




South Australia's **Magnetite Strategy**

*Making our State's magnetite
the world's choice for steelmaking*

www.minerals.dpc.sa.gov.au/magnetitestategy





"Unlocking South Australia's magnetite resources represents an untapped economic opportunity with significant energy efficiencies for steelmakers. Processed magnetite is a high-grade, concentrated product that requires less energy for steelmaking. In a carbon-constrained world, South Australia's magnetite products will assist the global steel industry to reduce their costs and their emissions."

Hon Tom Koutsantonis MP
Minister for Mineral Resources and Energy

Images front cover: Courtesy of Liberty OneSteel, SIMEC Mining and Magnetite Mines Limited
Image this page: Magnetite processing , Middleback Ranges - SIMEC Mining

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Minister's foreword

The South Australian outback has a history, landscape and culture rich in iron.



In the late 19th century, Iron Knob became the birthplace of iron ore mining in Australia. Ore sourced from South Australia's Middleback Ranges was the foundation of our nation's steelmaking industry. South Australia has manufactured quality steel products for nearly 80 years through an integrated supply chain backed by extraordinary technical expertise.

Using South Australian magnetite to make high-quality steel in Australia, to Australian Standards, to build Australia's infrastructure, simply makes sense. It creates jobs, sustains communities and supports a critical industry that maintains our nation's sovereignty. The inherent quality of Australian-made steel will result in a legacy of superior infrastructure for future generations.

South Australia is endowed with more than 14 billion tonnes of magnetite resources. This equates to 44 per cent of our nation's identified magnetite resources. Our State's advanced magnetite projects are located throughout the northern areas of our State, from south of Coober Pedy to Eyre Peninsula and through the Mid North to our border with New South Wales.

Achieving the ambitious vision of making South Australia's magnetite the world's choice for steelmaking will create and sustain thousands of jobs across the mining supply chain, particularly for residents and businesses in regional communities. Investment in these long-life mines creates business opportunities for Traditional Owners, boosts our export earnings, and provides a stream of royalty revenue to fund government services such as our schools and hospitals.

By planning now to meet international demand from steelmakers for low-cost, high-quality, energy-efficient feedstock derived from magnetite, South Australia has taken the first step on the path towards attracting \$10 billion of committed investment by 2022 and boosting production to 50 million tonnes of magnetite products per year by 2030.

A handwritten signature in black ink, appearing to read 'Tom Koutsantonis'.

Tom Koutsantonis MP

Minister for Mineral Resources and Energy



Chair's foreword

Magnetite is an increasingly important feedstock for high-quality steelmaking. Steel is the most used metal on earth, globally utilised at more than 20 times the rate of all other metals combined. With the world's population projected to grow by 50 per cent within the next 100 years, long-term demand for steel is assured.

The aim of South Australia's Magnetite Strategy is to encourage a larger portion of that steel to be produced using magnetite mined in this State.

High-grade steel products demand high-quality iron inputs. Global Direct Shipping Ore (DSO) continues to decline with a corresponding rise in impurities.

Unlike DSO, which is shipped unrefined to steelmakers, magnetite generally requires processing to make it suitable for use in blast furnaces and direct reduction steelmaking plants. This beneficiation process produces a concentrate that transforms South Australia's magnetite ores

into a high-grade, low-impurity feedstock for high-grade steel with benefits of energy efficiency resulting in reduced costs and emissions for steelmakers.

By capitalising on the emerging global demand for higher-grade iron products, South Australia has an opportunity to position itself as a leading global magnetite-producing region.

South Australia's Magnetite Strategy will foster collaboration between miners, mining services, steelmakers, researchers, government and communities to develop the industry through new partnerships, innovation and new technologies. The Strategy will present South Australia's magnetite opportunity to a global audience and encourage the investment required to unlock our mineral and magnetite wealth for the benefit of all South Australians.

Dr Ted Tyne

Chair

South Australian Magnetite Strategy
Steering Committee

Middleback Ranges mining - SIMEC Mining

Magnetite Strategy

VISION

By 2030, South Australia will be a leading global supplier of quality magnetite products for steelmaking.

OBJECTIVE

To secure \$10 billion of combined investment by 2022 to unlock magnetite resources and increase South Australia's magnetite production to 50 million tonnes per annum by 2030.

Cape vessel transshipping operations near Whyalla, Upper Spencer Gulf, South Australia - SIMEC Infrastructure



‘Making our State’s magnetite the world’s choice for steelmaking’

Action Themes

1

Establish South Australia as a leading global supplier of magnetite products

2

Engage with stakeholders and industry partners

3

Forge private-public partnerships to build transformational bulk-commodity infrastructure within a multi-user framework

4

Support a strong and sustainable Australian steel industry

Caterpillar dump truck at work on CU-River Australia's Cairn Hill mine near Coober Pedy - Cu-River Mining

Magnetite explained



Iron ore is a mixture of chemical compounds of iron (Fe) and other minerals.

The chemical compounds of iron ore suitable for steelmaking are essentially ferric oxides – a mixture of Fe with oxygen.

The most commonly used iron-bearing minerals are magnetite and haematite.

The Pilbara region in Western Australia is rich in high-grade, predominantly haematite ore, known also as Direct Shipping Ore (DSO). DSO passes through a simple crushing, screening (milling) and blending process before it is shipped overseas for use in steel production. DSO, when mined, typically has iron content of between 56 per cent Fe and 65 per cent Fe.

Magnetite ore generally has an iron content of less than 40 per cent Fe and is therefore unsuitable for steelmaking in its natural form. As its name implies, the iron in magnetite is magnetic and therefore can be separated from waste material by the application of a magnetic field.

Magnetite grain size and its degree of integration with the host rock determines the grind size to which the ore must be crushed and ground to enable effective magnetic separation.

The energy input requirement is commensurate with the level of crushing and grinding.

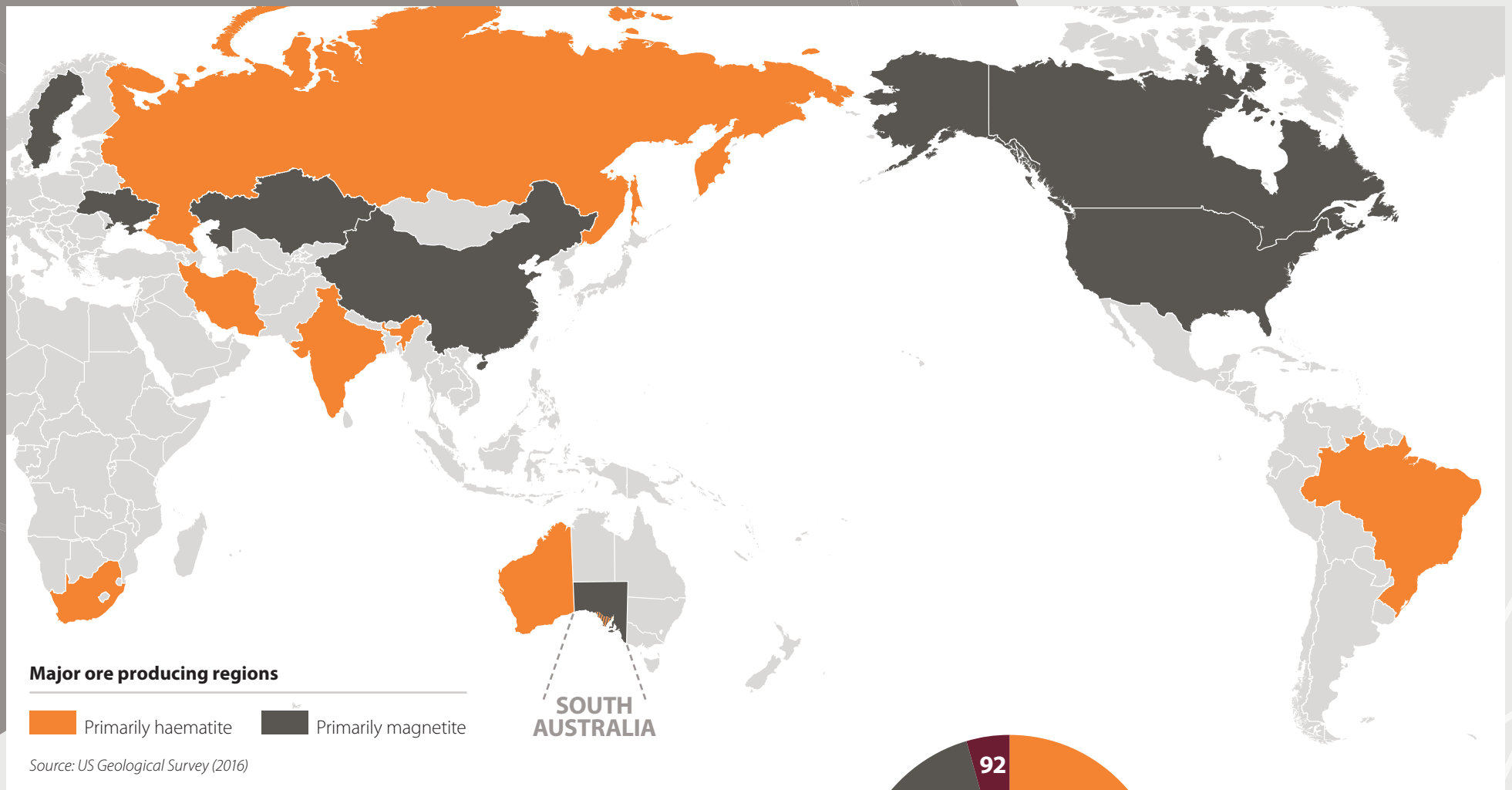
South Australia's magnetite ore is characteristically soft (low hardness) with large grain sizes in comparison with magnetite ore from other identified global magnetite regions.

