

# South Australia's Copper Strategy



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Government  
of South Australia

“This nation-leading strategy sets out clear pathways to enable South Australia to triple its copper production to 1 million tonnes a year within the next two decades and, in doing so, help drive Australia to become the world’s third-largest copper producer.”

Hon Tom Koutsantonis MP  
Minister for Mineral Resources and Energy

Cover image:  
Stacked copper cathode at Olympic Dam

Image this page:  
Core Samples - OZ Minerals



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# South Australian copper to the world – a nation-leading strategy

## Minister's foreword



**South Australia has a bold ambition to once again become one of the world's major copper producers. We've done it before, we can do it again.**

This nation-leading strategy sets out clear pathways to enable South Australia to triple its copper production to 1 million tonnes a year within the next two decades and, in doing so, help drive Australia to become the world's third-largest copper producer.

The extra tonnage sourced from South Australia will be needed to fill a looming global copper deficit.

Our cooperative research centres, universities and Centres of Excellence are working to develop more cost-effective technology to not only find and develop copper deposits under deep cover, but improve processing techniques to increase copper recovery and expand production at existing deposits. More importantly, a strategic approach to developing our copper resources will generate jobs and investment here in South Australia to strengthen our diversified economy.

This strategy demonstrates that South Australians can harness our spirit of innovation and willingness to seize new opportunities for development in a way that also benefits our regions and communities.

South Australia hosts 68 per cent of Australia's known copper resources; during the development of this strategy we found a consensus within the industry that there is plenty more red metal to be discovered in our mineral-rich Copper Belt.

The Copper Belt is already home to Olympic Dam, Prominent Hill, Kanmantoo and the world-class copper discovery at Carrapateena.

This is a strong base on which to build our future. The \$20 million Plan for Accelerating Exploration (PACE) Copper initiative is the next stage, adding to our comprehensive database which has been developed since the first aeromagnetic surveys were undertaken in the State. PACE Copper will generate new targets and support drilling programs to leverage \$400 million in private exploration spending and secure 1,000 jobs in the resources industry.

I am confident the collaborative approach adopted in these pages will generate community support and attract international investment to our state, helping us unlock the full potential of both our geology and geography.

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

**Hon Tom Koutsantonis MP**

Minister for Mineral Resources and Energy



# Our Copper Belt

## A foreword by Terry Burgess



**Having generated significant historic, economic and social benefits for the state, the South Australian Copper Belt continues to generate value, offering a vast, untapped potential.**

This comprehensive, long-term copper strategy, produced in collaboration with stakeholders in the wider resources sector, will create the best technical and business environment for a continued positive copper future for South Australia.

The success of this initiative will increase the attractiveness of the South Australian Copper Belt both regionally and internationally, which will encourage additional investment and new investors in exploration, development, operations and support services. This will in turn translate to more jobs and economic benefits for all South Australians.

The initiative to extend funds for *PACE* Copper will be greatly appreciated by exploration companies active in South Australia. This support for exploration makes a major contribution to the knowledge base of the Copper Belt geology.

A handwritten signature in black ink, appearing to read 'Terry Burgess', with a stylized flourish at the end.

**Terry Burgess**

President, South Australian Chamber of Mines and Energy

“This comprehensive, long-term copper strategy, produced in collaboration with stakeholders in the wider resources sector, will create the best technical and business environment for a continued positive copper future for South Australia.”

# Copper strategy

## Vision

By 2030, South Australia will be the major contributor to Australia's position as the world's third-largest copper producer.

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## Objective

More than triple South Australian copper production to 1 million tonnes per annum (mtpa) by 2030.

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## Actions

- Accelerate exploration, discovery and information
- Develop innovative infrastructure, services and research
- Build industry and community capacity



# Why a copper strategy?

**South Australia needs a copper strategy to ensure it reaps the full potential of its natural resources in a coordinated way that benefits everyone in the community. A strategy that accelerates exploration leading to increased production, that supports research and development leading to innovations, that makes the industry more efficient, and has spill-over benefits for South Australians. Regional communities and the next generation of South Australians seeking a high-skilled career in the mineral and mining services industries all stand to benefit.**

This is a chance for South Australia to leverage its natural endowment of copper to support sustainable economic growth and contribute to an expected increase in global demand for a metal that is critical to lifting the living standards of the countries in our region and combating the effects of climate change through the spread of renewable energy.

Elevating Australia into the top three copper-producing countries in the world also provides greater opportunities for our local companies to capture a larger share of the global supply chain.

Growth in copper demand across the world is estimated to outstrip supply from 2020<sup>1</sup> and South Australia is well placed to meet this demand. Figure 1 shows the potential for increased use of copper by countries as their gross domestic product increases per capita. Attachment 1 provides more information on the outlook for copper.

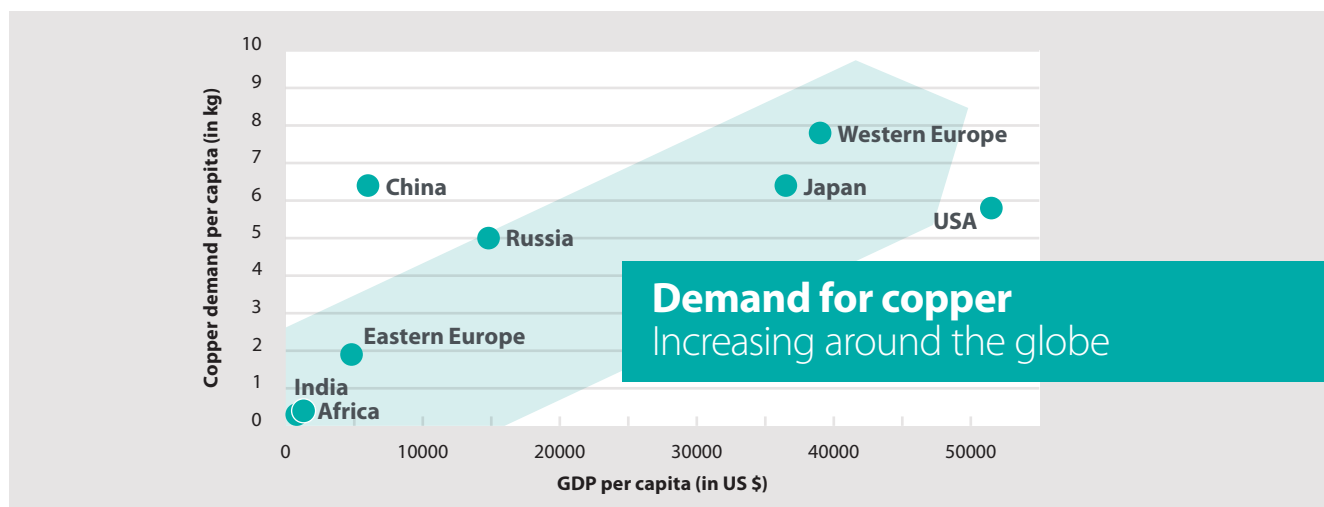
Despite the current market volatility, the underlying long-term trend for copper remains robust. Through this copper strategy, the South Australian Government is showing its support for the resources industry by increasing the State's attractiveness as a destination for investment during a risk-averse phase in the global commodities cycle, and ensuring production is available when demand picks up.

South Australia offers an outstanding opportunity for existing copper producers, new entrants, exploration companies and the services sector to grow their businesses in step with the production targets set in the strategy. For many years the South Australian Government has had a solid track record of partnering with industry through its innovative initiatives such as the *PACE* and the Mining and Petroleum Services Centre of Excellence, thus reducing the risks faced by the resources sector in a challenging environment.

"There's a real chance that South Australia will become a copper mining powerhouse and OZ Minerals wants to be a part of it."

**Neil Hamilton, Chairman, OZ Minerals**

**Figure 1:** Demand for copper.



Source: Woods Mackenzie in OZL presentation October 2015

<sup>1</sup> 'Copper Strategy Workshop' presentation by Dr Paul Heithersay, DCE, Department of State Development; 'Copper Strategy Workshop' Presentation by Andrew Cole, CE, OZ Minerals; 'Olympic Dam and the State's Copper Strategy' Presentation by Jacqui McGill, Asset President, Olympic Dam at South Australian Copper Strategy Workshop Oct 2015. The above should be read in conjunction with the full presentations at [http://minerals.dpc.sa.gov.au/about\\_us/initiatives/copper\\_strategy/](http://minerals.dpc.sa.gov.au/about_us/initiatives/copper_strategy/)

Further, copper is used in many products essential for an energy-efficient world. Figure 3 gives examples of the use of copper in emerging technologies, such as electric and hybrid cars, wind turbines and high-speed transport.

This strategy focuses efforts to maximise the job opportunities and economic and social benefits flowing from South Australia’s rich endowment of copper minerals — and does so in an environmentally sustainable way that also builds the community’s confidence in our ability to share the benefits of a successful industry.

