Consultation directions paper

Developing South Australia's copper strategy

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SOUTH AUSTRALIA

Government of South Australia
Department of State Development

Core Samples - OZ Minerals

We invite your ideas

The South Australian Government hosted a Copper Summit in May 2015, where more than 100 people from industry, research institutions and government contributed their ideas to grow South Australia's copper industry. This directions paper gives you the chance to have your say and help us develop a Copper Strategy for South Australia.

We seek your input on the proposed focus areas for the strategy and your ideas on the questions posed in the orange boxes throughout the document.

You can provide feedback either through the Copper Strategy website at **minerals.statedevelopment.sa.gov.au/copperstrategy**, the **YourSAy** website or via email **DSD.CopperStrategy@sa.gov.au** until 23 October 2015.

Cover image: Stacked copper cathode at Olympic Dam

Directions for a comprehensive South Australian copper strategy

Minister's foreword

As a significant copper producer, South Australia has a strong foundation on which to build a reputation as a major participant in the international copper industry.

A step-change in production could lead to substantial economic growth and improved standards of living for South Australia and the nation as a whole, and make our world more energy-efficient and environmentally sustainable.

Copper has a key role to play in the 21st century. Its efficiency will mean more sustainable construction in a rapidly urbanising world, helping to mitigate the effects of climate change.

South Australia has the resources and the expertise to unlock the full potential of our assets. A comprehensive copper strategy will help clear a pathway through the challenges faced by the industry to reach a shared objective that supports new jobs and investment.

We have set an ambitious target to lift Australia to third place in the ranking of world copper producers. It is my hope that this objective will focus government and its agencies at all levels, explorers, producers, the wider resources industry, Aboriginal communities, and the South Australian community towards a common goal.

Increased copper production is a springboard that will allow our resource companies, service suppliers and research institutions to not only be world-class, but to become world-renowned.

To achieve our ambitions, government, industry and the community will need to work collaboratively to drive down costs for exploration and production. Shared infrastructure is part of that story, but so too is commercialising the research carried out in our universities.

To ensure the success of a long-term strategy, we need your input. While this directions paper pulls together the key themes that emerged from this year's Copper Summit, it is your feedback that will help shape the final design of the strategy.

We need your views on the challenges, strengths, impediments and opportunities and the best way we can strike ahead together to create new jobs, investment and link South Australia into the global supply chain for the copper industry.

South Australia's geology offers us unique advantages, placing us to meet long-term demand for copper from the economic powerhouses of Asia. We have a highly-skilled workforce, and our academic institutions are on the forefront of research and development.

How we play to those advantages will be a measure of this state's capacity to deliver on the opportunities provided by our geology and geography. I look forward to receiving your suggestions on the ways we can advance together to confirm South Australia's global reputation as a major copper producer.

Hon Tom Koutsantonis MP
Minister for Mineral Resources and Energy

Our Copper Belt
A foreword by Terry Burgess

Having created significant historic, economic and social benefit to the state, the South Australian Copper Belt continues to generate value, offering a vast, untapped potential.

The state is already host to one world-class asset at Olympic Dam. Our current quest for exploration in the Copper Belt is to fill the 'discovery gap' by locating and developing additional large copper ore bodies, and continuing to discover deposits, such as Khamsin, that could potentially contribute to our economic prosperity.

The area for exploration is extensive, and the prospective rocks are generally buried below thick cover. To address these challenges, we need to utilise the skills and expertise of our geoscientists, researchers and technical engineers to deliver future economically viable discoveries.

Copper is a key metal for the future, offering major advantages for new and developing technologies. Many of these newer technologies have a higher unit requirement of copper compared with historical technologies – for example, in energy generation (wind and solar) and in vehicles (hybrids and electric) – and therefore offer incremental increases in demand.

Projections of demand for copper clearly indicate that increasing urbanisation in key markets will result in a future deficit, with supply affected by decreasing production from existing mines and variable global investment in exploration and mine development.

South Australia's Copper Belt ore bodies also offer valuable by-products, such as gold and uranium, as well as the unexploited potential of rare earth metals.

As such, South Australia's copper and by-product endowment offers unique opportunities for the state and provides a basis for significant future growth. This will benefit the broader community as well as resource companies, industry service providers and the skilled South Australian workforce, including in the regional areas of the state.

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.

A 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.

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.

Terry Burgess

President, SA Chamber of Mines and Energy,
Member of the Economic Development Board of South Australia,
South Australian Copper Summit

Copper is a key metal for the future, offering major advantages for new and developing technologies.