The magnetite concentrate that can be produced from South Australian magnetite is a high-grade product to greater than 65 per cent Fe with low impurities that is highly sought after by steelmakers to increase productivity, provide efficiencies and reduce emissions.

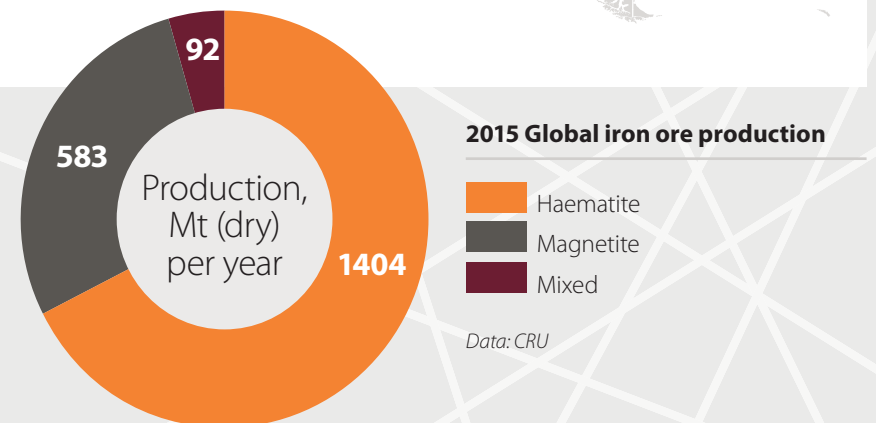
Global steel production is heavily reliant on coal. Almost 70 per cent of the steel manufactured globally uses coal. Magnetite concentrate is exothermic, releasing heat during processes for steelmaking, requiring less external energy inputs (e.g. coal).

Steelmakers seek efficiencies to reduce, manage and control emissions from the steelmaking process. The use of magnetite concentrate in place of haematite can reduce the emissions intensity by as much as 30 per cent in the overall steelmaking process.

Core sample of magnetite-rich siltstone
from Magnetite Mines' Mawson Iron Project
- Magnetite Mines Limited



Global iron ore producers



Why a Magnetite Strategy for South Australia?



More than 90 per cent of South Australia's identified iron ore resource is magnetite.

The Magnetite Strategy encourages government to work with industry and other stakeholders to grow an emerging sector and create jobs and economic prosperity for South Australians.

Direct Shipping Ore reserves are declining, coupled with increasing levels of deleterious impurities which increases steelmaking costs. This indicates reserve depletion of easily accessible, cheaply extracted DSO. Global demand is increasing for high-grade, low impurity feedstock for steelmakers.

In 2015, Geoscience Australia reported that magnetite represents 44 per cent of our nation's "Economic Demonstrated Resource" of iron resource. Coincidentally, South Australia's share of our nation's identified magnetite resources also equates to around 44 per cent.

Magnetite ores require initial crushing and screening like DSO, but then undergo successive stages of additional processing to produce a magnetite concentrate or pellets.

Unique mineralogical characteristics consisting of relatively soft ore and/or large grain sizes define much of South Australia's magnetite resulting in a concentrate that has comparatively lower input costs, higher iron grade and lower levels of deleterious impurities such as alumina, silica, phosphorus and sulphur. South Australia's magnetite resources projects benefit from having a highly sought after combination of hardness, integration with host rock and grain size to be globally competitive.

Further processing of magnetite concentrate can produce sinter or pellets that can be fed directly into blast furnaces and electric arc furnaces, including direct reduction iron (DRI) steelmaking plants. Pellets and concentrates are premium products that attract higher prices from steelmakers.

The magnetite products that are expected to be in demand during the next five to 10 years include:

- high-grade concentrates for use in sinter blends
- high-grade concentrates for blast furnace pellet feed blends, and
- very high-grade concentrates (> 67 per cent Fe, and < 3 per cent silica/alumina) for use as feed stock for direct reduction pellet production.

In the case of sinter and blast furnace pellet applications, magnetite concentrates will increasingly be needed to displace China's domestic concentrates as reserves are depleted and operations are closed due to uncompetitive costs and increasing environmental regulation. An opportunity exists for South Australia's magnetite products to meet this expected shortfall.

Whilst DSO currently dominates global, seaborne iron ore trade, the use of magnetite concentrates in sinter feed blends and pellet feed is widespread. Chinese steel mills are receptive to magnetite products supplied from foreign sources.

The regions of East Asia and Middle East and North Africa (MENA) have a well-established, low-carbon emitting DRI steelmaking industry and are therefore amenable to receiving magnetite concentrate from overseas suppliers.

Energy constitutes a significant portion of the cost of steel production. Thus, the steelmaking industry is one of the largest consumers of coal on the planet. For every tonne of steel produced, around two tonnes of greenhouse gases are emitted.

Magnetite has low external fuel requirements during induration as it is exothermic, releasing latent energy in the form of heat as it oxidises during the steelmaking process. Resulting improvements in energy efficiency in steel production reduce production costs, increase productivity, improve competitiveness and leave a smaller environmental footprint for steelmakers.

As the expectation of cleaner, greener steel production becomes further embedded in the global narrative, South Australia's magnetite products offer a viable alternative to DSO.

South Australia has a long history of stable, supportive government and a modern, regulatory framework that provides certainty for investors. South Australia is close to Asian markets and has

an international reputation as a reliable supplier of mineral resources. South Australia is building a global reputation as a jurisdiction that embraces innovation in the development of its mineral resource, energy and infrastructure assets.

Through international engagement strategies, South Australia continues to build strong links with China, India, South East Asia, North Asia and the MENA region. These links will complement the implementation of the Magnetite Strategy.

The Magnetite Strategy will accelerate the development of magnetite ore bodies and enable South Australia to build its reputation as a preferred supplier of high-grade, low-impurity, value-added magnetite products to the global steel industry.