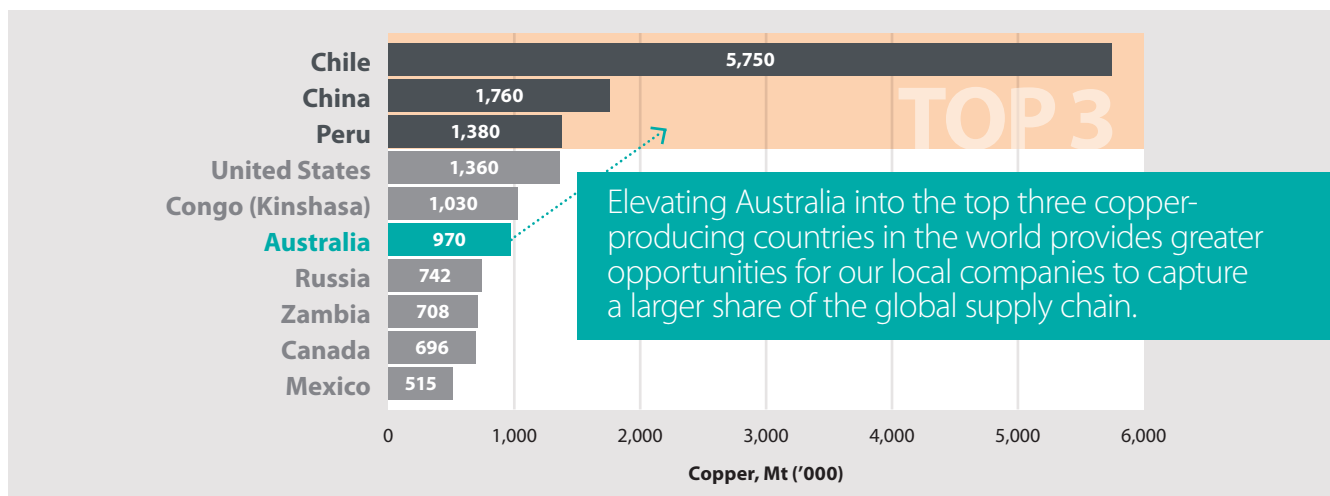
At its heart, the strategy provides a structured and systematic approach to deliver the South Australian community an improved Net Present Value from the state’s copper resources.

In 2015, South Australia’s copper industry employed about 5,000 people in exploration and production. Exploration companies spent \$37 million\* in the search for copper, although this has been much higher in the past, reaching \$146 million in 2012. South Australia produces and exports \$2 billion of copper annually, contributing about 1.8 per cent to Gross State Product.

Trebling copper production has the potential to create up to an additional 10,000 jobs, increasing the workforce involved in the sector to 15,000 people. Support for new discoveries funded by *PACE* Copper could unleash up to \$150 million of new spending on copper exploration. In addition, the mining equipment, technology and services (METS) sector supporting the copper industry will also need to increase as copper production builds up toward the 1 million tonne per year target.

Achieving the target would equate to South Australia producing and exporting more than \$8 billion of copper per year, with the red metal remaining the State’s number one export commodity. A contribution of more than 5 per cent to the State’s Gross State Product by 2030 will help to further strengthen and diversify South Australia’s economy.

**Figure 2:** World mine production, 2014.



Source: USGS (2016) [www.usgs.gov](http://www.usgs.gov)

Promotion of the copper strategy through events such as the Prospectors and Developers Association of Canada annual conference and the China Mining Congress and Expo — two of the world’s most influential gatherings of resources and mining service companies — will further raise international investor awareness about South Australia as a world-leading, long-term investment opportunity in a keenly sought-after commodity.

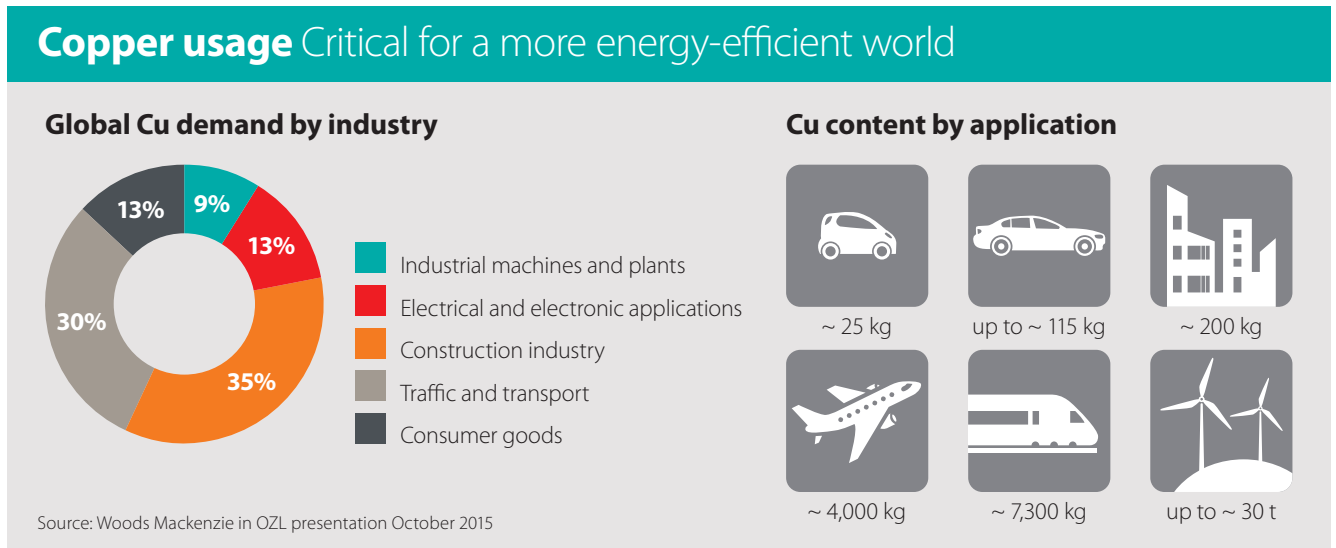
The strategy’s success will be built on collaboration, with all copper industry stakeholders, including explorers, miners, Aboriginal communities, farming and rural communities, supply chain participants, academic institutions, technology developers, customers and the government working together to deliver the strategy’s ambitious vision and objective.

Strategic collaboration and coordination between the South Australian Government’s Olympic Dam Taskforce, the Resources Infrastructure Taskforce and the Upper Spencer Gulf and Outback Taskforce will also be crucial to deliver economic benefits to regional communities such as Whyalla, Port Augusta and Port Pirie as they seek to diversify their local economies and participate in the rollout of infrastructure and productive capacity required to support a growing copper sector.

\* All values in Australian dollars unless otherwise stated.



**Figure 3:** Copper usage by industry.



Success will not just be measured against the production target, but through:

- medium and long-term job creation
- increased investment in exploration and the discovery of new prospects
- development of new and existing mines
- firmly establishing South Australia as a copper technology and research hub
- expansion of our world-class METS sector
- community support for those social and economic benefits.

South Australia's highly prospective copper provinces fall within areas of the state where native title rights and interests exist or might still exist, and where there are significant cultural heritage sites. The copper industry has made significant advances in building good working relationships with traditional owners and Aboriginal communities, recognising the enduring link to country and providing opportunities for employment, training and business partnerships. This strategy acknowledges these links and the opportunities for greater economic and labour force participation for Aboriginal businesses in an expanding sector.

Highly prospective targets for copper mineralisation and good agricultural land sometimes coincide. Both sectors make major contributions to the South Australian economy and local employment. These contributions need to continue and successfully coexist to ensure the South Australian Government delivers on its 10 Economic Priorities.

Early engagement and open communication with landholders and local communities is therefore essential to develop prospective copper exploration prospects and mining projects. This strategy recognises that collaboration with early and open dialogue will maximise the multiple-use benefits of our State's natural resources and minimise the impacts from the relatively small footprint occupied by mining in a strong and diversified economy.

The South Australian Government promotes the smart and environmentally sustainable use of land as vital to our State's long-term prosperity. This can best be achieved when all interested people, communities and organisations have a say in the decisions we make about land use. The copper strategy recognises South Australia's pioneering land-use framework that promotes the balancing of competing claims, encourages coexistence and creates certainty.

South Australia already supports the mining sector through a competitive royalties regime, more than a decade of drilling program partnerships and ongoing investments in the Deep Exploration Technology Cooperative Research Centre, the Mining Industry Participation Office, Resources Infrastructure Taskforce and the Mining and Petroleum Services Centre of Excellence.

The South Australian Government is also creating the lowest taxing state for business in Australia by returning \$2.5 billion to business and the community during the next decade. These tax reforms, coupled with the workers compensation changes that have returned \$180 million to business through lower premiums, are creating a low-cost business environment that will support further investment from resource and mining service and technology companies.

# Copper – South Australia’s comparative advantage

The Copper Belt extends across large parts of South Australia, including the central and eastern Gawler Craton, the Curnamona Province and the Adelaide Geosyncline (see Map 1).

Occupying a large portion of central South Australia, the geologically significant Gawler Craton, formed about 1.59 billion years ago, contains one of the world’s largest ore bodies at Olympic Dam and a host of other significant deposits, including Prominent Hill.

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“Our major assets are located in the Adelaide Hills so it makes sense to partner with the South Australian Government on a strategy that supports copper at every stage from exploration to export.”

