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Exploration comeback

Analysts cautiously optimistic for 2017

ELIZABETH FABRI

GLOBAL mining exploration expenditure has taken a dive for the fourth consecutive year, accounting for less than a third of the record-high 2012 spend and reaching an 11 year low.

In its March *Worldwide Mining Exploration Trends* report S&P Global Market Intelligence stated the budget for nonferrous exploration in 2016 declined 21 per cent year-on-year to \$US6.89 billion; however, it said the past three quarters have brought "signs of optimism" to the long struggling industry.

"Since last March, exploration companies have increasingly been able to raise funds, which represents a marked improvement over recent years," the report stated.

"Despite recent concern over the availability of finance as we enter 2017, S&P Global Market Intelligence is cautiously optimistic for the near term, and expects corporate exploration budgets this year to be flat."

Of the countries surveyed, Australian exploration contributed \$897 million or 13 per cent to the total.

With total spend 16 per cent below 2015, and share of global expenditure 1 per cent higher, Australia remained in fifth position behind Latin America, China/Russia, Canada and Africa, but overtook Canada as the top gold exploration destination for the first time since 2003.

"Western Australia was again by far Australia's most popular exploration destination, with 62 per cent of the country's total, and gold remained the top exploration target," the report stated.

"Although allocations were virtually



Image: Pilbara Minerals.

"WESTERN AUSTRALIA LED THE GROWTH, WITH EXPLORATION GROWING BY \$15 MILLION IN THE DECEMBER 2016 QUARTER TO \$263 MILLION; A 5.9 PER CENT INCREASE ON THE SEPTEMBER 2016 QUARTER."

CONTINUED ON PAGE 4

unchanged in 2016, gold's share of Australia's total budget jumped to 57 per cent from 48 per cent in 2015.

"The strong showing was mainly due to a 39 per cent decrease in the base metals budget, whose share of the total fell to 25 per cent from 35 per cent in 2015."

Australia was also the top destination for grassroots gold exploration, making up 16 per cent of the global grassroots budget.

The report called 2016 "a year of two halves" for the global economy, with recession concerns – peaking in June with the Brexit vote – giving way to an emphasis

on reflation through fiscal policy, and the subsequent "growth-friendly" election of Donald Trump.

The mining sector, in particular, saw a significant mid-year shift in sentiment, with attention switching from precious metals to industrial metals and minerals.

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SAMUEL BENNETT

WSP | PARSONS BRINCKERHOFF
DIRECTOR OF RESOURCES, AUSTRALIA & NEW ZEALAND

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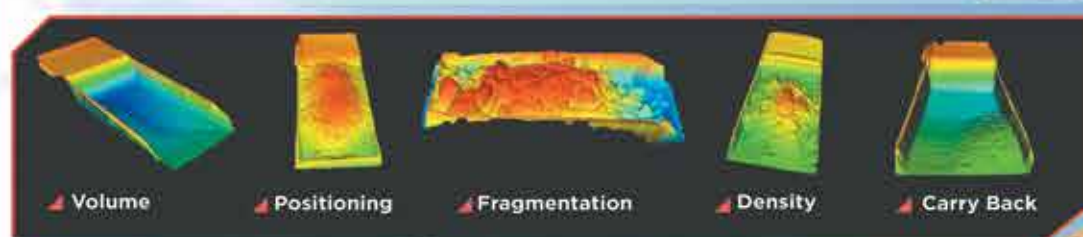
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Atlas is targeting a total export rate of 12mtpa by the 2018 June quarter. Image: Atlas Iron.

Atlas Iron approves Corunna Downs

CAMERON DRUMMOND

IRON ore junior Atlas Iron has approved the development of its Corunna Downs project in the WA Pilbara region.

Construction is expected to cost between \$47m and \$53m, funded from operating cash flow from amendments to its Term B loan facility.

Atlas managing director Cliff Lawrenson said it was a strong vote of confidence in Atlas by its lenders, some of whom were significant shareholders.

“Corunna Downs, together with Mt Webber, will rebuild our production rate to approximately 12mtpa after Wodgina and Abydos cease production in the first and second half of 2017 respectively,” Mr Lawrenson said.

“The amendments to the facility will enable Atlas to capitalise on current and future opportunities provided by the stronger iron ore price.”

Shipments from Corunna Downs were planned to commence in the March 2018 quarter at an initial rate of 4mtpa over a five to six year mine life.

Gascoyne raises \$50m for Dalgara

CAMERON DRUMMOND

WA-BASED gold explorer Gascoyne Resources has raised \$50 million to advance its Dalgara gold project in the WA Murchison region.

A feasibility study of the asset outlined a resource of 1.1 million ounces, with an annual production of 100,000oz over an initial six year mine life.

The company completed a bookbuild to raise the funds at an issue price of \$0.50 per share that was heavily oversubscribed, and announced it would raise up to a further \$5m at the same price as the placement through a share purchase plan.

Gascoyne said the funds would be applied towards the development of Dalgara, and for exploration and working capital.

“The overwhelming demand for this Placement from supportive shareholders and a large number of new well respected domestic and international institutional investors provides a strong endorsement of the quality of our high margin Dalgara gold project in the Murchison region of WA,” Gascoyne managing director Mike Dunbar said.

“The company is now in the strongest position it as ever been and we look forward to rapidly advancing the development of Dalgara for the benefit of our shareholders.”

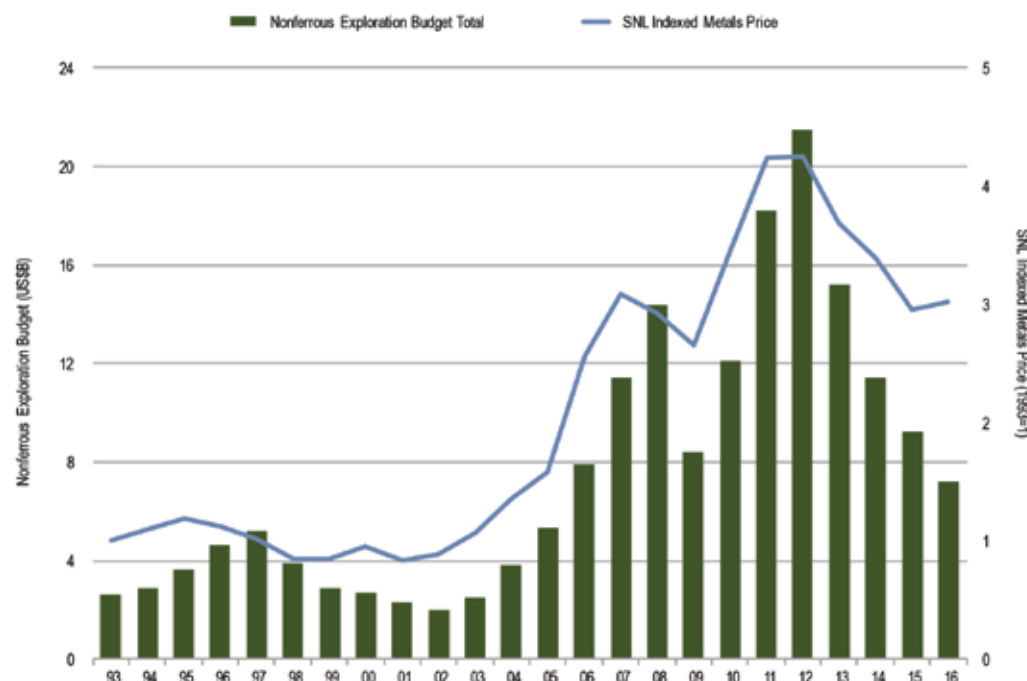
Gascoyne said it aimed to be in production at Dalgara by the 2018 June quarter.

Exploration comeback



Of the countries surveyed, Australian exploration contributed \$897 million or 13 per cent to the total.

Figure 1: Estimated Global Nonferrous Exploration Budgets



CONTINUED FROM PAGE 1

In the six months to the end of June, gold rose almost 25 per cent to \$US1,321/oz before retreating to about \$US1,135/oz; an increase over the whole year of just 7 per cent. This scenario was reversed for iron ore, thermal coal and copper; three of the most important industrial commodities.

Iron ore (62 per cent Fe) was up an impressive 26 per cent by mid-year, but accelerated during the second half to end 2016 up 79 per cent.

Thermal coal had risen 17 per cent by end-June and 69 per cent at year-end.

Similarly, copper was up 3 per cent at the mid-year point but ended the year up 17 per cent.

S&P Global Market Intelligence expected this to translate into a “small uptick” in the majors’ exploration budgets in 2017, while the aggregate exploration budget for junior explorers was expected to remain flat.

Data released by the Australian Bureau of Statistics in February confirmed Australian exploration was looking up, particularly in gold.

“The Australian Bureau of Statistics, Mineral and Petroleum Exploration release for the December 2016 quarter shows that total mineral exploration expenditure increased by 6.1 per cent to \$403 million,” Association of Mining and Exploration Companies chief executive Simon Bennison said.

“Western Australia led the growth, with exploration growing by \$15 million in the December 2016 quarter to \$263 million, a 5.9 per cent increase on the September 2016 quarter.

“The key statistics are brownfield versus greenfield exploration; to find the mines of tomorrow, Australia needs to boost its greenfields exploration.”

Mr Bennison said ABS results showed Australian greenfields mineral exploration

had increased.

“Greenfields drilling rose 22 per cent, while drilling in brownfields areas fell by 6 per cent in December 2016 quarter compared to the September 2016 quarter,” he said.

“The increase in greenfields mineral exploration is attributable to a number of factors, including improved commodity prices.

“The Federal Government’s Exploration Development Incentive (EDI) could also be having a positive impact on greenfields mineral exploration as intended.

“AMEC has called on the Government to rollover the funding for the EDI to 2017/18 and the Forward Estimates with the aim of increasing investment in greenfields mineral exploration.

“State and Territory exploration incentive schemes / co-funded drilling programmes also continue to be crucial in encouraging innovative mineral exploration in Australia, and generate significant economic returns for the economy.”



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IN BRIEF

Ausdrill secures
\$200m in contracts

WA

AUSDRILL has been awarded contract extensions at KCGM and Gold Fields operations valued at more than \$200 million.

The mining services provider's contract at KCGM's Super Pit had been renewed for \$143 million and would begin in March.

The company was also awarded a three year contract extension for exploration drilling at Gold Field's Granny Smith and St Ives gold mines, worth \$60 million.

"Ausdrill's relationship with KCGM and Gold Fields and our involvement at these three mines extends back to the very early days of our business," Ausdrill managing director Ron Sayers said.

"We are delighted to build on the relationships we have developed."

Blair Athol mine
to reopen

QLD

CENTRAL Queensland coal mine Blair Athol could reopen this quarter, and generate up to 600 jobs for the region after receiving State Government approval.

In February, the Queensland Government approved the transfer of mining leases for Blair Athol coal mine to TerraCom subsidiary Orion Mining, following its purchase from Rio Tinto for \$1 last year.

"The approval is subject to certain conditions in line with previous announcements," TerraCom stated.

"TerraCom is expediting the satisfaction of these conditions to enable completion of title transfer and commencement of mining and rehabilitation activities at Blair Athol Mine within this first quarter."

Monadelphous
secures WA
contracts

GOLD

ENGINEERING firm Monadelphous has secured multiple mining related contracts worth \$120 million, primarily in WA.

The company won two contracts with Fortescue Metals Group, for fixed plant crane services at the Solomon Hub in the WA Pilbara and the refurbishment of up to 900 ore wagons in Port Hedland.

It will also provide BHP Billiton with water treatment services for its Iron Ore Mining Area C operation in WA's North West.

A third contract with Chevron will see the company provide facilities maintenance services at the Wheatstone LNG project for 12 months.

Outside WA, it won a contract for the supply and delivery of steel works at Brolton Group's Hanson Bass Point quarry expansion project in Shellharbour, NSW.

MMG leadership shakeup



Jerry Jiao has been appointed MMG's new chief executive.

Image: MMG.

ELIZABETH FABRI

FORMER MMG chairman Jerry Jiao has been named the company's new chief executive, following the resignation of long-time boss Andrew Michelmore.

On 15 February Mr Jiao stepped down from his role as chairman, and was replaced by former MCC Group chairman Guo Wenqing.

Mr Jiao has served as director on MMG's board since the company's inception in 2006 and was appointed chairman in 2014.

"I am excited by the opportunity to lead this dynamic company - underpinned by

quality assets and talented people," Mr Jiao said.

"We remain as committed as ever to growing our business and to delivering value for our shareholders, our employees and our communities."

Mr Jiao said after eight years at the helm of MMG, Mr Michelmore handed over the business in very good health.

"Andrew has been an inspirational and tireless leader who has shepherded the company from its beginnings as Minerals and Metals Group in 2009, public listing as Minmetals Resources Limited, rebranding as MMG and the successful acquisitions of Kinsevere and most recently, Las Bambas,"

he said.

Mr Michelmore would continue with MMG until 1 July to assist with the transition and said his decision to retire was not an easy one.

"Over the past eight years we have built a unique company and I am particularly pleased to be handing over to Jerry, a founding member of MMG and, since 2014, our Chairman," Mr Michelmore said.

"It was Jerry with whom I held the first discussions regarding the creation of MMG. Jerry has been critical to the MMG strategy and the business model is in Jerry's blood. He is uniquely placed to steer the business forward."

NRW awarded Pilgangoora contract

CAMERON DRUMMOND

LITHIUM developer Altura Mining has awarded NRW Holdings a \$110 million contract for mine development and drill and blast services at its Pilgangoora lithium project in the WA Pilbara region.

The scope of the work includes construction of the mining infrastructure, development of mine haul roads, drill and blast services, and load and haul production mining of ore and overburden.

The award is subject to Altura completing project funding for the development of Pilgangoora as part of the final investment decision.

NRW said it would use existing mining assets for the project and expected to mobilise this month, with up to 60 personnel employed on site.

"NRW is delighted to be awarded the mining contract by Altura to develop their new lithium mine in the Pilbara," NRW chief executive Jules Pemberton said.

"We have gained significant knowledge and capability over the years in the now rapidly expanding lithium sector through our subsidiary, Action Drill and Blast, who have been performing the drill and blast services contract in Greenbushes for Talison Lithium since 2011."



Altura aims to be Australia's next lithium provider.

Altura said it was well positioned to commence commissioning of the project by the December quarter this year.

"The design for the process plant is progressing well and the project and

procurement teams continue to advance a number of key tenders which will enable construction works to commence by the end of Q1 2017," Altura said in a statement.

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At the peak of its construction, the Amrun project will provide work for about 1100 people.

Rio awards \$67m in Amrun contracts

CAMERON DRUMMOND

RIO Tinto has awarded two more contracts worth \$67 million as part of the development of its \$2.6 billion Amrun bauxite project near Weipa on the Cape York Peninsula.

A \$45m contract to build a dam for the mining operation was awarded to the QLD division of construction company Fulton Hogan.

Rio said the 10.9 gigalitre Arraw dam would create 120 jobs for local workers during construction.

Fulton Hogan will develop the impoundment area, embankment and intake infrastructure for the dam and other critical supporting infrastructure including the spillway, fishway and access corridor.

Fulton Hogan chief executive Peter Kessler said the company was delighted to bring its dam building technology to the Amrun project.

"Our construction teams are experienced in the challenges of working in a bulk water environment and strictly share Rio Tinto's commitment to a safe work environment," Mr Kessler said.

The work was expected to begin this month.

A second contract worth \$22m was awarded to facilities management provider Sodexo to supply camp management services to the project, and includes an Indigenous employment target of 20 per cent within two years.

A letter of intent was also signed for Sodexo to provide integrated facilities management services at mine sites at Weipa and Gove in the Northern Territory.

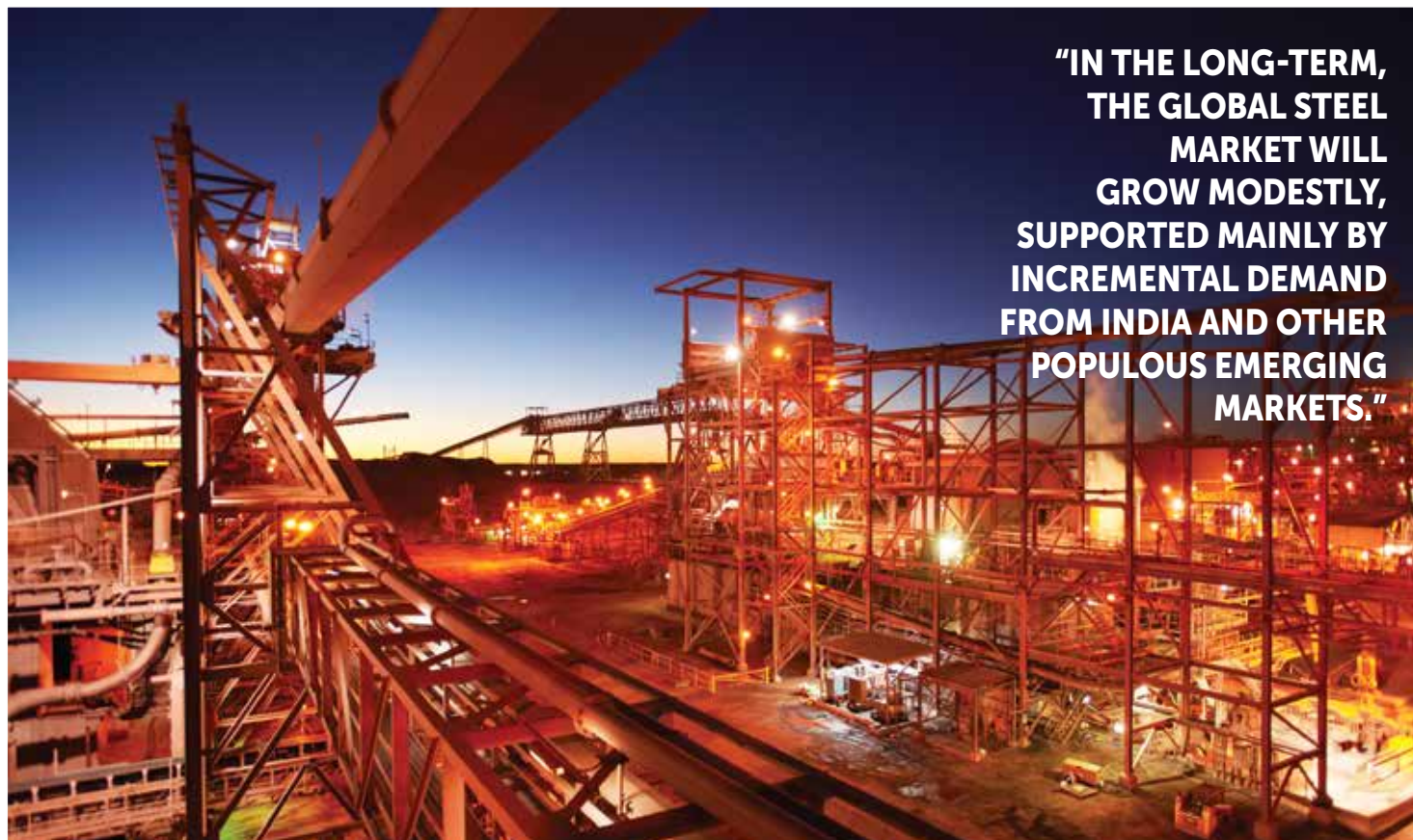
Rio Amrun project general manager Marcia Hanrahan said facilities management would be critical to the ongoing success of Amrun operations.

"We are very pleased to work with Sodexo to provide the safest and most comfortable environment for our people living and working onsite," Mr Hanrahan said.

"Sodexo is committed to achieving our Indigenous employment targets and will also work closely with local businesses to identify associated subcontracting opportunities."

Production and shipping from Amrun was expected to commence in the first half of 2019, ramping up to full production by the end of the year.

BHP back to profit



"IN THE LONG-TERM, THE GLOBAL STEEL MARKET WILL GROW MODESTLY, SUPPORTED MAINLY BY INCREMENTAL DEMAND FROM INDIA AND OTHER POPULOUS EMERGING MARKETS."

A doubling of iron ore prices helped BHP swing back into profit for the second half of 2016.

CAMERON DRUMMOND

BHP has reported a half year profit of \$US3.2 billion, facilitated by a broad-trend commodity price resurgence and operational cost reductions.

Results from the world's biggest miner were slightly better than analysts' expectations of \$US3.1bn.

Its underlying profit for H2 2016 surged to \$US3.2bn from \$US412m year-on-year due to higher than expected commodity prices and cost reductions across its operations.

This marked a huge turnaround from BHP's first reported half year loss in 16 years of \$US5.67bn, recorded in H1 2016.

"This is a strong result that follows several years of a considered and deliberate approach

to improve productivity and redesign our portfolio and operating model," BHP chief executive Andrew Mackenzie said.

"Our steadfast commitment to this plan has positioned us to take full advantage in a period of higher prices with underlying EBITDA up 65 per cent to US\$9.9 billion."

The company's overall commodities outlook was positive, with continued growth expected for iron ore, coal, copper, oil and gas during 2017.

BHP's average realised sale price of iron ore in H1 2017 had increased 28 per cent compared to the same reporting period last year, as strong prices were boosted by increased Chinese manufacturing.