South Australian Copper Summit

South Australia once produced 10 per cent of the world's copper from the Burra Monster Mine. Now we have just three major producers, exporting on average about 300,000 tonnes, or around 30 per cent of Australia's copper exports, despite hosting about 68 per cent of the nation's known copper resource.

Occupying a large portion of central South Australia, the geologically significant Gawler Craton contains one of the world's largest ore bodies at Olympic Dam and a host of other significant deposits, including Prominent Hill, formed around 1590 million years ago. This Copper Belt extends across large parts of South Australia, including the central and eastern Gawler Craton and the Curnamona Province.

The Gawler Craton and other copper ore bodies 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. Integral to the success of the Copper Strategy will be the involvement of Aboriginal people to help develop an appropriate shared, common understanding of the significance of the area to secure the wellbeing of all South Australians and that provides a basis for building and maintaining constructive relationships between all stakeholders.

Our history and geology suggest South Australia can do more to leverage the potential of its copper resources into increased investment and job creation to support sustained economic growth.

With that in mind, the Minister for Mineral Resources and Energy Tom Koutsantonis convened a South Australian Copper Summit in May 2015 to gauge the industry's support for a comprehensive strategy to unlock the state's potential as a world-class producer and exporter.

The summit provided a forum to discuss the challenges, opportunities and actions needed to raise South Australia's total copper production to support Australia becoming the world's third largest copper producer.

The challenge was set: triple the state's annual copper production to one million tonnes per year by 2030 to leapfrog Australia into the third ranked position in the world.

The 106 leaders from the mineral resources and services industries, traditional landowners, research institutions and government agencies attending the summit gave in principle support for this ambitious, nation-building target.

They also endorsed the South Australian Government's strategic role in creating a business and social environment that allows our copper producers, explorers and project developers to work with the community and traditional landowners to close the gap.

The Department of State Development was set the task of taking the feedback from the summit and articulating those shared views into this directions paper, which will guide the development of the comprehensive Copper Strategy for South Australia.

South Australia's copper mines in production as at June 2015

Olympic Dam	Prominent Hill	Kanmantoo
• Opened 1988 • Approx. 3,500 staff (including contractors and Adelaide) • Approx. 184,000 tonnes Cu production in 2014	• Opened Feb 2009 • Approx. 1,200 staff (including contractors) • Approx. 93,000 tonnes Cu in concentrates in 2014	• Opened Nov 2011 • Approx. 260 staff (including contractors) • Approx. 20,000 tonnes Cu in concentrates in 2014

What we learned

Copper is integral to the ongoing urbanisation of Asia and is a key ingredient in driving a more efficient renewable energy sector within a low-carbon world. South Australia has the capacity to draw on its copper endowment to support the anticipated global demand for copper. See Attachment 1 for more information.

Growth in copper demand across the world is estimated to outstrip supply from 2020 [1]. South Australia is well placed to step up production to meet this demand with:

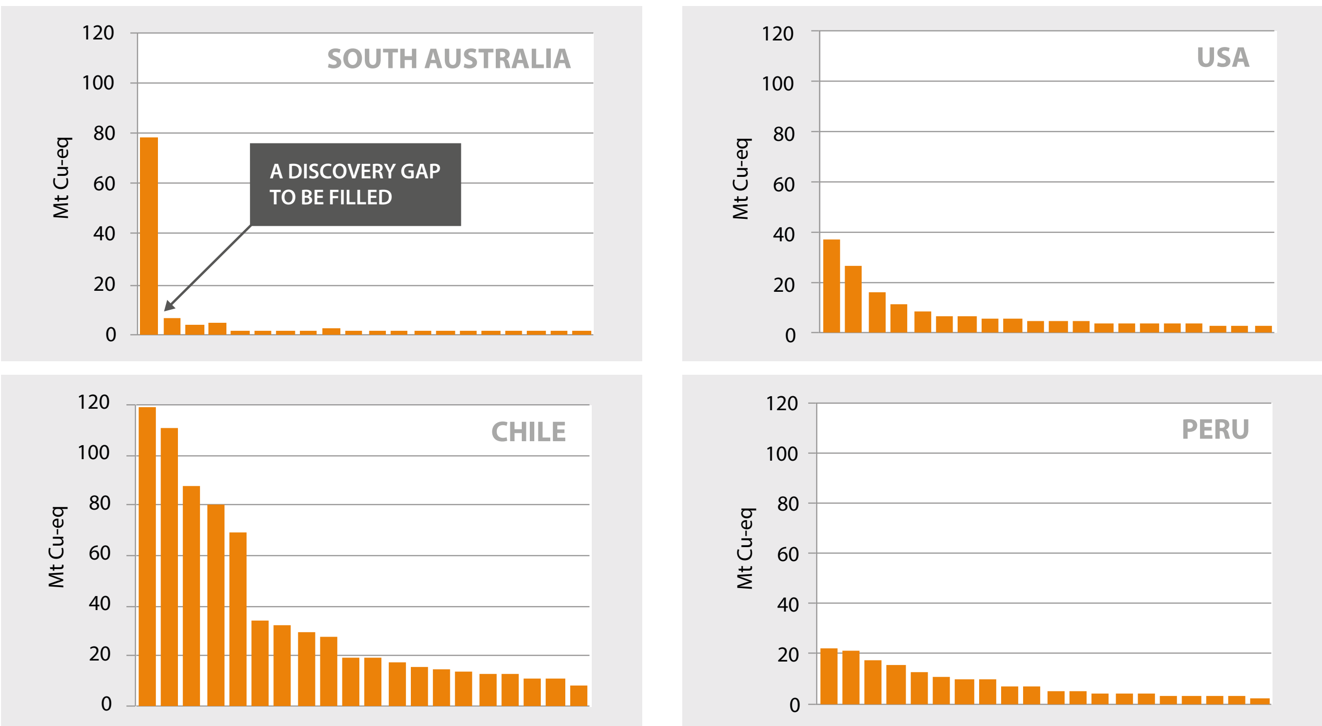
- the reputation as one of the best jurisdictions in the world for exploring, developing and mining
- a strong copper resource base and high potential for new discoveries
- a stable and progressive regulatory environment balancing environmental and community concerns with the needs of stakeholders
- a skilled resources workforce
- good transport and utilities infrastructure across the regional areas
- a strong local industry, capable of providing supply chain services
- world-class collaborative partnerships between industry, university and governments focused on geoscience and mineral processing research and development
- multiple land-use principles that include a well-established framework to negotiate flexible, pragmatic agreements with native title parties to develop positive outcomes for Aboriginal people and other stakeholders.

The summit also highlighted the opportunity to discover more major ore bodies and to build on the existing world class resources and reserves. Advances in understanding the state's geology and mineral exploration technology will improve the effectiveness of exploration for new copper deposits, particularly where these highly prospective rocks have been extensively buried and difficult to detect in the past.

Integral to the success of the Copper Strategy will be principles of Reconciliation that are inclusive of Aboriginal communities and respect the rights of native title holders.

The strategy will also align with the Australian Government's policy and guidelines for mineral exploration in the Woomera Prohibited Area, which also falls within the Gawler Craton.

Top 20 Copper Deposits - selected Countries



Source: Contained copper in resource. Data for Chile, Peru & USA; source SNL . Data for South Australia; source Mineral Resources Division, DSD, Government of South Australia.

1 'Copper overview for South Australia, Australia and the world - what are the opportunities?' Presentation Richard Schodde; 'Our Copper Perspective' Presentation Darryl Cuzzubbo; from SA Copper Summit, May 2015

Key themes for a Copper Strategy for South Australia

The information collected at the Copper Summit identified the following key themes for a comprehensive Copper Strategy for South Australia:

World Class SA projects need to be at the head of the queue for international mine development.

Cost Competitive SA 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.

The summit also identified a number of actions to deliver on these major themes:

- Exploration strategies to target significant ore deposits.
- Further increase efficiencies in approvals assessment.
- Coordinate and support infrastructure development with a focus on the Gawler Craton's Copper Belt.
- Consider sharing copper processing and other infrastructure within the Copper Belt to reduce costs.
- Improve and streamline stakeholder engagement with landholders, Aboriginal communities and the broader community.
- Link existing suppliers into global supply chains and grow their international capacity.
- Consider support for brownfields as well as greenfields exploration projects.
- Identify and secure sufficient water supplies to support mining activities.
- Maximise recovery of other metals from copper deposits, including those considered 'waste' or 'contaminants'.
- Assist projects to reach bankability stage.
- Promote commercially-relevant research in critical areas such as metallurgy and operational productivity.
- Identify and ensure a pipeline of appropriate skills to supply the future requirements of a growing copper sector.
- Support investment attraction at local, national and international levels.

