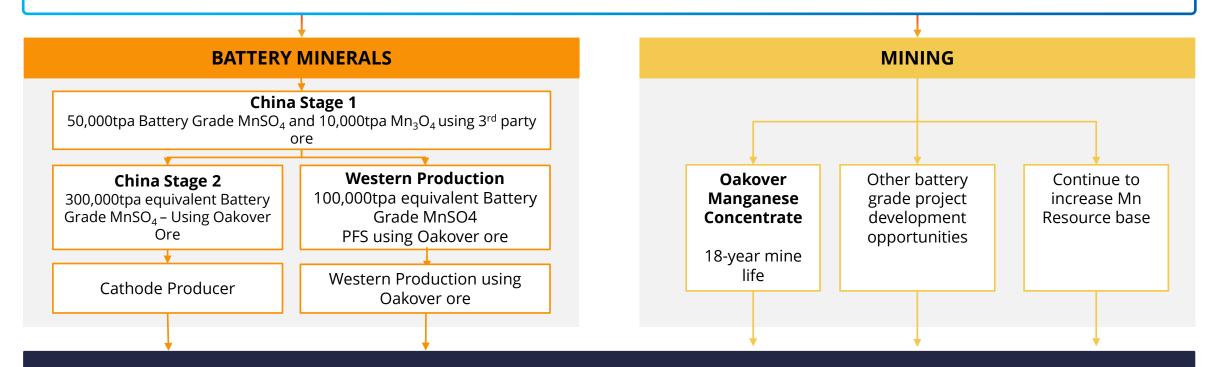
THE FIREBIRD VISION



COMPANY VISION

Become a global leader in the manganese industry by seamlessly combining mining and downstream processing, with a profound dedication to the advancement of Li-ion & Na-ion battery sectors.

By harnessing the power of innovation and sustainability, Firebird aims to play a pivotal role in shaping the future of energy storage solutions and significantly contributing to a more sustainable and electrified world.



GLOBAL CATHODE PRODUCER

STAGE 1 CHINA-BASED FEASIBILITY STUDY

GENERATED STRONG ECONOMICS

- Study results demonstrate exciting opportunity for Firebird to become a key producer of high-purity manganese sulphate
- Significant cost, development and operational advantages gained by building a plant and establishing operations in China
- In China, a Feasibility Study is completed first and forms the basis of engineering design, government permitting and financing activities. The Study contains a large portion of compliance and project economics assessment
- The Study was completed by Hunan Chemical Engineering Design Institute Co., Ltd ("HCEDI") and in line with stringent Chinese regulations. HCEDI is the leading high-purity manganese project design institute globally
- Feasibility Study validates Firebird's LMFP battery strategy to produce battery grade manganese sulphate in China:
 - Robust economics using lowest selling price, compared with peers & conservative cost estimates
 - Low CAPEX of US\$83.5M, working capital US\$10.7M
 - Plant Capacity: Battery Grade MnSO4 50kt/a & Mn3O4 10kt/a or equivalent MnSO4 of 72.5kt/a
 - Environmentally friendly process with no wastewater and all residues consumed by cement plant



