South Australian Resources and Energy Investment Conference

Dr Paul Heithersay
Adelaide
9 April 2019
To deliver affordable, reliable and secure energy supplies in a transitioning national energy market, and responsibly unlock the value and opportunities offered by South Australia’s mineral and energy resources.
Contribution of Mining and Energy Industries to Gross State Product

Current contributions to SA economy

- Minerals, Oil and Gas: $3.7Bn
- Manufacturing of Resources: $0.9Bn
- Mining Equipment, Technology and Services: $0.98Bn
- Energy Industries: $1.8Bn

Total Energy and Mining - $7.6 Billion

Source: REMPLAN Economy 2016-2017
South Australia’s Mines and Projects
South Australia
Mineral Industry Project Pipeline

MINERAL PROCESSING
3 Major Mineral Processors

MINES & DEVELOPING PROJECTS
$4.6 Billion Production
$150.7 Million Royalties

MINERAL PROJECTS
$955 Million Capital Expenditure

MINERAL EXPLORATION
$76.1 Million Exploration Expenditure

180 with 700+ companies mineral exploration licences

ASX Release

6th March 2019

Carr淄博ena Block Cave Expansion has potential to optimise value and further unlock the province

OZ Minerals Limited (ASX:OZL) is pleased to report it has completed a Scoping study on the Carr淄博ena Block Cave Expansion. The Scoping study shows that converting the lower portion of the Carr淄博ena Sub Level Cave Expansion to a block cave from 2030 may optimise value and further unlock the Carr淄博ena Site of Province Plan.
• Expansion plans to increase steel production to 1.8 mtpa
• Estimated capex $1.5 billion
• Progressing feasibility/business case for new pulverised coal injection plant & rolling mill
• Concept study underway for additional steel production of 10 mtpa
Mineral Lease Granted for Siviour

- Mineral Lease for Siviour Graphite Project granted by South Australian Minister for Energy and Mining
- Grant of Mineral Lease follows an extensive three-year period of preparation and review of all potential environmental, social, economic and technical aspects of the Siviour Graphite Project
Carrapateena Province
On schedule for first production in Q4 2019

PROJECT DETAILS

- 20 Year mine life from a plant operating at 4.25Mtpa*
- Average annual production: 65kt copper and 67koz gold*
- Bottom quartile LOM costs
- First production on track for Q4 2019; payback by 2024

FIRST LIFT OF CRUSHER CHAMBER

MINERALS PROCESSING PLANT

PROJECT STATUS

- Total decline development on track, reaching 10,600 metres at the end of January 2019
- Tjati decline entered basement granite and progressed towards first production level
- First lift of underground crusher level complete
- Processing plant and non-process infrastructure construction progressing well
- Operational readiness well progressed with early recruitment of key production positions and development of commissioning, ramp up and production processes and procedures

* These production targets must be read in conjunction with the production targets cautionary statement on slide 4
Carrapateena Province
Block Cave Expansion progresses to pre-feasibility

**BLOCK CAVE EXPANSION SCOPING STUDY COMPLETED**

- Conversion of the lower portion of the Carrapateena sub level cave to a block cave from 2026:
  - Increase in mine throughput rate from 4.25 Mtpa to 10–12 Mtpa*
  - Increase in life of mine average copper production to ~105–125 ktPA from 2026*
  - Reduction of life of mine all-in sustaining costs to ~US 90–95 c/lb
  - Access to higher grade bornite mineralisation via the top-down sub level cave followed by a bottom-up block cave

**PROPOSED MINE LAYOUT**

- Block cave expansion can occur without impeding existing sub level cave delivery, ramp-up or ongoing operation
- Pre-production capital of circa A$1.0 – A$1.3 billion
- Carrapateena Resource increased to ~587 Mt at ~0.8% CuEq** enabled by block cave option in lower portion
- Block Cave Expansion unlocks possible future value accretive options for the Carrapateena Life of Province Plan
- Sub level cave capital payback achieved before Block Cave Expansion major development spend

* These production targets must be read in conjunction with the production targets cautionary statement on slide 4
** Copper equivalent calculation can be found on slide 4
Oak Dam West discovery
IOCG mineralisation
Announced by BHP, Nov. 2018

425m @ 3% copper, 0.59 g/t gold + U + Ag

Inc. 180m @ 6% copper, 0.92 g/t gold
Lake Torrens Project
South Australian Copper to the World

- Accelerate exploration, **discovery** and information
- Develop **innovative** infrastructure, services and research
- **Engage** to build industry and community capacity
Copper growth forum

COPPER to the WORLD
2019 CONFERENCE

creating global Copper connections

17-18 June 2019
ADELAIDE

Copper growth forum

• **International Outlook for Copper**
  • Erik Heimlich CRU Chile

• **Technology and Innovation**
  • *Gavin Wood* – Chief Information Officer, Newcrest
  • *Katie Hulmes* - General Manager Transformation and Readiness, OZ Minerals
  • *Chris Barnesby* - General Manager, Surface operations at ODX
  • *Dr Alexander Schmitt* - Anglo American, Singapore

• **Opportunities for developing copper processing capability in Australia – Panel**
  • *Jacqui Mcgill* - former Asset President ODX
  • *Ian Dover* - A/CE METS Ignited
  • *Ray Shaw* - CSIRO Processing expert
  • *Simon Corrigan* - Community engagement expert

• **Discovering the Future**
  • *Holly Bridgwater* – Industry Lead, Unearthed
  • *Andrew Bailey* - CE, MinEx CRC
DISCOVER GOLD in SOUTH AUSTRALIA

SOUTH AUSTRALIA
Solid gold opportunities for discovery

- Exploration tools to open up new search spaces and reduce discovery risks.
- Diverse opportunities in mines and projects for investors and business.
- Responsibly sourced gold for our modern lives and future.