These ideas all fed into an analysis of strengths, weaknesses, opportunities and threats (SWOT). The key points of this analysis are listed in Attachment 3.

Developing the Copper Strategy – a proposed approach

Feedback from the Copper Summit supports the following vision and objective as a foundation for developing a Copper Strategy for South Australia.

Vision

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

Objective

Grow South Australian copper production to 1 million tonnes per annum (Mtpa) by 2030.

What is the role for Commonwealth, state and local governments in supporting an expanded copper sector?

Should we focus our efforts on the Gawler Craton?

By achieving both this bold vision and economic objective, South Australia will establish its international credentials not only as a producer of copper but a supplier of technology, skills, techniques and services across the globe.

The strategy will broaden and deepen our understanding of contemporary Aboriginal issues so that stakeholders are more likely to successfully navigate the key focus areas of the strategy.

Production increase required

To achieve this objective, a net increase in production of about 700,000 tonnes of contained copper per year by 2030 will be required from both existing and new mines as well as identifying a pipeline of projects to maintain annual output.

A potential pathway to achieving the objective of 1 Mtpa copper output by 2030 could include:

- up to 540,000 tpa from unlocking copper resources already identified in mine resources or feasibility studies
- 120,000 tpa reserve replacement and brownfields discoveries
- 120,000 tpa from exceptional new discoveries that can move into production by 2030.

Given this scenario, it is clear that the majority of the target will result from a net increase in production through unlocking already identified copper resources. Reserve replacement and exceptional new discoveries account for a smaller component. Understanding these breakdowns will direct attention to particular focus areas and align actions for the future.

Numerous studies undertaken by the broader mining sector have identified water supply and the related lack of water information as a major risk to future mine development. Identifying and securing sufficient water supplies to support mining activities will be an important factor in developing South Australia's copper industry to achieve these production increases.

Sources for new copper production will potentially come from six key areas of project development across the minerals value-chain:

1. Discovery and definition of exceptional new resources that are high grade, readily accessible and can be in production in less than 15 years.
2. Brownfields discoveries near existing mines that can move more quickly into production.
3. Unlocking known resources for copper projects currently in advanced exploration and undergoing feasibility.
4. Definition of additional resources and replacement of reserves to increase mine life for currently operating mines.
5. Increased annual output of currently operating mines.
6. Increasing production of copper from off-site mineral refineries using imported ore.

How can we best strike a balance between focusing on existing mines and reserves and exploring for the next big reserves?

Focus areas

To develop practical actions for inclusion in the strategy, six focus areas are recommended to ensure South Australian projects reach the head of the queue for international mine development and achieve the required increase in production.

Developing a strategy offers an opportunity to formulate government policy and guidelines for key process improvements and best practice.

Potential actions for the strategy will be identified by running workshops for the focus areas in late October 2015 for industry, researchers, government, landholders and other community representatives.

These actions will then be prioritised with stakeholders and implemented through partnerships and collaboration by the respective stakeholders.

Which focus areas are the most important to begin work on?

Prominent Hill

Focus area	Workshop topic
Enhanced support to find and expand copper resources	Exploration – future focus and technologies to locate the next major copper deposits and expand existing deposits. **What role does pre-competitive data play in identifying copper targets, and what more can be done?**
Improved cost competitiveness for copper production	Driving cost competitiveness, efficiency and waste reduction across the entire copper production chain. **Where should we focus our efforts on driving cost competitiveness?**
Shared commercial research for copper production	Collaboration and innovation in research and development – stocktake and future priorities for commercial outcomes for copper production. **How can we encourage universities and industries to engage in commercial research?**
Effective engagement to gain a social licence to operate	Engagement with all communities and stakeholders, including Aboriginal communities, in areas for current and future copper mining and production. **How can we help foster good relations between landholders, including Aboriginal communities, explorers and producers?**
Reducing bottlenecks in processes across the copper value chain	Identify and address bottlenecks in the value chain for copper from discovery to the export market; e.g. can approvals, land access and development processes improve, can we better identify and secure water supplies to support mining activities? **How can we ensure processes are best practice?**
Collaborative infrastructure development	Supporting the copper value chain - where to focus, what types of infrastructure needed, who will collaborate in its development, and how it is funded. **How best can we deliver infrastructure within the constraints of the national competition law?**

Processing area at the Kanmantoo copper mine

Given the complexity and scale of the challenge, the Copper Strategy will develop pragmatic short, medium and long-term actions aligned with the copper resources value chain. Figure 1 maps the six focus areas against the copper resources industry drivers.