Firebird Metals

Feasibility Study OPEX



Benchmark Minerals

China ore to HPMSM OPEX average

of various calculated routes

Source: Benchmark Minerals Intelligence

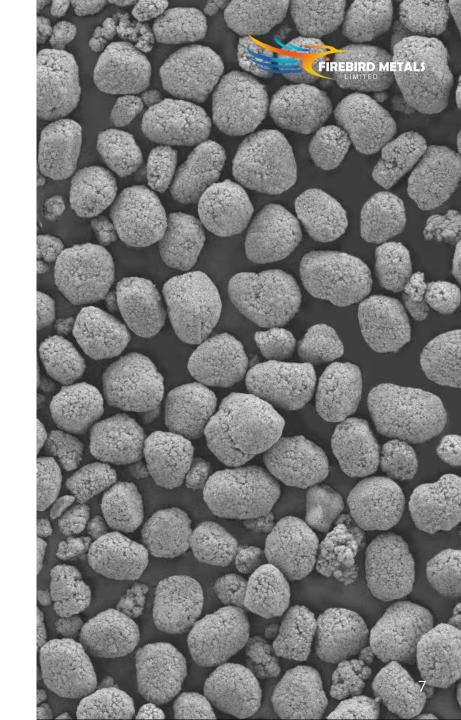
Benchmark Minerals

China EMM dissolution OPEX estimate

Battery Grade Manganese Sulphate Stage 1 Ke	y Figures	
Ore Feed	Ktpa	66
Battery Grade MnSO ₄ produced	Ktpa	50
Mn ₃ O ₄ produced	Ktpa	10
Battery Grade MnSO4 price (China)	US\$/mt	\$1,419
Mn ₃ O ₄ price (China)	US\$/mt	\$3,365
Operating Cost - BG MnSO4 (excluding VAT)	US\$/mt	\$608/t
Operating Cost – Mn3O4 (excluding VAT)	US\$/mt	\$1,763/t
CAREV	LICA	¢02.5N4
CAPEX	US\$	\$83.5M
WORKING CAPITAL	US\$	\$10.6
CNY/USD exchange rate		7.2

DEVELOPMENT PROGRESS IN CHINA CONTINUING AS PLANNED

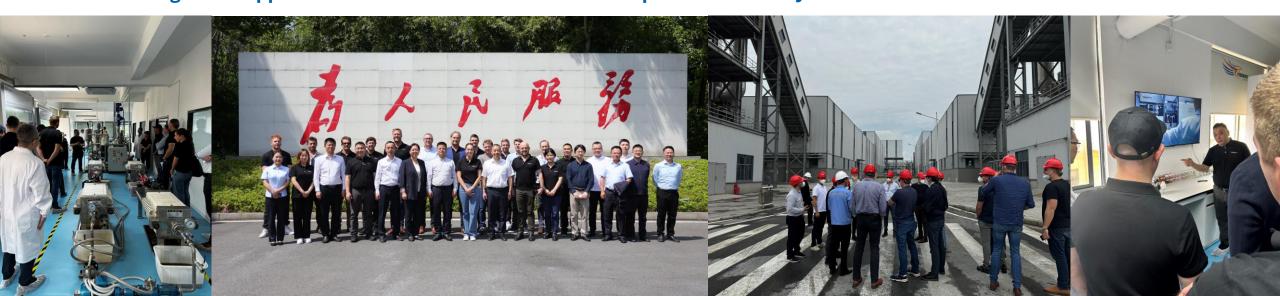
- Preliminary design work, R&D centre, equipment supplier due diligence & project permitting all being progressed at full speed
- Estimated permitting & design on track for completion by late Q3 2024
- European customer site visits & off-take discussions commenced, with excellent feedback received and engagement ongoing
- Formal advice from Jinshi Government & relevant departments on process to repatriate profits and capital from operations
- As further proof to the strong levels of support in China, Firebird will receive a preferential tax rebate for 6 years
- First Australian investor & broker site visit completed in April. Key activities included a tour of the Jinshi High-Tech Industrial Park, Pilot Plant and Jinshi Port Next site visit planned for mid-June 2024
- Oakover project development continues as planned and forms an integral part of Firebird's long term manganese battery materials strategy



INVESTOR SITE VISIT TO CHINA



- Firebird hosted a large investor group on a site visit in China. Primary objectives were to demonstrate:
 - The unique and significant advantages of operating in China
 - Progress being made on-the-ground by the Company's leading manganese sulphate team
- Site visit included comprehensive tours of:
 - The Company's battery grade manganese sulphate Pilot Plant and R&D centre, located in Jinshi, Hunan Province
 - Jinshi Port
 - Company's proposed site in the Jinshi High-Tech Industrial Park, where Firebird's processing facilities are set to be established
 - Major shareholder Canmax Technologies Co., Ltd's tier-one, globally significant 60,000tpa lithium hydroxide plant in Meishan
- The group spent a large amount of time with key Jinshi Government officials, where the strong levels of support for the Project and Company were clearly demonstrated
- Importantly, the site visit successfully demonstrated the compelling opportunity of establishing operations in China and the strong local support for Firebird. Next investor site visit planned for mid-June 2024



TIMELINE TO BATTERY GRADE MANGANESE SULPHATE PRODUCTION







GROWING IMPORTANCE AND NEED FOR MANGANESE IN BATTERIES





Traditional Uses

- Manganese has a long history of being a cathode material for batteries in the form of Electrolytic Manganese Dioxide (EMD)
- Current production market sizes are 482,000t in China and 107,000t for rest of the world