Magnetite processing plant,
Middleback Ranges - SIMEC Mining

Magnetite mining in South Australia

IRON KNOB

in the Middleback Ranges is the first commercial iron ore mine in Australia



3 APPROVED MAGNETITE MINING PROJECTS IN SOUTH AUSTRALIA



Magnet Project
(Middleback Ranges)



Cairn Hill Project



Central Eyre Iron Project

**\$10
BILLION**



The amount of committed investment required by 2022 to enable production targets to be met.

ESTIMATED TOTAL DIRECT JOBS

1400 ongoing

5000 construction

**1 MILLION T
OF STEEL**

produced using magnetite pellets in South Australia



THE USE OF MAGNETITE
**REDUCES
GREENHOUSE
EMISSIONS**
DURING THE STEEL
MAKING PROCESS BY
AS MUCH AS **30%** VS
THE USE OF HAEMATITE.

APPROXIMATE IDENTIFIED MAGNETITE RESOURCES BY STATE/TERRITORY

44%

South Australia
including Hawsons
resource (NSW)

13% National
production

54%

Western Australia

74% National
production

1%

Northern Territory

1%

Tasmania

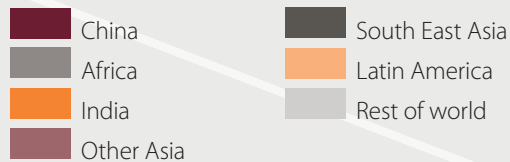
13% National
production

With **44%** of the nation's magnetite resources, **South Australia** has the opportunity to produce more than **13%** of Australia's magnetite products.

The global demand for magnetite

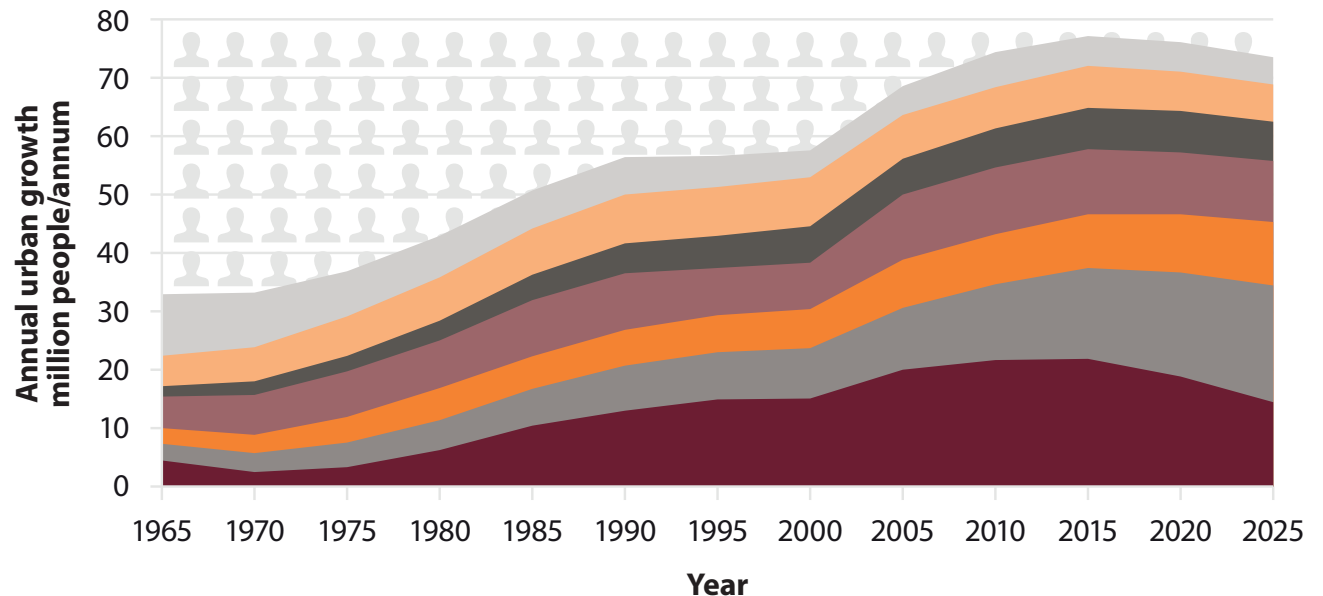
Global urban population growth drives demand for steel, particularly as nations industrialise and materials are needed to develop and expand cities.

World urban population, annual growth rate



Source: United Nations (2014) World Urbanisation Prospects: The 2014 Revision

GLOBAL POPULATION GROWTH RATE DIAGRAM



WORLD STEEL PRODUCTION IS PROJECTED TO INCREASE BY 50% OR
500 MILLION TONNES by 2030

50
MILLION TONNES

The amount of magnetite aimed to be produced in South Australia by 2030

3
MILLION TONNES

The amount of magnetite produced in South Australia in 2016

South Australia's untapped potential



From a national perspective, future development of Australia's known magnetite industry is estimated to add \$4.5 billion to Australia's GDP a year and increase employment by an average 4,440 FTE a year to 2034 (Deloitte Access Economics, 2011).

The Magnetite Strategy aims for South Australia to seize a significant share of that untapped economic and employment growth potential.

South Australia is already home to two magnetite producers: SIMEC Mining (part of the GFG Alliance) and Cu-River Mining Australia. There are other magnetite projects proposed for development that require an estimated \$15 billion in investment.

South Australia's most advanced greenfield magnetite project is the \$4.5 billion Central Eyre Iron Project on the Eyre Peninsula. As potentially Australia's largest magnetite mine, the 21.5Mtpa project is located near Wudinna. The project involves constructing a 148-kilometre rail line to an approved deep-water port at Cape Hardy near Tumby Bay. A mining lease and development authorisations have been granted by the State Government.

Pending achievement of financial close, the Central Eyre Iron Project is expected to contribute an average of \$2.7 billion per year to Gross State Product (GSP) over its 25-year project lifecycle. The project is

expected to employ around 2,000 people during construction and 750 during operation.

Cu-River Mining's Cairn Hill has been approved to expand its mining operation initially targeting 3Mtpa production.

Internal South Australian Government modelling of the economic impacts of a typical 6Mtpa magnetite project with a 12-year mine life beginning in 2018 indicate it would provide an estimated GSP contribution of \$700 million a year, and an annual average of 3,520 direct and indirect Full Time Equivalent (FTE) jobs supported for the life of the project.

The Braemar Iron Formation straddles the South Australia and New South Wales border and contains several magnetite projects in the design and planning stage of development. Projects include the Mawson Iron Project (incorporating Olary and Razorback) and the Hawsons Iron Project. Hawsons Iron Project is situated in New South Wales on the border of the two States.