Figure 1: Focus areas linked with the copper resources industry drivers

1 Mtpa by 2030	**Strategic Target**
Existing Mines · **New Mines**	**Production Source**
Operation Productivity · **Exploration Success** · **Capital Financing**	**Key Drivers** **Focus area:** Cost competitiveness, find & expand copper reserves, reduce bottlenecks
Competitive Supply Chains • ICT • Support & Business service • R&D • Input Suppliers • Consulting	**Globally Competitive Supply Chains** **Focus area:** Commercial research
Water, Energy, Infrastructure, Skilled Labour	**Strategic Enablers** **Focus area:** Collaborative Infrastructure
Community and Environment	**Stakeholder Engagement** **Focus area:** Effective engagement to gain support for industry

Measuring success

The Copper Strategy will outline proposed measures of success in each of the focus areas and link them to the additional production required to meet the long-term target.

Next steps

Feedback > Due 23 October 2015

Feedback is sought from stakeholders on the the questions raised in this Directions Paper and potential actions for the Copper Strategy.

You can provide feedback either through the Copper Strategy website at **minerals.statedevelopment.sa.gov.au/copperstrategy**, the **YourSAy** website or via email **DSD.CopperStrategy@sa.gov.au** until 23 October 2015.

Stage 1 > October 2015

Workshops will be conducted to develop actions for Copper Strategy.

Stage 2 > November 2015

Finalise focus area action plans and targets for Copper Strategy.

Stage 3 > December 2015

Copper Strategy released.

Stage 4 > January 2016

Begin implementation of strategy.

Stage 5 > February 2016

Focus areas roundtables continue.

Attachment 1
Outlook for copper

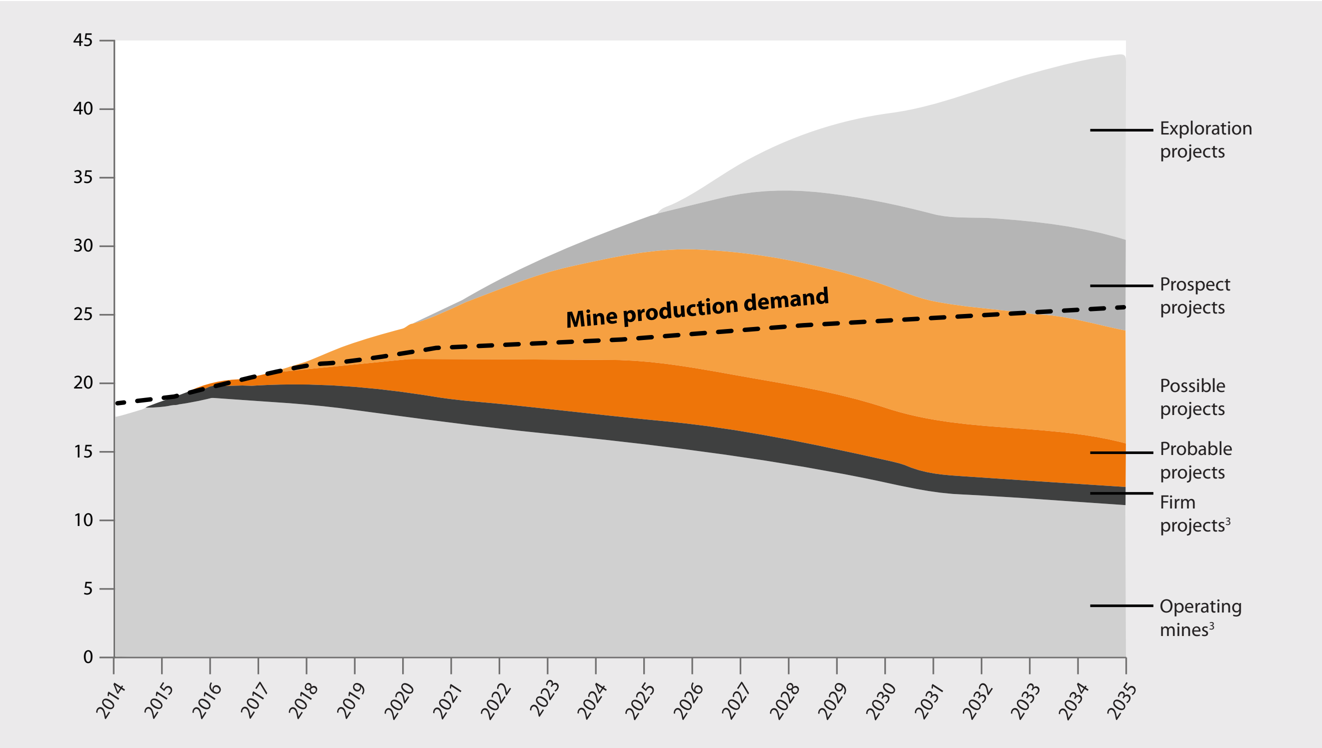
Based on a number of forecasts[2], existing resources and projects under development across the world are likely to meet predicted demands in the copper market until the end of the decade. However, a significant deficit is expected to emerge from circa 2020 due to:

- 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 middle class expands.

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.



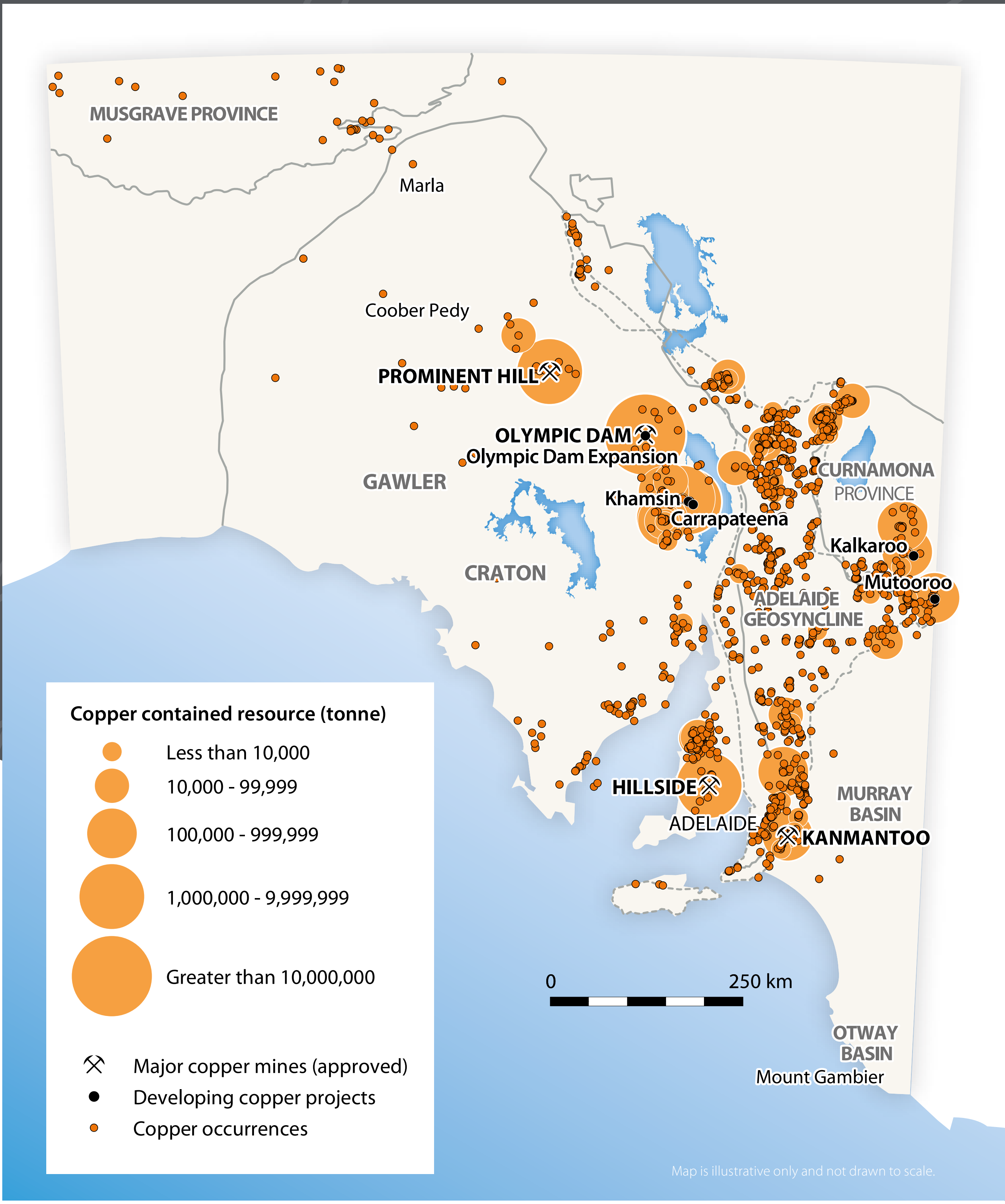
2 'Copper overview for South Australia, Australia and the world - what are the opportunities?' Presentation Richard Schodde; 'Our Copper Perspective' Presentation Darryl Cuzzubbo; from SA Copper Summit, May 2015