Manganese Lithium-ion Batteries

- Mn is used Li-ion batteries, including NCM, LMO and LMFP – Due to significant benefits of LMFP, the use of this cathode mix is set for massive growth
- Size and growth of LMFP market is potentially the largest in medium to long term (est. avg. 900kg of MnSO4 per 1 tonne of LMFP)

Na-ion Batteries

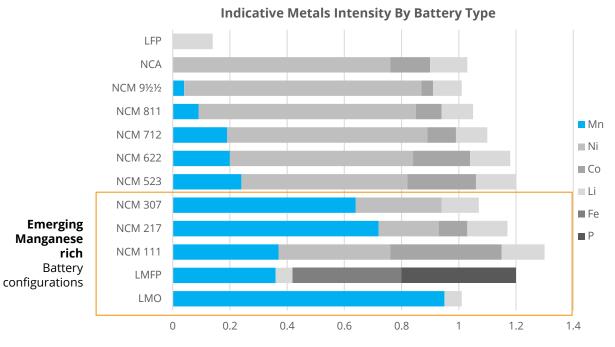
- · Na-ion batteries inherently have lower density
- Sodium batteries contain around 30% Mn

Research and advocates for manganese rich batteries is on the rise, due to manganese being abundant and relatively inexpensive compared with nickel and cobalt



Manganese content (kg) in per battery in each vehicle above

Source: Benchmark Mineral Intelligence



Source: Benchmark Mineral Intelligence and company research



- Lithium Iron Phosphate (LFP) is the world's most used Li-ion cathode material for EV batteries
- Three critical key considerations for battery manufacturers when assessing and developing a cathode mix is safety, cost and capacity
- Adding high purity manganese sulphate (MnSO4) to LFP, creates LMFP and delivers significant operational and safety benefits to a battery
- LMFP is an upgrade from LFP by introducing manganese to replace iron
 - LMFP has a higher thermal run-away temperature than nickel-based batteries
 - LMFP costs approximately 30% of nickel-based batteries
 - Enhances the voltage platform and increases energy density by 15-20%
 - LMFP is flexible, used on its own or mixed with nickel-based batteries
- Soochow Securities forecast LMFP will replace 50% of LFP batteries by 2030
- Caitong Securities forecast blending LMFP with nickel-based batteries in China to reach 30% by 2030
- Firebird is executing its LFMP battery strategy at the perfect time and will be well-positioned to supply into this rapidly growing market