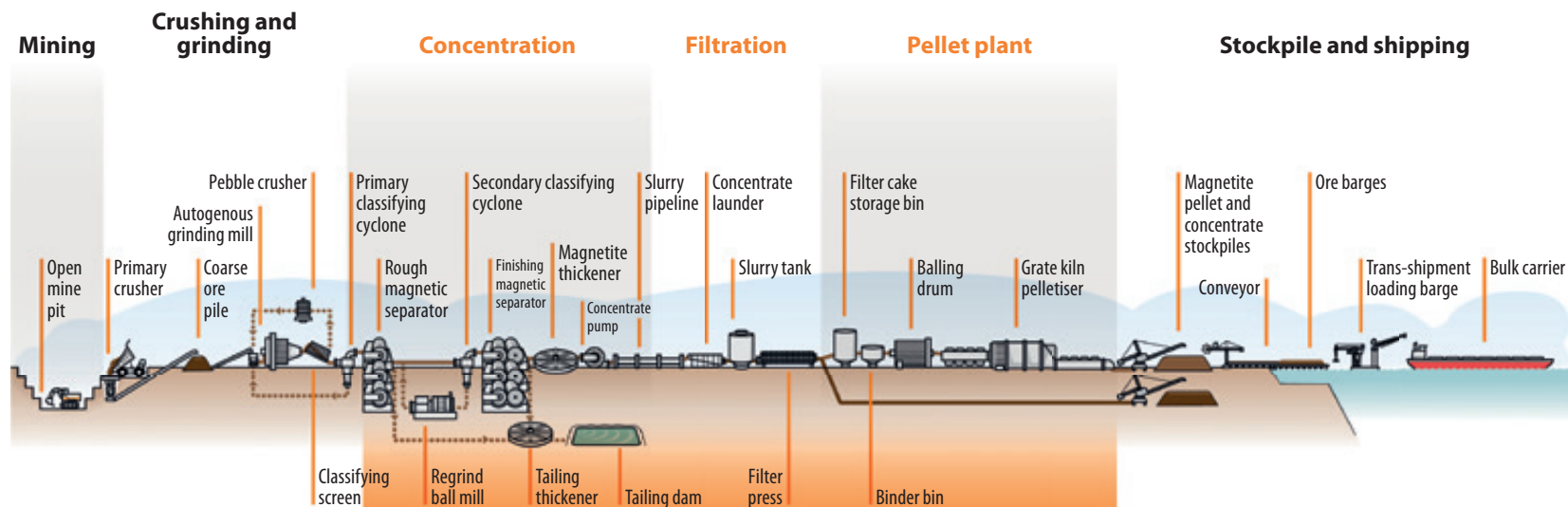
In 2013, the South Australian and New South Wales governments signed a Memorandum of Understanding (MoU) formalising a partnership aimed at maximising investment and economic development in mineral resources near the shared border.

The cross-border initiative recognises the untapped potential of the area and provides a foundation for seeking federal and State funding opportunities for combined, strategic infrastructure investment.

The Magnetite Strategy's success will be measured by the rate of development and investment in our magnetite projects, the level of collaboration within the industry to facilitate infrastructure development, and the level of support from stakeholders, including industry, communities, research organisations, suppliers and government, to deliver on the vision and objectives.

The development of associated supply chain infrastructure and support services will provide capacity and capability to regional economies and benefit other exporters, including the agribusiness sector.

MAGNETITE PRODUCTION FLOW CHART



POTENTIAL VALUE-ADD IN SOUTH AUSTRALIA

Magnetite ore - SIMEC Mining

MAKING OUR STATE'S MAGNETITE THE WORLD'S CHOICE FOR STEELMAKING



China's flight to quality

China, the largest global producer, consumer and importer of iron ore, is in the process of restructuring its steelmaking industry to reduce pollution, cut excess steelmaking capacity and improve efficiency and safety.

Operational efficiency in steelmaking requires the use of higher-quality feedstock. Quality higher-grade, lower-impurity feedstock produces more steel for each tonne used, with the added benefit of reducing steelmaking costs and emissions.

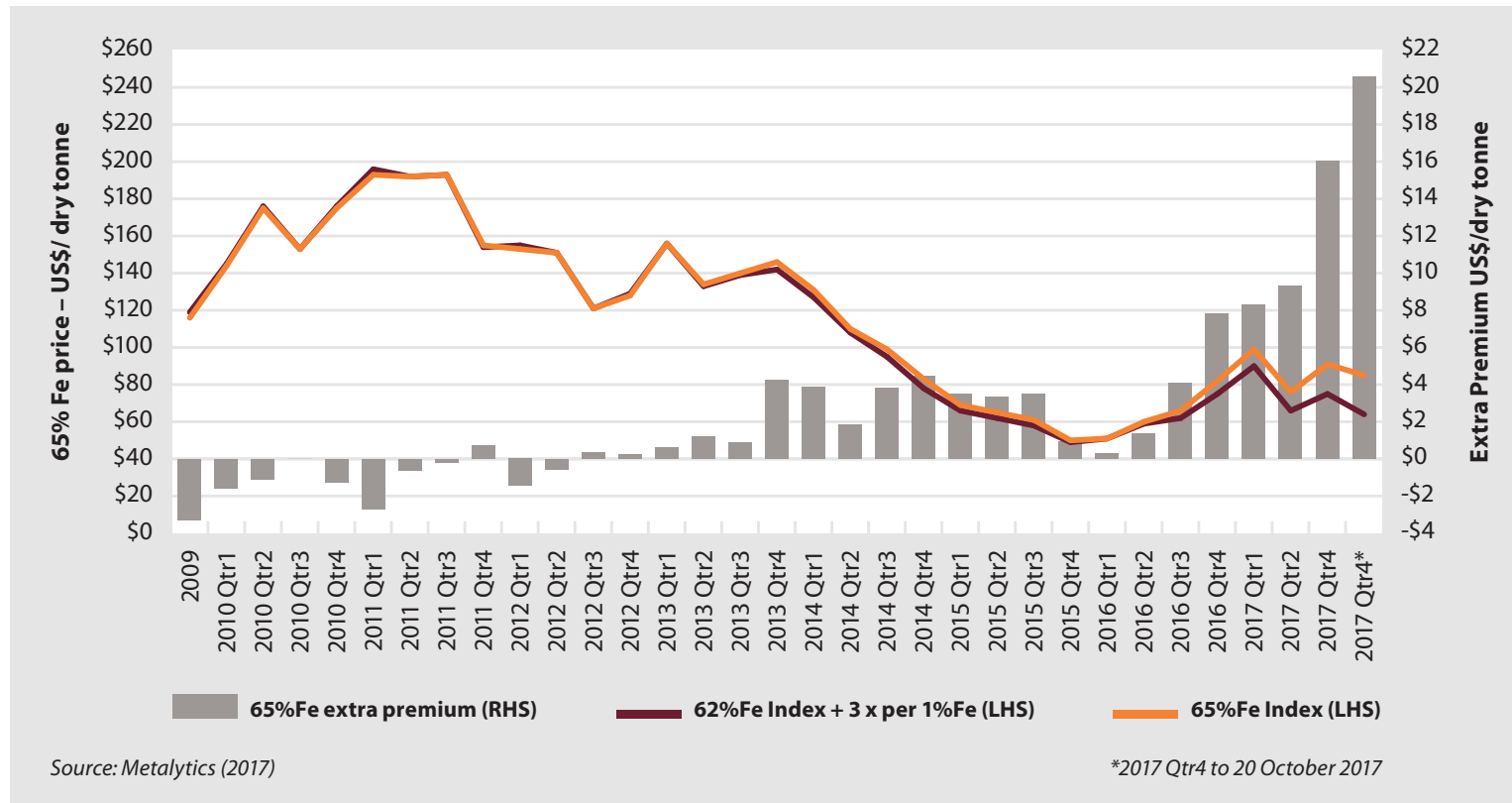
China's government-led initiative of reducing emissions from low-tech steelmaking practices has led to the escalation of price differentials for

quality between high- and low-grade iron ore products. This is resulting in what could be a structural shift in the price gap between high- and low-grade iron ore products.

China's shift towards higher-quality feedstock presents an opportunity for South Australia to become a leading global supplier of magnetite products to China's steelmaking sector.



Iron ore price premium



Extra high grade premium price for high-quality iron ore will persist into the 2020s.

Indicative magnetite product quality from South Australia

| Product | Fe% | SiO ₂ % | Al ₂ O ₃ % | S% | P% |
|--------------------------|-------------|--------------------|----------------------------------|----------------|---------------|
| South Australia | 66.5 – 70.0 | 1.8 – 3.36 | 0.2 – 1.9 | 0.002 – < 0.01 | 0.005 – 0.009 |
| Global producer (Sweden) | 67.90 | 0.75 | 0.16 | 0.002 | 0.025 |
| Global producer (Brazil) | 67.75 | 1.40 | 0.55 | 0.007 | 0.035 |

Meeting the supply chain challenge

South Australia's existing freight and logistics, water and electricity infrastructure will require development to meet the challenges from the increasing future magnetite production volumes to be delivered to market at globally competitive levels and costs.