3 Firm expansions/extensions and firm restarts included in operating mines

South Australian resources

South Australia hosts globally significant assets of copper, accounting for 68 per cent of Australia's 93.1 Mt of demonstrated resources and including the fifth[4] largest copper resource in the world at Olympic Dam.

Copper is the principal commodity produced in South Australia, with the state's copper miners producing 306,452 t of copper valued at more than $2 billion in 2014. South Australia produced almost a third of Australia's 969,540 t of mined copper, with Australia producing five per cent of the world's mined copper production of 18.4 Mt.



4 SNL global copper resource database accessed 21 May 2015

Attachment 2
Current work

Investment

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

Exploration/information

- Expanding the PACE Program into FRONTIER areas of the Gawler Craton.
- 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 (e.g. the southern Gawler Ranges and far west Coompana).
- Establishing a vibrant exchange program between the Chilean (Sernageomin) and South Australian geological surveys focusing on copper geoscience.
- Hosting the South Australian Resources Information Geoserver (SARIG) - internationally recognised for online precompetitive geoscience and infrastructure data.
- Constructing the new, purpose-built $32.2 million Drill Core Reference Library at Tonsley to house more than 7.5 million metres of drill core material and the data metallogenica collection.

Services sector

- 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 concept study underway with MIPO and WSP Parsons Brinckerhoff.

Research and development for mining and processing

- Supporting mining technology research in partnership with SA universities and the Ian Wark Institute.
- Supporting groundwater research with the Goyder Institute for Water Research in South Australia.
- Sponsoring OZ Minerals 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.

Prominent Hill

Leading practice regulatory and policy frameworks

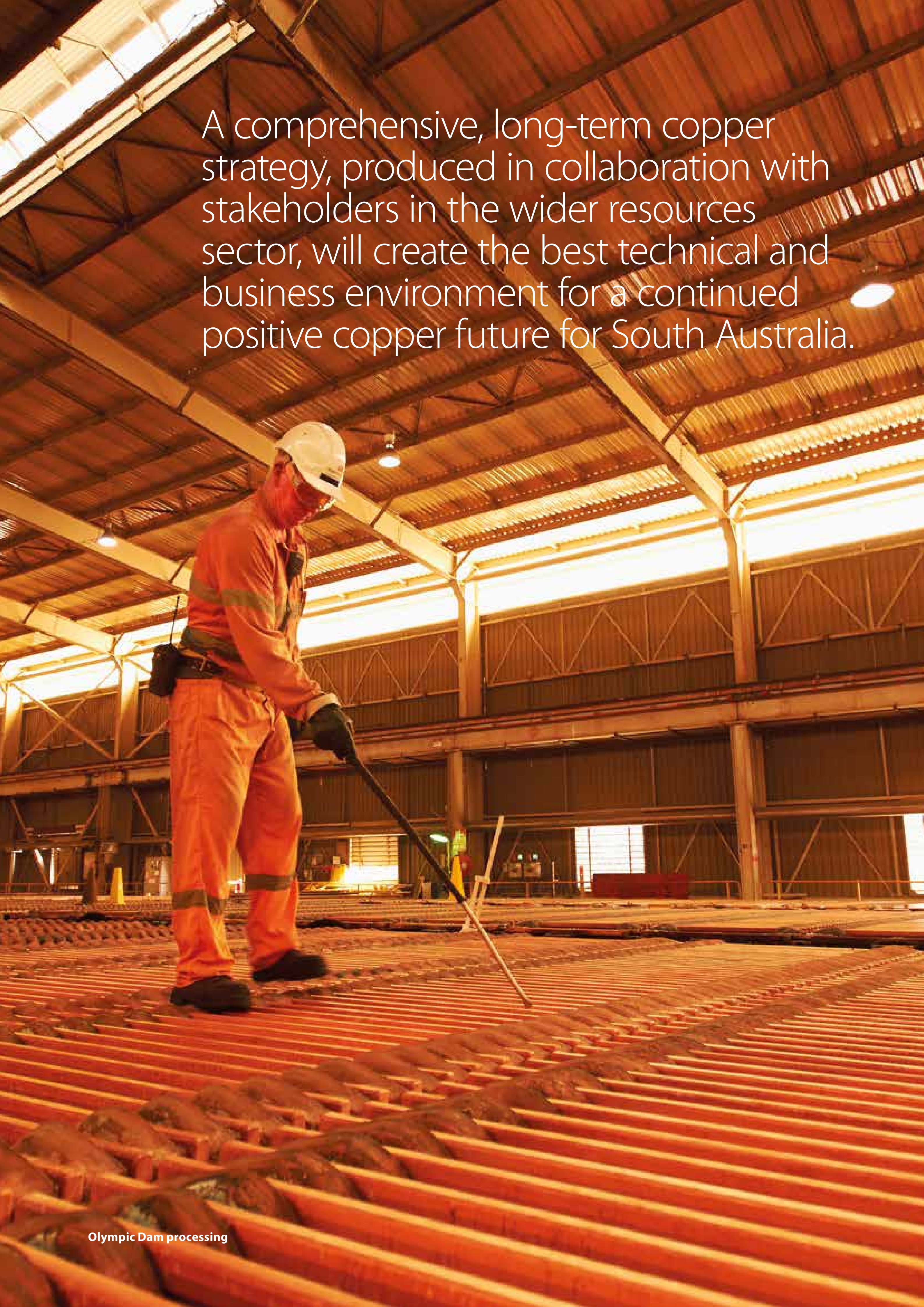
- The South Australian Government is rolling out a comprehensive suite of programs that support the mining sector in securing its 'social licence to operate', including the Multiple Land Use Framework, *Environment Protection and Biodiversity Conservation Act 1999* accreditation and promoting effective 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[5].
- South Australian Resources Information Geoserver (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 to future infrastructure and economic development of the world-class Gawler Craton mineral province.
- 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'.