EV manufacturers using LFMP









Battery manufacturers using LFMP

















Cathode material manufacturers using LMFP













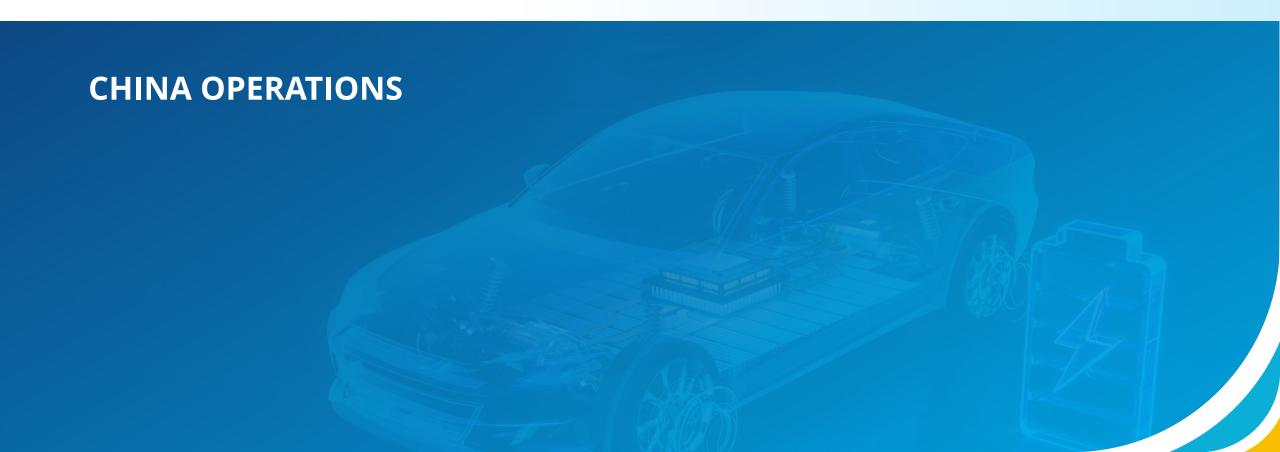












INDUSTRY LEADING MANGANESE TEAM



- Firebird has recruited an industry leading, highpurity manganese team, to ensure the Company develops into a long-term, low-cost MnSO₄ producer
- In-country team brings proven track record of success and value generation across the manganese sulphate development and operational lifecycle in China
- Team led by manganese sulphate specialist Mr Zhou Qiyun, Chief Operating Officer of Hunan Firebird Battery Technology Co Ltd (Chinese subsidiary of Firebird Metals)
- Mr Zhou was previously a part-owner of a battery grade MnSO₄ plant and has consulted to many existing MnSO₄ plants in China.
- Across his career, Mr Zhou has been involved in the development, optimisation and commercialisation of technologies for MnSO₄ processing (including patents)



Hunan Chemical Engineering Design Institute (PFS engineering group) and Hunan Firebird
Battery Technology staff including Mr Zhou

INDUSTRY LEADING MANGANESE PARTNERS



- Firebird's partners are leaders within their industries
- Cooperation agreement with China Chemical Strategic Cooperation
 Agreement, which will deliver Firebird a significant amount synergies and advantages:
 - China Chemical invested in and manages the Jinshi High-Tech Chemical Industrial Park, where the Company's plant and operations will be located
 - China chemical has significant technical expertise and proven credentials in construction of chemical plants
 - China Chemical has the highest qualification for installation of chemical equipment
- A dedicated technical team will be formed with China Chemical, once preliminary design work is completed
- Hunan Chemical Engineering Design Institute (HCEDI) engaged to complete the Feasibility Study & Engineering Design
- HCEDI is the leading MnSO4 project design institute globally and Firebird's in-country technical team have previously worked closely with HCEDI on several projects





OPERATIONS LOCATED IN THE EPICENTRE OF MNSO4 DEMAND



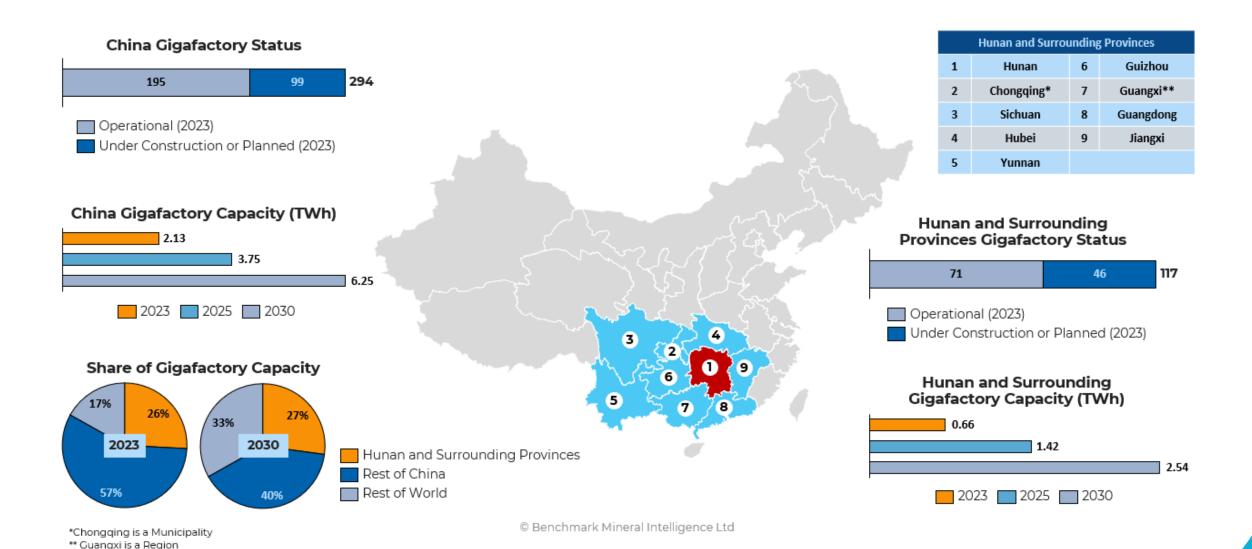
After thorough due diligence and assessment of a large number of possible location opportunities in China for Firebird's high-purity manganese plant, Jinshi, Hunan was selected as the Company's stage 1 Battery Grade MnSO4 & Mn3O4 site