The State Government is implementing initiatives to address the development of bulk commodity and utilities infrastructure capacity and demand. Investment in private and public-owned export infrastructure in the State will create thousands of jobs and ensure the development of a world-class freight and logistics system.

OUR ENERGY PLAN

In response to the transition in Australia's National Electricity Market, the South Australian Government is implementing a comprehensive plan to take charge of the State's energy future and deliver reliable, affordable and clean power. "Our Energy Plan" will ensure more of the State's power is sourced, generated and controlled in South Australia. The Plan's key elements will result in a more competitive, reliable, sustainable and affordable energy supply for industry, businesses and communities including:

Battery storage and Renewable Technology Fund -

Building one of the world's largest batteries to store energy from the wind and sun that supports clean and affordable power.

New gas power plant - The State Government is building its own gas-fired plant that will provide more back-up power when we need it most.

Local powers over the national market - Recently enacted legislation provides stronger powers to bring greater market control back into South Australia's hands.

New generation for more competition - The State has used its own electricity contract to attract Solar Reserve's solar thermal project to Port Augusta, increasing competition in the market and putting downward pressure on prices.

South Australian gas incentives - The State now provides targeted incentives to ensure more gas is sourced and used in South Australia, replacing coal-generated power from the national market.

Energy Security Target - The State's future Energy Security Target will ensure more South Australian-generated power is derived from clean and secure energy sources.

WATER FOR RESOURCES

Water is a vital natural resource and is a limiting factor in the development of some of the most prospective areas for resources development in regional South Australia.

The Water for Resources project is being developed by the Resources Infrastructure and Investment Task Force in partnership with other government agencies and specialised research organisations to address South Australia's major challenges locating, using and sustainably managing water resources.

Proposed actions to address these three challenges within South Australian regions with high mineral development potential include:

- Confirmation of priority areas for future groundwater exploration and mapping;
- Collation and interpretation of existing hydrogeology data to identify areas for future groundwater exploration;

- Determining the integrity, relevance and accessibility of existing hydrogeology data available through State Government and industry databases;
- Identifying opportunities and addressing barriers for collection of groundwater data from current and future industry activity in identified priority areas; and
- Identifying other economic and environmentally-sustainable water sources.

TRANSPORT AND UTILITIES INFRASTRUCTURE

The State Government will work with industry to identify multiuser infrastructure corridors to support exports of magnetite product. Facilitating access to existing transport infrastructure will increase the success of the Strategy and enable early investments to develop the existing pipeline of projects.

The State's existing infrastructure will need to be upgraded and expanded to meet the expected demand created by the 2030 magnetite production volume target of 50mtpa envisaged in the Strategy. Priority projects previously identified in the Regional Mining and Infrastructure Plan include:

- Commercially-viable, deep-sea ports to consolidate social and environmental impacts and provide multiuser access to cost-effective shipping solutions;
- Supporting the delivery of regional electricity transmission projects; and
- Developing multiuser land infrastructure corridors and protecting environmentally-significant areas from incompatible uses.

Supporting South Australia's steel industry



The Australian Steel Institute estimates that about 60 Australian jobs are supported for every 1,000 tonnes of locally produced steel. The structural steel sector accounts for about 1.6 million tonnes a year of fabrication work and the Australian steel industry employs more than 90,000 people, generating \$30 billion in annual turnover.

The rebranded Liberty OneSteel Steelworks located in Whyalla is the only Australian manufacturer of “long” products including structural steel and rail. Maintaining local capability in steelmaking benefits South Australia by providing jobs to a highly skilled workforce and ensures local production of structural steel that meets Australian Standards.

In September 2017, the GFG Alliance (consisting of the Liberty House Group and the SIMEC Group) acquired the Whyalla Steelworks, the Port of Whyalla, and the Middleback Ranges iron ore and associated infrastructure assets.

The identified iron ore resources contained within the Middleback Ranges include around 200 million tonnes of magnetite. Substantial exploration

potential exists to increase the current resource estimate significantly. The integrated steelmaking supply chain uses magnetite as an energy efficient feedstock for the steelworks. SIMEC Mining, part of the GFG Alliance, is currently assessing options to grow magnetite ore production from the current 2Mtpa to as much as 20Mtpa.

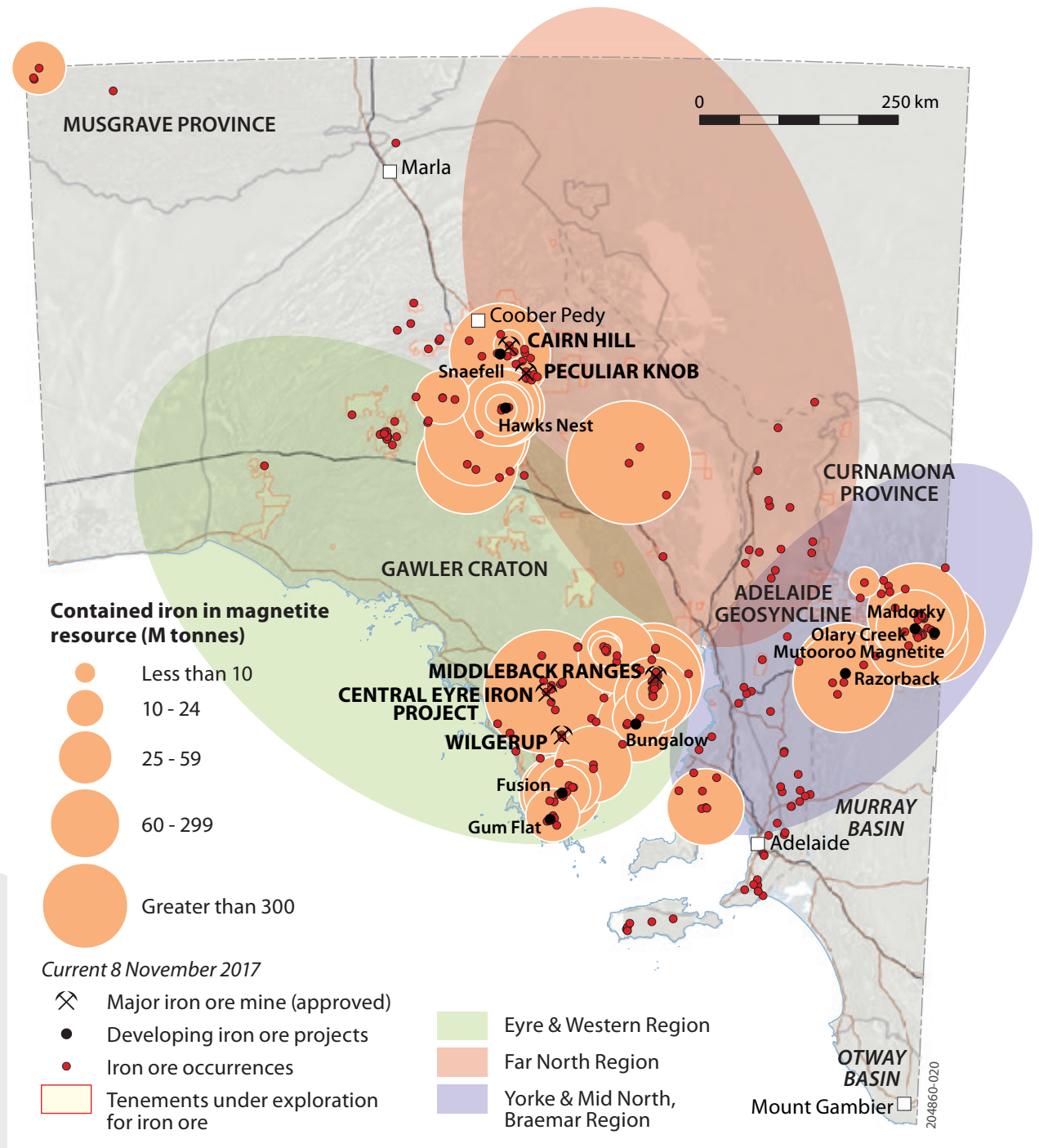
GFG Alliance has committed to leading the way in modernising the Australian steel sector by transforming the Liberty OneSteel Steelworks in Whyalla into a world-class steelmaking facility.