Steel production, although tipped to weaken in China, was expected to grow modestly elsewhere.

"Steel production in the rest of the world is likely to improve marginally, led by India," the company said.

"In the long-term, the global steel market will grow modestly, supported mainly by incremental demand from India and other populous emerging markets."

BHP declared an interim dividend of 40 US cents per share, up from the 16 US cents dividend it paid for the same period last year.

"We are confident in the long-term outlook for our commodities, particularly oil, with markets expected to rebalance in the near-term and copper where we expect a deficit to emerge in the early 2020," Mr Mackenzie said.

"We have the right settings in place to substantially grow shareholder value."

South32, AusQuest form alliance

ELIZABETH FABRI

SOUTH32 has signed an agreement with AusQuest to develop high-potential exploration opportunities in Australia and overseas targeting copper, zinc and nickel.

Under the deal, South32 would fund exploration activities over at least five AusQuest projects in Australia and Peru, which would be offered exclusively to South32 over a three year time frame, subject to financial conditions.

Projects of interest included Jimberlana and Balladonia/Gibson Soak nickel-copper projects and the Blue Billy Project in WA, and Chololo and Los Otros porphyry copper prospects in Peru. AusQuest said a work program and budget to advance each project to a drill-ready stage would be agreed by the parties and South32 would make payments of at least \$US250,000 per project up to a maximum of \$US500,000.

Programs costing more than \$US500,000 could be undertaken with agreement of both parties, with funding above \$US500,000 reducing the \$US4.05m expenditure required under the Joint Venture Agreement for South32 to earn a 70 per cent interest in each project.

To earn an 80 per cent interest in a project, South32 would also have to complete



AusQuest carrying out works at its Fraser Range prospects.

Image: AusQuest.

a pre-feasibility study.

"We are looking forward to working with AusQuest on potential opportunities to generate low cost entry points for early stage exploration, outside our existing portfolio," South32 chief executive Graham Kerr said.

AusQuest managing director Graeme Drew said the alliance would leverage its skills as an explorer and was a unique opportunity for the company to work alongside one of the world's most diversified miners.

"The agreement is structured to give

AusQuest the financial capability to identify and evaluate opportunities as well as rewarding the company for success along the way," Mr Drew said.

"The immediate injection of exploration funds across a number of projects in our portfolio will allow us to get on with the job of generating and evaluating prospects, advancing them to drill-ready status which is where the real value will be.

"We are looking forward to working with South32 to build a quality pipeline of exploration opportunities."

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IN BRIEF

WEARX appoints new tech manager

APPOINTMENT

MINING services company WEARX has named Tobias Krull as its new Innovations and Technology manager.

Previously holding a general management position at TURNA Bulk Solids, Dr Krull has been brought on to help grow the internal technical, research and testing divisions, and cement the company's status as a market leader in wear solutions.

"WEARX is privileged to have Tobias joining us, bringing his skill set, leadership, and an in-depth understanding of bulk material handling engineering, enabling us to reach the next level in transfer solutions," WEARX chief executive Gary Newman said.

Neometals to recover cobalt from laptops, phones

LITHIUM

LITHIUM developer Neometals has advanced its research into processing lithium-ion batteries to recover high value materials at its Montreal laboratory.

The company has co-developed a technology to economically recover high-value cobalt (99.2 per cent recovery) as a material that can be recycled within the battery manufacturing chain.

Neometals said it now planned to invest in a continuous operation, pilot-scale hydrometallurgical plant at its Canadian lab and proceed with a feasibility study for the technology.

"Here the opportunity is to provide an environmentally and ethically responsible, end-of-life solution by recycling the lithium units we produce – urban mining," Neometals managing director Chris Reed said.

Clean coal advertising campaign launched

COAL

A NEW Australian coal advertising campaign – *Coal: Making the future possible* – highlights the role that high efficiency, low emission (HELE) coal-fired generation plants provide in reducing emissions.

Asia has embraced clean efficient, HELE coal-fired generation with some 725 units in place while a further 1,142 installations are under construction or planned, according to Minerals Council of Australia Coal executive Greg Evans.

"HELE coal-fired generation is significant as it emits up to 40 per cent fewer emissions than the oldest technology in place," he said.

"Furthermore, the most modern plants are using accompanying technology to reduce all other emissions including particulates to levels that comply with the most stringent urban air quality requirements."

Unmanned drone trial



Image: Airobotics.

The Airobotics drone system is made up of three components; a drone, airbase and cloud-based software.

ELIZABETH FABRI

SOUTH32 will begin autonomous drone trials at its Worsley Alumina project in WA in an effort to capture new insights and data across its operations.

The company will trial Israeli-based company Airobotics' fully automated, multi-purpose drone solution; a state-of-the-art drone technology capable of unmanned programmed missions to inspect equipment, conduct surveying and mapping on site.

While South32 had been using drones at its operations for more than three years, the miner said this was the first trial using fully-automated, multi-purpose technology.

"Some of our current day-to-day drone

applications include stockpile and pit scans, communicating plans using 3D models with point and photography data, inspecting confined spaces and infrastructure, incident investigations and environmental (fauna and flora) monitoring," a South32 spokesperson said.

"Across the business we're identifying opportunities where technology can help drive productivity and enhance safety.

"The autonomous drone has the benefit of being able to fly more regularly than drones that need operator intervention to take off and land.

"It is set up to provide continuous capture and feed of data in real time, and can also change its own battery pack and sensors.

"For example, it can change its lens from normal photography to infrared."

Airobotics co-founder and chief executive Ran Krauss said the project was a significant achievement for the company.

"The launch of Airobotics' automated drone platform at South32 marks an important milestone, being the first deployment for Airobotics in Australia," Mr Krauss said.

He said the drone platform was the first of its kind in the global market and included a high capacity drone, automated base station and cloud based software and didn't require a pilot for operation.

South32 would launch the drone from the freestanding base station, and send the drone on a pre-programmed mission for up to 30 minutes to collect aerial data.

At the end of the mission, the drone would return to the base, and a robotic arm would replace its battery and payload.

Hybrid truck tech at New Acland

ELIZABETH FABRI

NEW Hope Group will trial a diesel and natural gas hybrid truck at its New Acland Queensland coal mine over the next 18 months as part of a move to reduce costs and truck emissions.

Developed by Mine Energy Solutions, the High Density Compressed Natural Gas truck runs on an advanced dual fuel system and was developed to support a full work shift of 12 hours in line with New Acland's regular equipment on site.

"So far the hybrid truck has performed to the same engine and truck performance as New Acland's regular diesel-fuelled trucks," Mine Energy Solutions Mine Integration manager Bernie Ford said.

"The new dual fuel system overcomes the weight and space limitations of conventional Compressed Natural Gas and the cryogenic complexities of Liquefied Natural Gas.

"In addition to significant cost savings, we're confident the hybrid truck will also reduce vibration and noise levels compared to standard mining industry trucks."

To support the trial, a natural gas re-fuelling station had also been installed at the mine.

New Acland general manager David Vink



The new High Density Compressed Natural Gas truck will be trialled at New Acland over 18 months.

said New Acland had a long track record as an industry leader in mining innovation.

"This new hybrid truck trial follows a string of other successful New Acland innovations like the introduction of the Wirtgen Surface Miner for thin seam mining and the use of 4G equipped surveying

drones in the controlled airspace above our operation," Mr Vink said.

"Mine Energy Solutions shares our commitment to innovation so we've really enjoyed working with them to get this new hybrid technology up and running at New Acland."

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IN BRIEF

Endeavour extends Karma mine life

NORTH AMERICA

CANADIAN gold miner Endeavour Mining has extended the life of its Karma gold mine to 10 years after infill drilling at the project's North Kao deposit converted a maiden resource of 314,000oz to 262,000oz of gold reserves.

Endeavour chief executive Sébastien de Montessus said the company had been confident in its exploration potential and ability to quickly extend the project's mine life.

"Following the conversion of resources at North Kao to reserves, Karma now meets our strategic portfolio criteria of having a minimum life of 10 years and ability to produce at all-in sustaining costs (AISC) below \$US850/oz," Mr de Montessus said.

Lithium Australia to form JV

GERMANY

LITHIUM Australia (LIT) and German-based Tin International AG have signed an agreement to form a Joint Venture to extend and upgrade the Salisdorf resource in Saxon, Germany.

Under the agreement, LIT can earn a 15 per cent interest by spending EUR 750,000 on exploration until the end of 2017, and up to 50 per cent through investing a further EUR 1.25 million over a three-year period.

"Sadisdorf has mine openings, historic tin production and a well identified lithium halo through and around the JORC Resource," LIT managing director Adrian Griffin said.

"This is a great opportunity to establish a substantial lithium resource to feed a Sileach processing facility in Europe."

Axiom moves toward first production

SOLOMON ISLANDS

AXIOM is raising up to \$6.9 million to push the Isabel nickel project in the Solomon Islands towards production.

With drilling program progressing to deliver a resource estimate, the company is aiming to commence mining in 2017, subject to licensing.

"We have recently made significant progress in advancing our position for the opening of mining of the world class Isabel Nickel Project on both San Jorge and Kolosori deposits – and so this funding transaction has been specifically designed to maximise the opportunity to shareholders," Axiom chief executive Ryan Mount said.

"This progress coupled with the increasingly tightening supply for nickel ore by the recent closure of nickel producers in Indonesia and the Philippines, Axiom is poised to be a significant supplier to this demand."

Work suspended at Grasberg



The Grasberg open pit and Freeport's original Contract Of Work (COW) area (inset).

Image: By Alfindra Primaldhi.

REUBEN ADAMS

MINING giant Freeport-McMoRan has suspended work at the world's largest gold mine, Grasberg, after a dispute with the Indonesian Government over concentrate exports and other matters related to its Contract of Work (COW) were not resolved.

Indonesian government regulations passed in January and February 2017 required Freeport to terminate its COW and convert to a special license (IUPK) in order to export its concentrate production.

The company disputed Government attempts to enforce this regulation as a violation of its COW, and stated that it was "unwilling to terminate its COW unless replaced by a mutually acceptable form of agreement providing fiscal and legal assurances to support its long-term investment plans in Papua, Indonesia".

Freeport estimated that for each month of delay in obtaining approval to export, Freeport share of production was projected to be reduced by 70 million pounds of copper and 70,000 ounces of gold.

In late February, Freeport announced that as a result of the standoff it would be proceeding with its plan to suspend investments in Papua, reduce production by about 60 per cent from normal levels, and implement cost savings plans involving significant reductions in its work force and spending levels with local suppliers.

"Despite extensive efforts to reach an agreement with the Government, we have been unsuccessful in achieving a resolution that would avoid the negative impacts for all stakeholders, especially for our workforce and the local economy," Freeport president and chief executive Richard C. Adkerson said.

"We are simply asking the Government to

honour our legally binding contract. We urge the Government to honour the contract and demonstrate that the Country remains open for foreign investment.

"This would be in the best interests of all stakeholders, including the Government of Indonesia, our large work force, the local community, local suppliers and Freeport's shareholders."

Freeport, the world's biggest publicly listed copper producer, warned it could take the Indonesian government to arbitration and seek damages over the contractual dispute, according to *Reuters*.

The two sides have 120 days to settle their differences before heading to arbitration.

According to the *Jakarta Post*, the Indonesian Government is preparing state-owned aluminium producer PT Indonesia Asahan Aluminium (Inalum) to manage the massive Grasberg operations if Freeport decides to exit.

\$51m raised for Brazil project

CAMERON DRUMMOND

PERTH-based gold miner Beadell Resources has tapped investors to the tune of \$51 million for exploration and upgrades to its Tucano mine in northern Brazil.

The company raised \$46m through a share placement of 159 million shares at 29 cents each, and planned to raise a further \$5m via a share purchase plan at the same price.

Beadell said the funds would be used for long lead items such as a ball mill associated with the design and construction of plant upgrades at Tucano.

"The support of our major shareholders allows us to continue exploration and mill upgrades that are vital to maximising the returns our shareholders will enjoy from the Tucano mine," Beadell chief executive Simon Jackson said.

"With a strong balance sheet, a virtually unexplored greenstone belt and a pathway to a fully optimised project with a long life and significant production profile, the outlook for Beadell is exciting.

"We are delighted with the strong support received from leading domestic and international institutional investors and in particular we are pleased with the backing of a major UK institutional shareholder as cornerstone investor to the placement."



The Tucano gold mine processing plant.

Image: Beadell Resources.

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Lucapa uncovers 227ct diamond

ELIZABETH FABRI

ASX-listed Lucapa Diamond Company has discovered a 227 carat diamond at its Lulo mine in Angola, taking the company's tally of 100ct plus diamonds found at the mine up to seven.

The Type IIa D-colour gem was recovered from the new mining area 28 at Lulo, and is the second largest diamond recovered in Angola to date behind the 404c 4th February Stone discovered last year.

The stone was also the largest recovered from the company's new XRT large-diamond recovery circuit commissioned in the December quarter.

Lucapa managing director Stephen Wetherall said the company was delighted to uncover the stone within a week of their one year anniversary of the 4th February Stone find.

"We are also delighted to have recovered this spectacular diamond from a new mining area at Lulo which is 4km from the prolific Mining Block 8 area," Mr Wetherall said.

"This further underlines the potential there is for the remainder of the about 50km stretch of the Caculo River to continue to produce large valuable alluvial diamonds.

"The recovery of the 227 carat diamond through the new XRT circuit also vindicates our investment in this large diamond recovery technology, which will have more than paid for itself with the recovery of this one stone alone."



The 227 carat diamond is the second largest diamond recovered from Lulo mine.

Image: Lucapa Diamond Company.

Lucapa also uncovered a 62ct diamond from the Mining Block 25 area at Lulo in February, further bolstering the region's

resource wealth.

"We look forward to the remainder of 2017 with great excitement as we

continue to advance our kimberlite drilling and alluvial mining operations at Lulo," Mr Wetherall said.

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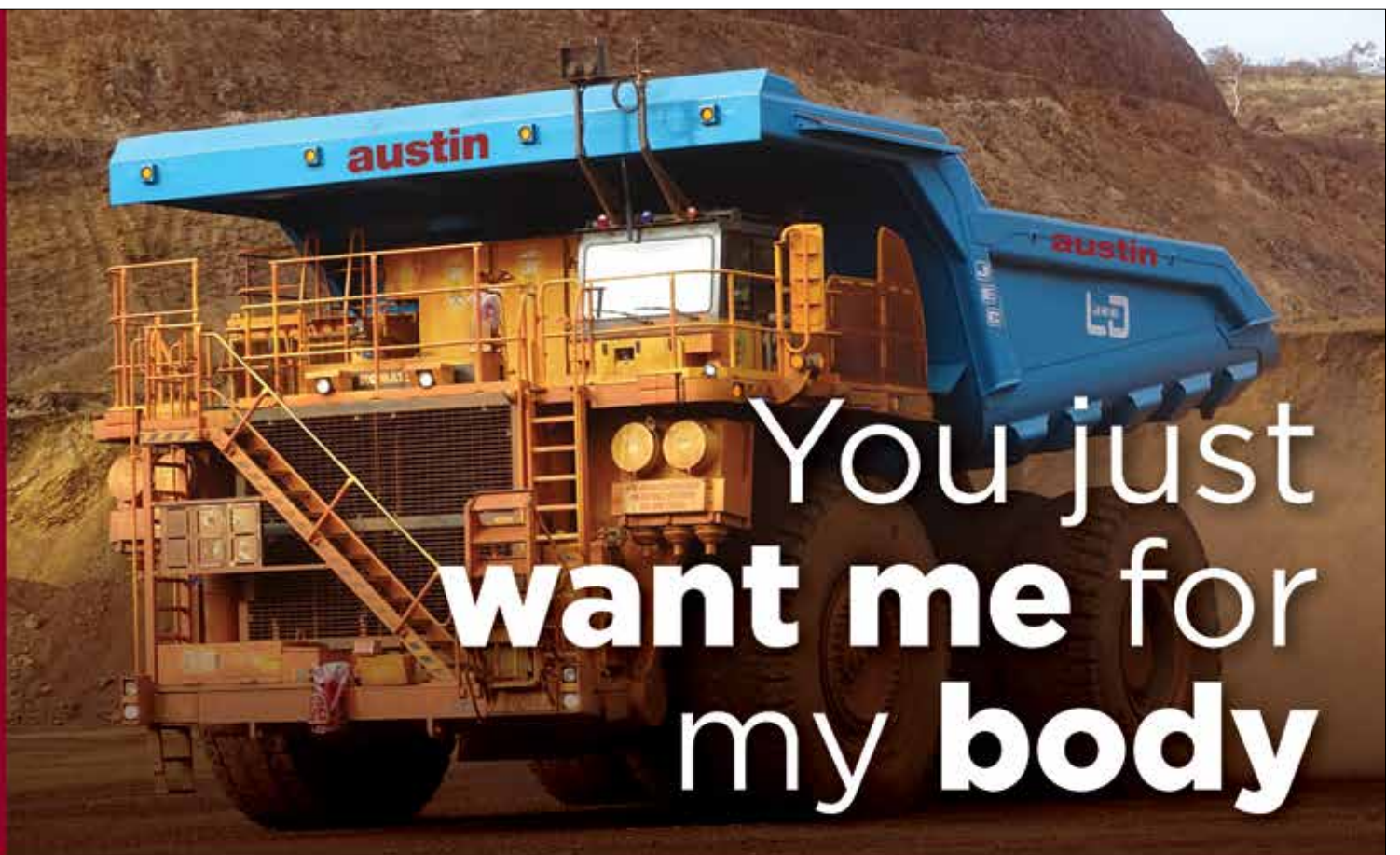
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Silver Mines progresses Bowdens

CAMERON DRUMMOND

ASX-listed Silver Mines owns the Bowdens project in central NSW, one of the largest undeveloped silver mines in the world.

The project, 26km east of Mudgee, has a silver resource of 134 million ounces across 408,000 acres.

Silver Mines bought an 85 per cent stake of the Bowdens silver project from Kingsgate Consolidated in mid-2016 for \$20 million, and in December raised \$5m to acquire the remaining 15 per cent after being impressed with drilling results.

During the 2016 December quarter, Silver Mines completed airborne surveys covering 20,000 line kilometres across the 1654sqkm tenement area, together with 15,000m of diamond drilling that confirmed multiple high-grade silver zones at Bowdens.

With a cash balance of \$7.3m at the end of 2016, Silver Mines planned to further expand the resource.

The company said it would continue exploration drilling programs for the first half of 2017 and expected a feasibility study of Bowdens to be completed by the middle of the year.

Production down at Cannington

CAMERON DRUMMOND

PRODUCTION at South32's Cannington project declined 27 per cent from 11.9moz in the first half of FY16 to 8.7moz in FY17.

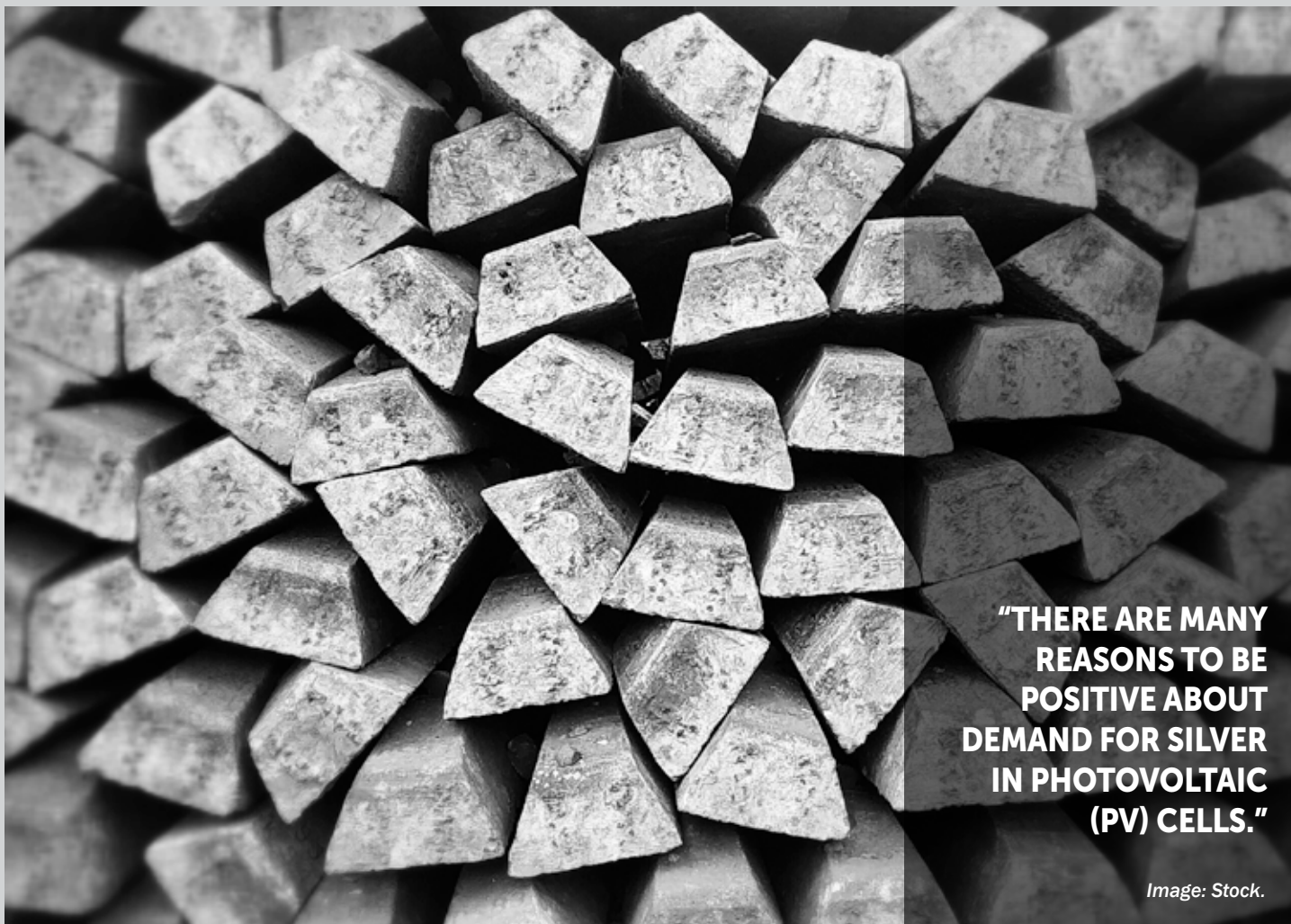
The project, near Townsville, QLD, is the world's largest primary silver mine and processes about 3.3 million tonnes of ore each year to produce about 20moz of silver.