**Steven McClare**

Chief Executive, Hillgrove Resources

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Our state’s geology was key to South Australia once producing 10 per cent of the world’s copper and being known worldwide as the Copper Kingdom. From those early heady days of the Burra Monster Mine, South Australia now has just three major producers, exporting on average about 300,000 tonnes per annum. Even though South Australia hosts about 68 per cent of the nation’s known copper resource, our State contributes just 30 per cent of Australia’s total copper exports. Copper mining is synonymous with South Australia’s past and will, through the achievements of the copper strategy, re-establish its international prominence.

South Australian mining industries provided \$4.38 billion in production (copper contributing \$1.9 billion) and \$3.64 billion in export revenue in 2014-15, with copper exports contributing more than \$1.95 billion. These overseas sales provided a valuable complement to the total value of South Australia’s primary industries exports, which also comprised \$3.5 billion in agriculture and food exports and \$1.2 billion of wine exports.

Together mining and agriculture comprise 74 per cent of South Australia’s exports, underscoring the continued importance and strength of diversity in supporting the economic prosperity of our regional communities.

South Australia also has well-established supply chains and infrastructure, an abundance of world-class pre-competitive geological data and a highly skilled progressive exploration sector. These companies can be valuable contributors to the global supply chain, adding a further layer of diversity to our exports by growing the services component of overseas trade.

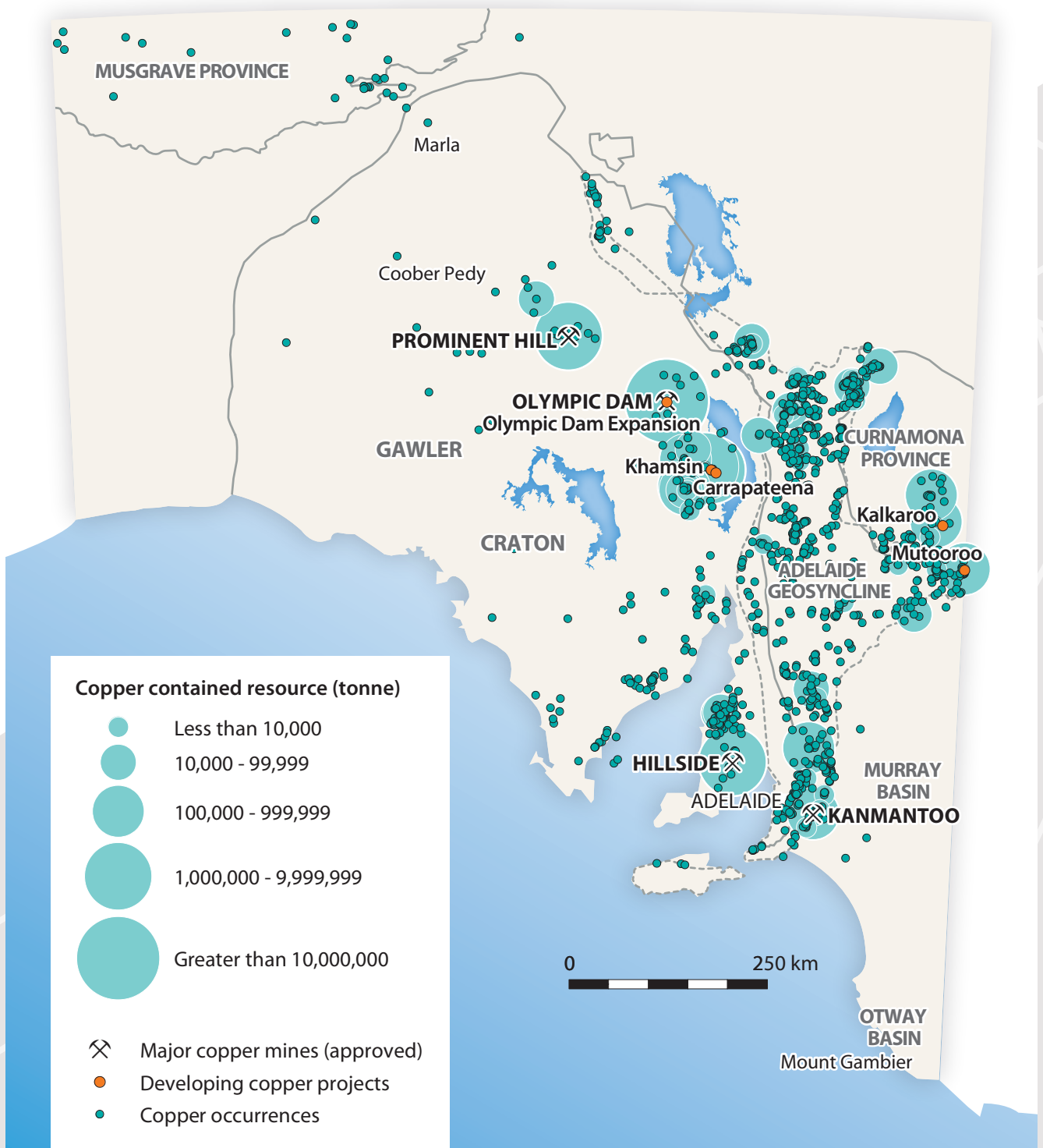
Underpinning these natural and comparative advantages is a State Government that is internationally recognised for providing a stable regulatory environment, as well as a supportive community that appreciates the many benefits generated by a successful resources sector.

In summary, South Australia has:

- a long history of copper mining
- a reputation as one of the world’s lowest risk and preferred mineral investment jurisdictions
- a rich copper endowment with a track record of world-class copper discoveries and potential for new discoveries
- a stable and progressive regulatory environment balancing environmental and community concerns with the needs of stakeholders
- a government committed to investing in long-term strategies and initiatives that build on South Australia’s reputation as one of the world’s best resource jurisdictions including: *PACE*; Low Carbon Investment Strategy for South Australia; Water for Good; South Australia Drill Core Reference Library; Mining and Petroleum Services Centre of Excellence; Regional Mining and Infrastructure Plan; investment strategies for India, China and South East Asia

- a good understanding of transport and utilities needs across the regional areas
- a skilled resources workforce and strong local industry, capable of providing supply chain services
- world-class research and development and collaborative partnerships between industry, university and governments focused on geoscience and mineral processing
- multiple land-use principles that include a well-established framework to negotiate flexible, pragmatic agreements with native title parties, farmers and landholders to develop positive outcomes for traditional owners and other stakeholders
- good relationships between communities and industry.

**Map 1:** Copper resources in South Australia.



# Growing South Australia's copper production

## South Australia's copper mines - annual production as at Dec 2015\*

Olympic Dam	Prominent Hill	Kanmantoo
 Opened <b>1988</b>	 Opened Feb <b>2009</b>	 Current operations opened Nov <b>2011</b>
 Approx. <b>3,000</b> staff and contractors	 Approx. <b>1,200</b> staff and contractors	 Approx. <b>260</b> staff and contractors
 <b>154,600</b> tonnes copper	 <b>130,305</b> tonnes copper (in concentrate)	 <b>17,306</b> tonnes copper (in concentrate)

\* Historically South Australia produces around a third of Australia's copper production, however this fell to one quarter during 2014-15 due to unplanned outages.

## Achieving the production increase through:

 South Australia's stable and progressive regulatory environment

**Accelerating exploration, discovery and information for copper**

**Developing innovative infrastructure, services and research**

**Building industry and community capacity**

### Increase production efficiencies



**120,000 tpa**

reserve replacement and brownfields discoveries

### Reserve expansion



up to **540,000 tpa**

from unlocking copper resources already identified in mine resources or feasibility studies

### New discoveries



up to **200,000 tpa**

from significant new discoveries that can move into production by 2030

South Australia's copper landscape in **2030**

**1 million** tonnes per annum



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## South Australian resources

In 2016, South Australia hosts globally significant assets of copper, accounting for 68 per cent of Australia's 88.5 million tonnes of economic demonstrated resources and including the fifth-largest<sup>2</sup> copper resource in the world at Olympic Dam.

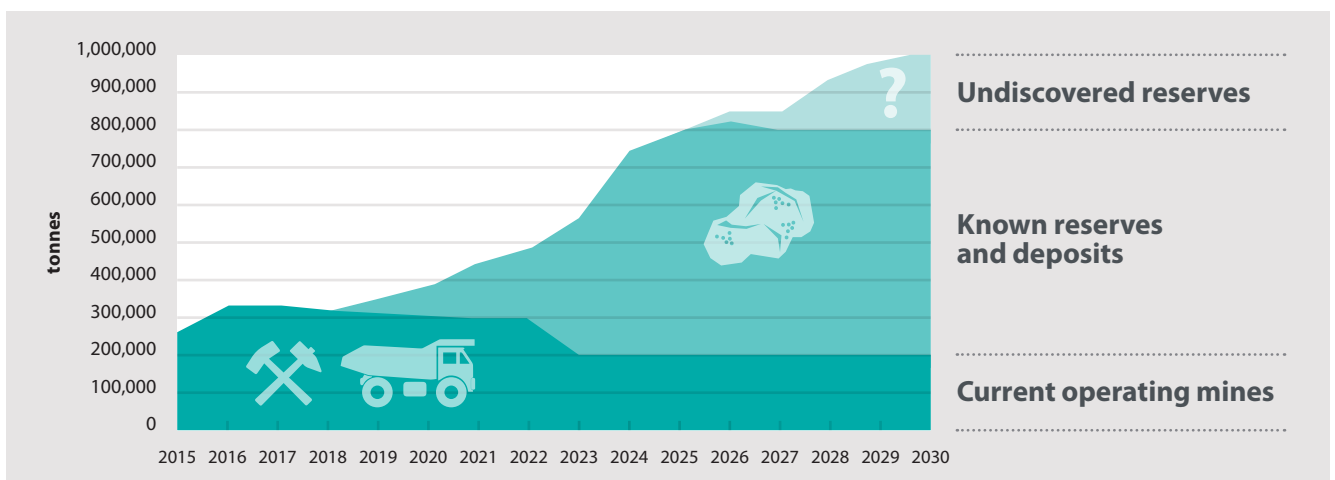
Copper is the principal mineral commodity produced in South Australia, with the state's copper mines producing 261,000 tonnes<sup>3</sup> of copper valued at \$1.9 billion in 2014-15. South Australia produced more than a quarter of Australia's 956,000 tonnes of mined copper, with Australia producing 5 per cent of the world's mined copper production of 18.4 million tonnes.