5 http://www.miningaustralia.com.au/News/Australia-drops-in-global-mining-rankings

Attachment 3
Copper Summit SWOT analysis

Strengths/advantages	Weaknesses/gaps
• Strong government support – SA is a low risk jurisdiction • Supportive regulatory framework • Large copper resources in Gawler Craton • Copper grade higher than world average • 130 companies committed to exploring for, developing and mining South Australia's copper resources • Major copper mines and deposits are poly-metallic • Excellent research infrastructure and programs • Skilled workforce • Strong supply chain capability • Reasonable core infrastructure • Pro-business approach • Strong culture of collaboration	• High operating costs (in Australia, compared to international projects) • Difficulty in raising capital for exploration and development • Complex mineralogy requiring increased processing • Deep cover significantly increases exploration and development costs • Approvals process can be time-consuming • Large underexplored areas • Lack of holistic approach within SA, with diverse range of interests • Limited integration between companies and projects • Limitations on water and power supplies in remote regions • Lack of international explorers • Perception of SA as small mining jurisdiction compared to WA and QLD • Low number of operating mines
Opportunities/ideas	**Threats/risks**
• Collaborative, integrated approach to exploration, mining and processing – shared resources • Opportunity to engage early with all stakeholders, including traditional owners • Discovery of exceptional new copper deposits • Unlock the existing known resources of copper • Step up production in operating mines • Capitalise on technologies and infrastructure from other industries • Exploit reputation of SA as a safe place to invest • Develop modular construction services to reduce capital cost • Common infrastructure for new and existing projects • Technology to create 'clean' ore • Research technologies to reduce OPEX and CAPEX	• Companies as competitors – collaboration may be a risk • Community concerns about mining • High cost structures in Australia • Competition for investment funds • High entry costs due to deep cover over deposits • Global demand and copper price not reaching predictions • Impurities unable to be removed at competitive cost • Uncertainty in future of research funding • Loss of expertise and knowledge with changing economic landscape • Substitution of copper by other products • Loss of risk appetite for investors • Complacency as a 'leading jurisdiction'

A 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.



Olympic Dam processing

Contact

Department of State Development

Level 4, 11 Waymouth Street
Adelaide, South Australia 5000

GPO Box 320
Adelaide, South Australia 5001

T: +61 8 8226 3821
E: dsdreception@sa.gov.au

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