However the company expected production to the end of June would increase and be able to produce 19.05moz of silver for FY17, near the FY16 amount of 21.4moz.

"Silver and lead grades are expected to increase significantly in the June 2017 half year as a higher grade stope in close proximity to the existing underground crusher chamber is scheduled to be extracted towards the end of FY17," South32 said in a statement.

The drop in production at Cannington can be put down to declining silver grades over the years.

The average silver ore grade from the turn of the millennium was 636 grams per tonne (g/t), declining to just 255g/t in 2016.



"THERE ARE MANY REASONS TO BE POSITIVE ABOUT DEMAND FOR SILVER IN PHOTOVOLTAIC (PV) CELLS."

Image: Stock.

The silver lining

It is traditionally found in coins and the window of the local jewellery store, but the applications of silver are far more widespread, as it is increasingly utilised in electrical and industrial applications from ethylene oxide (EO) to photovoltaics.

ELIZABETH FABRI

SITTING at about \$US18 an ounce mid February, silver has enjoyed a steady climb over the last 12 months, much like gold.

On 13 January last year the metal's spot price had plummeted to a depressed \$US13.87 an ounce, but by 3 July had peaked to \$US20.71 on the back of Brexit.

"Despite being another volatile year for global commodity markets, with many of the commodities surveyed being hit with further price decreases, the safe haven assets of gold and silver offered much needed upside opportunities for Australian investor portfolios," Deloitte WA Clients & Markets Partner Tim Richards said in a Diggers and Dealers presentation last year.

"Gold and silver were the stand out performers showing a substantial price increase of 13per cent and 18per cent during the year and even higher on an Australian dollar basis, with the uncertainty in the commodities market and the Brexit evidently working to their advantage as investors took refuge in the safe haven commodities."

While prices have lulled to a more modest \$US17 and \$US18 since, industry analysis suggests a sterling year for silver.

Characterised by its white appearance and malleable and conductive qualities, silver has many uses, most notably in monetary coins and jewellery, and more recently ethylene oxide (EO) and photovoltaics for solar energy.

Over the years the metal's spot price has run in tandem with gold, making it an attractive, and more affordable option for investors.

Almost half of mined silver comes from North and South America with most silver emerging as a by-product of mining other metals such as gold, and lead/zinc.

"Silver continues to trade positively,

"WE ESTIMATE THAT MINE SUPPLY PEAKED IN 2015 AND WILL TREND LOWER IN THE FORESEEABLE FUTURE."

breaking up above the 61.80 pct Fibonacci retracement of the Nov-Dec down move, and now heading for the 61.80 pct retracement of the Sep-Dec move down," ABC Bullion general manager Nicholas Frappell said in his 17 February weekly report.

"Targets proliferate at the US\$18.70-79 and US\$19.10 level, and further resistance is anticipated at the top of the Weekly Cloud which is currently around US\$18.61, but more likely to be intercepted at the US\$18.78 mark."

On the supply side, silver mine supply was expected to decline, while scrap levels were estimated to stabilize, The Silver Institute found.

"We estimate that mine supply peaked in 2015 and will trend lower

in the foreseeable future, [and] supply from scrap is expected to stabilize around 2016 levels in the medium term," The Silver Institute stated in its *The Silver Market in 2016* report published in November.

"Declining total supply is expected to be a key driver of annual deficits in the silver market going forward."

However, it said physical demand was expected to pick up again (in Europe) supported by short term falling prices, while PV demand in the solar sector was expected to continue to be a star performer of industrial offtake, driven by capacity expansions in China.

In December it stated 600 million ounces of silver would be consumed in photovoltaics and ethylene oxide production through to 2020.

"There are many reasons to be positive about demand for silver in photovoltaic (PV) cells," The Silver Institute stated.

"The number of solar panel installations is forecasted to rise steadily in the coming years as a result of a combination of carbon emissions legislation, government policies and a decrease in the cost per gigawatt of electricity generated using PV.

"This will bring about substantially increased silver consumption despite slow and steady declines in the amount of silver used per individual solar panel.

"2018 will be a bumper year for silver demand in PV due to the construction of a record number of solar arrays; silver use in PV in 2018 is expected to be some 75 per cent greater than in 2015."

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**"GIVEN PREVAILING
IRON ORE PRICES,
IRON HILL SHOULD
BE A SOLID CASH
GENERATOR OVER
ITS LIFE."**

All Images: Mount Gibson.

The Extension Hill crushing plant where ore from Iron Hill will be processed.

Bounce back

With final approvals and offtake agreements in place, Mount Gibson's Iron Hill project is ready to lift off within the next few months as the company transitions from the nearby Extension Hill mine.

CAMERON DRUMMOND

MOUNT Gibson Iron is an independent Australian iron ore producer with assets in the Kimberley and Mid West regions of WA.

The company is one of Australia's largest hematite exporting companies and owns the Iron Hill and Koolan Island operations.

Iron Hill

On 9 February, Mount Gibson received final statutory approvals for its Iron Hill project, which has a total mineral resource of 8.8 million tonnes grading at 58.3 per cent Fe.

Mount Gibson said it would mine between 5.5m and 6m wet metric tonnes (Mwmt) until the end of production in late 2018, at an estimated cash cost of between \$46/wmt and \$48/wmt.

Mount Gibson chief executive Jim Beyer said the company was very pleased to gain the final approvals required for Iron Hill, which was the successful culmination of a huge effort by its permitting team since the initial application was made more than two years ago.

"Obtaining these approvals in a large part reflects our proven record of, and ongoing commitment to, responsible resources



Koolan Island will undergo evaluation in the hope the mine will be eventually restarted.

development in the state's Mid-West and Kimberley regions," Mr Beyer said.

Just before Christmas last year, the company signed an offtake agreement with Chinese steelmaker Shougang Corporation for the purchase of about one quarter of first annual production from the company's fledgling Iron Hill mining operation.

The agreement was Mount Gibson's third offtake for the project, bringing the total commitment for Iron Hill's first annual production to 70 per cent.

"This agreement further emphasises Mount Gibson's excellent relationship with Shougang, which has been a strong and supportive shareholder and customer

of our company for many years," Mount Gibson chief executive Jim Beyer said.

Because Iron Hill is just 3km from the Extension Hill mine, it allowed the company to utilise the depleted mine's workforce of about 160 staff and contractors along with existing camp, processing and transport infrastructure for the project.

For the company, it represents a low-cost production opportunity for its Mid West business, with development costs flagged at between \$2m and \$3m.

"Iron Hill represents an important extension of production from our Mid West operations, given mining was completed at Extension Hill last November, and we have been relying on sales from high and low grade stockpiles since then," Mr Beyer said.

"We now look forward to rapidly developing this attractive high value, low-capital production opportunity, thereby extending the life of our Mid-West business.

"Given prevailing iron ore prices, Iron Hill should be a solid cash generator over its life."

First ore sales from the project were targeted for May this year.

CONTINUED ON PAGE 20

A Fresh Approach

NOW celebrating 50 years in business, Morris provides village and asset management services to the mining and construction sectors.

The company is currently providing its services at Mount Gibson Iron's Koolan Island, Extension Hill and Perenjori operations.

Morris offers its clients the "Fresh Approach", which is about hospitality (rather than a traditional mine site offering) and an authentic desire to embed the practices and touches that really do make a difference.

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Being a service provider to Mount Gibson Iron is no different, as Morris took this "Fresh Approach" and 3B philosophy, and implemented it across all three sites.

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The Morris team during mobilisation.



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CONTINUED FROM PAGE 18

Koolan Island

In November 2014, operations at Mount Gibson's Koolan Island iron ore mine were suspended when a seawall collapsed and flooded the main pit.

This was a dramatic event for the company and led to the closure of the mine and the loss of 360 jobs.

The company had since been negotiating an insurance payout, and in June 2016 secured \$86m for damage caused to property at the mine, although this did not include business interruption costs.

Since then, Mount Gibson had been focusing on evaluating the potential for a restart at Koolan Island.

In the September quarter last year, \$1.5m was committed to undertake detailed design for the seawall as well as the design of the mine and production scheduling to achieve a material reduction in the average strip ratio.

Mount Gibson indicated a restart at Koolan Island would need to achieve key technical and operating parameters to make the project viable.

The main pit would need to be reinstated safely and in an economically feasible manner; total redevelopment costs would need to be less than \$90m; sufficient ore reserves to produce at least 15mt of hematite ore over a period of 3 to 4 years (above 62 per cent Fe); and an average life of mine strip ratio less than 3:1.

Even with such stringent parameters, the company said it remained positive about a potential restart at Koolan Island.

"We remain upbeat about the high quality production potential that remains at Koolan Island due to the extremely high quality and grade of the hematite mineralisation remaining in the main pit deposit if we can confirm a safe and economically viable means of rebuilding the main pit seawall," Mr Beyer



Mount Gibson chief executive Jim Beyer.

said.

"We remain on track to complete our evaluation work and make a determination on whether to proceed during the current March 2017 quarter.

"Obviously, there can be no formal timeline until such time as that work has been completed and a decision has been made, however, as a rough guide, we would anticipate that ore production would be achievable approximately 18 months after any formal decision to proceed.

"On that basis, a positive study outcome by the end of March could potentially see production at Koolan Island resume by late 2018, around the time that our Iron Hill project would be winding down.

"However, such projections remain entirely speculative at this time – we really won't know until we have completed our evaluation work and are absolutely comfortable that the seawall can be reinstated safely," Mr Beyer said.



The Extension Hill mine.

Extension Hill

During the December quarter, Mount Gibson completed mining at its Extension Hill operation as scheduled, with run-of-mine ore stockpiled during the last stage of mining to continue processing into 2017 as the company transitioned its infrastructure assets to be utilised at Iron Hill.

Shipments through Geraldton Port totalled 0.8Mwmt, comprising 362,000wmt of standard lump and 295,000wmt of standard fines, in addition to 118,000wmt of low grade lump from existing low grade stockpiles at the mine.

At the end of December, about 248,000wmt of crushed finished product was stockpiled at the mine, together with 417,000wmt at the Perenjori rail siding, leaving 3.4mwmt of uncrushed lower 50-55 per cent Fe material at the site.

The company said sales from the mine's existing low grade stockpiles would continue at suitable prices until exhausted.

Outlook

First half FY17 sales of iron ore were 1.78mwmt, equating to revenue of \$102m for the period and cash on hand rose \$10m to \$447m for the December quarter.

With Iron Hill expected to provide about 0.4 - 0.5mwmt of iron ore, Mount Gibson increased its group ore sales guidance for FY17 to between 3.2mt and 3.5mt, at a reduced average cost of between \$47/wmt and \$51/wmt.

"Another excellent performance by the Mount Gibson team in the December quarter has further enhanced [our] solid financial position, and leaves the company well placed to continue executing its ongoing operational transition in 2017," Mr Beyer said.

"Consequently, Mount Gibson [has entered] the new calendar year with great confidence and in outstanding shape to capitalise on the significant opportunities before it."

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"WITH QUITE A FEW ASSETS YOU NEED TO BE A GOOD SELLER AS WELL AS A GOOD ACQUIRER TO BE SUCCESSFUL OVER THE LONG TERM."

All images: Evolution Mining.

A strategy for growth

Between six and eight projects is an ideal number of assets to have within a portfolio to remain a globally competitive mid-tier gold company, Evolution Mining chief executive Jake Klein has said. This strategy has seen the company, which recently acquired an \$880 million economic interest in the Glencore Ernest Henry operation, become Australia's second largest ASX-listed gold miner.

ELIZABETH FABRI

SINCE Evolution's establishment in late 2011, through the merger of Catalpa Resources and Conquest Mining and acquisition of Cracow and Mt Rawdon, the miner has carefully followed this portfolio tactic.

"With quite a few assets you need to be a good seller as well as a good acquirer to be successful over the long term," Mr Klein said.

In 2015 the miner acquired Cowal and Mungari; last September it let go of Pajingo mine to make room for a 30 per cent stake in the world-class Ernest Henry mine, and the acquisition of Newcrest's Marsden project, which was soon to be confirmed.

The company currently had six operating mines to its name and an economic interest, with each of its projects performing strong and in line with the company's three year guidance out to FY19.

"They're progressing very, very well," Mr Klein said.

"The last quarter we produced 217,812 ounces, our C1 costs were down 22 per cent, and our all in sustaining costs were 15 per cent down to \$900 an ounce.

"If you convert that to \$US dollars we're now one of the lowest cost producers in the world.

"And what pleases me most is that we



The Cowal E42 pit.

have through our consistent strategy of wanting to upgrade and improve the quality of the portfolio, over the last 24 months have recalibrated our portfolio to long life low cost assets, particularly Cowal, Ernest Henry, and Mungari."

Project updates

Cowal

Evolution Mining's Cowal project had its name up in lights last month with news it had received approval to extend mining operations out to 2032.

In November 2016, Evolution submitted a modification application and comprehensive Environmental Assessment (EA) to the NSW Department of Planning

and Environment to extend operations.

On 9 February, to Evolution's delight, the application was approved.

"Obviously we were very pleased to get that approval; It's a very important approval," Mr Klein said.

"What pleased me most about it was during the public consultation period, there were 65 submissions from local governments and interested parties and all of them were supportive of extending it.

"That I think speaks huge volumes for the engagements with the community and the outstanding environmental management track record that the mine has developed.

"That allows us now as we've publically said to consider the next phase of the mine life and we're doing studies that will be put to the board this quarter and we're hopeful that we

can make an announcement this quarter that will outline our plans for the future of Cowal."

Located near West Wyalong 50km from Sydney, the mine was acquired from Barrick Gold in 2015 and has been performing exceptionally well.

The mine consists of crushing, two stage grinding, sulphide flotation, regrind, and CIL recovery, and employed about 400 full time employees and contractors.

In the December quarter the mine achieved record production of 71,903oz at an AISC of \$815/oz.

Recent mining activities focused on the Stage G cutback, as well as the completion of Stage H definition drilling.

The Stage H drilling confirmed the presence of a large, richly mineralised zone.

On 16 February, Evolution Mining announced its board had approved investments for the E42 Stage H cutback and the Dual Leach Project which would extend mine life by eight years and increase production by 1.2 million ounces.

Mungari

In FY17, Mungari will receive the largest allocation of Evolution's exploration spend.

The operation, 600km east of Perth (20km west of Kalgoorlie), is made up of the Frog's Leg and White Foil mines, and has a processing capacity of 1.7mtpa.

CONTINUED ON PAGE 26

Partnering with Evolution Mining



Force Equipment is a leader in mining equipment maintenance services and earthmoving equipment hire.

FOUNDED in 1987 in Kalgoorlie, WA, Force Equipment has built its reputation based on performance and excellence.

The company offers an unwavering commitment to customer service, with quality machinery presented to the highest industry standards.

Force Equipment has developed its capabilities to provide an integrated service nationally for earthmoving equipment hire, sales, and maintenance for mining, construction, and infrastructure projects.

Force Equipment has operations and large workshop facilities in Perth, Kalgoorlie, Port Hedland and Mackay.

With an experienced and professional maintenance team of more than 200 staff and a fleet of 170 heavy earthmoving machines, the company has the resources to deliver trusted solutions to its clients.

Force Equipment is engaged in several mining projects throughout the Pilbara and Goldfields regions of WA.

One of these projects is for Evolution

Mining at the Edna May gold mine.

At this project Force Equipment provide a fleet of more than 25 machines, which include six 785D Caterpillar Trucks and one Hitachi EX3600-6 Excavator.

With more than 20 experienced onsite staff the company maintain and support its own equipment and the client's equipment on site, performing scheduled maintenance and break down repairs.

Force Equipment run 24-hour maintenance crews of heavy duty

mechanics, boilermakers and servicemen to ensure all maintenance schedules are met and breakdowns are repaired promptly.

Entering its eighth year, Evolution Mining and Force Equipment have forged a strong working relationship on site at Edna May gold mine and other projects.

Evolution Mining is a valued client and the team at Force Equipment said they were privileged to be working into the future with such a classy operator.



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RIOFLEX triumphant at Cowal

MINING operations nationally are switching to RIOFLEX explosives for optimum performance and versatility throughout their mining operations, including Evolution Mining's Cowal gold mine in NSW.

In May 2016, MAXAM was engaged to supply explosives, products and services to Cowal Gold Operations (CGO), and has delivered significant results since.

During the initial trial alone, MAXAM achieved a significant decrease in average fragment size; a large improvement in instantaneous loading rates; and a notable reduction in mill powerdraw.

"As a global company, we are bringing

a different approach, different product and different product options to suit customers' varying needs in the mining industry," MAXAM Australia marketing manager Daniel Stewart said.

"We are seeing that mining operations nationally are turning to MAXAM for optimum performance and versatility throughout their mining operations.

"Our performance has grown our relationship with Evolution from Edna May to Mt Carlton and Cowal sites and we expect to continue on this path of growth and be supplying other Evolution sites in the near future."

Mr Stewart said explosives are the

primary crusher and the most efficient tool in driving value throughout a mining company's operations, with products like RIOFLEX leading the way.

Unique to MAXAM's business in Australia, RIOFLEX is a watergel technology that has been utilised in a number of large-scale operations in the country.

"Side-by-side test results prove watergel bulk explosives outperform emulsion explosives," he said.

"RIOFLEX is unrivalled in performance and versatility."

RIOFLEX qualities include:

- Higher energy
- Higher energetic material content
- Can be sensitised to a far greater range of densities in isolation or with ANFO
- Densities as low as 0.6 g/cc possible
- High water resistance

- Superior inhibiting qualities
- Cross-linked properties (solid rubber like state with 10-15mins)
- Mechanically sensitised (increased loading accuracy)
- Contains less water than emulsions

RIOFLEX is a highly energetic product with outstanding

performance which can improve blasting operations through:

- Expansion of drill patterns
- Improved fragmentation and dig-ability
- Increased production
- Overall reduction in drilling and blasting costs





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PRODUCERS IN THE
WORLD."**

Evolution Mining's Mungari operation is made up of the Frog's Leg and White Foil mines.

Frog's Leg was operated as an open pit mine in 2004 and 2005, with underground mining beginning at the site in August 2007.

White Foil was mined briefly in 2002-2003 and 2010-2011 before open pit operations recommenced in 2014 following construction of the Mungari plant.

In the December quarter Mungari produced 41,645oz of gold, with exploration drilling totalling 167 holes for 22,724m across the tenure.

Of this amount, Frog's Leg underground produced 6 per cent more ore tonnes at a 40 per cent higher grade than the September quarter, which was largely attributed to access to higher grade stopes in the Mist orebody.

A drill platform for the Mist orebody will be developed in the June 2017 half to test the resource at a further depth.

A high-grade, laminated vein was also intersected in a diamond hole 1km east of Frog's Leg, similar to the Raleigh deposit further north, with work now ongoing to analyse results.

At White Foil, mining in the open pit continued to focus on Stage 2b and Stage 3 with total open pit material movement increased by 13 per cent to 2.9mt at Stage 2b despite unfavourable ground and water conditions.

Mt Carlton

Production at Mt Carlton was in steady state, with 25,674oz of gold produced in the December quarter, in line with the 25,544oz produced in the September quarter.

Costs had improved significantly with C1 cash costs of \$277/oz and an AISC of \$604/oz, compared to the September result of C1 \$323/oz and AISC \$779/oz.

150km south of Townsville in Queensland, the mine began production in July 2013 with a mine life that could extend to FY22.

In December, construction of concrete civils for the gravity recovery gold circuit had begun, and commissioning was expected in the March quarter.

Evolution had also continued mining of the Stage 3a western end, and in December began first blasting of the Stage 3b pre strip.



Cracow mine is located 500km north-west of Brisbane, QLD.

"Recent drilling at Mt Carlton has confirmed continuity of high-grade mineralisation beneath the V2 pit," the company stated.

"The new results will be used to evaluate a range of pit extension and underground mining options."