The state's major copper mines and deposits have the advantage of being poly-metallic, producing gold and silver in addition to copper, with Olympic Dam additionally producing uranium oxide.

South Australia's copper resources are a key focus for more than 130 companies currently committed to exploring for, developing and mining South Australia's copper resources. Further opportunities will emerge for new entrants, both small and large, seeking to develop newly discovered copper prospects.

Figure 4 shows the source of the production increases required to achieve the target of 1 million tonnes per year of copper production.

**Figure 4:** Achieving the increased production based on potential resources from publicly available information.



<sup>2</sup> SNL global copper resource database accessed 21 May 2015.

<sup>3</sup> South Australia normally produces around a third of Australia's copper production, however this fell to one quarter during 2014-15 due to unplanned outages.



# Drivers for a nation-leading copper strategy

The key drivers for the copper strategy for South Australia are:

- **WORLD-CLASS** - South Australian projects need to be at the head of the queue for international mine development.
- **COST-COMPETITIVE** - South Australian mines and projects need to be cost-competitive on an international scale.
- **COLLABORATION** between industry, government, landholders, research institutions and small to medium-sized enterprises (SMEs) is key to achieving success.

To achieve the increased production required, it is vital for companies to be at the lower end of the international cost curve to ensure further investment in this key sector. Figure 5 shows that South Australian companies are aiming to move into the lower third of the cost curve over the next few years. Lowering current costs provides support for ongoing production but also strengthens the case for further investment and expansion within internal corporate processes for determining resource allocation. Accordingly the copper strategy sets out strategies to help companies move down this cost curve and therefore strengthen the case for increased investment in production and exploration spending to extend the mine life.

**Figure 5:** World copper mining cost curve.



Source: SNL December 2015

**Copper is the principal mineral commodity produced in South Australia**



# Action themes

This copper strategy has identified, through the consultation process, three action themes, each with a series of practical and achievable actions that will deliver the copper strategy vision for South Australia.

The State Government has led the development of this strategy but its success requires support and contributions from the mining and services industry, research institutions and companies and the Commonwealth Government to collaboratively achieve its bold vision for South Australia. The Department of the Premier and Cabinet will lead the implementation of the strategy, supported by an Industry/Government Reference Group, working with interested stakeholders who can manage and execute the strategy's various actions.

## Theme 1: Exploration, discovery and information

Theme 1 aims to lift the cover for South Australia to host future exploration discoveries by providing world-class geoscience data and information as a foundation for competitive attraction of mineral exploration investment for greater quantity and quality of exploration. This builds on the previous achievements of the highly successful *PACE* initiative and maintains South Australia's position as an international leader for innovative exploration partnerships and geoscience data and information delivery; a reputation that has been enhanced with the new South Australia Drill Core Reference Library at Tonsley, opened in February 2016.

The \$20 million *PACE* Copper initiative, an early action of the copper strategy, was launched on 30 November 2015 by the Mineral Resources and Energy Minister Tom Koutsantonis.

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“The time is right for South Australia to deliver a new geoscientific initiative that will help the exploration industry recover from the challenging global economic cycle of the past five years and confidently face the next surge in exploration for strategic metals such as copper.”

Mineral Resources and Energy Minister Tom Koutsantonis launching *PACE* Copper in December 2015.

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The two-year initiative will reinvigorate mineral exploration activity at a time of an industry downturn, bringing forward new discoveries and setting the vital foundations for the next generation of mineral industry growth and job creation in the services, supplies and manufacturing sectors. Figure 6 highlights the potential for discovering substantial copper deposits in South Australia.

The aim of *PACE* Copper is to find the next major copper resource in South Australia. More than 40 years after the discovery of Olympic Dam, the world's fourth-largest copper deposit, this strategy will encourage accelerated investment in exploration to target the next world-class ore body within our State's Copper Belt.

*PACE* Copper will deliver:

- the world's largest high-resolution airborne geophysical and terrain imaging program
- a “rebirth” of exploration in the Gawler Craton
- industry-government collaborative drilling on new targets and domains
- world-class data and interpretation that will open up an untouched mineral province in the State's far west.

**Figure 6:** Contained copper for major global copper deposits (calculated for resource).



Source: Data for Chile, Peru & USA; source SNL Metals & Mining. Data for South Australia; source Mineral Resources Division, DSD, Government of South Australia.

*PACE Copper* links into major national industry-research programs, including the Deep Exploration Technologies Cooperative Research Centre (DET CRC) and the Australian Academy of Sciences’ UNCOVER initiative. These links promise to improve future mineral exploration success within the covered mineral exploration frontier that includes 80 per cent of South Australia. *PACE Copper* will also link to programs to find and map suitable water resources, such as those led by the Goyder Institute and the CSIRO.

The acquisition of vast amounts of new geoscience and exploration data captured through the *PACE Copper* initiative will have a significant impact on the government’s online delivery systems. Enhancing the capacity and capability of the world-class South Australian Resource Information Gateway, or SARIG, will in particular be a priority project in *PACE Copper*. SARIG includes a capability to store and share survey information captured by exploration and mining companies that is appropriate for sharing with third parties.

The Fraser Institute Annual Survey of Mining Companies ranks South Australia as the second-best jurisdiction for the quality of its geological database. Initiatives such as *PACE Copper* and the South Australia Drill Core Reference Library continue to position South Australia as a top-ranked jurisdiction for geological data.

Actions	Timeframe	Responsibility
<ul style="list-style-type: none"> <li><b>PACE Copper:</b> Drive a major uplift in new pre-competitive drilling, surveys, data analysis and information across the Gawler Craton and western region of the state including the existing brownfields and greenfields regions.</li> </ul>	1.5 years	South Australian Govt - lead Industry - participate
<ul style="list-style-type: none"> <li><b>World-class Information Exchange:</b> Enhance existing online systems to improve the capture and sharing of existing survey information and support industry to exploit new information-sharing technologies.</li> </ul>	2 years	South Australian Govt - lead Industry - participate
<ul style="list-style-type: none"> <li><b>Promote the new South Australia Drill Core Reference Library at Tonsley</b> as a world’s best facility for providing geological data.</li> </ul>	Ongoing	South Australian Govt - lead Industry - participate

## Theme 2: Developing innovative infrastructure, services and research

Theme 2 identifies ways to leverage the growth of the South Australian copper sector into an expanded role for local businesses within the global commodities and mining services market.

Three broad approaches are:

- develop innovative and strategic infrastructure
- enhance focus on commercial research and its application
- build services capability.

### Innovative infrastructure

Infrastructure is both an enabler and a limiter of industry and community growth. Adequate infrastructure such as sustainable power, water, rail, road and port facilities is necessary to provide the necessary inputs for exploration, mine development and operation, and export.

Knowing what infrastructure is needed, when it is needed and how it could be funded are key issues that require further investigation. Access to both private and public infrastructure is also important to ensure the most cost-effective option for investors.

Numerous studies undertaken by the broader mining sector have identified water supply and a requirement for increased water information as a major opportunity for further research that will also enable South Australia to support future mine development. Identifying and securing sufficient water supplies to support copper mining activities will be an important factor in developing South Australia's copper industry to achieve these production increases. Developing innovative water conservation measures will be just as important as discovering new sources of water supply, so promotion of such measures is an important part of the copper strategy.

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**“This is a great set of first results for OZ Minerals and the copper industry in South Australia.”**

OZ Minerals CEO Andrew Cole announcing that trial results from the South Australian Government – OZ Minerals joint-funded Hydromet demonstration plant returned copper-in-concentrate levels of more than 55 per cent.

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Energy supplies are also critical for operations across the copper value chain. The strategy links with South Australia's Climate Change Strategy and its Low Carbon Investment Strategy by supporting opportunities for companies to investigate renewable and alternate energy sources, including those that can be used in remote locations.

### Commercial research

Enhancing the level of collaboration between South Australia's mining industry, research organisations and suppliers is fundamental to the continued development of technologies and globally competitive services across the copper value chain — from exploration, through mine development and processing, to marketing and engagement.