DiscoverGold@sa.gov.au
Exploration – momentum building

- Exploration approvals ↑ 37%
- Approved drill metres ↑ 31%
- Cu represents >50% of activity
  - IOCG’s, magmatic Cu-Ni, Sed-Cu, lode Cu-Co
- Fe-ore, Gold >25%
- also U, HMS, Zn, Co, C, Ag, diamonds, kaolin
• Next generation airborne magnetic and radiometric coverage for South Australia
• World’s single largest contiguous airborne TMI survey; 200m line spacing
• Value add products & collaboration to determine Optimum magnetic source solutions for depth to crystalline basement
Gawler Craton Airborne Survey

- Enhanced magnetic and depth modelling products.
- Hundreds of magnetic source depth solutions per GCAS block
Gawler Craton Airborne Survey

- New Data Releases:
  - Block 3B, Torrens
  - Block 9A, Childara
Geophysical targeting methodologies

- Spatial statistics to quantify correlations between magnetic and gravity responses
- Gravity and magnetic polygons over selected IOCG deposits/prospects
- Oak Dam West gravity high

Katona and Fabris, in press. GAC-MAC 2019, Quebec, SC Volume “Exploring for IOCG Deposits”
IOCG prospectivity - weighted ingredient mapping

Geological “pre-requisites”

- Fluid/metal primed lower crust – MT conductors
- Structural conduits – interpreted faults and shears
- Heat + metal sources – c. 1590 Ma plutons
- Contact between 1590 Ma magmatism and low grade volcano-sedimentary basins

Residual Gravity Anomalies - statistical clustering*

Anomalies ranked by geological pre-requisites

Geological pre-requisites + gravity anomalies weighted by clustering

*Katona & Fabris, 2019, in press (in Iron oxide copper-gold (Ag-Bi-Co-U-REE) and affiliated deposits, Corriveau, L., Mumin, A.H. and Potter, E.G., eds, Geological association of Canada, Short Course Note 21)

(based on solid geology)
National Drilling Initiative

Focus areas:
1. Fowler to Flinders – Gawler Craton
2. Curnamona Province
3. Delamerian Orogen
New Digital Library for all MER Publications and Maps

Contains MER’s 135 year history and future publications / maps in digital format

Available online for free download
- Publications from 1903
- Geological maps from 1886
- Technical Reports from 1888

Improved metadata for enhanced search capability

eBookshop provides an easy to use first point of access for searching and downloading of MER publications
Providing greater visibility and more efficient sharing of South Australian government geoscience data, services and products.
SARIG: New HyLogger™ data visualization

Improving data visualization
WPA Report released

- Report released 29 March 2019
- Australian Govt continues to support coexistence in the WPA
- Incorporates SA Govt recommendations
- SA interests continue on WPA Advisory Board
LEIGH CREEK REHABILITATION – FIELD TRIALS
Designing rehabilitation strategies with confidence

Areas of previous heating

Before rehabilitation and monitoring borehole installation May 2017

Post rehabilitation and monitoring borehole installation June 2018
Petroleum successes

Top in Oceania

PPI Score

- South Australia
- Western Australia
- Australia—Offshore
- New Zealand
- Malaysia
- Queensland
- Northern Territory
- Papua New Guinea
- Indonesia
- New South Wales
- Victoria
- Tasmania

Fraser Institute Global Petroleum Survey 2018

Policy perception index

PACE GAS

Two rounds of PACE gas has injected $48 million into exploration, driving excellent outcomes for domestic sales.

Cooper Basin

- Gas flowing from Senex-Santos-Beach Vanessa East pipeline.
- Santos-Beach re-fracture and underbalanced wells.
- Potentially significant discovery Gemba 1

Otway Basin

- Haselgrove 3 Discovery – a source of significant gas supply for local economy
SA’s Energy Transition Snapshot

• One of the world’s highest penetrations of renewable energy.
• 48% renewable energy generation in 2017/18.
  • 39% large scale wind (19 wind farms)
  • 9% solar PV
• AEMO projects ~73% renewable energy generation in 2020/21
• A pipeline of large scale wind, solar and energy storage projects > 14GW / $21B
• One of the most distributed grids globally
Currently operating

- 1,809MW wind
- 122MW utility solar PV

Under construction or development

- 4,000MW wind
- 5,700MW utility solar PV
- 2,700MW battery
- 1,400MW pumped hydro
- 190MW solar thermal/hydrogen turbine/biogas turbine/compressed air

"~ $4B investment"

"~ $21B investment"
Santos to convert 56 crude oil pumps to 100% solar and battery storage.
GFLOWS: Finding Long-term Outback Water Solutions

The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department for Environment and Water, CSIRO, Flinders University, the University of Adelaide, the University of South Australia and The International Centre of Excellence in Water Resources Management. The Institute enhances the South Australian Government’s capacity to develop and deliver science-based policy solutions in water management. It brings together the best scientists and researchers across Australia to provide expert and independent scientific advice to inform good government water policy and identify future threats and opportunities to water security.
Established South Australian Centre of Excellence in Predictive Analytics in 2016

Integrating innovative technologies developed by South Australian Companies into mining and energy operations nationally and globally.

Project partners
SANTOS
IPACS (a South Australian technology company), IBM, SKF, OSIsoft and Schneider Electric.

Project has created a South Australian-based commercial centre to service SANTOS and other resource companies using data analytics to lower the costs of production.
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