As part of the Magnetite Strategy and through the Steel Task Force, the South Australian Government will continue to advocate for Australian, State and Territory Governments to implement procurement policies that encourage the domestic steel industry to invest, restructure and innovate. The Steel Task Force is also working with the GFG Alliance to expand capacity and provide third-party access to the Port of Whyalla.



Australian steel rail - ARTC

South Australian magnetite resources



South Australia's operating and advanced magnetite projects

Operating mines and approved projects

| Company Name | GFG Alliance | Cu-River Mining Australia | Iron Road |
|------------------|------------------------------------|---|-------------------------------|
| Project Name | Magnet Project (Middleback Ranges) | Cairn Hill Project (incl. Mt Woods Magnetite Project) | Central Eyre Iron Project |
| Resource Size | 183Mt | 570Mt | 4,510Mt |
| Average Fe Grade | 34.8% | 47% (27%) | 16% |
| Product | Concentrate | DSO/Magnetite concentrate | Magnetite concentrate |
| Status | Operating | Operating/ advanced exploration | Mine and development approval |

Advanced projects and deposits

| Company Name | Magnetite Mines | Carpentaria Resources | Minotaur Explorations/ Sumitomo |
|------------------|---|-----------------------|---------------------------------|
| Project Name | Mawson Iron Project (incl. Red Dam Project) | Hawsons Iron Project | Mutooroo Magnetite Project |
| Resource Size | 4,920Mt | 2,400Mt | 1,500Mt |
| Average Fe Grade | 19.5% | 17% | 15% |
| Product | Magnetite concentrate | Magnetite concentrate | Magnetite concentrate |
| Status | Advanced exploration | Advanced exploration | Advanced exploration |

| Company Name | Havilah Resources | Maosen Australia | Southern Iron (Arrium) |
|------------------|-----------------------|-----------------------|------------------------|
| Project Name | Maldorky Project | Giffen Well Deposit | Kestrel Project |
| Resource Size | 451Mt | 690Mt | 123Mt |
| Average Fe Grade | 27% | 31% | 34.8% |
| Product | Magnetite concentrate | Magnetite concentrate | Concentrate |
| Status | Advanced exploration | Advanced exploration | Advanced exploration |



Magnetite Strategy Action Themes

Strategy

Establish South Australia as a leading global supplier of magnetite products

Engage with stakeholders and industry partners

Forge private-public partnerships to build transformational, bulk- commodity export infrastructure within a multiuser framework

Support a strong and sustainable Australian steel industry

Theme 1

Establish South Australia as a leading global supplier of magnetite products

A: BENCHMARK SOUTH AUSTRALIA'S MAGNETITE PRODUCTS

To capitalise on the emerging global demand for high-grade, low-impurity magnetite products to supplement lower-grade feedstock, South Australian exporters can benefit from benchmarking the quality of magnetite products exported from the State.

Benchmarked products that consistently behave predictably during smelting conditions will provide

steelmakers with confidence in South Australia's magnetite products, and build the State's reputation as a reliable supplier to global markets.

Successful benchmarking of South Australian produced magnetite products will improve international marketability.

B: MARKET SOUTH AUSTRALIA'S MAGNETITE RESOURCES TO GLOBAL STEELMAKERS

Implementation of South Australia's Magnetite Strategy will result in the production of a communications plan to attract investment. The communications plan will be complemented by the State Government's international engagement strategies and action plans.

Execution of the communications plan will further increase global awareness of South Australia's

abundant magnetite resources and provide an additional platform to attract investment.

South Australia's reputation as a low-risk investment destination is already well-established. The State consistently ranks in the top 20 international mining jurisdictions based on the Fraser Institute's "investment attractiveness index" derived from its annual survey of mining companies.

Advocacy by the State Government alongside our magnetite project proponents at international trade and investment forums will help build global confidence in industry and strengthen South Australia's position as an emerging magnetite region with financiers, steelmakers and iron ore traders around the world.

The State Government is committed to unlocking our magnetite resources and has a role to play

through agencies, including Investment Attraction South Australia, in facilitating investment attraction initiatives such as targeted trade missions and engagement strategies, and increasing South Australia's presence at international iron ore and steelmaking conferences.

There is currently no international magnetite mining and processing conference hosted anywhere in the world.

The Strategy aims to establish a biennial, international magnetite conference in Adelaide to further strengthen recognition of South Australia as a globally significant magnetite producing jurisdiction.

C: ESTABLISH A RESEARCH AND DEVELOPMENT ALLIANCE

Government will cultivate partnerships between local and international research institutions and potential exporters. These partnerships will lead to the development of a magnetite research and development alliance in Adelaide. Government will partner with the alliance to undertake research into the sustainable, economic extraction and processing of magnetite ore.

The alliance will provide industry-leading expertise in elemental analysis, metallurgy and mineralogy of magnetite, leading to the definition of benchmarked products that achieve predictable, specific standards during the steelmaking process.

Theme 2

Engage with stakeholders and industry partners

A: LAND ACCESS

Access to land is critical to the expansion of our resource sector. It influences international competitiveness and provides for long-term sustainability. South Australia is a pioneer in this field – and recognises the immense value of the natural environment to all exports, economy and way of life.

The implementation of the Magnetite Strategy will align with South Australia's "Multiple Land Use Framework" by promoting early and meaningful engagement with stakeholders, particularly Traditional Owners and local communities, during the feasibility stages of projects. Understanding how all stakeholders will be affected, gaining their respect and building trust across communities are key elements in maintaining South Australians' support for the continued expansion of the resources sector.

The Multiple Land Use Framework encourages transparent project planning and decision-making to minimise land use conflict and promote clear engagement. It builds on the commitment to engage in the most effective way with South Australians on decisions that affect them.

The first framework of its kind to be released by an Australian State or Territory means landholders,

industry, communities and regulators have a new guide to smarter and better coordinated land use.

The South Australian Government encourages a coexistence model to maximise the social, economic and environmental benefits from current and future land uses.

The Magnetite Strategy recognises the benefits of engaging with all mineral project developers to explore mutually beneficial land access solutions to overcome shared infrastructure challenges. This will accelerate the development of efficient pathways to export.

B: ALIGNMENT WITH INDUSTRY SERVICE PROVIDERS

The South Australian Government's Mining Industry Participation Office (MIPO), a division of the Department of State Development, is a critical partner with industry. MIPO was established to help build South Australia's mineral and energy resources supply chain capability and assist local companies to capture opportunities from national and global resources projects.

MIPO helps suppliers understand the requirements of resource project proponents by:

- providing information about future projects
- identifying gaps in local capability and providing data on the opportunities that exist
- working with companies to build capability and capacity
- partnering with Investment Attraction South Australia to ensure investment attraction efforts are coordinated and targeted.



**South Australian innovation:
the world's first "rotainers"
loading iron ore at Port
Adelaide - Flinders Ports**

Using a range of government programs, MIPO:

- assists local firms to build capacity and capability to meet the needs of the State's mining and mineral processing projects
- develops "Centres of Excellence" that bring together South Australian manufacturing firms with key resource sector providers
- fosters partnerships across the manufacturing, services, research and resources sectors, making business intelligence more readily available and,
- works with industry to establish collaborative partnerships where companies can boost their capabilities and capacity to supply goods and/or services to a range of mining and mineral processing projects.