Importantly, Hunan and the Company's proposed operations are located at the epicentre of Chinese MnSO4 demand

- Excellent location for operations. Close proximity to existing and potential customers - within a 150km radius, LFP capacity is just under 3Mt/a
 - Even if a fraction of conversion from LFP to LMFP is actioned, it will significantly exceed Firebird's production capacity
- Strong support from local governments on foreign investment and for Firebird's strategic ambitions to establish operations in China
 - Firebird's permitting is being fast-tracked and being the first fully owned foreign entity in Jinshi, is a significant project for the region
- World class chemical industrial park built by China Chemical and the local government. The Park has attracted more than 100 companies and current demand for land for additional projects far outweighs supply
- Access to tier-one infrastructure including easy access to Yangtze River, which is the most cost-efficient transport system in China, close proximity to key input materials and several cement plants
- Attractive land price & tax incentive. Firebird has received better incentives than any other company in the Chemical Industrial Park and also qualifies for all Chinese domestic company grants

HUNAN IS AT THE EPICENTRE OF CHINESE MNSO4 DEMAND





JINSHI HIGH-TECH INDUSTRIAL PARK

- The High-Tech Industrial Park (Park) is located ~8km away from the centre of town
- The Park is ranked as one of the highest in the Hunan Province for its services and facilities
- The Park is conveniently located on Lishui River, which connects onto the Yangtze river. The bulk terminal has a capacity of over 10 Mt/annum
- Provides access to tier-one infrastructure such as a steam plant, dual power lines, water treatment plant, cement plant depot
- The Park is divided into three districts; New Chemical Materials, Pharmaceutical and General
- Currently over 100 companies operate in the Park.
 Several new businesses have set up pilot plants within the development area and Firebird currently operates from the development area





RAPID DEVELOPMENT PROGRESS BEING DELIVERED IN CHINA

R&D LAB COMPLETE, PILOT PLANT TRIALS UNDERWAY



- Firebird completed construction of the Research and Development lab in January 2024, ahead of schedule and under budget
- Pilot Plant operational and is producing samples of MnSO₄ and Mn₃O₄ for potential customers and offtake parties
- Testing results on site is consistent with 3rd party analysis and meets the highest quality standards required by potential customers
- Pilot Plant has design capacity to produce 10kg of battery-grade MnSO₄ per day (can be increased to suit Company needs)
- The Pilot Plant will also be used to demonstrate the production process to financiers
- R&D lab will be used to complete testing on several other potential Mn rich precursor Cathode Active Materials (pCAM)