Mt Rawdon

Evolution's Mt Rawdon mine in Queensland also had a strong quarter; producing 25,983oz of gold at a C1 cash cost of \$656/oz and AISC of \$898/oz.

Located 75km south-west of Bundaberg, the single open pit mine had been in production since 2001, and was acquired by Evolution Mining in 2011.

This year, the mine was working towards achieving its FY17 guidance of between 90,000oz and 100,000oz, with current activities focusing on the progression of the Stage 4 cutback.

"In the March 2017 quarter work will focus on waste movement from the south western sections of Stage 4 cutback," the

company stated.

"Ore to the mill will be predominantly supplied from the northern sections."

The project was scheduled to continue out to FY26 with a remaining life of mine strip ratio of 2:1.

Cracow

Also in Queensland, Cracow was one of Evolution's highest cash flow producing mines with a long track record for reliable production.

In production since 2004, the mine produced 19,763oz of gold at a C1 cash cost of \$782/oz, and AISC of \$1283/oz for the December quarter.

"A total of 136kt of ore was mined at an average grade of 4.77g/t gold," the company stated.

"Primary ore sources were the Kilkenny and Empire ore bodies [and] grades are expected to improve in the June 2017 half with the increased production from Kilkenny transverse stopes and Empire 1854 level."

A total of 2609m of drilling was completed in the quarter that tested seismic targets within the Phoenix South Corridor and on the southern 2D2R seismic line.

Edna May

Back over in the West was Edna May; Evolution's open pit mine that utilised conventional drill blast, load and haul methods.

Production for the last quarter came in at 18,588oz at a C1 cash cost of \$1350/oz and AISC of \$1478/oz; a slight slump from the 20,012oz produced in the September corresponding period.

"A full review of the operation was undertaken during the quarter with a number of management changes made," Evolution stated.

"As a result of this review, a plan is being implemented to materially improve mobile fleet productivities.

"Steps have been put in place to target higher volume open pit mining by removing Bore 6 in the North Cutback and completing mining at the base of the pit."

The company anticipated material movement from the open pit to increase to 1mt per month in the June half year.

In addition, the rehabilitation of the mine's underground infrastructure continued with an extra 918m of the decline completed.

The Stage 1 Underground Development received board approval during the March quarter last year, and began development in June.

"Development of the underground mine remains on track with first production expected in early FY18," Evolution stated.

Acquisitions

Ernest Henry

On 1 November 2016, Evolution completed its economic interest in Glencore's Ernest Henry mine in Queensland.

Under the deal, Evolution would have a 30 per cent stake in the mine, and receive 30 per cent of copper and silver payable, and 100 per cent of gold payable production.

The HOTSHOT specialists

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With all the insurances in place as well as being fully RTO trained and ticketed, Dananni is able to provide radioactive and dangerous goods transport; as well as project, interstate, and over-dimensional transport alongside its specialised HOTSHOT freight services 24/7.

As WA's mining and offshore HOTSHOT specialists, Dananni has a large, modern and well-maintained fleet of ADR42 compliant (this means the drivers have a sleeper compartment, not the front seat of a 2WD ute) HOTSHOT vehicles and include customised utes, 3 tonne (t), 5t, 8t, and 12t trucks and semi-trailers.

All trucks come standard with satellite tracking and set up for long distance travel to minimise downtime.

With this array of options, Dananni can take on cargo loads of all sizes: from 1kg to 100t.

Goods can be transported straight from an overseas cargo plane to a waiting work vessel; supply agent to the barge; the drilling company to the rig; the workshop to the pit; or even the aircraft to someone waiting for an organ donation.

All Dananni drivers are fully qualified and have extensive experience in the industry to deliver freight every night and day of the year.

Calls can be answered – even on the



Dannani prides itself on its ability to provide quick, professional round-the-clock delivery.

weekends – to send freight the same day.

When the job calls for a long haul HOTSHOT, the company uses a two-man team to ensure driver safety and the swift and successful delivery of goods – on time,

every time.

No matter the time of day or night, Dannani two-driver teams are on stand-by to travel anywhere in Australia.

Dannani prides itself on the high

standards it has set to ensure the safety of not only its drivers, but all road users, hence the company's well earned reputation for delivering goods safely and within specified timeframes.



Mt Carlton plant processes are via conventional technology, including crushing, grinding and flotation.

Mr Klein said the deal was undoubtedly a "tremendous breakthrough" for the company as it looked at enhancing its portfolio.

"The Ernest Henry transaction, at \$880 million was the most significant transaction we've undertaken – it was also one of the most complex but it will prove and is proving to be one of the best," he said.

"We've consistently said that we have wanted to improve the quality of our portfolio and there's no doubt that the Ernest Henry deal did that.

"It was a different deal; it was challenging to negotiate but most importantly demonstrated our willingness and capacity to collaborate.

"Both the counter party Glencore and ourselves are very pleased."

The asset was expected to deliver gold production at a very low AISC across the 11 year mine life.

In the December quarter, two months of gold production at the mine came in at 14,257oz at an AISC of (\$114)/oz.

Marsden

In addition, Evolution Mining was currently finalising its acquisition of Newcrest Mining's Marsden copper-gold project.

On 17 October 2016, the miner announced it had entered a binding agreement with Newcrest to acquire the project, with an upfront payment of \$3 million followed by a further \$7 million contingent on a decision to mine.

"There is still some regulatory approval required but that's just due process," Mr

Klein said.

"We acquired it because it's the most significant known deposit around the Cowal region.

"It was really for strategic reasons to simply acquire an additional ground position that was available from Newcrest at the time.

"We have no immediate plans but will consider it in the long-term future of Cowal."

Outlook

Looking forward to 2017 and beyond, Mr Klein said he was confident the future for Evolution would be bright, and the company would comfortably deliver its FY17 guidance of between 800,000oz and 860,000oz.

"We are working on extending the mine life for the operating permits at Cowal to 2032," he said.

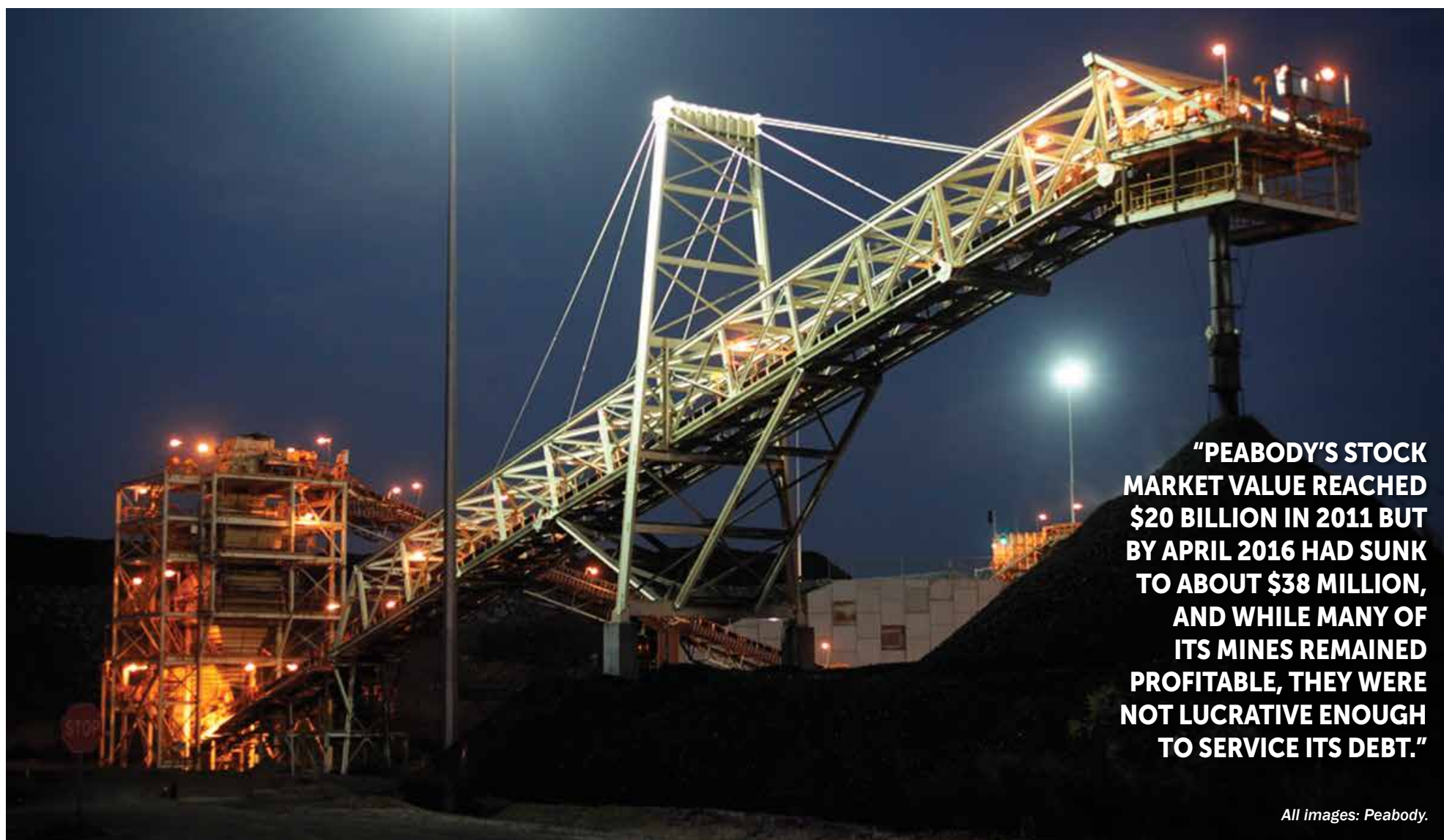
"When we acquired it, it had an eight year mine life and now has potentially a 15 year mine life, and we think it will extend beyond that."

Mr Klein said the Ernest Henry transaction also gave Evolution another decade long asset based on reserves.

"It has an 11 year mine life just based on reserves, so average quality of our portfolio has improved to the point where we have an average eight year mine life in our portfolio of six operations and the Ernest Henry asset," he said.

"We're very confident of both future and our current capacity to deliver to the expectations that we've put out there to the market."





"PEABODY'S STOCK MARKET VALUE REACHED \$20 BILLION IN 2011 BUT BY APRIL 2016 HAD SUNK TO ABOUT \$38 MILLION, AND WHILE MANY OF ITS MINES REMAINED PROFITABLE, THEY WERE NOT LUCRATIVE ENOUGH TO SERVICE ITS DEBT."

All images: Peabody.

Confident in recovery

2016 was a transformative year for US coal giant Peabody Energy. Following the American division's bankruptcy blow in April, the company has streamlined its Australian business plan with a focus on 'divesting, selling or suspending' non-strategic assets.

ELIZABETH FABRI

PEABODY Energy has been a leading force in the global coal sector for 133 years.

Founded by Francis Peabody in the Illinois city of Chicago, the company's first coal mine opened in 1895 in the Illinois county of Williamson and in 1949 was listed on the New York Stock Exchange.

In the 1960s Peabody first entered the Australian coal market with the opening of the country's first major export mine, which significantly boosted production levels.

Today Peabody has become the world's largest private-sector coal company serving customers in 25 countries on six continents, with majority interests in 26 coal operations across the US and Australia.

Its Australian division comprised six mines in Queensland, and three (soon to be two) mines in NSW, with the sale of Metropolitan currently in progression.

The divestment was undoubtedly an outcome of last year's bankruptcy shakeup, as the company looked at ways to future-proof its business model.

In April 2016, Peabody filed petitions under Chapter 11 for the majority of its US entities in the United States Bankruptcy Court for the Eastern District of Missouri, after grappling with low prices and heavy debt commitments for some time.

Peabody's stock market value reached \$20 billion in 2011 but by April 2016 had sunk to about \$38 million, and while many of its mines remained profitable, they were not lucrative enough to service its debt.

The Australian division alone reported



Peabody's Wambo project in NSW.

consolidated net losses of \$2.7 billion, including \$1.8 billion of impairments, for the year ending in December 2015, compared with the \$1.27 billion loss a year earlier.

In August, the company released its 2017-2021 Business Plan report; one of the requirements of the Chapter 11 process.

Within the report, was Peabody's business model for its Australian arm, which outlined its plan to obtain mid-tier metallurgical assets and top tier thermal projects.

The company said its goal was to establish a "smaller more profitable platform focused

on high-quality products to take advantage of higher growth in Asia".

Within three months Metropolitan was offloaded to South32, leaving only two operating mines in the NSW region.

NSW operations

Peabody operates three mine sites in NSW; Wambo, Wilpinjong and Metropolitan, which extend from the Hunter Valley west of Newcastle to north of Wollongong.

While much focus on its Australian projects was on its six mines in Queensland, the company's influence in NSW is not to be

ignored.

In 2015, Peabody's NSW assets shipped 22 million tonnes of coal, and employed more than 1150 personnel.

Of this amount, Metropolitan mine produced 2mt of saleable coal for the 2015 year.

Metropolitan

Located near Helensburgh, Metropolitan metallurgical coking coal mine has been a valued asset of Peabody's for some time, but was the first to go as part of the company's restructure.

On 2 November, the company announced it had entered into a definitive agreement to sell Metropolitan and its associated 16.67 per cent interest in the Port Kembla Coal Terminal to a South32 subsidiary for \$US200 million.

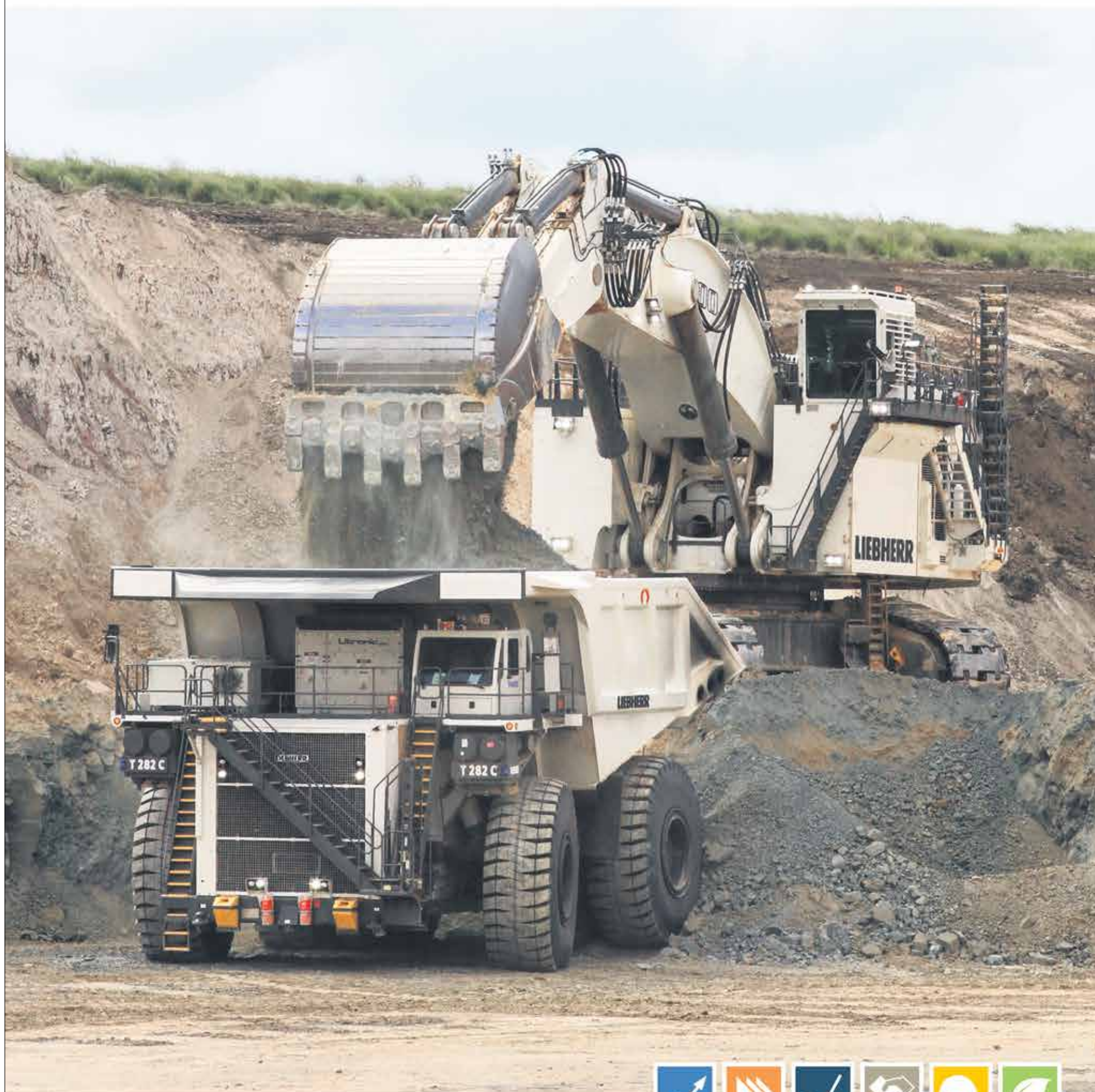
"This sale supports our actions to strengthen the Australian portfolio, which remains core to Peabody, and is consistent with the strategy outlined in our business plan," Peabody president and chief executive Glenn Kellow said.

"We expect the transaction to be accretive to the value reflected in the business plan, generate meaningful proceeds for the Australian business, decrease future capital expenditure needs, and reduce risk to the Australian platform as we pursue a smaller but more profitable portfolio going forward."

South32 said the Metropolitan Colliery was a natural fit within its portfolio given its close proximity to its existing Illawarra operation.

CONTINUED ON PAGE 30

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CONTINUED FROM PAGE 28



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Peabody's Australian operations.

“The mine’s recently upgraded infrastructure and close proximity to Illawarra Metallurgical Coal will enable us to further optimize performance and unlock unique blending and resource synergies,” South32 chief executive Graham Kerr said.

“We look forward to the Metropolitan team joining South32.”

The sale would also release Peabody of about \$20 million in financial assurances in the form of bank guarantees and cash.

At the time of the announcement Peabody assured the transaction was not expected to have any impacts on the project’s workforce or community which it has served for 129 years.

“The mine employs approximately 250 mine-site employees and as of December 31, 2015 has approximately 28 million tons of proven and probable reserves,” Peabody stated.

“Transaction closing is anticipated to

occur in the first quarter of 2017, subject to clearance by the Australian Competition and Consumer Commission.”

Wambo

Further north was Wambo thermal coal mine; one of Peabody’s largest operating mines with a workforce of 500 people.

Operating in the Hunter Valley since 1969, the mine was acquired by Peabody in 2006, and in 2015 produced 3.5mt (3.1mt) of saleable coal from its open cut and 3.1mt (2.8mt) from the North underground mine.

In August last year, the Wambo Underground Mines Rescue Team (MRT) took up first place in the 10th International Mines Rescue Competition First Aid competition in Sudbury, Canada.

Peabody Australia president Charles Meintjes said the Wambo group was among 27 teams from 13 nations that gathered

Repowering R 996 B excavators

IN a long-standing tradition of collaboration between Moolarben Coal Operations (MCO) and Liebherr-Australia, two R 996 B engine repower modules were performed successfully last spring.

In keeping with the six pillars that define Liebherr Mining, the genesis of this initiative came from a shared desire for efficiency, reliability and customer service.

Through the collaboration of MCO maintenance manager Liam Whittaker and Liebherr-Australia Mt Thorley customer support manager Ben Kerr, both parties agreed on a scope of work, commercials, labour and support to deliver the first R 996 B engine repower module on time and on budget.

The Liebherr-Australia Mt Thorley branch and MCO worked together to limit the repower to one down-time event eliminating the need for multiple change-outs and minimising the effects in-situ component replacements have on production.

The chance of error and cost was greatly reduced with the modularised power pack concept; with the operation performed on a designated build pad in just five days, on budget and making environmental impact and waste reduction a foremost priority.

“All components (splitter boxes, radiators, hydraulic pumps) used in the power packs (excluding the engine itself) were rebuilt in our Adelaide Reman facility, with all hoses manufactured by Liebherr-Australia,” Mr Kerr said.

“From a local labour perspective, 24 technicians, electricians and supervisors were involved in the project working 24 hours a day for six days and five nights.

“There were four fire suppression technicians required for the recommissioning of fire system; and on the last day, two Cummins technicians were required to commission the engines.

“The Mt Thorley team ensured sufficient



A photo taken from the specially commissioned time-lapse video of the project.

Image: Bestmann Imagery.

product support representatives and a leading hand were present to complete a full hydraulic tune up.”

As always, safety was paramount on this project, with pre-erected scaffolding in place for ease of access and safety when power packs were removed and minor parts interchanged.

Ultimately the success of this project was based on teamwork and understanding

the customer requirement and delivering a solution.

The power pack replacement project reduced machine downtime for major end-of-life component replacement from 14 days to six days.

It enabled a critical production machine to be repowered in greater than half the time of a traditional engine, splitter box and

hydraulic pump change.

Results are measured by availability and this was shown during the month of October following the installation of the rebuilt modules, with the EX103 exceeding 600 production hours for the month, while maintaining high MTTS/MTTF, much to the delight of production and maintenance at Moolarben Coal.

to compete in four days of events to test emergency preparedness skills and train through competition.