Theme 3

Forge private-public partnerships to build transformational, bulk-commodity export infrastructure within a multiuser framework

South Australia has produced a large body of work on solutions to bulk mineral export infrastructure on the Spencer Gulf. The Regional Mining Infrastructure Plan recommends assessment of infrastructure options should focus on multi-user rather than single-user infrastructure solutions.

Successful implementation of the Magnetite Strategy will require collaboration with industry to identify preferred infrastructure corridors and aggregation opportunities that can support bulk-export supply chain capacity within a multi-user framework.

The Port of Whyalla has excess capacity and the potential for expansion that could meet the needs of other users conditional upon the provision of third-party access.

Facilitating improvements in access to existing, underutilised transport infrastructure and the development of new bulk-export infrastructure will be required to meet the Strategy's ambitious targets.

Coordination will also be required to ensure that the economic opportunities created by investment in new infrastructure are captured by other regional industries.

In collaboration with industry, the South Australian Government will support the development of multi-user supply chain infrastructure to improve the feasibility of projects and establish economies of scale.

The Magnetite Strategy is not a stand-alone document. It is part of an integrated strategic approach adopted by the South Australian Government. The Strategy sits alongside and builds on the strengths of the Integrated Transport and Land Use Plan, the Regional Mining Infrastructure Plan, South Australia's Copper Strategy, Our Energy Plan and the Leading Practice Review of the Mining Act and Regulations, as well as the China, India, North Asia and Southeast Asian Engagement Strategies and the MENA Action Plan.

The South Australian Government is already working with industry to develop a 50-year Port Strategy to maximise economic opportunities arising from South Australia's existing and proposed port assets. The Strategy is an opportunity to position ports to deliver broader economic growth as well as improve transport logistics services through innovation.

Successful implementation of this theme will require coordination across numerous Government departments.



Theme 4

Support a strong and sustainable Australian steel industry

The Liberty OneSteel Steelworks (part of the GFG Alliance) in Whyalla is Australia's only producer of rail and hot-rolled structural steel products. As a nationally strategic industry, Whyalla's steelmaking capability, along with its integrated mining and port operations, underpins the continued sustainability and economic development in the Upper Spencer Gulf region in South Australia.

Magnetite sources from the Middleback Ranges near Whyalla are processed into pellets to feed the Liberty OneSteel Steelworks blast furnace. Magnetite currently represents around 45 per cent of the identified iron ore resources in the Middleback Ranges.

The Liberty OneSteel Steelworks will benefit from an investment plan that will transform it into a world-class steelmaker. The transformation plan includes a 10-fold increase in magnetite production, reinvigoration of the supply chain, and development of new sources of co-generated power which will create a more sustainable and internationally competitive steel industry hub in South Australia. The transformation will result in a significant increase in steel production and redevelopment of port capabilities to bolster the supply of structural steel, rail and other products to local and global markets.

The South Australian Government is steadfast in its position that a sustainable steelmaking industry is of national significance. The government has implemented several policies and other initiatives to support the continued commercial operation of steelmaking in this country, including establishing the Steel Task Force which successfully coordinated efforts to secure investment in South Australia's steel sector.

Other initiatives taken by the Steel Task Force include ensuring Australian Standards for steel are upheld in government procurement of steel products and providing financial assistance to steel fabricators to gain and maintain appropriate accreditation. The South Australian Government has supported strengthening the operations and investigative powers of the Anti-Dumping Commission to eradicate the illegal "dumping" of foreign-made steel products into the Australian market.

The State Government, through the Steel Task Force, will coordinate cross-government efforts to support GFG Alliance's investment in Whyalla's steelworks, mines and associated transport infrastructure.

The South Australian Government continues to advocate the development of a National Steelmaking Road Map that will set out a long-term vision for a sustainable and globally competitive Australian steel industry.



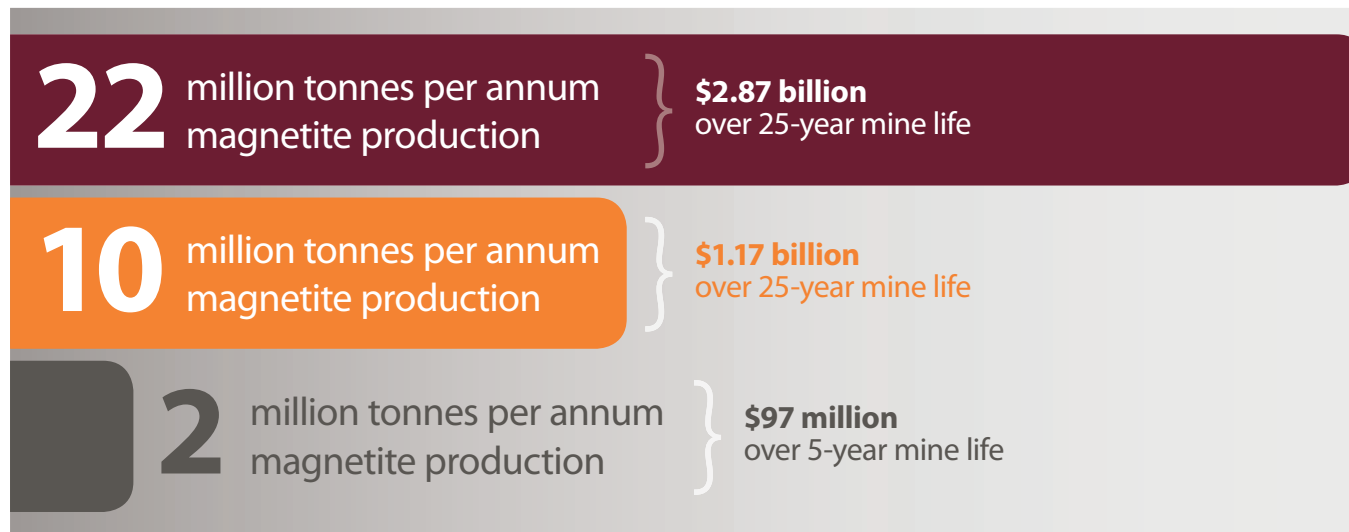
Pouring liquid steel at the Whyalla Steelworks - Liberty OneSteel

Measuring our success



Middleback Ranges mining - SIMEC Mining

Forecast royalty revenue



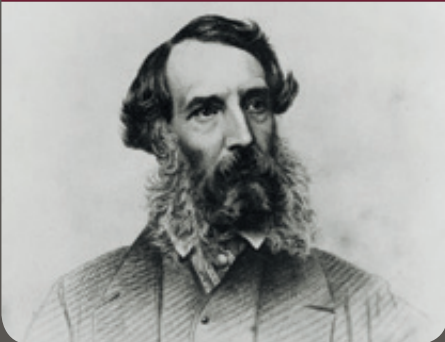
Artists rendering of Capesize and roll-on roll-off ships at Iron Road's proposed deep water port; Cape Hardy, Eyre Peninsula - Iron Road Ltd



History of iron and steel industry in South Australia

1839

Substantial deposits of ironstone in the Middleback Ranges first recorded by Edward John Eyre.



1888

Franz Heinrich Ernst Siekmann's Mount Minden Mining Company granted 800 acre lease for exploration and mining at Iron Knob. Supplies iron oxides to BHP for use as a flux for lead smelting at Port Pirie.



1899

BHP granted leases over Iron Knob and broader Middleback Ranges area.



1923-1932

Steel made from South Australian ore used to construct the Sydney Harbour Bridge.



1915-1917

Shipping of South Australian iron ore to BHP's Newcastle steelworks begins. BHP commences supply of rail to construct the Trans-Australian Railway, launching BHP as a steelmaker and South Australia as their primary source of iron ore.



1915-1938

South Australia exports iron ore to USA, Europe, Great Britain and Japan until Government announces an embargo on iron ore exports from Australia in 1938 (repealed in 1966).

1915-1949

Up to 99% of Australian demand for iron ore is met by supply from Middleback Ranges.