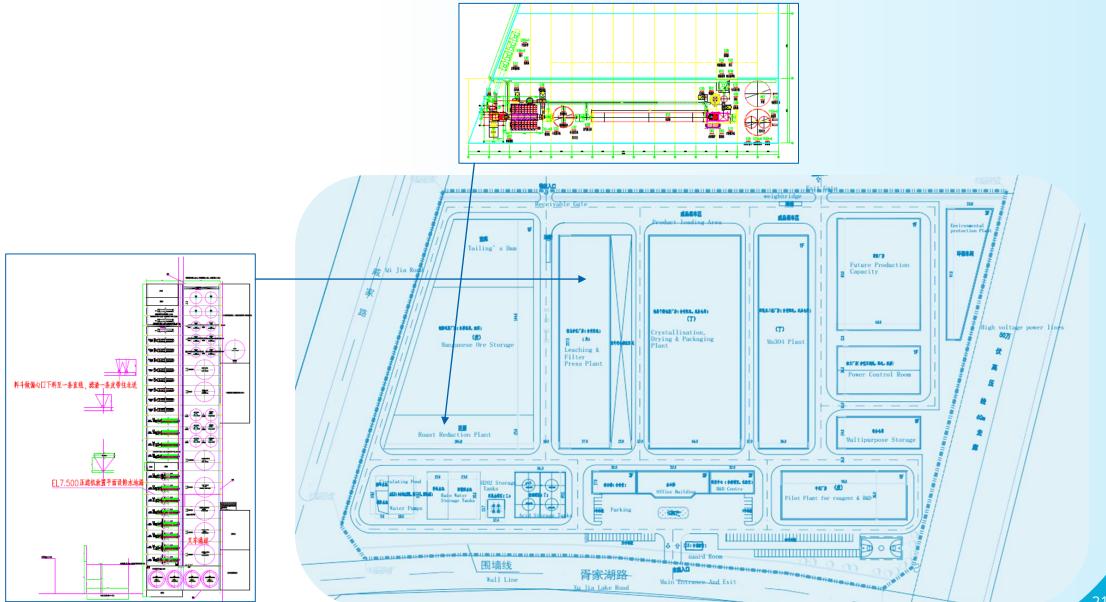






STAGE 1 BATTERY-GRADE MNSO4 & MN3O4 PLANT LAYOUT



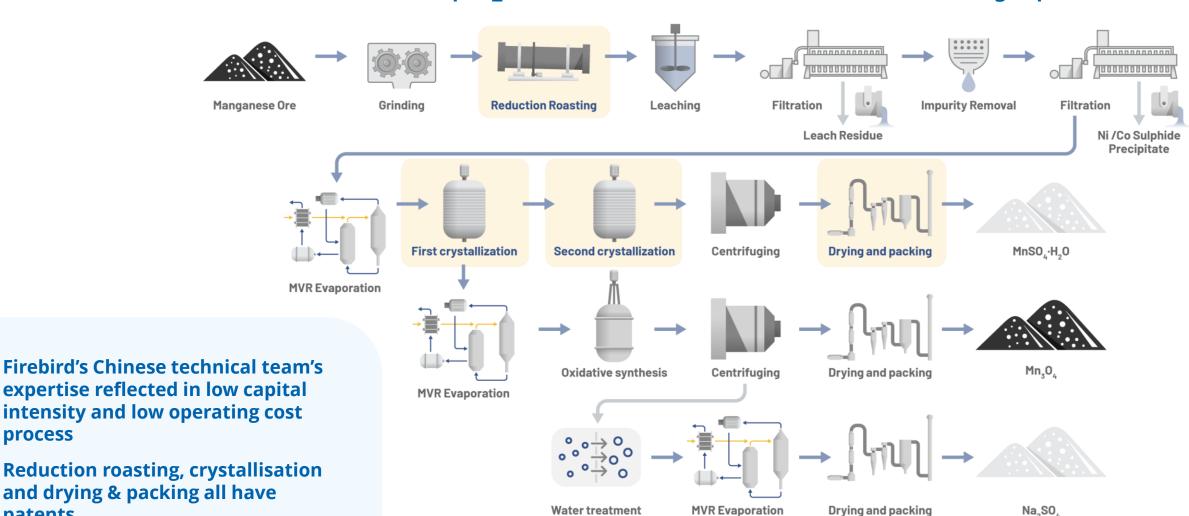


HIGH-LEVEL PROCESS FLOW DIAGRAM -50KTPA HIGH PURITY MNSO₄·H₂O AND 10KTPA HIGH PURITY MN₃O₄

process

patents





5th GENERATION CONTINUOUS HIGH PRESSURE CRYSTALLISATION REACTOR IS WORLD LEADING





1st generation Single effect evaporator

Indirect heating to concentrate solution



2nd **generation** Multi-effect evaporator

- •60% energy use of 1st generation
- Recycle residual heating to pre-heat incoming solution



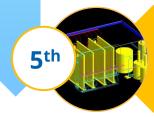
3rd generation MVR

- •40% energy use of 1st generation
- More efficient heating and recycle energy



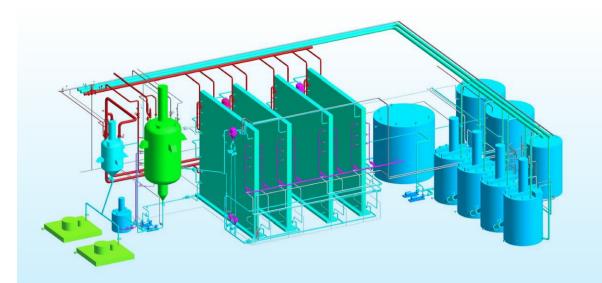
4th **generation** Single High pressure, high temperature reactor

- •25% energy use of 1st generation
- •Like a pressure cooker, efficiency improved due to high



5th **generation** (patent technology) Continuous highpressure system, 8% energy use of 1st generation

- •1/3 energy use of 4th generation
- •Based on 4th generation system, it operates continuously & residual energy is used in pre-heating feed solutions