“We take great pride in the global safety leadership demonstrated by our Wambo Underground Mines Rescue Team, which is an extraordinary tribute to Peabody’s first value of safety,” Mr Meintjes said.

“Using this competition as a platform to advance best practices in safety around the world benefits our people, our organization and our industry.”

But perhaps the most notable milestone achieved at the project in recent years was the 50:50 joint venture formed between Peabody and Wambo in 2014.

The joint venture, once effective would combine the existing open-cut operations at Wambo and United Collieries, with operations expected to begin mid-year.

Wilpinjong

Wilpinjong is an open-cut mine east of Mudgee that produces a high-quality thermal coal.

The mine was purchased in 2006, and is one of the lowest cost coal mining operations in Australia.

In 2016, Peabody submitted an application to the NSW Planning Assessment Commission to extend the mine by seven years from 2026 to 2033.

A public hearing was held in Mudgee in late November, with strong opposition from locals.

On 20 December, the NSW Planning Assessment Commission released its review report, and stated recommendations of its report must be “satisfactorily addressed before the project can be considered further”.



Peabody operates in more than 30 countries.

“The Commission has balanced the economic, social and environmental factors in its review of the proposal, and in doing so, identified a number of areas where further information or assessment is required,” it stated.

If approved, the extension would involve extensions to various existing open cut pits; the development of a new open

cut pit to the east of existing operations; a minor increase in coal production from the current 12.6mtpa to 13mtpa; and the development of a range of ancillary infrastructure.

The NSW Planning Assessment Commission said there was about 79mt of ROM coal remaining with the approved footprint of the mine, however without

an extension approval; production was expected to significantly decrease from 2017 onwards.

Outlook

While the bankruptcy was a setback for Peabody, things were starting to look up for the company in other areas of business.

In October the company received the *Best ESG-Responsible Mining Company Global 2016 Award* from Capital Finance International, and in November its shares rose more than 50 per cent the day after Donald Trump won the US presidential election.

In Peabody’s 2017-2021 *Business Plan* the company said its objective for its Australian footing was to maintain safe and efficient operations while aggressively managing costs.

The miner said it would continue to meet rehabilitation obligations at its mine sites, proactively manage rail and port contracts to reduce infrastructure obligations; and enhance liquidity through monetisation of non-strategic assets to optimise its portfolio for long-term success.

However, the company expected its Australian metallurgical coal volumes to drop to 7mt by 2021, compared to the 15mt volumes recorded in 2016.

“Continued low-price environment and increasing strip ratios could drive early suspension of mining activities at certain metallurgical mines by 2021 and has been reflected in the plan; met coal production by 2021 is expected to be less than 50 per cent of 2016 levels,” Peabody stated.

“Sustaining capital remains manageable over the plan, but multiple mines require recapitalisation to extend mine lives, primarily after 2017.”



"THE CONTRIBUTION OF THE MINING INDUSTRY TO THE GOLDFIELDS-ESPERANCE REGION ECLIPSES THAT OF ALL OTHER INDUSTRIES."

Image: Independence Group.

Tropicana processing plant capacity was now upgraded from 5.8mtpa to 7.5mtpa.

Full of life

There is no region in Australia quite like the Goldfields. Defined by its rich history and social fabric, the province has become synonymous with gold and nickel mining, with new projects still opening each year to exploit the wealth of resources that lie beneath the surface.

ELIZABETH FABRI

THE late nineteenth century gold rush of the WA Goldfields is a tale that has been passed on from generation to generation, from the discovery of gold in 1892, to the 530km pipeline C.Y. O'Connor engineered in 1903 to supply water to the region.

The historic region has stood the test of time and continues to be the beating heart of WA mining.

"There's no doubt that Kalgoorlie is really in the centre of the other major mining mineral provinces in Western Australia," Kalgoorlie Chamber of Commerce chief executive Hugh Gallagher said.

"You've got the Pilbara in the North, and you got the Goldfields east of Perth; it's been that way since 1893 and it's probably one of the few mining communities that continue to exist really."

The Goldfields-Esperance region itself is the largest in WA, covering some 771,276sqkm; just under a third of the State's total land mass.

Made up of nine local government areas, mining accounted for 56.6 per cent of the more than \$9.3 billion 2014/15 economic output for all industries in the region.

"The contribution of the mining industry to the Goldfields-Esperance region eclipses that of all other industries," a Goldfields-Esperance Development Commission (GEDC) spokesperson said.



Image: Independence Group.

"Mining accounts for around half of the region's economic output.

"It is also a significant contributor to employment with over a quarter of the population working in the sector."

And unlike other mining hubs across Australia, a large percentage of the Goldfields mining workforce resided in the area.

"The mining workforce was estimated overall at 7958," the GEDC spokesperson

said.

"Around 60 per cent of the FIFO workers to the GE region were in the mining sector (3375 jobs)."

A brief history

The WA Goldfields origins date back to September 1892, when prospectors Arthur Bayley and William Ford first discovered gold in Coolgardie.

In June 1893, the find was bolstered by a second discovery to the east in Kalgoorlie by Patrick "Paddy" Hannan, Tom Flanagan and Dan Shea.

The discovery spurred a massive increase in population to the Goldfields-Esperance region, attracting prospectors from across Australia and all over the world.

"This led to the tripling of the population in Western Australia between 1891 and 1901 fuelled by migration to the Goldfields region," GEDC stated in its *Regional Investment BLUEPRINT A Plan for 2050* report.

"Many prominent characters were lured to the Goldfields in search of their fortunes, perhaps none more famous than the 31st President of the United States, Herbert Hoover.

"In 1897 he was invited to undertake mine management and exploration work in the Goldfields, and by the time Hoover left Western Australia in late 1898, he was one of the best-known mining engineers in the colony.

In 1903, C.Y. O'Connor engineered the Goldfields pipeline to provide the region with a constant supply of water.

This created the basis for industrial-size irrigation and prompted larger mining, agricultural and social infrastructure developments.

"O'Connor achieved what many believed was impossible – to pump water from the Mundaring Weir, east of Perth, to the towns



BHP's Nickel West project is located in Kalgoorlie.

of the Goldfields over 600km away," the report stated.

"When the Goldfields Water Pipeline was completed in 1903 it was the longest such pipeline in the world and a significant step in advancing the growth of Western Australia."

While gold dominated the first half of the 20th century, in the 1960s and 1970s nickel was uncovered at Leinster and Mount Windarra, near Laverton in the Northern Goldfields, as well as Kambalda in the Goldfields.

The discovery led to even further expansion of the mining industry, and cemented the region's reputation for its mineral wealth.

Top performers

In recent years the Goldfields has expanded its portfolio beyond gold and nickel, with a number of iron ore, copper, zinc, silver, and lithium projects and exploration initiatives across the region.

"When I first came here 30 years ago it was simply about gold and nickel here, there was no iron ore," Mr Gallagher said.

"People who had been here a long time would say it's a world-class mineral province, well they're proving to be right if you look at all the minerals that are being mined out of the region.

"Usually in most mining related locations if there is drilling happening it

means you're in pretty good health."

Of the local governments and shires, Coolgardie had the highest value of minerals in 2015-16, followed by Kalgoorlie-Boulder, Leonora, and Laverton.

Gold

While a large number of commodities were now mined in the region, the region's namesake gold remained in top spot, with its value reaching about \$6.6 billion in 2015-16.

"Following the drop in the price of gold in 2013, Goldfields producers have worked hard to cut costs and have also benefited from the price structure," the GEDC spokesperson said.

"While the \$US price of gold has dropped the average Australian price of gold has remained strong with the average price of gold reaching \$1731 in June 2016."

Top performing gold mines for the 2015-16 year included KCGM's Kalgoorlie Super Pit, AngloGold Ashanti's Tropicana mine, Gold Field's St Ives mine, Regis Resources' Duketon operation, Gold Field's Granny Smith mine, and AngloGold Ashanti's Sunrise Dam mine.

"Throughout the region, there has been quite a few gold operations that haven't been operating for a few years that are being re-established," Mr Gallagher said.

CONTINUED ON PAGE 34

Engineering design specialists



The WML team.

FOR more than 20 years, WA-owned consulting engineering company WML has been a leading specialist in road, civil, structural and geotechnical design engineering; as well as technical support and project supervision.

The company is able to assemble tailored, multi-skilled teams to meet particular job requirements for projects in the resources sector.

WML prioritises servicing regional locations with offices in Kalgoorlie, Bunbury and Mandurah.

WML's services are readily accessible to regional areas allowing the company to

provide cost effective and timely solutions for its clients.

The company has extensive structural engineering knowledge for building and structures design, condition assessments, structural audit, structural maintenance and construction supervision for projects in the mining industry.

The company also provides civil engineering design and supervision for haul road crossings of highways and rail, as well as tailings dams lifts.

More information on WML's capabilities can be found at:

www.wml.com.au.

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CONTINUED FROM PAGE 33



The KCGM Super Pit's current mine life extended to 2015.

Image: KCGM.

"We can't say the same thing for nickel; nickel has been in a pretty sad state now four or five years."

Nickel

Despite the downward pressure on nickel prices, exploration expenditure in nickel was expected to continue in the region, with Kambalda arguably containing more nickel than any other part of Australia.

"The Goldfields-Esperance region has an abundance of nickel reserves across a number of local government areas," the GEDC spokesperson said.

"Metals X's Nickel Division centred on the Wingellina Project in the Shire of Ngaanyatjarraku, is part of the larger regional Central Musgrave Project and is one of the largest undeveloped nickeliferous 'pure oxide' limonite accumulations in the world.

"This project has significant potential with a minimum 40-year mine life at an average annual production rate of 40,000 tonnes of nickel and 3000 tonnes of cobalt."

BHP Billiton planned to extend the life of its Nickel West operations to at least 2032, and the Kalgoorlie smelter to 2040.

Independence Group has also recently opened the world-class Nova project within the Fraser range, 120km east of Norseman; a significant nickel, copper and cobalt resource with an estimated 10 to 12-year mine life.

"And then you've also got Leinster which is north of Kalgoorlie, which was originally a WMC company, which became BHP of course," Mr Gallagher said.

"It's been re-established, and repopulated, and the school up there is full; things are beginning to change again in that part of the region.

"Murrin Murrin has also stood the test

of time as a laterite nickel project, which is something that can't be said for a lot of laterite operations."

However, Mr Gallagher said nickel had never run in tandem with gold in the region.

"At the moment its gold, and whether that trend will continue, I daresay time will tell," he said.

Future developments

In a region as vast and prosperous as the Goldfields, there were always new projects in the pipeline.

Exploration projects currently underway included Northern Star Resource's aggressive program which had increased its gold reserves by 33 per cent, as well as Silver Lake Resources' high-grade gold find from a \$1.4 million drilling program that could sustain underground operations at its Maxwells mine.

AngloGold Ashanti continued its extensive exploration campaign around Tropicana mine, and Gold Road Resources was also exploring the Yamarna Belt east of Laverton.

On the lithium front, there were a number of mines recently completed or under construction that added new opportunities.

Galaxy Resources Mt Cattlin spodumene project, near Ravensthorpe, began its first shipment in January and was currently ramping up towards its production goal of 160,000t in 2017.

Tellus Holding's kaolin Sandy Ridge Project also brought another dimension to the diversity of mining and waste management and was currently under Public Environmental Review.

"North of Kalgoorlie there's also a proposed phosphate operation – that's mining phosphate out of the multitude of salt lakes that there

are in the northern part of the region to make fertiliser for Australia, not necessarily for export," Mr Gallagher said.

Uranium exploration had also increased following the lifting of the ban in 2008 by the State Government.

"With global demand currently low uranium companies are pursuing community engagement and development activities to be ready for a change in the market price," GEDC stated.

"As examples of local uranium resources Mulga Rock to the east of Kalgoorlie-Boulder is expected to produce 1360 tonnes per annum of uranium oxide for 17 years and the Wiluna uranium deposits – Lake Way and Centipede are estimated to contain 11,000 tonnes of uranium."

One of the biggest concerns facing the region however was the closure of Kalgoorlie's iconic KCGM super pit.

Current mining will finish in 2025, but pending approvals for the Morrison and Brown Hill deposits could see mine life extend to 2035.

"The super pit as we know it is getting towards the end of its life; it's been going since 1893," Mr Gallagher said.

"The super pit is almost like the Bambi of mining; you never want to do anything to hurt it.

"It's excellent for tourists and many Australian and overseas investors have invested in Kalgoorlie because of the super pit's high profile and so many are of the view that it will go forever, but that's not mining.

"They do have a finite life, and indications are the longer term future of it will be underground mining."

GEDC said exploration was integral to the continuation of mining in the region.

"Exploration and mining support service companies in the Goldfields-Esperance region employ over 1866 persons and produce an output of around \$632.956 million p.a. with regional exports around \$305.799 million p.a.," the spokesperson stated.

Regional growth

Based on existing and prospective projects, as well as the stable flow of investment, the Goldfields future looked bright.

"Mining has been the lifeblood of this place for 120 years and they just keep finding different types of minerals so I think it's still going to be the major economic driver for years to come," Mr Gallagher said.

"I appreciate the fact that gold can ebb and flow but usually when gold slows down nickel comes good."

He said the growth of the region however was not without its challenges.

"Kalgoorlie's on the end of Australia's SWIS system (South West Integrated System), and that's providing some challenges going forward for some of the investment that is proposed for the region but I think we live in quite a different world to what our forefathers did.

"You've now got renewables happening in isolation at some of the major mine sites around the region and you've got the natural gas which you can put spur lines into."

Mr Gallagher said the other issue facing the sector was limited skilled personal that lived in the region fly-in, fly-out a readily accessible option for workers.

"I am confident gradually those who want to work in the industry will consider moving to where the work is as there are so many well paid exciting opportunities still in the industry," he said.



Fimiston open pit benches at the Super Pit.



Tropicana processing plant.

Image: Independence Group.



**"WE'RE WORKING
INCREDIBLY FAST AND
HARD HERE TO DELIVER
THE PROJECT AS QUICKLY
AS WE CAN."**

Eyes on the prize

Pilbara Minerals continues to go from strength to strength. After raising \$100 million to help fund its Pilgangoora lithium project in 2016, the miner is now progressing construction, and on track to begin commissioning by year end.

ELIZABETH FABRI

LOCATED in WA's Pilbara region, Pilbara Minerals flagship project Pilgangoora contains one of the largest spodumene and tantalite resources in the world.

With a 36 year mine life, the project has capacity to produce 2 million tonnes of ore feed per annum, and up to 4mtpa following an expansion.

Mining first began in the region in 1947, and from 1978 to 1982 Pilgan Mining conducted large scale operations on site.

Pilgangoora Mining Venture followed suit between 1992 and 1996, and since that time a number of miners had shown interest in the project, including Global Advanced Metals Wodgina; the company Pilbara Minerals purchased the project from in July 2014.

The acquisition was a big moment for Pilbara Minerals, taking it from a small time miner to its current position on the world stage.

Pilbara Minerals has since accelerated drilling on site, conducted multiple rounds of feasibility work, and undertaken a major \$100 million raising to kick-start development.

In December 2016 the company purchased the neighbouring high-grade Lynas Find project from Dakota to further bolster its pipeline of exploration targets available in the Pilgangoora district.

Pilbara Minerals' next step was to upgrade its resources base to reflect the addition of the new asset.



All images: Pilbara Minerals.

In January, the company increased its total Measured, Indicated, and Inferred Resource by 22 per cent to 156.3mt, and total Measured and Indicated Resource by 14 per cent to 95.3mt.

The result reflected the Lynas Find purchase along with Pilbara Mineral's latest 2016 drilling program that brought the total amount of drilling at Pilgangoora by Pilbara to 80,631m of reverse circulation drilling and 4974m of diamond drilling.

"From a standing start following the acquisition of the project in 2014, the Pilbara Minerals exploration team has delivered a series of resource upgrades, establishing what is now without question, one of the biggest

hard rock lithium-tantalum resources in the world," Pilbara Minerals managing director and chief executive Ken Brinsden said.

"With the Pilgangoora development pathway already clearly established through the DFS completed in September 2016, much of our more recent drilling has been designed for sterilisation purposes and to assist with mine and infrastructure design.

"Even this drilling has exceeded our expectations, resulting in the discovery of several new areas and further substantially increasing the overall resource inventory.

"Together with the recently completed acquisition of the Lynas Find Lithium resource, which represents a strategic

and high-grade addition to our resource inventory, the global resource inventory has now increased to over 156 million tonnes — a fantastic milestone and one with which our exploration team should be very proud."

Mr Brinsden said the results also demonstrated potential for growth should the company choose to explore further.

"It's a phenomenal exploration province and we've already demonstrated a huge amount of potential in the resource but there would be plenty more if you'd decided to keep drilling," he said.

"With early works construction activities already underway and major contracts awarded, currently tendering, or soon to be tendered, our focus is now very much on the delivery of this outstanding project, which will put Pilbara on course to become a globally significant new strategic metals producer this year."

Project updates

In parallel to its resource upgrade, Pilbara Minerals has been ramping up construction.

In January, the company awarded two contracts for the Engineering, Procurement and Construction (EPC) of the mine, and the relocation and reestablishment of its newly acquired accommodation camp.

Awarded to RCR Tomlinson, the EPC contract had an estimated value of \$138 million and cap of \$148m, and would see RCR deliver plant construction in 35 weeks, and plant commissioning by the December quarter.

The Stage 1 front-end engineering and design (“FEED”) phase will begin immediately, coinciding with the procurement of major equipment, with Stage 2 expected to begin in May.

Mr Brinsden said the terms of the contract were “extremely competitive”, with RCR appointing Minnovo and Primero as key technical and engineering subcontractors for the works.

In addition, the miner awarded the first stage of its 300-room camp relocation and reestablishment contract to OTOC Australia.

Purchased from Roy Hill in October, the camp resided 90km from Pilgangoora’s site and would soon be de-constructed, transported, erected and commissioned at its new location.

Mr Brinsden said both companies had now begun works.

“They both have commenced albeit in different guises,” he said.

“OTOC are involved in early works to establish our camp facility and they started up in the Pilbara so they have started the process of mobilisation and getting that job underway.

“RCR have started work but it’s in the final design stage, so that’s all happening here in Perth through their design offices and through their partners in the project.

“The idea is that they will have completed the detailed design for the purpose of commencement of construction for their activities from May.”

He said remaining contract packages for the project were either under negotiation or would be the subject of tender processes shortly.

“The really important initiatives we are working on right now are the early works; they’re an important part of the site work that will be under interim approvals while we wait for the final approvals to come through,” he said.

“Final approvals we expect late in the



The Pilgangoora site was expected to begin commissioning at the end of the year.

current quarter and on the assumption that all of that goes well we’d be into the major siteworks from April and again on the assumption that that all holds we’d be commissioning the plant from late 2017 and then ramping up spodumene concentrate production during the first half of 2018.

“We’re working incredibly fast and hard here to deliver the project as quickly as we can.”

Offtake agreements

The 2016 year also saw Pilbara Minerals enter two offtake agreements with Chinese companies General Lithium, and Shandong Ruifu Lithium Industry.

The first of the agreements, signed with General Lithium in July, was for the supply of 140,000tpa of 6 per cent chemical-grade spodumene concentrate from the first quarter of 2018 for an initial six year period, with the option to extend for another four years.

This represented about 40 per cent of the mine’s anticipated initial output from the Phase 1 project.

“The initial offtake agreement that we signed was for spodumene concentrate in chemical markets so that’s a product that’s very closely aligned to the lithium ion battery supply chain and that’s an important relationship with General Lithium and one that we hope to continue to grow over time,” Mr Brinsden said.

“We discovered in those negotiations with General Lithium that and ourselves had a common objective that in the future spodumene concentrates could be converted to lithium raw materials in chemical facilities somewhere other than from within China.

“So in the form of a MOU we have a project underway that considers that objective—basically a joint venture where we both get involved in the establishment of new chemical facilities and that’s still an ongoing conversation and has to be viewed within the context of where we take the Pilgangoora project from here.”

In November Pilbara Minerals also entered an offtake agreement with lithium carbonate producer Shandong Ruifu Lithium for crushed but unprocessed Direct Shipping Ore (DSO) from Pilgangoora or the Lynas Find Lithium Project, from as early as July this year.

“Shandong Ruifu are proposing to buy a Run of Mine (ROM) ore product, so that’s basically an unprocessed ore from the site and subject to a couple of conditions precedent that would start just after midyear,” he said.

“The conditions precedent relate to our access to the Utah Point Port facilities in Port

Hedland and on their side the settlement for pre-payment amount for that ROM ore of \$US10 million, and on the assumption that all of that progresses as we’d expect, we’d be selling the ROM ore product just after the mid year.”

In addition, Pilbara Minerals was hoping to take advantage of technical grade spodumene concentrate; a slightly more specialised product aligned with sales to the glass industry, as well as Pilgangoora’s by-product; tantalum.

“Tantalum is an important by-product from the mining at Pilgangoora, which is primarily focused on spodumene concentrate but we pick up tantalum as a by-product credit to that activity, and again we’re in pretty mature discussions with the tantalum industry about buying that raw material, but again that would be shipped overseas,” he said.

Future developments

With such a large-scale resource to its name, Pilbara Minerals would focus its attention solely on Pilgangoora for the foreseeable future.