The South Australian Government recognises the economic potential for the innovative use of processing techniques, such as Hydromet<sup>4</sup>, to realise and enhance the resources of our Copper Belt. In an early action to support the copper strategy, the State Government allocated \$10 million to fund an \$18 million joint study between OZ Minerals and Orway Mineral Consultants, with research conducted by Adelaide University, into a process to improve levels of copper-in-concentrate. The results of the trial will contribute to ongoing studies into optimising the value proposition for the Carrapateena copper project.

The Strategy also proposes building South Australia as an International Copper Technology and Research Hub, through leveraging existing copper research initiatives and programs from the universities of South Australia, research companies, mining research associations, CSIRO and Cooperative Research Centres (CRCs).

4 Hydromet: demonstration plant test to investigate a processing method to increase copper yield and remove adverse elements.

Linking South Australian mining and exploration companies, service and technology businesses, and industry and research organisations will enable collaborative solutions to industry challenges and create new technologies and business opportunities to maximise production and commercial values.

Coordinated efficient and effective research and development, such as that developed through an industry hub, will help solve industry problems, test new technologies and create and demonstrate new commercial opportunities at scale. When research is shared within a community, it has the potential to leverage value-added outcomes and be a catalyst for developing and commercialising new intellectual property for the export market.

## Services capability

The development and operation of sustainable globally competitive copper operations will be underpinned by ensuring competitive services capability and supply chains. South Australian mining operations have, in collaboration with the local METS industry, begun to develop some of the technologies needed to overcome many of the specific challenges of regional copper extraction and processing.

The copper strategy will link with the METS sector programs underway in South Australia with a focus on the copper industry, the *PACE* Supply Chain Development program and Mining and Petroleum Services Centre of Excellence; this will create a platform for increased communication and collaboration to solve the challenges the industry faces and create supply opportunities.

The *PACE* Supply Chain Development program addresses the issues constraining South Australian business growth and drives global competitiveness and economic transformation by: providing a platform for non-resource sector based SMEs to diversify into the resource sector; assisting South Australian SMEs to market and promote themselves; and providing direct access to export market opportunities. This program is currently being piloted, and is expected to expand to deliver training and mentoring regionally.

The Mining and Petroleum Services Centre of Excellence drives the commercialisation of new technologies and services for the resources industry. The Mining and Petroleum Services Centre of Excellence complements the *PACE* Supply Chain Development Program to address the key capabilities of successful METS companies through increasing supplier competitiveness and building suppliers with truly global reach. Examples include the facilitation of the Advanced Modular Solutions initiative and growing the State's ICT capability in the resources sector.

The strategy supports prospects to develop services and technologies at Tonsley and Mawson Lakes, as well as the Upper Spencer Gulf region, to support initiatives to strengthen and diversify the economies of Whyalla, Port Augusta and Port Pirie, in collaboration with Global Maintenance – Upper Spencer Gulf Group and other and regional and economic development groups in the regions. The strategy also links into the opportunities for supporting the resources sector identified in the Northern Economic Plan.

Actions	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>• <b>Innovative infrastructure:</b> Identify infrastructure requirements and develop scenarios to meet the needs of the copper projects required to meet the 1 Mtpa target by 2030, including: <ul style="list-style-type: none"> <li>- potential suitable water resources</li> <li>- identify likely future energy needs and potential sources - power/gas/renewables</li> <li>- investigate transport opportunities in the Copper Belt</li> <li>- investigate concept of common processing plant that operates on a 'toll' basis.</li> </ul> </li> </ul>	2 years	South Australian Govt - lead Researchers and industry - participate
<ul style="list-style-type: none"> <li>• <b>Strategic approach to copper research:</b> <ul style="list-style-type: none"> <li>- investigate establishment of an International Copper Technology and Research Hub and Centre of Excellence to link with, and enhance, existing research programs.</li> </ul> </li> </ul>	1 year	South Australian Govt and researchers - lead Industry - participate
<ul style="list-style-type: none"> <li>• <b>National mining services:</b> <ul style="list-style-type: none"> <li>- initiate program to establish South Australia as a nationally recognised hub for copper mining services, technologies and research through the <i>PACE</i> Supply Chain Development Program and Mining and Petroleum Services Centre of Excellence.</li> </ul> </li> </ul>	2 years	South Australian Govt - Lead Industry and researchers - participate



## Theme 3: Building industry and community capacity

This theme addresses the need to build industry, government and community capacity through sharing knowledge, experiences and insights to improve competitiveness and understanding, build better relationships between the stakeholders, and identify opportunities to simplify steps in the development processes while maintaining community standards.

### Sharing insights

The copper sector sits within a globally competitive market of supply and demand dynamics.

To maximise the South Australian copper sector's competitiveness, every component of the value chain needs to be operating at world's best practice. One of the best ways to develop best practice is to share information, experiences and knowledge through practical workshops, seminars and conferences – the program of Copper Strategy Success Seminars (CS<sup>3</sup>).

The CS<sup>3</sup> program will address the whole copper value chain and incorporate established commercial events as well as targeted government and industry-initiated workshops and seminars. The three-year program will be coordinated by government, updated annually and made available through the copper strategy web page.

Topics to be covered include sharing success stories and lessons from failures for technologies and innovations, understanding company technical and economic feasibility processes and State and Federal government assessment and approvals processes, and working with local services providers.

### Sharing insights

Chile and South Australia are two of the world's most prospective copper provinces. An MOU signed between the Geological Survey of South Australia (GSSA) and the National Geological and Mining Survey of Chile, Servicio Nacional de Geología y Minería provides a framework for technical cooperation and exchange between geologists. A complementary MOU for bilateral cooperation in the mining industry is also being negotiated to build on this international relationship.

### Building regional business and community relationships

Ongoing community participation and engagement is fundamental to the success of any new operational footprint that impacts on an existing landscape. Understanding and addressing community concerns and expectations as well as maintaining an open dialogue is essential to achieving a good outcome and building trust between stakeholders.

Building relationships to support good-faith negotiations will be essential to achieve the long-term goal of increasing copper production. Access to land and water for exploration, mine development and supporting infrastructure is critical to the long-term sustainability and international competitiveness of South Australia's copper production. Early engagement with farmers, landholders, native title parties and other stakeholders is critical to ensuring support for resources activities.

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**“We believe culture and inclusion are key components of a vibrant society and that partnerships play an important role in building capacity for Indigenous people and communities.”**

BHP Billiton Asset President Jacqui McGill at the opening of the TARNANTHI Festival of Contemporary Aboriginal and Torres Strait Islander Art at the Art Gallery of South Australia.

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A good example is consultation with traditional owners to establish relationships that will underlie the application of the *Aboriginal Heritage Act 1988* and *Native Title Act 1993 (Cwlth)* as a critical step in building relationships between industry and Aboriginal communities.

This trust-building approach to relationships gives openings to stimulate real, ongoing employment and enterprise opportunities for Aboriginal people and regional farming communities. The growth of the copper industry will provide further prospects for economic participation and financial autonomy. Early engagement by companies can help to identify and link Aboriginal and regional job seekers to employment and training, as well as establish joint ventures between Aboriginal organisations, service suppliers and other supporting businesses.

More broadly, the South Australian Government has committed to applying leading practice engagement principles for government, community, business and industry by adopting the principles of the National Multiple Land Use Framework for South Australia, the State's *'Better Together: principles of engagement'*, and the Department of State Development's Engagement Framework. This Framework is underpinned by the International Association for Public Participation.