1937-1941

BHP construct blast furnace in Whyalla and commence shipbuilding activities – HMAS Whyalla launched in 1941.



1968

Whyalla Steelworks completed, pellet plant and the coke ovens both begin operation.

1978

Iron Curtis, the 64th ship manufactured in Whyalla, launched in January 1978. Shipyards closed later that year.



2011

Arrium commences mining at Peculiar Knob, South Australia's second iron ore mine outside the Middleback Ranges.

2010

IMX Resources officially opens the Cairn Hill magnetite mine, the first new iron ore mine owner in South Australia since 1899 (mine now owned and operated by Cu-River Mining Australia).

2000

BHP divests the Whyalla steelworks and mining operations to OneSteel (Arrium).

2017

Iron Road receives mining lease and development approval for their Central Eyre Iron Project – potential to become Australia's largest magnetite product exporter.



2017

GFG Alliance acquires Arrium's Australian business with plans to expand Whyalla steelmaking and mining operations.

2030

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The Government of South Australia particularly acknowledges the contribution of:

- South Australian Magnetite Strategy Steering Committee, including representatives from SIMEC Mining (member of the GFG Alliance), Iron Road, Magnetite Mines, Cu-River Mining Australia, Havilah Resources and Carpentaria Resources
- South Australian Chamber of Mines and Energy (SACOME)
- The Future Industries Institute, University of South Australia
- SMaRT Centre, University of New South Wales.

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- Resources Infrastructure & Investment Task Force, Department of the Premier and Cabinet
- South Australian Steel Task Force, Department of the Premier and Cabinet
- Resources and Energy Group, Department of the Premier and Cabinet
- Marketing, Communications and Industry Partnerships, Department of State Development
- Mining Industry Participation Office, Department of State Development
- Investment Attraction South Australia, Department of State Development




Image above: Crushed magnetite ore on a conveyor,
Middleback Ranges - SIMEC Mining

“By capitalising on the emerging global demand for higher-grade iron products, South Australia has an opportunity to position itself as a leading global magnetite-producing region.”

Dr Ted Tyne
Chair

South Australian Magnetite Strategy Steering Committee

Magnetite and haematite stockpiles in storage sheds - SIMEC Infrastructure

Suite of integrated strategies



Glossary

Blast furnaces

A type of metallurgical furnace used for smelting iron ore in the production of steel

Direct Reduced Iron (DRI)

Also known as sponge iron, is produced from direct reduction of iron ore (in the form of lumps, pellets or fines) by reducing gas produced from natural gas or coal

Fines

These are high-quality fine ore powders, stemming from lower-grade sources of iron ore having undergone beneficiation, using techniques like crushing, milling, gravity or heavy media separation, screening and silica froth flotation to improve the concentration of the ore and remove impurities

EDR

Economic Demonstrated Resources

Induration

The process of hardening through convention, heat and pressure

Investment Attractiveness Index

An overall Investment Attractiveness Index is constructed by combining the Best Practices Mineral Potential index, which rates regions based on their geologic attractiveness, and the Policy Perception Index, a composite index that measures the effects of government policy on attitudes toward exploration investment

Lump

The natural (30mm x +6mm) fraction of iron ore that is produced predominantly from Direct Shipping Ore (DSO = ore that is mined and crushed and screened only, before being sold)

Milling

A complex yet cost effective technique used to create nanoparticles

Mtpa

Million tonnes per annum

Pellets

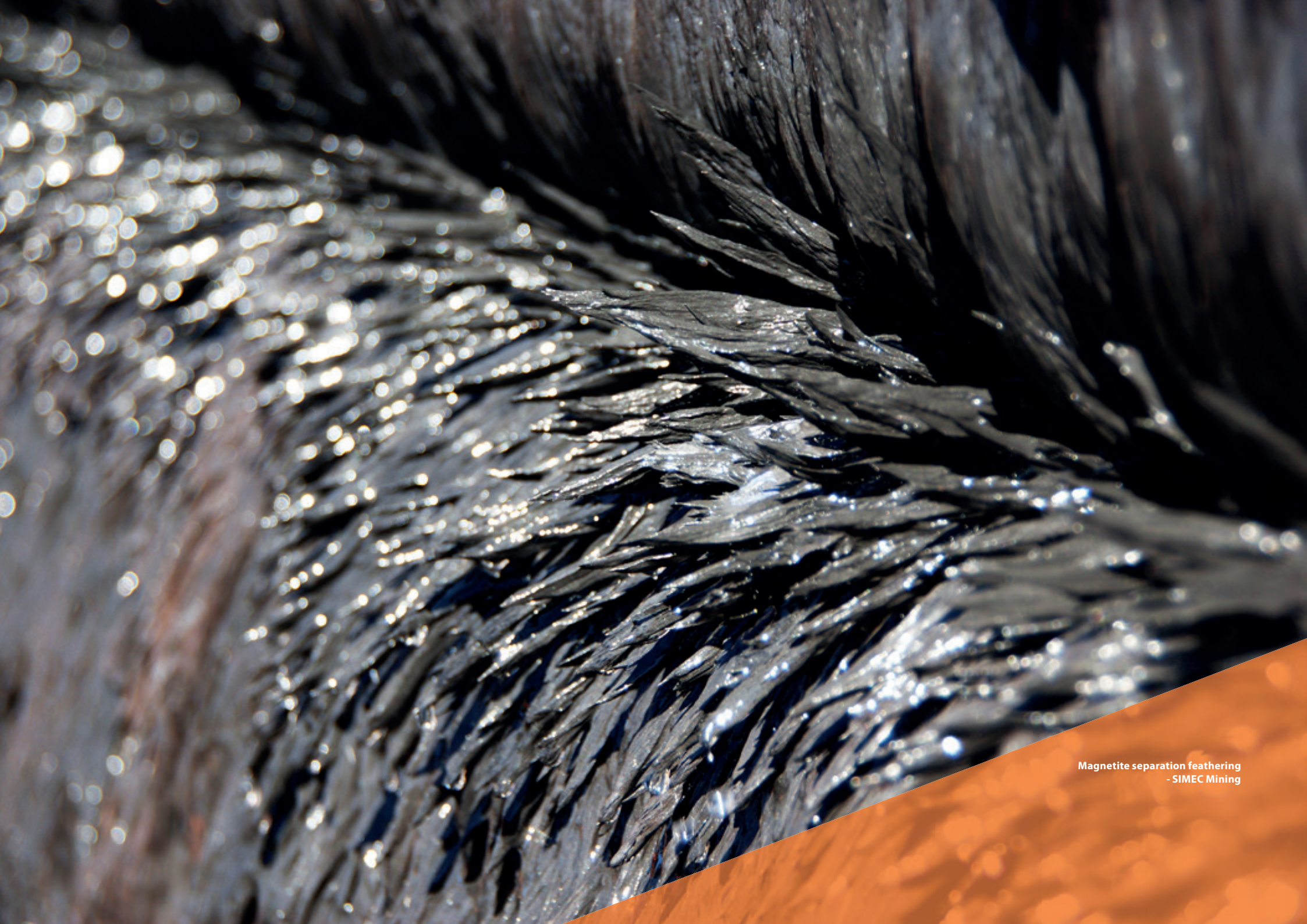
Are produced by taking very fine iron ore and/or concentrates (e.g. magnetite) and agglomerating them with moisture and a binder in balling discs or drums to form balls approximately 16mm in diameter. These are then indurated (baked and fused) at temperatures of 1,275 degrees centigrade to form very strong agglomerates for charging to the blast furnace

“Achieving the ambitious vision of making South Australia’s magnetite the world’s choice for steelmaking will create and sustain thousands of jobs across the mining supply chain, particularly for residents and businesses in regional communities.”

Hon Tom Koutsantonis MP

Minister for Mineral Resources and Energy





Magnetite separation feathering
- SIMEC Mining

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Government
of South Australia