“There are certain locations in the region and in WA that we keep our eye on, but we’re spoiled in many respects that our Pilgangoora project is really ground zero as far as the lithium potential of the region is concerned,” Mr Brinsden said.

“It’s the centre of a massive pegmatite swarm and should we choose to continue to keep drilling there, I have no doubt we will continue to turn up more tonnes.

“It’s an amazing project with incredible continued exploration potential so that is really the main game but we keep our eye on what’s both in the region and elsewhere in WA.

Mr Brinsden said if the company was to pursue other projects, it would have to be “elephant country”, and a project that matched Pilgangoora’s scale.

“We’re not after rats and mice projects,” he said.

“It’s really a case of taking advantage of significant scale, because that’s the sort of thing that’s going to create tier one projects that have the lowest cost base and you’d hope ultimately the highest quality products.

“Pilbara Minerals had recently released a pre-feasibility study for the potential expansion of Pilgangoora which would double plant capacity to 4mtpa.

“The current schedule would have us commissioning that project in late 2019 but it’s dependent on further work from an engineering perspective and also observations

where the conversion industry is at globally,” Mr Brinsden said.

“We would require more chemical conversion capacity to be established elsewhere in the world, including China, and for that matter our own facilities to see or to underwrite that expansion.

“Our hope is that could be achieved in 2019.”

Global demand

The Pilgangoora project will come online at an opportune time, when lithium demand was expected skyrocket in Asia with the move towards electric vehicles.

In 2017 alone, Tesla would be releasing its new model; Mercedes Benz would be releasing 12 new models of EVs, along with the BMWi3 series.

Toyota would also cease using lead acid batteries in 2017 and start employing lithium ion batteries in its models.

“I have no doubt that demand (lithium) will continue to grow,” Mr Brinsden said.

“The phenomenon that’s unfolding in China, I think will continue to surprise the Western world.

He said the speed with which China was rolling out renewable sources of energy, complementary battery technology to support the rollout, and the electrification of the transport industry in China was impressive.

“An analogy that I often point to with people to explain what is going on, is to think about steelmaking capacity in China in the early 2000,” he said.

“There was no one in the Western world that ever imagined that they would end up building a billion tonnes of steel making capacity; they did, and they did it within not quite a decade, maybe 12 years.

“I think that those same phenomenons are unfolding now in the lithium ion supply chain.”

On the tantalum side, Mr Brinsden expected the market to welcome Pilgangoora’s tantalum product with open arms.

“The world has become heavily reliant on Central African supply and it’s a problem for them because it has reputational challenges from the point of view of where the tantalum is coming from and the countries that its coming from,” he said.

“As a result in the event that there are new western sources of supply like by-product out of Pilgangoora, it is highly sought after, and as a result we’re not overly concerned about placing our tantalum concentrates.

“We’re confident of it being an important subset of our Pilgangoora production.”

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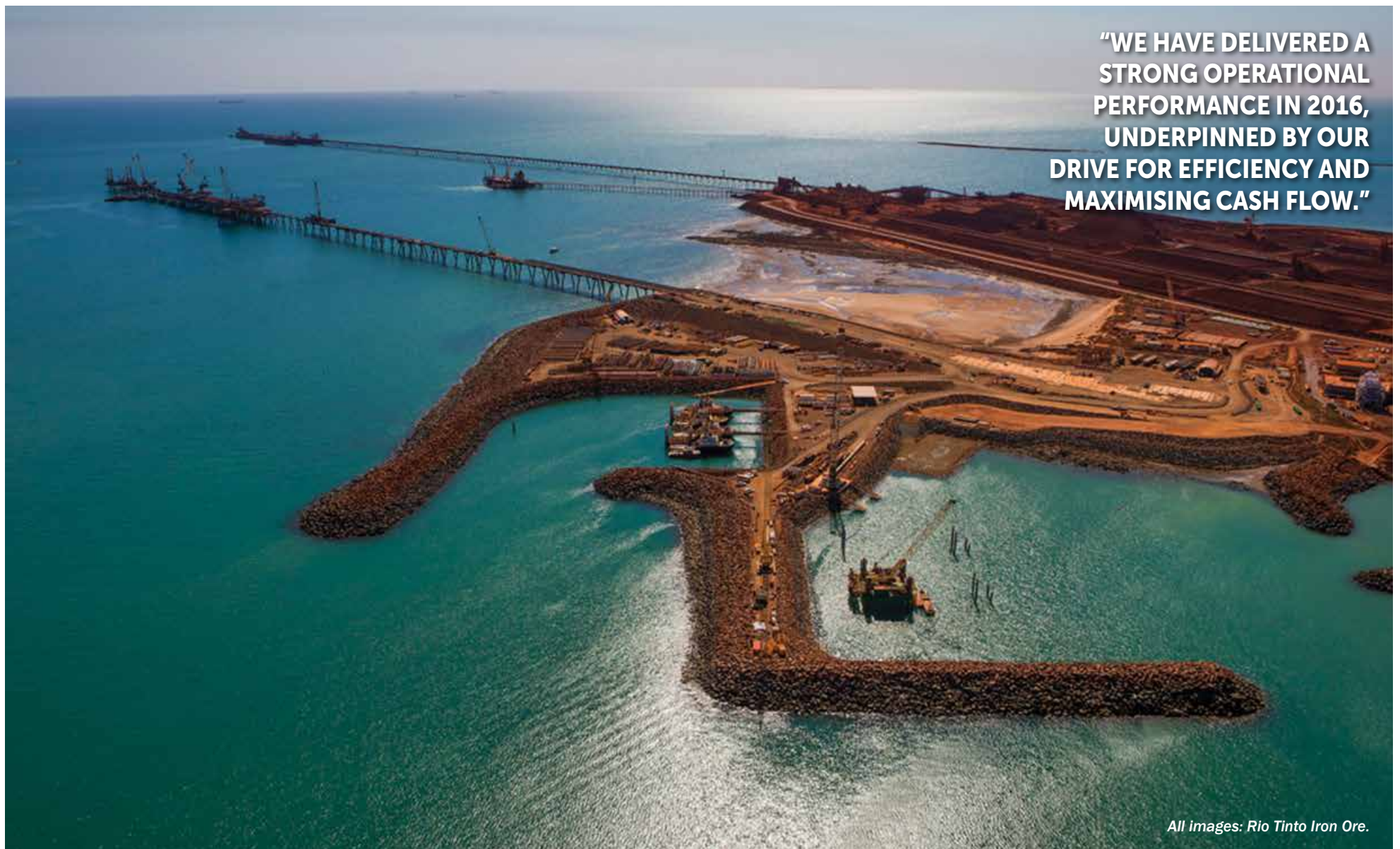
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"WE HAVE DELIVERED A STRONG OPERATIONAL PERFORMANCE IN 2016, UNDERPINNED BY OUR DRIVE FOR EFFICIENCY AND MAXIMISING CASH FLOW."

All images: Rio Tinto Iron Ore.

Optimal value

Rio Tinto Iron Ore has an exciting year ahead across its Pilbara portfolio, with increased production, improved commodity prices and the soon-to-be-completed Silvergrass mine paving the way for sustained growth.

ELIZABETH FABRI

IN Australia's far North West, Rio Tinto Iron Ore operates the world's largest integrated network of iron ore assets, comprising 15 mines, four port facilities and a 1700km rail system.

Its portfolio is made up of a number of core assets, including the Brockman operations; Robe Valley; West Angelas; Mt Tom Prices; Greater Paraburdoo operations; Marandoo; Yandicoogina; Mesa; and Hope Downs mines.

The miner has been active in the last 12 months with construction nearing completion at its highly anticipated Silvergrass mine.

The company also made headlines with a leadership shakeup that saw long time boss Andrew Harding step down from the role as part of new Rio Tinto chief executive J.S. Jacques portfolio reshuffle.

Replacing the long-time executive was Chris Salisbury, who had almost 30 years experience working for Rio Tinto, including the company's coal business, and copper and coal division during the leadership transition.

Speaking in December at an investor seminar in London, Mr Salisbury said he felt privileged to now be fronting the iron ore business, which was at the tail-end of one of Rio Tinto's largest project investments.

"I will now lead it from the growth to the run phase; my clear mandate is to deliver optimal value from our integrated system,"



AutoHaul - the automation of Rio Tinto's trains, aimed to improve safety controls and productivity of its rail operations.

Mr Salisbury said.

"The associated challenges are familiar to me, and I see many value opportunities."

2016 performance

2016 was a solid year for Rio Tinto's Pilbara iron ore production.

For the 12 months ending December 2016, the miner produced a total of 329.5 million tonnes of ore; a six per cent increase from 2015, with fourth quarter production coming in at 85.5 million tonnes.

Shipments were 327.6mt; a three per cent increase on 2015, while cash unit costs were \$13.7 per tonne in 2016, compared to

\$14.9 per tonne in 2015.

"We have delivered a strong operational performance in 2016, underpinned by our drive for efficiency and maximising cash flow," Mr Jacques said.

"Our disciplined approach remains in place in 2017, with the continued focus on productivity, cost reduction and commercial excellence.

"This will ensure that we continue to deliver value for our shareholders."

Mr Jacques said the strong performance was also the result of the ramp-up of expanded mines, operational productivity improvements and minimal weather disruptions.

He said the increase in production coincided with improved global iron ore prices.

"In 2016, there was a significant recovery in many commodity prices, especially iron ore," he said.

"This, in part reflects renewed growth in China's industrial sectors, which was stimulated by policy actions.

"The renewed industrial growth in China, combined with a higher degree of consumer confidence in some global markets, resulted in a better operating environment for our industry in 2016."

Iron ore started the year at about \$US40 per tonne, and ended at about \$US75/t, with the average price sitting at \$US53.60; a six per cent increase from 2015.

Silvergrass progresses

In August last year, Rio Tinto announced it would invest \$US338 million to complete its Silvergrass mine, subject to regulatory approvals.

Located adjacent to the company's existing Nammuldi project, the mine was part of the Greater Nammuldi precinct, and would produce high-quality, low-phosphorus Marra Mamba ore that would then be treated at the Greater Nammuldi processing plant and blended into the company's premium Pilbara blend product.

CONTINUED ON PAGE 40

World’s largest mobile shear launched by Liberty Industrial



Liberty Industrial's new GXT 2555R shear made its debut at the demolition of Munmorah coal fired power station.

NATIONAL deconstruction and remediation services provider Liberty Industrial has commissioned the world's largest and most powerful mobile shear to date that is set to revolutionise the global demolition industry.

Custom-built in Wisconsin for Liberty Industrial's Liebherr R 994, the new GXT 2555R model is capable of cutting through a 1.2 metre thick steel I-beam in a single bite, enabling it to tackle the most technically challenging demolition projects the heavy industry has to offer.

With a cutting force of more than 3000 metric tonnes and a reach of 6.5m, the state-of-the-art shear weighs more than 30 metric tonnes, is 7.85m in length and

stands 2.9m tall with a jaw opening of 1.4m and a depth of 1.4m.

"This technology will make the demolition environment a safer and more efficient workplace," Liberty Industrial director Clinton Dick said.

"The recently refurbished 994 and the new GXT2555R is the most formidable demolition rig anywhere on the planet.

"In the few months we have seen it in action; the results have been eye watering."

The shear made its debut at Liberty Industrial's demolition of the 1400 megawatt Munmorah coal fired power station; the largest power station demolition project to be carried out in Australia to date.

Liberty Industrial director Simon

Gill said the shear had been put to work processing large structural steel members associated with the heavy boilers, turbine hall, precipitators and filter fabric structures.

"The obvious key advantage is that we can now demolish substantially larger and heavier structures without the need to preweaken them, reducing any reliance on working at heights and removing the risk of personnel preweakening structures," Mr Gill said.

"Reducing the need for working at heights and the removal of personnel from the demolition work face has been the corner stone of our risk minimisation strategy.



"The arrival of the GXT 2555R further reinforces and strengthens that strategy."

As Australia's leading provider of industrial deconstruction and remediation contracting services, Liberty Industrial has been involved in a whole host of projects like this across the country, with strong ties to Rio Tinto.

The company has been engaged to provide demolition and remediation works at a number of Rio Tinto's operations over the years, but most notably in the delivery of the World Demolition Award-winning Hismelt Closure project, a first of its kind in Australia, with the project involving the complex dismantling and relocation of almost half of the Hismelt plant which was salvaged and shipped to China for reassembly.

Its line up of projects have resulted in a string of national and international awards, with its most recent accolade a *World Demolition Award* for its Duck River Bridge Dismantling Project carried out for Viva Energy.

More information on Liberty Industrial's GXT 2555R Shear and services can be found at www.libertyindustrial.com.au.



Liberty Industrial is a leading provider of deconstruction and remediation services.

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**"IN 2016, THERE WAS A
SIGNIFICANT RECOVERY
IN MANY COMMODITY
PRICES, ESPECIALLY
IRON ORE."**

In September, the project received the green light from the WA Government to begin construction, and later that month WA mining services company RCR Tomlinson (RCR) was awarded a \$120m contract to build processing infrastructure.

In December, construction and engineering firm Decmil was awarded a \$40m contract for the design, construction and commissioning of new facilities at the existing Nammuldi central mine services and the Silvergrass mine services area.

Once completed, the satellite mine would deliver an additional 10 million tonnes per annum (mtpa) iron ore capacity to the Rio Tinto portfolio.

"Silvergrass is not the lowest operating cost mine, but it enables the blending of high Phosphorus material from other mines, creating additional margin," Mr Jacques said.

"We will seek to maximise free cash flow through the cycle – and volume is an outcome.

"Be it higher or lower. From iron ore to borates, aluminium to zircon, the principle will be the same – value over volume."

First ore was expected in the second half of 2017.

Technology focus

One of the defining traits of Rio Tinto Iron Ore division is its commitment to advancing technology and innovation to drive productivity, and reduce risk.

The business is renowned as the world's largest autonomous truck operator and a proud leader in automated mining technologies.

In 2017, the company will continue its AutoHaul project with extensive running of trains in automated mode, with a driver on board until all safety and reliability systems are verified.

"AutoHaul - the automation of our trains - will deliver a step change in the safety controls and productivity of our rail operations," Mr Salisbury said.

"Ultimately, empty trains will depart from the coast without a driver on board and



Autonomous haulage trucks at the West Angelas minesite. Image: Christian Sprogø Photography.

complete the full cycle to the mines, through the loading process, and back to the coast without manual intervention.

"The system delivers multiple safety benefits, for example - automatic responses to level crossing operations; and there are considerable productivity benefits - no train stops for driver changeovers; and importantly, higher and less variable train speed control."

The trial was expected to be fully implemented by the end of 2018.

In addition, Rio Tinto's rail operations at the mines were also a focus, with loading times recently reduced by 6 per cent, while the ore car dumpers at the ports improved cycle time by 4 per cent in 2016, and reduced variability by 46 per cent.

"Rail system capacity will be further augmented through low capital investment options - for example, an extra consist and wagons, and a range of other productivity improvements," he said.

The company has also integrated wearable

technology, and a smart phone app that showed, in real time the truck utilization of its haul fleet in the Pilbara, which was helping improve productivity.

Portfolio growth

The iron ore business began its significant growth program in late 2009, with more than \$14 billion of mine and infrastructure now having been spent.

"We have increased production by more than 50 per cent, with high value optionality for further productivity driven growth, where warranted," Mr Salisbury said.

"To maintain mine value options post Silvergrass, we have a range of low capital cost brownfield developments being evaluated in conjunction with the Koodaideri greenfields development.

"In rail, we have increasing confidence in AutoHaul, and we will continue to expand its use through 2017 and 2018."

In 2017, Rio Tinto's Pilbara shipments were expected to reach between 330mt and 340mt.

From a supply and demand perspective, Mr Jacques said there were a number of factors that created a cloud of uncertainty for the iron ore market, which showed why the company needed a strategy in place to navigate any volatility.

"The domestic iron ore production in China is a key source of uncertainty and could tip the balance," Mr Jacques said.

"Put simply, in 2017 we will continue to strengthen our portfolio of world-class assets, those that are low cost and expandable.

"We want to deliver superior performance; in safety and in profitability."

Mr Salisbury said another challenge was sustaining existing production due to depleted mines.

"We are fortunate to have multiple high quality, low cost options available," Mr Salisbury said.

"Our brownfield mine developments will continue to be easy add-ons that benefit greatly from in-situ infrastructure.

"For example, West Angelas Deposit F will utilise existing processing plant and infrastructure, while Yandi Oxbow will utilise existing facilities, including the Yandi automated truck fleet."

"Indeed, over the next few years, it is expected that all mine developments – except a possible new mine at Koodaideri – will be brownfield replacement mines, with a capital intensity between \$5/t and \$20/t of installed capacity."

Mr Salisbury said Phase 1 development of Koodaideri would require capital of about \$2.2 billion, to establish a 40mtpa dry crushing and screening plant, non-process infrastructure, product stockyards, rail loop and load-out, and a 170km rail link to the main line.

"Our present view is first ore to be available around 2021," he said.

"However, we continue feasibility study work at this stage, with particular scrutiny of options that extend brownfields capacity, further reductions in capital, and staged capacity, potentially up to about 70mtpa."



**"WE PURPOSELY CHOSE
SALT AND CLAY BECAUSE
THEY ARE USED
AROUND THE WORLD
– PARTICULARLY
IN EUROPE AND
NORTH AMERICA
– AS GEOLOGICAL
REPOSITORIES."**

All Images: Tellus Holdings.

The Kaolin clay bed will provide a natural barrier for waste storage.

Dual revenue opportunity

Infrastructure development company Tellus Holdings has two major dual commodity-waste projects in the pipeline in remote regions of the Northern Territory and WA.

CAMERON DRUMMOND

TELLUS Holdings is in the business of creating economic, social and environmental value, predominantly from hazardous waste, clay and salt.

Plans for the Chandler salt mine in the NT and Sandy Ridge kaolin clay operation in WA are both nearing final project approvals.

The company is aiming to mine both salt and clay products for export to South East Asia, with the voids left over from mining utilised for underground waste storage.

Waste would be stored in multi-barrier systems of manmade and natural geological barriers to prevent hazardous waste seeping into the ground.

Tellus founder and managing director Mr Van Der Werwe said the traditional landfill method of waste storage only has a lifespan of about 10 to 20 years, however when reinforced by natural geological barriers, waste can be stored almost indefinitely.

"We purposely chose salt and clay because they are used around the world – particularly in Europe and North America – as geological repositories," he said.

"A geological repository with manmade and geological barriers can permanently isolate waste from the biosphere, and the lifespan of containment can run into millions of years without requiring any ongoing monitoring post mine closure."

The dual commodity and waste revenues would give the projects sustainable, long-term life spans, an attractive prospect for offtake partners.

A unique business model for Australia, it has been used in German salt and



The project would provide about 90 jobs during construction, with 23 direct and 46 indirect jobs during operation.

potash mines since the 1970s, providing companies with two revenue streams.

As well as mining and waste storage, the projects will host technology parks at both sites to create methods for the recycle and recovery of any valuable materials out of the stored waste and contribute it back into the economy.

Although the facility will take mostly chemical waste, there will be a small volume of low level radioactive waste such as medical isotopes and smoke detectors (not nuclear waste).

The company took a major step forward in October 2015 after it signed a memorandum of understanding (MoU) with China Coal Technology and Engineering Group Corp (CCTEG) for the

supply and finance of mining equipment to develop Tellus' Chandler and Sandy Ridge projects.

The package was valued at \$120m and included the supply and financing of mobile diesel equipment, conveyor systems, continuous miners, mobile bolters, auxiliary fans and salt handling plants.

"This is a great achievement for the company and significantly de-risks our project equipment supply and funding requirements," Mr van der Merwe said.

"CCTEG is a major supplier of high-quality specialised mining equipment to global operators, and also a leader in research and development of new mining technologies and processes."

Sandy Ridge

Kaolin clay is commonly used in ceramics, and well-suited for use as an environmentally friendly medium for the solidification of hazardous waste types.

Tellus' \$96m Sandy Ridge project, 75km north-east of Koolyanobbing, WA, is a proposed dual revenue business that involves a kaolin open cut mine, using the resultant mine voids as a secure waste storage facility.

The clay will be mined from the up to 36m thick, 20 million year old Sandy Ridge kaolinite clay bed, some nine metres below the semi-desert, for a mine life of 25 years.

The space created by mining will then be backfilled with mostly chemical waste using an artificial liner and the natural kaolin clay bed barrier.

"The reason we chose the Sandy Ridge location is because of its 40 metre thick clay bed that is up to 20km wide and 160km long, has no aquifers and is in an arid area, which mitigates the potential for the barrier to break over time," Mr Van Der Werwe said.

The company said it would support releasing valuable materials back into what it calls the 'circular economy' or storing them safely until using an associated technology park to be built near the mine.

The technology park will provide methods for the recovery and/or permanent isolation of mostly hazardous and intractable chemical waste; as well as a small volume of low level radioactive waste such as smoke detectors and medical isotopes.

The project would provide about 90 jobs during construction, with 23 direct and 46 indirect jobs during operation.

Mr van der Merwe said there had already been some interest among blue chip companies in the storage option, and a market development agreement with Hong Kong ceramics trader Asian Material Resources (AMR) was signed in April last year, whereby AMR would act as the ongoing sales agent for kaolin products in South East Asia.