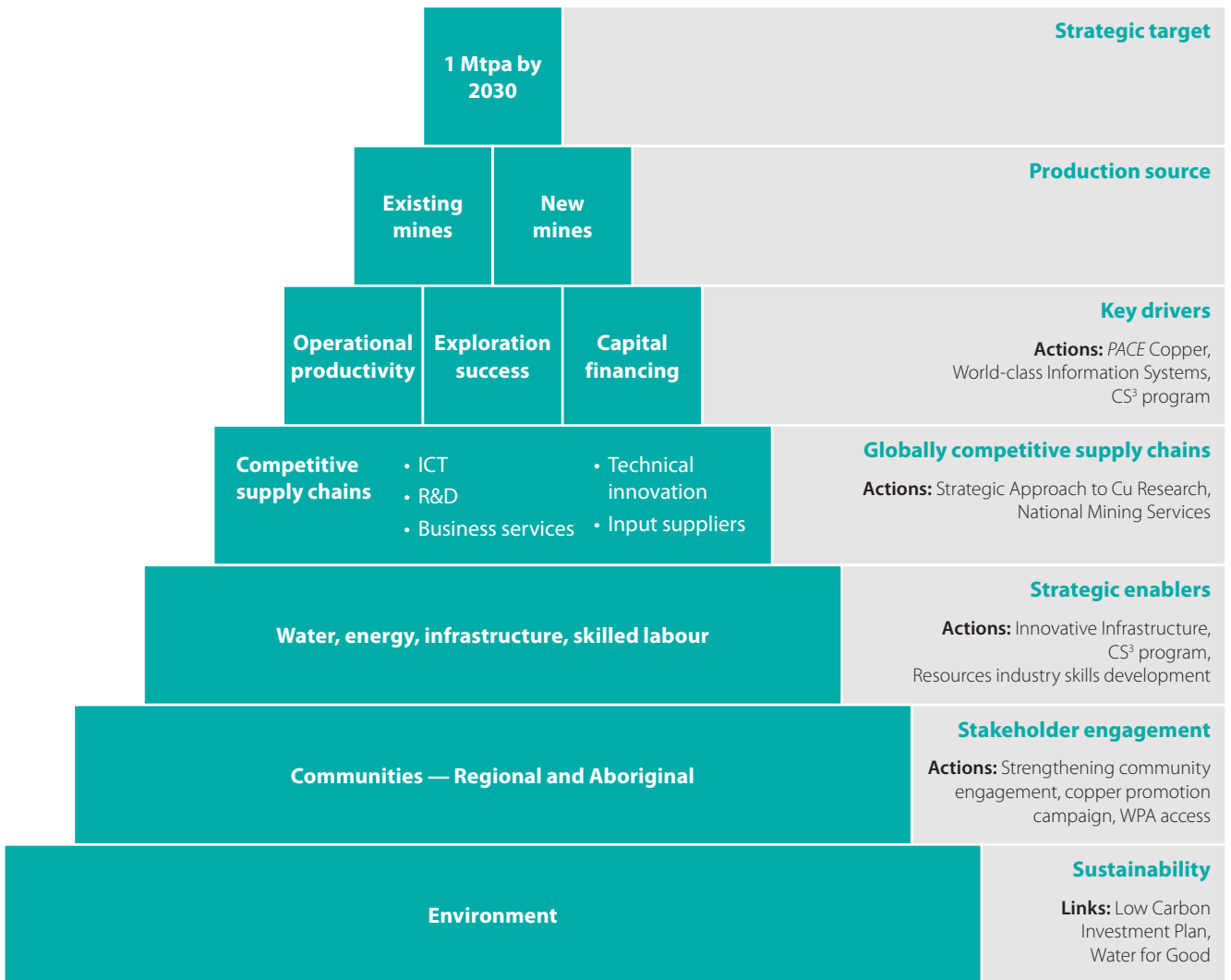
The South Australian Multiple Land Use Framework will enable the State to capitalise on the opportunities from multiple land use access in a sustainable manner, ultimately delivering increased jobs and value, and ensuring better outcomes for communities and landholders.

South Australia's defence industries are a significant contributor to the strength of the State's diversified economy and the work conducted at the Woomera Prohibited Area (WPA) is a key element of that contribution.

The strategy confirms the importance of taking an active collaborative approach in the review of the WPA, scheduled for 2018. Maintaining access to the WPA through the new co-existence model is important for future development in the mineral-rich Gawler Craton.

Actions	Timeframe	Responsibility
<ul style="list-style-type: none"> <li> <b>CS<sup>3</sup> program</b>            Develop and deliver a program of copper relevant workshops, seminars and conferences to build skills and share knowledge and insights.           <ul style="list-style-type: none"> <li>topics to include Exploring for Copper, Copper Research and Development, Approvals Processes, Investment and Finance, International Approaches, Multiple Land Use Framework.</li> </ul> </li> </ul>	2-year program reviewed annually	South Australian Govt - lead Industry - participate Research - participate
<ul style="list-style-type: none"> <li> <b>Strengthening community engagement:</b> <ul style="list-style-type: none"> <li>strengthen industry relationships with Aboriginal and rural communities based on understanding and respect and early engagement on proposals</li> <li>support, and provide greater awareness of, employment opportunities for all communities involved in the copper value chain</li> <li>develop regional approaches to respond to changes in industry as mineral production varies in scale over time</li> <li>define the skills needed in the expanded industry and facilitate programs to develop these skills and key competencies.</li> </ul> </li> </ul>	1 year 2 years 1 year 2 years	Industry - lead SA Govt - participate Industry - lead SA Govt - participate SA Govt - lead Industry - participate SA Govt - lead RESA/Industry - participate
<ul style="list-style-type: none"> <li> <b>Copper promotion campaign:</b> <ul style="list-style-type: none"> <li>develop a copper communication plan to convey the benefits and importance of copper (and other resources) across the value chain to the community</li> <li>proactively address issues before they arise by promoting factual information</li> <li>promote strategies and programs already underway.</li> </ul> </li> </ul>	2 years	Industry - lead South Australian Govt - support
<ul style="list-style-type: none"> <li> <b>Addressing land access:</b> <ul style="list-style-type: none"> <li>engage stakeholders to support ongoing review of land access policy with the aim of identifying opportunities to reduce steps in the process</li> <li>develop response for 2018 WPA Review by the Department of Defence to support access for infrastructure and exploration.</li> </ul> </li> </ul>	2 years 1 year	SA Govt - lead Industry and community - participate SA Govt - lead Industry - participate

**Figure 7:** Copper strategy actions linked to the copper industry drivers.



The copper strategy confirms the importance of a collaborative approach

# Current progress and aligned actions

## South Australian strategies and plans with links to copper strategy

- Economic priorities for South Australia
- Low Carbon Investment Plan for South Australia a part of South Australia's Climate Change Strategy
- Water for Good
- Tonsley innovation precinct
- Northern Economic Plan
- Regional Mining and Infrastructure Plan
- Finding Long-term Outback Water Solutions (FLOWS) program.

## Investment actions

- Facilitating OZ Minerals' and Hillgrove Resources' head offices to Adelaide
- Progressing the China, India and South East Asia investment strategies, and supporting mining delegations to visit key markets
- Attracting major Chilean copper and mining services companies to invest in South Australia
- Attracting major resource and service companies from the United States with deep-mining expertise and technology
- Implementing a new mineral exploration licence regime based on competitive work-program bidding to ensure greater transparency and ground 'turnover'.

## Exploration/information actions

- *PACE* Copper initiative
- Constructing the new, purpose-built South Australia Drill Core Reference Library at Tonsley to house more than 7.5 million metres of drill core material and the data metallogenica collection
- Extending research collaboration with the Deep Exploration Technologies Cooperative Research Centre to develop cheaper and faster drilling
- Supporting innovative research in geophysics and geochemistry to improve prospect prediction and drill hole targeting in emerging mineral provinces with copper potential
- Establishing a vibrant exchange program between the Chilean (Sernageomin) and South Australian geological surveys focusing on copper geoscience
- Hosting the South Australian Resource Information Gateway (SARIG) — internationally recognised for online pre-competitive geoscience and infrastructure data.

## Services sector actions

- The Mining Industry Participation Office (MIPO) is focused on building the capability and capacity of South Australian mining and petroleum supply companies
- Advanced Modular Solutions (AMS) concept study underway with MIPO and WSP Parsons Brinckerhoff.



## Research and development for mining and processing

- Supporting mining technology research in partnership with South Australian universities, such as the ARC Research Hub for Australian Copper-Uranium
- Supporting groundwater research with the Goyder Institute for Water Research in South Australia
- Working with the South Australian Museum on Olympic Dam hydrothermal geochemistry
- Sponsoring OZ Minerals with \$10 million for research and development to scale-up new technologies to improve recovery of copper from South Australian ores
- The Mining and Petroleum Services Centre of Excellence is facilitating applied research and development by linking resource companies with research institutions and innovative services companies; examples include IMPTEC Super Fine Crushing Technology Trial, ICT Roadmap for Mineral and Energy Resources, Remote Mining Operations Centre and Real Time Drill Site project.

## Infrastructure

- Support for development of an alternative water supply for the Kanmantoo Copper Mine.

## Leading practice regulatory and policy frameworks

- The South Australian Government is rolling out a comprehensive suite of programs that support the mining sector in securing its 'social licence to operate', including the Multiple Land Use Framework, *Environment Protection and Biodiversity Conservation Act 1999* accreditation and promoting effective stakeholder engagement practices
- The Fraser Institute's annual survey of mining and exploration companies assesses how mineral endowment and public policy factors affect exploration investment. South Australia scored extremely well in terms of its geological database, coming second globally behind Finland, and well ahead of Western Australia, which came fifth
- The South Australian Resource Information Gateway (SARIG) won the Geospatial Category in the 2013 Australian Government Excellence in eGovernment awards
- Providing clarity and certainty of access to the Woomera Prohibited Area (WPA) for non-defence users has been a top priority of the South Australian Government. The introduction of new WPA legislation in 2014 has established an innovative co-existence framework, providing greater certainty for future infrastructure and economic development of the world-class Gawler Craton mineral province
- Managing the Water Resource Impacts of Mineral and Energy Development — a statewide policy and regulatory framework
- South Australia offers an innovative, discount royalty rate of two per cent for the first five years on mineral production from a declared 'new mine'.

Processing area at the Kanmantoo copper mine





# Measuring success

The success of a long-term, comprehensive copper strategy cannot simply be measured against the central objective of tripling copper production. Along the way, other important milestones will need to be passed to ensure the strategy provides economic and social benefits to industry, universities and the wider South Australian community.

These milestones include new copper discoveries and the development of existing copper prospects into mines during the next 15 years, including the expansion of existing mines, as well as growing the mining equipment and technical services companies required to support copper ventures — all with the aim of creating jobs and business opportunities for South Australians.