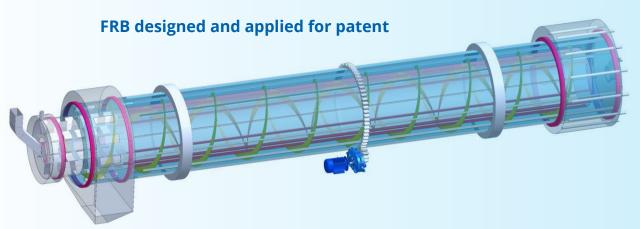


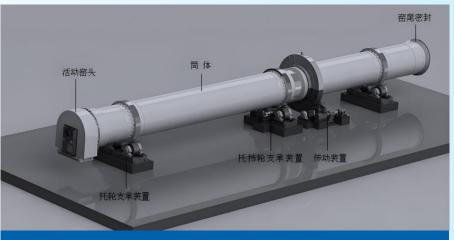
- Most Chinese companies currently using 1st to 4th generation
- 5th generation is successfully used in Commercial Production

CALCINING UNIT



- Conventional calcining technology consumes minimum 300kwh per tonne of feed
- Materials are heated to 900 degrees celsius and then cooled down by using a combination of water and air energy is wasted during cooling
- Firebird has lodged an application to patent a modified system which will significantly reduce energy use
- The essence of Firebird's technology is utilising heat from calcined material to pre-heat incoming material
- Firebird is sourcing a supplier to build a Pilot Plant ~1/15 of actual size
- Cost of the build is financed through savings from R&D Lab
- If proven, Firebird technology could potentially reduce energy use to 1/6 of conventional system

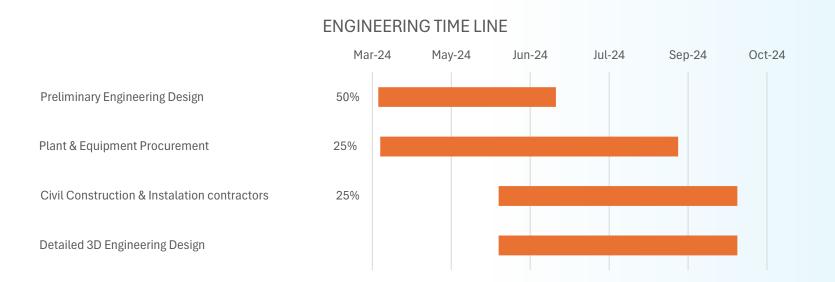




PROGRESS UPDATE - ENGINEERING & CIVIL DESIGN



- Firebird is currently focused on preliminary engineering & civil work design
- More than 50% of preliminary design work has been completed
- Firebird has engaged several high-quality equipment suppliers
- Equipment costs being fed into the design work and detailed estimates
- Once completed, the design work will be reviewed by relevant department for preliminary permitting of construction process
- Firebird funded to complete full detailed engineering work





PERMITTING UPDATE - PROGRESSING AS PLANNED



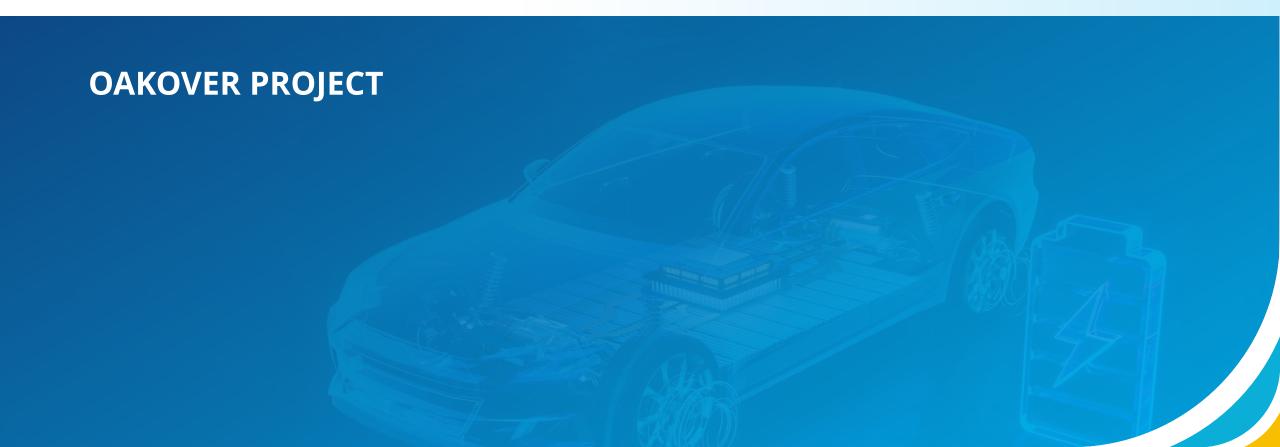
- Government permitting is progressing rapidly
- 8 major permits required before construction begins, key permits being:
 - Environmental Impact Assessment Report: On track to be completed in April and then goes to an Expert Panel for review. <u>Full approval is expected</u> <u>before the end of financial year</u>
 - Safety Report approved by Expert Panel. Changes in design have been made to reflect the Panel's review points. Permit is likely to be received at the end of April
 - Energy Consumption Report: Advanced stage of drafting and expected completion is mid-April and then goes to an Expert Panel for review.
 Permitting is expected to be received before the end of June