Progress

In December last year, the Public Environmental Review (PER) document for the Sandy Ridge facility was approved for release by the WA Environmental Protection Authority (EPA).

That milestone initiated a 12-week public consultation and feedback process, which when due this month, would allow Tellus to address any issues raised before getting the final go ahead for the project.

Mr van der Werwe said investors had recognised early the financial opportunities of the company's assets and growth strategy after the company successfully raised \$15m to accelerate the development of Sandy Ridge.

"We are very pleased with the solid support of existing shareholders and we are also delighted to welcome new sophisticated high net worth and leading Australian institutional investors on to the register," Mr van der Merwe said.

"This has strengthened our balance sheet and is a significant step forward in the execution of our strategy to grow our business."

Chandler

Tellus aims to develop the Chandler underground rock salt mine and waste storage project 120km south of Alice Springs to reap the economic benefits of salt export, while providing secure storage for hazardous waste.



Drilling at the proposed Sandy Ridge project

The \$464 million project, near the Indigenous Titjikala community, would be the first underground rock salt mine in Central Australia with a targeted production of 500,000 tonnes per annum (tpa) of industrial and edible salts, as well as other minerals such as potash.

Hazardous waste would be stored in the voids left by the salt mining operations, using the same proposed multi-barrier method as Sandy Ridge.

If developed, it would be Australia's first 'permanent repository' for hazardous waste.

Along with clay, thick salt beds are regarded by scientists as the best option among geological formations for storing waste over millions of years.

Even in the event of an earthquake, rock salt heals its own fractures because of its visco-plastic qualities known as 'salt creep'.

According to Tellus, in 100 years salt can creep between 7 and 18 metres, entombing anything placed within it, which is at the

heart of the safety case put forward for its waste storage proposal.

Tellus said Chandler would provide between 280 to 350 jobs during construction and about 180 during operation, at what could potentially be Australia's longest life mine.

Additionally, plans are under way to develop storage and transport facilities that would support the Chandler project.

The proposed Apirmta facility will be 28km west of Chandler, adjacent to the Adelaide-Darwin railway line and utilise existing transport infrastructure to move salt product to Adelaide for export.

It comprises the construction of a 10,000 square metre storage warehouse and logistical infrastructure for the company's dual revenue business.

The warehouse would house both salt for ready for transport and waste ready for storage, with stringent safety protocols placed for the protection of employees and the environment.

Progress

After a successful South East Asia roadshow in February last year, Tellus secured an offtake agreement with Indonesian-based PT Damarco Internasional for the purchase of industrial salt from the Chandler project.

Under the agreement, Tellus would exclusively sell 500,000tpa from Chandler's first production representing up to 70 per cent of its future average annual production.

Mr van der Merwe said the company was delighted to sign with its partners in Indonesia.

"Tellus' unique sustainable dual revenue Chandler project has JORC resources in excess of 500 years of annual production targets, which will support Tellus' objective to be one of Asia's most reliable and long-term suppliers of high quality halite (industrial and edible salt) throughout commodity cycles."

Approvals progressed throughout 2016, with Tellus signing a project facilitation agreement (PFA) providing whole-of-government facilitation and support in return for Tellus' commitment to maximise the project's local benefits.

Mr van der Merwe said major project status was important for de-risking the project to gain investor, customer and stakeholder support.

"It is also important from the government's perspective in showing its support for a mine that could potentially bring a lot of investment, business opportunities and become one of the biggest private employers in the Alice Springs region," he said.

On 17 February Chandler's EIS was made available for a six week public review, after which the NT EPA would consider Tellus' response to the public submissions and make its recommendations to the NT Environment Minister.

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All images: Gold Road Resources.

Road to production

Gold Road's Gruyere joint venture project is one of the most significant greenstone belts in the Goldfields region, sitting at the eastern most edge of the Yilgarn Craton.

CAMERON DRUMMOND

COMPLETED in 2010, a study by the Geological Survey of WA suggested the Yamarna Belt shared geological similarities with the Kalgoorlie Terrane greenstone rocks, and studies by previous explorers such as Ausgold supported that claim.

Gold Road Resources's 5000 square kilometres of tenements in the Yamarna Belt already contain a number of discoveries dating back to 2009 when the company made its first find, Central Bore.

Central Bore is contained within Gold Road's North Yamarna tenements, with a JORC 2012 resource of 180,000 ounces (oz) of gold grading at 0.9 grams per tonne (g/t), including the high grade Imperial Shoot deposit containing a resource of 112,000oz grading at 22.7g/t.

While the deposit had not been included in the Gruyere feasibility study, Gold Road said there was potential to process ore from the deposit through the proposed Gruyere plant facility.

It wasn't until the discovery of the Gruyere deposit that the Yamarna Belt started proving itself as the next big thing in the region since the 2005 discovery of AngloGold Ashanti's Tropicana.

Gruyere, discovered in October 2013, is 200km east of Laverton in the WA Goldfields region.

The company's exploration strategy was to divide its tenements into 'gold camp scale targets', between 15km and 25km in strike length.

"We flew aeromagnetic surveys across the tenements, looked at the old gravity surveys and employed some of the big geological thinkers from WA to come in and interpret those surveys and they came up with what they called 'camp scale targets,'" Mr Murray said.

"This led to us reducing the area of focused exploration by 80 per cent from 5000sqkm down to roughly 1000sqkm, and we ended up generating 10 of these camp scale targets, each of them between 80sqkm and 120sqkm."

The first camp scale target Gold Road unearthed contained the monster Gruyere deposit and the YAM14 deposit.

Gruyere and YAM14 were discovered 9km apart on the same trend, and exhibited two different mineralisation types not seen previously in the Yamarna Belt.

Within 10 months, the company had



Gruyere is a long life, low cost gold mine.

defined Gruyere as a significant gold deposit with a maiden mineral resource of 96.96 million tonnes (mt) grading at 1.23g/t for 3.8moz of gold.

By October 2016, Gold Road completed a bankable feasibility study that confirmed Gruyere as one of the longest life, lowest cost undeveloped gold deposits in the world, containing 6.16moz of gold to support the production of 270,000ozpa over a life of mine of 13 years.

Development of the Gruyere project will be based on a single large open pit mine with a conventional SAG/ball mill circuit, gravity carbon-in-leach processing plant with a throughput of 7.5mtpa of fresh ore and up to 8.8mtpa of oxide ore.

Partnering up

In November 2016, Gold Road formed a joint venture (JV) with South African miner Gold Fields to de-risk and fast-track the development of its Gruyere project.

It agreed to split the project down the middle, selling Gold Fields 50 per cent for a consideration of \$350 million cash and an uncapped 1.5 per cent net smelter return royalty after the production of 2moz.

Gold Road managing director Ian Murray said the company was pleased to have chosen Gold Fields as its JV partner.

"The highly experienced team that we have

established over the past 18 months will be the team that will develop the Gruyere gold project under the guidance and leadership of Gold Fields," Mr Murray said.

Environmental approvals were granted in December last year, with final mining and construction approvals received in February.

Mr Murray said that achieving environmental approval was an important milestone and cleared the path for obtaining the final approvals for the project, all of which were submitted mid-January.

The first 300 rooms of accommodation for the project's village were completed in January, with work to dismantle, relocate and install the second lot of 300 rooms commencing in February for completion during the June quarter.

"Detailed engineering for the airstrip, access roads, tailings storage facility and Anne Beadell bore field are well advanced and will be completed by the end of the March 2017 quarter," the company said in a statement.

Gold Road also said it was in the final stages of evaluating tender submissions for works contracts including the engineering, procurement and construction (EPC) contract for the process plant and associated infrastructure.

On 15 February, the Gruyere project received its final approvals from the WA Department of Mines and Petroleum.

"Approval of the project management

plan, mining proposal and mine closure plan is another important milestone in the development pathway for Gruyere, and importantly it was completed according to the project schedule," Mr Murray said.

"Once we award the EPC, bulk earthworks and gas contracts, full scale construction will start this month.

"We are expecting first gold from Gruyere in late 2018, with the ramp up to up to full scale production to occur in 2019."

Exploration

Exploration at Gold Road's prospects along the Yamarna Belt continued through the second half of 2016, with RC drilling at the Ibanez prospect 55km north-west of Gruyere, as well as the Santana and Satriani prospects 35km south-west of the company's flagship project.

Looking into 2017, Gold Road is now fully funded to develop Gruyere and accelerate exploration activities across its 100 per cent owned North Yamarna and 50 per cent owned South Yamarna tenements.

The company announced it would allocate \$22m for exploration in the Goldfields region; an effective doubling of the company's 2016 exploration budget.

"The funding we have available following completion of the Gruyere JV transaction allows us to accelerate our geological evaluation of the Yamarna Belt," Gold Road executive director exploration and growth Justin Osborne said.

"In 2017, we plan to test multiple targets identified over the last three years across the North Yamarna tenements and are anticipating an aggressive drilling program for the Gruyere JV which will be targeting the potential underground extension to the current open pit mineral resource."

Mr Murray said Gold Road's exploration budget was currently one of the biggest greenfields gold exploration budgets in the world.

Between \$12m and \$15m would be used for exploration at North Yamarna, \$5m below the Gruyere pit, and a further \$2m to be used for drilling at South Yamarna with 50:50 JV partner Sumitomo Metal Mining Oceania.

"We will be doing further RC and diamond drilling to confirm the size and scale of our discoveries at North Yamarna, testing below the Gruyere pit, to increase the Attila and Alaric reserves; and undertaking regional aircore exploration at South Yamarna to define targets for the future," he said.

A wealth of experience

ACQUA Drill Resources is a new force in water well drilling in WA, combining a wealth of industry experience with modern drilling equipment, a culture driven by safe productive outcomes, and a lean business management model.

Acqua Drill's two Versa Drill V-2000ADP rigs have all the modern features, including angle drilling capability, automated rod handling, and automatic breakouts.

The rigs have low hours and have been very well maintained, making them highly reliable in remote locations.

It also provides ancillary equipment and support services including trucks, crew vehicles, camp facilities and a fully equipped engineering workshop.

The current Acqua Drill team has a wealth of experience in managing drilling programs for top tier miners such as Rio Tinto Iron Ore, BHP Billiton, Newcrest and FMG.

Acqua Drill managing director Alan Olive has a long history in the water well drilling sector.

Mr Olive has more than 35 years of industry experience, most recently as the managing director of Connector Drilling, which under his leadership became one of Australia's most innovative and successful water well drilling companies.

After selling Connector to Ausdrill in 2011, Alan is now back in the drilling industry offering the same high level of service while maintaining the small business focus on cost control, safety, and productivity.

The primary goal is to become the water bore drilling company of choice by delivering quality technical outcomes at highly competitive rates.



Acqua Drill provides high-quality, experienced drilling services to the mining sector.

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INDUSTRY PROFILES

COMPANIES GEARING UP

Technological transformation

A switch from ball mills to Vertimill® boosts Miaogou Iron Mine in challenging market conditions.

HEBEI Iron and Steel Group operates the Miaogou Iron Mine which is located in China's Qinglong County, 300km east of Beijing. The site produces iron concentrate at a rate of 800,000 tons per annum.

Due to the downturn in the iron and steel industry, Miaogou's concentration costs were exceeding the price of iron concentrate.

In response to these challenging market conditions, Miaogou Iron Mine launched a technological transformation project in 2014. The project included replacing the original tertiary ball mills with Metso's Vertimill® VTM-1500-WB vertical grinding mill. The new machine delivered a decrease in both power and grinding media consumption for the site.

Improved recovery, less energy

The mine's original grinding circuit consisted of ten ball mills, two of which were dedicated to the tertiary stage. These existing mills produced material with 71 per cent to 73 per cent passing 44 microns.

Iron concentrate grade was 65 per cent with an average recovery rate of 87 per cent.

Since the Vertimill® installation, site production costs have reduced and allowed the mine to successfully operate under tighter market conditions. General Chief of the Miaogou Iron Mine, Zhang Runshen explains how the new machine has increased productivity.

"Since installing the new machine, grinding fineness has increased from 71-73 per cent to 88-90 per cent passing 44 microns. Our iron concentrate grade rose from 65 per cent to 66 per cent, and average recovery improved from 87 per cent to 89 per cent. At the same time, silica content decreased by 1 per cent," he said.

In addition to improving the recovery rates, the Vertimill® has lower energy and grinding media consumption when compared to the existing ball mills. It also takes up much less space. Miaogou's Grinding Plant Technician Zhang Jiankang highlights how the smaller footprint helped the installation.

"We would have needed a larger ball mill to achieve the current grinding fineness however, the original plant space was limited. Thanks to the Vertimill's compact dimensions and the ease of installation, the new machine was commissioned quickly. At present, the VTM-1500-WB runs at 85 per cent load to achieve a capacity of 200 tons per day. Eliminating the original two ball mills has also yielded a 30 per cent reduction in energy costs," he said.

In addition to the energy savings, Miaogou's media usage for the tertiary



Metso Vice President of Capital Equipment Max Wijasuriya.

stage dropped from 0.8 kg/t to 0.3 kg/t, equivalent to a 60 per cent reduction.

With an annual output of 800,000 tons of iron concentrate, the savings in grinding media alone had a significant reduction on operational expenditure.

Commenting on Metso's capabilities in Australia, Max Wijasuriya, Vice President for Capital Equipment highlights innovative thinking as the key to driving productivity in the current economic climate.

"For Australia with the increasing focus to improve efficiency and productivity competitively, this kind of technology transformation thinking is where our industry is going. We see other applications like these where we can help to challenge how things are being done and find solutions working collaboratively with our customers," he said.

Metso is a leading process performance provider, with customers in the mining, oil and gas, and aggregates industries. Metso's cutting-edge services and solutions improve availability and reliability in minerals processing and flow control, providing sustainable process and profit improvements.

Metso is listed on the NASDAQ OMX Helsinki, Finland. In 2013, Metso's net sales totalled EUR 3.8 billion. Metso employs approximately 16,000 industry experts in 50 countries. Expect results.



Metso's Vertimill VTM 1500 installed at the Miaogou Iron Mine.

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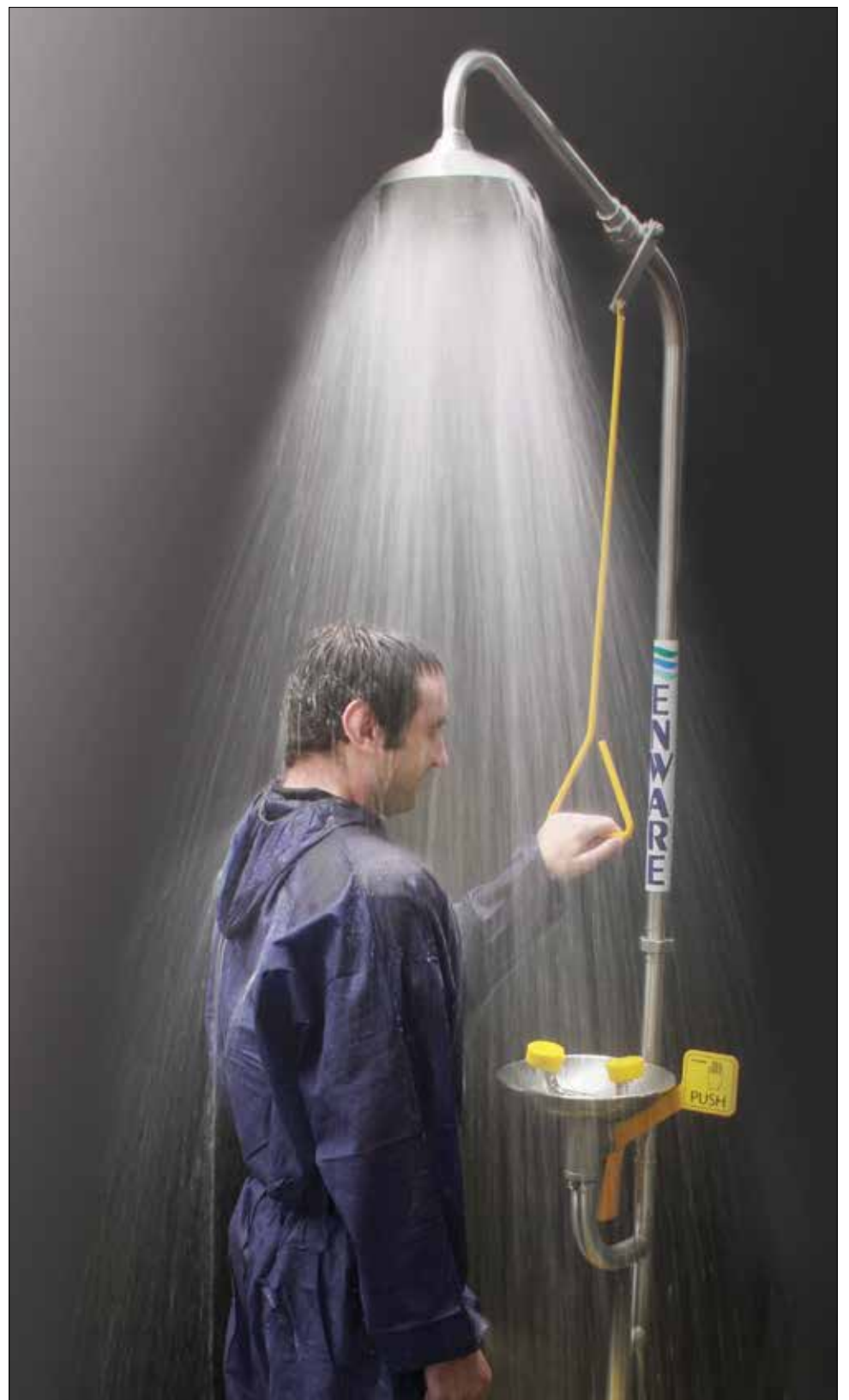
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MEDICAL and industrial experiences have shown that initial first-aid treatment for many hazardous contaminants should be to wash the contaminated part of the body as soon as possible.

Every second counts in the treatment of an injury so Enware emergency systems have been designed to swiftly deliver an effective response.

Enware offers customised solutions for specific users, sites or hazards to meet particular workplace safety initiatives.

Enware's experience and flexible manufacturing process means emergency systems can be customised to suit your needs.

Whether it's a basic eyewash, a fully self-contained gravity fed shower or additional accessories such as audio visual alarms or lighting, Enware can advise and manufacture an appropriate solution for any situation.

Enware's VERTECH technology has been designed to create a 'zero velocity' point for effective relief when it's needed most.

This technology has redesigned the water velocity for eyewashes, creating a gentle yet highly effective flow and allowing a greater amount of time in the flushing zone, which is particularly important when cleansing sensitive eyeballs from hazardous materials.

This – combined with Enware's dedicated eyewash streams for targeting and flushing eyes and independently angled face wash streams – provides optimum coverage to ensure fast and effective flushing.

Enware emergency systems have been protecting people, the workplace and the environment for many years in industries such as mining, petrochemical, oil refinery, chemical manufacturing, handling and storage, as well as laboratories and hospitals.

Enware's knowledge and expertise will ensure a solution that offers the best possible protection with products that will perform when needed most.

More information can be found at:
www.enware.com.au/safety.

Turning night into day

Energy saving is only the beginning

While the energy saving benefits of LED lighting are widely known, new generation LED technology allows WADCO LED fittings to be completely reimagined and redesigned to client needs giving rise to numerous advantages in addition to energy savings.

Directional lighting

One of the recurring frustrations of HID fittings is uncontrolled spill. New generation LED technology allows WADCO LED fittings to be tailor-engineered with superior cut-off capabilities to focus light on specific areas requiring illumination thereby eliminating unwanted spill and direct glare.

Colour consistency

HID and earlier generation LED fittings are notorious for the significant colour deterioration that occurs as they age. New generation LED technology, on the other hand, ensures WADCO LED fittings deliver consistent crisp clear light during the lifecycle of the fitting.

“Turtle friendly” solutions

Coastal environments are increasingly difficult to illuminate because of growing sensitivity around the impact artificial lighting may have on coastal areas. WADCO LED fittings ensure the correct wavelength of light is delivered in accordance with regulatory requirements.

Reduced maintenance

New generation LED technology delivers significantly improved reliability and longevity compared to HID light sources and earlier generation LED technology. Reputable manufacturers warrant their technology for a minimum of 5 years. WADCO LED fittings correctly installed have a life span of at least 10 years and allow a “set and forget” approach to



WADCO LED fittings deliver crisp clear white light in the background.

facilities lighting management.

Auxiliary lighting

WADCO LED fittings can incorporate an inverter and battery unit which provides auxiliary lighting for up to 3 hours in the event of external power loss.

Lighter smaller fittings

New generation LED technology is both much smaller and lighter than traditional HID light sources. Miniaturisation of technology allows WADCO LED fittings in stainless steel and aluminium to be less in size and weight than their HID counterparts. Reduced size and weight makes installation easier and imposes less fatigue on lighting support infrastructure.

HID Retrofit Options

The lifespan of HID fittings can be extended and improved by replacing the HID light engine with a WADCO LED retrofit kit

without having to replace the existing HID fittings.

Coal Ship Loader – A picture is worth a thousand words...