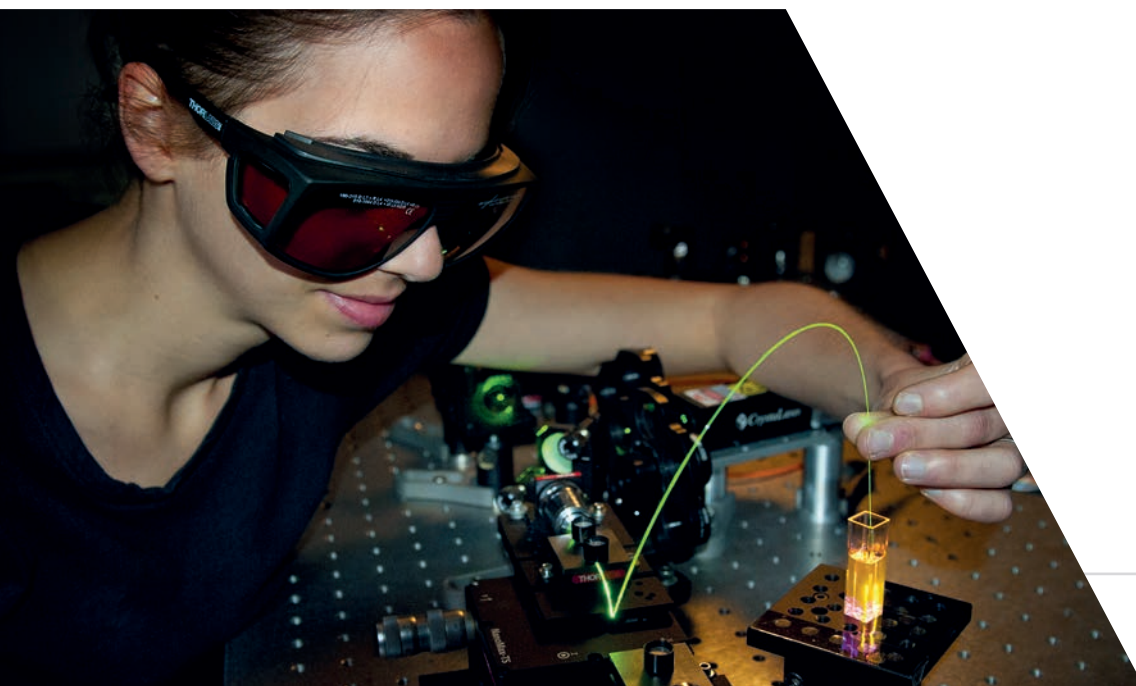
Our ability to commercialise the ongoing joint government-industry and private sector-funded research into improving the quality of copper in concentrate — and then use that technological advance to drive investment in new mining projects — will also be a benchmark for the strategy.

In the short term, success will also be judged on the level of participation in the Copper Success Series Seminars focused on building the capacity of industry to adopt new technologies and of all stakeholders to adopt best-practice engagement. Finalising the investigations to develop an international copper technology and research hub and identifying ways to provide suitable infrastructure, including for water, will be key milestones in the first three years of the strategy.

Driving national and international investors' interest in South Australia as a secure and profitable destination for investment will also signal the success of the strategy.

The South Australian Government will lead the implementation of the strategy, supported by an Industry/Government Reference Group, working with interested stakeholders who can manage and execute the various actions of the copper strategy, with reviews at 18-months and three years to monitor achievements. A 'measuring success' scorecard will be developed and presented for review by stakeholders at the 18 month review date.

Finally, the copper strategy will draw its success from the collaborative approach adopted to firstly identify our strengths, weaknesses, opportunities and threats, and then frame an agreed response. This spirit of partnership, important in its genesis, will be vital in the years ahead as the South Australian Government works together with industry and our community towards achieving the ambitious objective at the heart of this strategy.



# Attachment 1

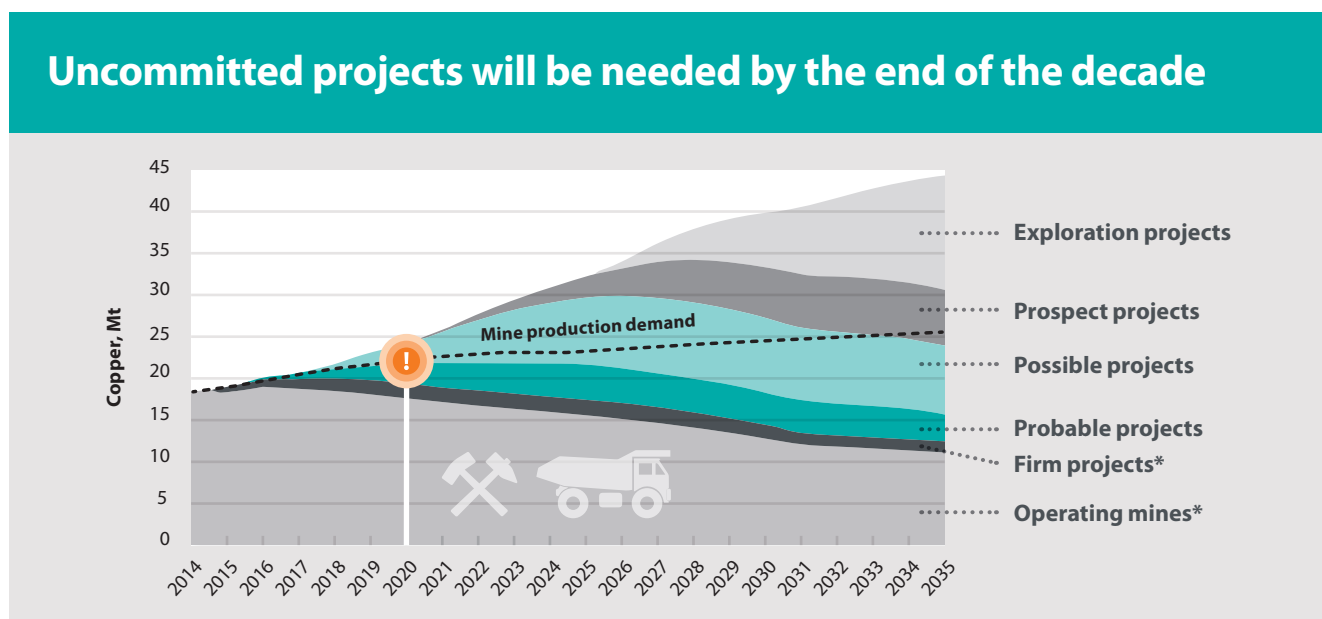
## Outlook for copper

Based on a number of forecasts<sup>5</sup>, existing resources and projects under development across the world are likely to meet predicted demands in the copper market until the end of the decade (see Figure 8). However, a significant deficit is expected to emerge from 2020 (see Figure 9) due to:

- declining resources grades in existing and potential mines
- increasing costs of extraction and processing
- longer cycle times for projects
- rising resource nationalism
- difficulties in accessing ready-made power and water supply
- rising environmental and community issues
- longer approval processes.

Demand is expected to remain strong over time as China and other countries continue to grow and the global middle class expands.

**Figure 8:** International copper projects - demand demonstrating deficit expected in 2020.

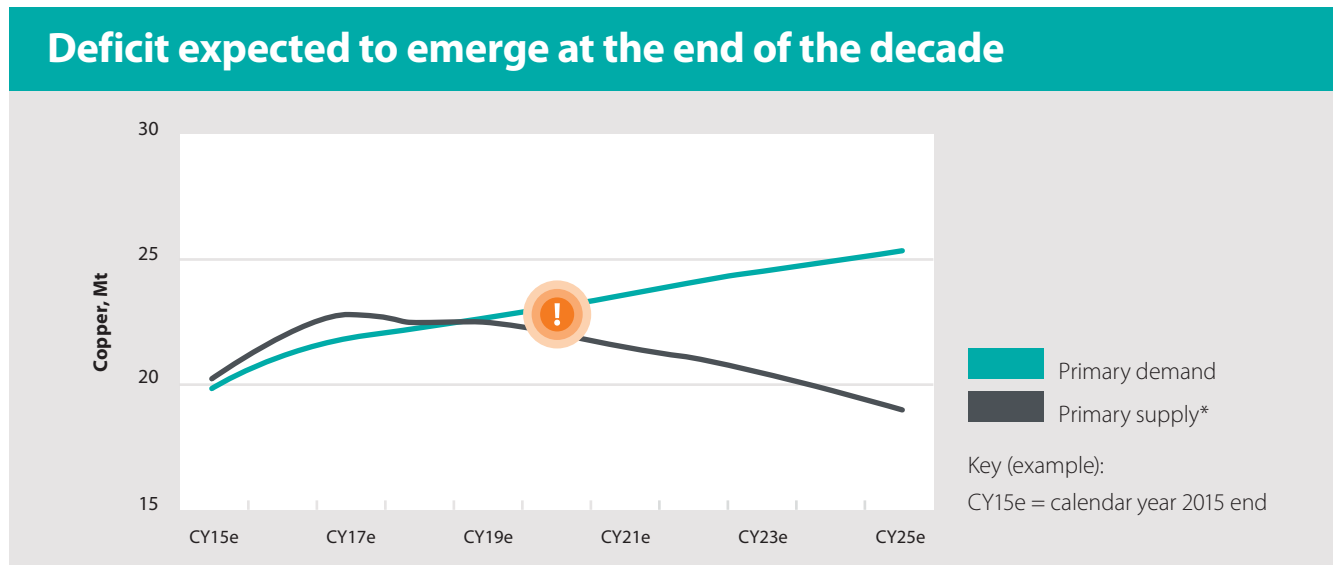


\* Firm expansions/extensions and firm restarts included in operating mines.