PERMITTING TIME LINE









OAKOVER UPDATE

Over the long term, Oakover will play an integral part of Firebird's manganese battery material strategy

Key Highlights:

- Near-surface, gently dipping geology
- Metallurgical test work demonstrated saleable 30 32% Mn Concentrate product achievable
- Hydrometallurgy test work demonstrated Battery Grade MnSO₄ achievable
- Concentrate DMS Scoping Study 18-year mine life, 1.2Mtpa with low strip ratio and mining costs

Mineral Resource Classification	Tonnes (Mt)	Mn (%)	Fe (%)	SiO ₂ (%)	Al ₂ O ₃ (%)	P (%)
Indicated	105.78	10.1	8.9	39.2	9.8	0.10
Inferred	70.87	9.6	8.0	36.5	9.5	0.09
Total	176.65	9.9	8.6	38.1	9.7	0.10



LARGE RESOURCE WITH STRONG GROWTH UPSIDE

- Firebird has successfully explored and developed Oakover into a sizeable manganese project, with exciting growth potential
- Development work completed has highlighted the Project as a long-life, high-quality operation. Updated DMS Manganese Concentrate Scoping Study generated strong results including:
 - 18-year Life of Mine
 - ~A\$741.3 M NPV at a discount rate of 8%
 - Impressive IRR of 73.1%, with pay back in 16 months
- Company's primary focus is on the execution of the China-based LMFP battery strategy; however, development and environmental work will continue over next 12 to 18 months, with key activities including:
 - Environmental surveys and studies to be completed in H1 2024
 - Diamond drill program for ongoing metallurgical test work to be completed in H2 2024
 - PFS metallurgical test work program
 - Hydrology/water monitoring
 - Finalisation of the Mining Lease Application, including native title and heritage negotiations
- Execution of these workstreams will see Firebird successfully deliver on its vision to become a global leader in the manganese industry, combining mining and downstream processing and building WA's next major manganese operation



CORPORATE SNAPSHOT





EVAN CRANSTON Chairperson

Mr Cranston is an experienced mining executive, with a background in corporate and mining law.



PETER ALLEN Managing Director

Mr Allen is a mining executive, with more than 20 years' experience in the marketing of manganese and lithium products and a range of other commodities.



WEI LI Finance Director

Mr Li is a Chartered Accountant with extensive experience in the mineral resource industry. Mr Li managed a private base metals' exploration company in the Northern Territory and assisted in commissioning a A\$150 million Electrolytic Manganese Dioxide (EMD) plant in Hunan China.



ASHLEY PATTISON Non-Executive Director

Mr Pattison has over 20 years' experience in the resources sector from both a corporate finance and operational perspective. Qualified as a chartered accountant, he has extensive experience in operations, finance, strategy and corporate finance.



BRETT GROSVENOR Non-Executive Director

Mr Grosvenor is an experienced mining executive, with over 25 years' experience in the Mining and Power industry. Holding a dual tertiary qualification in Engineering and a Master in Business.

Firebird Metals Limited	ASX:FRB
Share price as of 3 rd May 2024	\$0.19
Shares on issue	142.36 M
Market capitalisation	\$27 M
Options @ \$1.00	12.0 M
Performance rights	2.2 M
Options @ \$0.30	12.5 M
Options @ \$0.40	12.5 M
Cash on hand (31st March 2024)	\$6.1 M

Major Shareholders

Canmax Technologies	9.7%
Tolga Kumova	9.5%
Mining Equities	3.2%
Board (incl. related parties) & management	15.05%



THANK YOU

ASX:FRB

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