Source: CRU International.

<sup>5</sup> 'Copper overview for South Australia, Australia and the world - what are the opportunities?' Presentation Richard Schodde; 'Our Copper Perspective' Presentation Darryl Cuzzubbo; from South Australian Copper Summit, May 2015; World Bank Commodity Forecast Price Data, October 2015. The above should be read in conjunction with the full presentations at [http://minerals.dpc.sa.gov.au/about\\_us/initiatives/copper\\_strategy/](http://minerals.dpc.sa.gov.au/about_us/initiatives/copper_strategy/)

Figure 9: Copper supply - demand demonstrating deficit expected in 2020.



\* Production from base case and highly probable projects.  
Source: BHP Billiton analysis; Wood Mackenzie<sup>6</sup>

While it is expected that copper prices will fluctuate within broad parameters as economic influences change, consensus forecasts for copper prices are to remain relatively stable in the foreseeable future, providing a sound base for investing in copper exploration, mining and processing.

All of these factors combined provide a unique opportunity to develop South Australia's copper resources to take advantage of the predicted long-term global copper supply deficit.

6 The above should be read in conjunction with the full presentation "Copper Briefing and Chilean Site Tour", 1 December 2015, accessible at: [www.bhpbilliton.com/~media/bhp/documents/investors/news/2015/151201\\_coppersitetourday1.pdf?la=en](http://www.bhpbilliton.com/~media/bhp/documents/investors/news/2015/151201_coppersitetourday1.pdf?la=en)



Olympic Dam processing

# Attachment 2

## Copper Summit SWOT analysis

The South Australian Copper Summit in May 2015, which brought together 106 leaders from the mineral resources and services industries, research institutions and government agencies, discussed the challenges, opportunities and actions needed to raise South Australia's total copper production to support Australia being in the top five rankings of global copper producing nations.

These ideas were used for an analysis of strengths, weaknesses, opportunities and threats (SWOT) for the copper strategy, which is presented in the attached table.

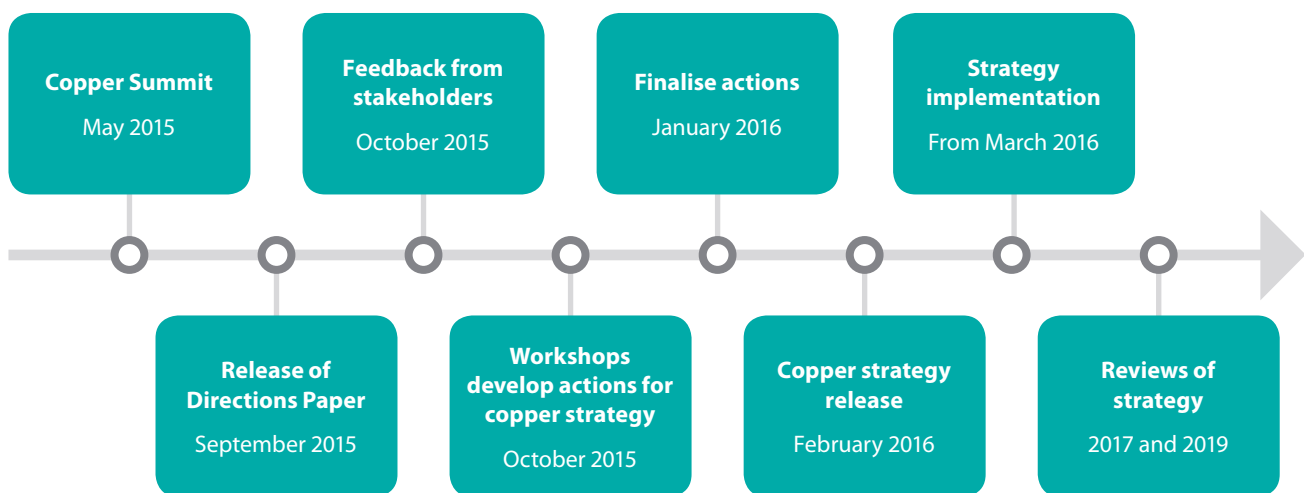
Strengths/advantages	Weaknesses/gaps
<ul style="list-style-type: none"> <li>• Strong government support — South Australia is a low-risk jurisdiction</li> <li>• Supportive regulatory framework</li> <li>• Large copper resources in Gawler Craton</li> <li>• Copper grade higher than world average</li> <li>• 130 companies committed to exploring for, developing and mining South Australia's copper resources</li> <li>• Major copper mines and deposits are poly-metallic</li> <li>• Excellent research infrastructure and programs</li> <li>• Skilled workforce</li> <li>• Strong supply chain capability</li> <li>• Reasonable core infrastructure</li> <li>• Pro-business approach</li> <li>• Strong culture of collaboration</li> </ul>	<ul style="list-style-type: none"> <li>• High operating costs (in Australia, compared to international projects)</li> <li>• Difficulty in raising capital for exploration and development</li> <li>• Complex mineralogy requiring increased processing</li> <li>• Deep cover significantly increases exploration and development costs</li> <li>• Approvals process can be time-consuming</li> <li>• Large underexplored areas</li> <li>• Lack of holistic approach within South Australia, with diverse range of interests</li> <li>• Limited integration between companies and projects</li> <li>• Limitations on water and power supplies in remote regions</li> <li>• Lack of international explorers</li> <li>• Perception of South Australia as small mining jurisdiction compared to Western Australia and Queensland</li> <li>• Low number of operating mines</li> </ul>
Opportunities/ideas	Threats/risks
<ul style="list-style-type: none"> <li>• Collaborative, integrated approach to exploration, mining and processing – shared resources</li> <li>• Opportunity to engage early with all stakeholders, including traditional owners</li> <li>• Discovery of exceptional new copper deposits</li> <li>• Unlock the existing known resources of copper</li> <li>• Step up production in operating mines</li> <li>• Capitalise on technologies and infrastructure from other industries</li> <li>• Exploit reputation of South Australia as a safe place to invest</li> <li>• Develop modular construction services to reduce capital cost</li> <li>• Common infrastructure for new and existing projects</li> <li>• Technology to create 'clean' ore</li> <li>• Research technologies to reduce OPEX and CAPEX</li> </ul>	<ul style="list-style-type: none"> <li>• Companies as competitors — collaboration may be a risk</li> <li>• Community concerns about mining</li> <li>• High cost structures in Australia</li> <li>• Competition for investment funds</li> <li>• High entry costs due to deep cover over deposits</li> <li>• Global demand and copper price not reaching predictions</li> <li>• Impurities unable to be removed at competitive cost</li> <li>• Uncertainty over future of research funding</li> <li>• Loss of expertise and knowledge with changing economic landscape</li> <li>• Substitution of copper by other products</li> <li>• Loss of risk appetite for investors</li> <li>• Complacency as a 'leading jurisdiction'</li> </ul>

# Attachment 3

## Developing the strategy

Stakeholders from across industry, research institutions, community and government have actively contributed to the development of this copper strategy, as shown in Figure 10. It started with a Copper Summit in May 2015 hosted by Minister Tom Koutsantonis, Minister for Mineral Resources and Energy, which endorsed the proposed target.

**Figure 10:** Timeline and steps to create the copper strategy.



A Copper Strategy Directions Paper was released in September 2015 for public consultation over seven weeks. Three consultation workshops were run in October 2015, two in regional South Australia (Port Augusta) and one in Adelaide, which identified challenges, opportunities and ideas for inclusion in the strategy.

Workshop discussions centered around six main focus areas for action:

- Focus area 1 – Enhanced support to find and expand copper resources
- Focus area 2 – Improved cost competitiveness for copper production
- Focus area 3 – Shared commercial research for copper production
- Focus area 4 – Effective engagement to gain social licence to operate
- Focus area 5 – Reducing bottlenecks in processes across the copper value chain
- Focus area 6 – Collaborative infrastructure development.

From these focus areas, three action themes were developed for the copper strategy:

1. Exploration, discovery and information for copper
2. Developing innovative infrastructure, services and research in copper
3. Building industry and community capacity.

A large cross section of our stakeholders has helped shape this copper strategy - the next phase provides more opportunities for involvement as we deliver on the actions.

This strategy will be reviewed with input from key stakeholders after 18 months and after three years.



# Acknowledgements

The Government of South Australia acknowledges and thanks the many stakeholders who have contributed to the strategy either through the YourSAy website, at the Copper Summit, at one of the three workshops or by direct contact with the copper strategy team.



“South Australia has a bold ambition to once again become one of the world’s major copper producers. We’ve done it before, we can do it again.”

Hon Tom Koutsantonis MP  
Minister for Mineral Resources and Energy







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