The photograph of a recently commissioned coal ship loader visibly contrasts the crisp clear white light of the WADCO LED fittings on the coal ship loader above in the background with the uncontrolled spill of the HID dock lights in the foreground.

The absence of spill or glare reflects the superior cut-off characteristics of WADCO LED fittings.

In addition, WADCO LED fittings deliver well-defined directional light distribution ensuring uniform illumination. Constructed from 316 stainless steel, WADCO LED fittings offer the owners of the coal ship loader superior performance, guaranteed longevity and the ability to future-proof their investment.

More information on WADCO Lighting can be found by visiting: www.wadco.com.au.



More information can be found at www.axishire.com.au or by calling (08) 9791 8300.

Capital optimisation bolstering shareholder value

OVER the last 12 months, market trends are indicating a timid return to a growth mindset across various pockets in the mining industry, with a specific focus on bolstering shareholder value and reducing costs.

With commodity prices improving, prudent companies will be looking to their balance sheets, considering how best to optimise their capital.

For some, this will mean embracing new technologies, while others may rely more heavily on the relationships with long term suppliers to build value. Axis Hire (formerly Brogen Hire) has seen this move and understands why companies are choosing to hire plant and machinery instead of buy.

For the last decade, Axis Hire has been providing high-quality vehicle, truck and equipment hire solutions to the mining, civil and construction industries. Forming close, valued partnerships with its clients means it is able to anticipate hire demands and provide a tailored solution.

Productivity and job efficiency relies heavily on having the right tools – and Axis Hire ensures its vehicles are customised for the specific task they’re assigned.

Not being at the mercy of the Australian dollar makes rental an attractive cost-saving option for many companies. Long term customised hire solutions, like those provided by Axis Hire, also ensure capital isn’t tied up in large purchases and equipment isn’t left unutilised.

This renewed demand is invigorating for hire companies, especially those that offer tailor made solutions like Axis Hire. Major industry players have turned to Axis Hire, for its hands-on approach to supplying high-quality equipment hire solutions.

By considering factors such as purpose, environment, customisation, value, scalability, maintenance, safety and features, Axis Hire is able to supply vehicles and machinery that are optimised to help clients achieve project objectives seamlessly.

With a thorough understanding of industry needs, Axis Hire goes to great lengths to understand what its clients’ specific businesses require. By expediting decision-making, staying approachable, keeping itself flexible and placing a greater emphasis on attentive customer service, customised long term rental companies such as Axis Hire are ensuring clients are free to focus on optimising processes and reducing running costs.

Built for all occasions

THE Adelaide Convention Centre was the first multi-purpose built convention centre in Australia.

Its ongoing commitment to providing outstanding service excellence and quality food – together with in-house audio visual technology – has seen the venue continuously ranked as one of the best conference destinations in the world.

The convention centre is located on North Terrace in the heart of Adelaide’s CBD and has sweeping views of the picturesque River Torrens.

With ease of access to the heart of the city and its adjoining accommodation, the convention centre is suitable for any type of event.

It comprises of three interconnecting buildings: the Central Building, the West Building (which was opened in early 2015) and the soon to be completed East Building.

The new East Building will boast the world’s largest rotating seating drums.

Two 18 metre revolving rooms – each accommodating seating for 320 persons – can rotate 180 degrees in minutes,



A render of the central building’s foyer and skywalk.

and can be used to quickly reconfigure conference and event spaces within the East Building Plenary.

With an overall space of 28 meeting rooms and 15 halls, the venue has

the capacity for any size or type of function; including a breakfast, banquet, conference or cocktail party.

More information can be found at: www.adelaidecc.com.au.

Minimising expensive tyre damage

TYPICALLY mines can have harsh environments, creating a multitude of problems for both plant and personnel.

Extreme temperature variations, heat, wind, rain, rock, dust and mud means machines need to be strong and uncomplicated.

When it comes to rock rubbllisation, nothing could be tougher and less complicated than the Broons Square Impact Roller.

The solid square compactor module is located within a reinforced mobile frame and actuated by a simple spring-loaded linkage system.

The roller is the best choice for remote mining applications around the world as it has no complicated electronics or hydraulics, no problematic sensors or temperamental software, no engine, transmission or suspension to maintain. It is ideal for fracturing sharp rocks, thereby minimising expensive haul truck tyre damage by improving the running surface on tip heads, pit floors and waste dumps – all with round-the-clock reliability.

In 'mine spec', the unit features wear plates on the square module, heavy duty linkage and a reinforced main frame.

Towed at about 10 kph, this heavy duty compactor will fracture larger rocks to create a secure cobbled surface – ideal for protecting expensive tyres.

35 years of development has perfected the Square Impact Roller, but Broons director Stuart Bowes is still amused by



The Broons Square Impact Roller.

his client's curiosity.

"They can't believe how simple and effective this roller really is, they keep

looking for some kind of hidden secret," Mr Bowes said.

Broons can be contacted on (08) 8268 1988

or info@broons.com to discuss surface security at mine sites, with a brochure available at www.broons.com/impact.

The way forward for BTI is fluid

AFTER more than 50 years of manufacturing underground mining vehicles, Breaker Technology (BTI) is seeing its future as fluid.

This doesn't just represent the recent mining slowdown, but more an embracing of an innovative hydraulic drive system that has been developed and incorporated into its existing line of articulated underground service vehicles, including fuel/lube vehicles, shotcrete transport/spraying, crane/pipe handling, scissor lift and ANFO loading vehicles.

While current market conditions may well be fluid, the four wheel drive hydraulic system is proving a winner as it lowers maintenance costs and increases productivity as it completes existing work with lower fuel burn.

One important element of the innovative system is that removal of traditional calliper or drum braking systems; the service braking element is completed within the hydraulic drive unit and eliminates brake wear and tear, a massive contributor to maintenance costs.

While radically cutting costs of brake maintenance the brakes system also use a spring applied hydraulic release (SAHR) emergency and park brake system.

This fluid future has also seen the development and launch of BTI's latest innovation the Minerunner All Purpose Vehicle.

The Minerunner is a reimagined and re-engineered solution for those underground miners who are interested in reducing their maintenance cost



and increasing the life and operational effectiveness of their underground light vehicles.

The Minerunner is purpose built for the underground mining environment. It includes the same four wheel hydraulic drive system already proven in their articulated service vehicles. The Minerunner's features also include an integrated ROPS/FOPS (level 2) cabin and electronic management system for electronic speed governance and diagnostics.

The hydraulic drive also gives lower fuel usage over traditional repurposed

road vehicles. The totally sealed chassis assists with corrosion resistance, while the overly solid construction takes the hits that invariably come in underground mining industry.

The feature that has most heads turning is the impressive carrying capacity. With a payload capacity up to 2900kg the Minerunner can lift a lot more with each trip compared with its road going cousins; this provides greater operational flexibility with interchangeable payload modules already developed such as an 8 seat ROPS/FOPS personnel carrier, scissor lift EWP, high access basket, fuel

lube and ambulance/ rescue module.

The BTI underground vehicles are sold and serviced in the Australian mining market through sister Astec Industries business, Astec Australia. Astec Australia, based out of Brisbane, is the face of Astec Industries businesses in Australia and supports the equipment with factory trained personnel, OEM spare parts and the Astec Response Promise – "if you're working, we're working".

The Minerunner will be on show at Massmin 2016 in Sydney on 8 to 11 May and is available to test drive and field testing by appointment.

Mine monitoring solutions

ESTABLISHED in 1962, Kenelec Scientific is one of Australia's leading scientific and environmental technology companies.

Kenelec Scientific has an extensive range of scientific and environmental solutions, and employs highly trained and experienced sales and technical staff.

It provides a variety of monitoring solutions for the mining, engineering and construction sectors, ranging from dust and aerosol monitoring, respirator fit test systems, airflow test instruments and air quality monitors.

One of these products, the new TSI AM520 SidePak(tm) Personal Aerosol Monitor, provides real-time aerosol readings of dust, fumes, mist, smoke and fog within a worker's breathing zone.

Real-time monitoring provides immediate data and feedback so you can action change straight away, and is used in a wide variety of workplace environments including mining, foundries, refineries, construction sites, transportation and general industry.

With an intrinsically safe version of the AM520 arriving in a few months, Kenelec Scientific are very excited about the future of this model.

Kenelec Scientific supports the AM520 in its world class calibration laboratories which professionally calibrate a wide range of test instruments; not just the brands they supply but many others as well.

NATA accredited for the calibration of particle counters and vane anemometers, Kenelec Scientific help many of its more specialised customers with requirements for certifications.

Anthony Busuttil, Managing Director of



Kenelec's laboratories routinely test and calibrate products it supplies to customers.

Kenelec Scientific, affirms the company's most prized asset is the dedication of the staff, many of whom have more than 20 years of experience forging the strong relationships with customers, suppliers and

other stakeholders; a testament to their reputation for integrity and ethical business practices over the last five decades.

With offices in Sydney and Melbourne and distributors throughout Australia

and New Zealand, Kenelec Scientific is recognised as a well-connected, innovative industry leader in the supply of globally sourced, latest generation technologies, at competitive prices.

MONITOR WHERE IT MATTERS

with the **AM520 SidePak™**
Personal Aerosol Montitor

Developed by TSI - the experts in aerosol monitoring - the AM520 allows you to **instantly measure and evaluate worker exposure** to a variety of aerosols including dust, DPM and smoke:

- Smallest, most portable personal monitor available
- Real-time results for immediate feedback
- Range of impactors to measure multiple PM fractions
- Rugged construction for dirty environments
- Minimum 20-hour battery life for long shifts
- Audible and visual alarms for enhanced safety
- Buy outright, or rent short-term

Intrinsically Safe version for all AU (including QLD) coming soon

Kenelec Scientific knows monitoring equipment. Whatever your monitoring needs, we have your solution.



1300 73 22 33 | sales@kenelec.com.au | www.kenelec.com.au

When low-quality fuel is not an option

FUEL Technology has been working within the mining and transport industries for more than 30 years.

Following a sole Australian distribution agreement with world leading filtration manufacturer DieselPure, Fuel Technology is set to drive fuel cleanliness to new heights.

"Poor fuel quality or contaminated fuel is a major cause of engine failures while also increasing fuel consumption and emissions," Fuel Technology stated.

"At Fuel Technology we are focused on helping industries achieve the best possible fuel efficiency therefore reducing operating costs and lowering emissions."

DieselPure filters were specifically designed to address the changes in today's ultra-low sulphur diesel (ULSD) and ULSD/Biodiesel blends, where a new hidden problem within storage and fuel systems has been identified; emulsified water.

Tested to industry standard SAE J1488 2010, DieselPure filters have been proven to remove not only contaminants down to 0.2 of a micron and free water, but also 100 per cent of harmful emulsified water from ULSD and 96 per cent from Bio-Diesel blends.

No other bulk diesel filter has been proven to achieve this.

"With modern engine fuel systems operating at high pressures and fine tolerances, diesel that is clean and moisture free is no longer an option, but a necessity," the company stated.

"DieselPure filters have a two-stage design, firstly allowing fuel to flow through internal core media to filter out large contaminants (dirt, microbial growth, etc.).



More information can be found at www.fueltechnology.com.au.

"Fuel is then passed through the specially engineered layers of pleated media to remove emulsified water and fine particulates."

Fuel Technology supply a range of

DieselPure fixed systems to suit any bulk diesel application, while also providing a mobile tank cleaning service to ensure storage tanks are clean and moisture-free.

Storage tank maintenance is critical to

ensuring clean fuel.

Fuel Technology and DieselPure have set a new standard in diesel filtration and are recommended for all diesel storage tanks where fuel quality is paramount.



YOUR DIESEL QUALITY SPECIALISTS

Fuel Technology has teamed up with world leading filtration company DieselPure to provide an exciting new range of innovative filtration options which set a new standard in diesel quality. Proven to remove what no other filter can, DieselPure filters should be the only choice for bulk diesel storage systems. With over 30 years' experience in the Australian mining industry, we have the knowledge and a proven range of products to reduce your operating costs, reduce greenhouse gas emissions and protect your valuable equipment.

- DieselPure Bulk Fuel Filtration Systems
- Fuel Tank Cleaning Service
- Fuel Cleaning Service / Fuel Analysis
- Scientifically Proven FPC Combustion Catalyst
- Emission Testing

A NEW STANDARD IN DIESEL FILTRATION IS HERE

REDUCE COSTS, REDUCE EMISSIONS AND PROTECT YOUR ASSETS



(08) 9353 1016
admin@fueltechnology.com.au

www.fueltechnology.com.au

THE LEADERS IN RAB AIRCORE AND RC DRILLING SERVICES



In 1993 Bostech Drilling Australia was established in Western Australian exploration drilling. Bostech prides itself on satisfaction with the safety, reliability and quality of our drilling services to our clients.

Bostech offers no compromise to safety or quality. Our emphasis is on safe work-practice with experienced and knowledgeable crews providing effective, efficient and quality drilling outcomes.

While Bostech Drilling Australia operates primarily throughout Western Australia, we also work in the Northern Territory, Queensland, New South Wales and South Australia with RAB and Air Core and RC rigs designed and manufactured by Bostech Engineering.

OUR SERVICE OFFERS

RAB/Aircore	150 meters+
Reverse Circulation mud rotary	500 meters+
Diamond core	Geotech holes and directional drilling
PQ	300m
HQ	1000m
NQ	1800m

CONTACT US

(08) 0250 4252

admin@bostech.com.au

www.bostech.com.au

Quality service safely

HAGSTROM Drilling is a privately owned company, recognised for its proven professionalism and expertise in the supply of drilling solutions both nationally and internationally.

Hagstrom has been in operation for 25 years specialising in Aircore, Air and Mud Rotary, Diamond, Auger, Direct Push Probe and Cone Penetration Testing (CPT); with extensive experience on land and over water.

Hagstrom provides these services with an end-to-end service capability; from feasibility, exploration and construction, to monitoring and site remediation.

With its head office in Canning Vale, WA and representation in NT, NSW and Victoria, Hagstrom has the capability to service the industry, internationally and Australia wide.

In conjunction with its experienced personnel and extensive range of drill rigs and equipment, Hagstrom can provide specialised services that include service locating, sampling and waste management; its operations are a complete package for the ever expanding business.

Irrespective of challenges Hagstrom faces, its team strives to ensure that the environmental impact is minimised in line with company and client policies.

Hagstrom values the environment,



Hagstrom provides nation-wide drilling services to the resources sector.

eco-sensitive and cultural sites and respects the rights of landowners.

In 2012, the company was awarded the WA *Business News* Rising Stars and the Australian Business Award for Enterprise.

Receiving the awards confirmed the strategic and operational focus of the organisations' effectiveness.

Hagstrom's vision is to achieve the highest level practicable with safety and health of all employees, contractors and visitors.

Its warehouses are stocked with a

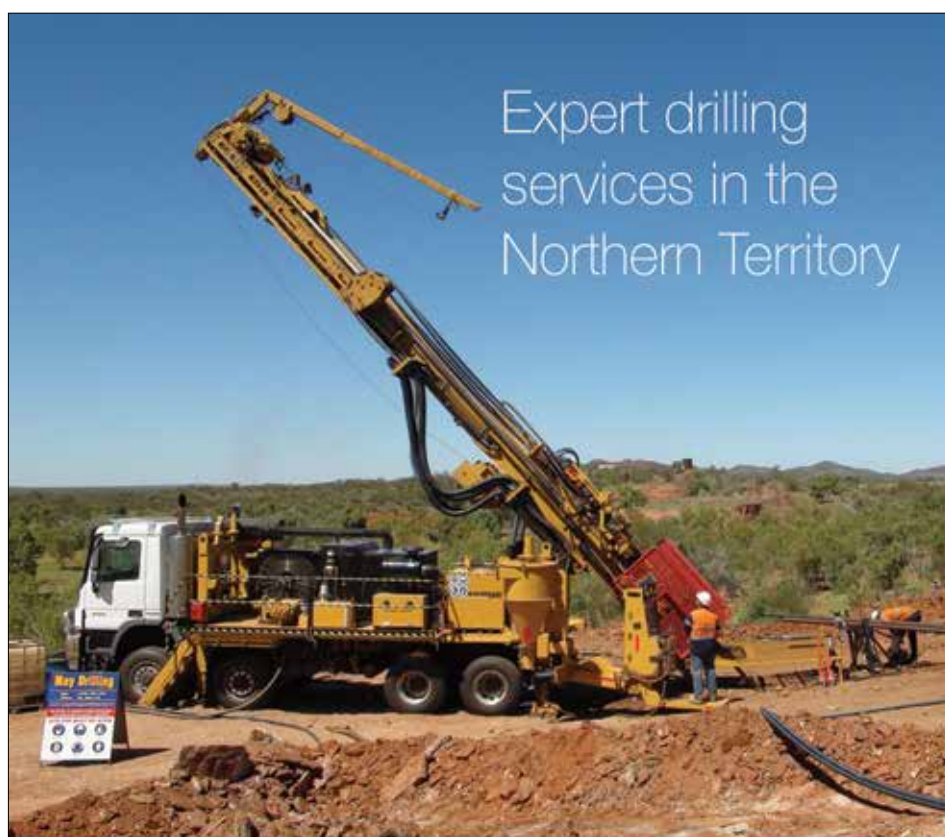
comprehensive inventory of spares and consumables for necessary repairs, fabrication, maintenance and rebuilds of all plant and equipment; giving Hagstrom the ability to fully support its equipment in the field in order to minimise any unplanned down time.

All Hagstrom safe work procedures are rig specific and incorporate a high level of national competency, as all staff are required to understand and exercise all company policies together with ISO 4801 compliance, safety management plan and visions.

With a comprehensive training matrix covering each role to industry competencies, best practice, internal procedures, policies and standards, Hagstrom's focus on staff training and development is an asset to the business and industry as a whole.

Hagstrom continues to provide highly efficient and accurate drilling solutions, while remaining true to its 'quality service safely' motto.

Additional information can be found at: www.hagstromdrilling.com.



Remote Exploration | Multi-Purpose | Core Drilling

- 20 yrs top end drilling
- Licensed certified employees and trades men
- Excellent local knowledge
- A large inventory of spares and consumables
- Well maintained late model equipment
- All terrain vehicles

MAY DRILLING

0428 530 306 | maydrillingptyltd@bigpond.com

www.maydrilling.com.au

The remote drilling experts



More information can be found at www.maydrilling.com.au.

MAY Drilling is a professional, multi-purpose drilling company specialising in mineral exploration drilling across the Northern Territory.

With a wealth of expertise in mobile drilling that spans three generations, May Drilling is proficient in a wide variety of drilling techniques; including diamond core sampling, reverse circulation, rotary mud, geo technical site investigation sampling

and water bore installation.

"Our longstanding history within our highly specialised field of expertise has led us to invest in the right equipment and resources required to produce the results that our clients seek," May Drilling owner Seamus May said.

"And with our own mineral leases, we understand first hand client requirements and industry needs."

Orbit acquires new diamond drills



More information can be found on Orbit Drilling's website.

ORBIT Drilling is pleased to introduce new additions to the fleet that will significantly increase its diamond drilling capacity.

In February, Orbit Drilling purchased the 1800 series diamond drilling rigs with all supporting equipment.

"These rigs were received in excellent condition having come off major contracts with majors mining resource companies and are ready to go supported by our very experienced diamond drillers and supervisors," Orbit Drilling managing director Martin Smith said.

Prior to the purchase, the drills were checked over, thoroughly inspected and underwent minor maintenance, including a fresh coat of paint.

"The expansion of our diamond drilling capacity will allow Orbit Drilling to continue

the substantial restructuring of our company in fleet and management areas while we remain committed to the pursuit of excellence continuous improvement and in meeting the individual needs of clients," Mr Smith said.

In addition to diamond drilling, Orbit Drilling continues to provide a comprehensive range of drilling techniques throughout Australia including reverse circulation; aircore; rotary air blast; and mud rotary.

The senior management team has a combined experience of more than 90 years in the drilling industry. Together with its hand-picked team, Orbit Drilling are at the leading edge of professional expertise, building long-term sustainability that drives the future of the company in mineral exploration, water well drilling and geotechnical works.



BDA is a leading force in exploration drilling.

Industry leaders in drilling

BOSTECH Drilling Australia (BDA) has had more than 25 years of successful experience in the aircore drilling field, primarily driven by founder Peter Boswell.

BDA has developed a strong reputation throughout Australia as one of the leading forces in exploration drilling.

This reputation comes from its commitment to providing high-quality, cost-effective drilling services with strict adherence to industry standards and no compromise on safety.

"Are your budgets tight? Wish your funding would go further? We can help," Bostech Drilling operations manager Paul Allen said.

"With the current tough economic times we understand that the clients need the best possible service at a cost-effective rate, with no compromise to safety.

"At Bostech Drilling, we are able to provide you with the most efficient, cost-effective and safest drilling possible with a variety of new drilling methods on offer."

Bostech Drilling tailors contracts to each

client, and works in partnership with some of the world's leading mining companies.

Some of its services include RAB, aircore, slimline & deephole RC as well as diamond drilling methods.

"Our aircore drilling equipment is at the cutting-edge of performance, safety, efficiency and gives excellent sample integrity," Mr Allen said.

"Aircore is also a fraction of the cost of RC which allows us to drill two to three times the number of metres in the same time and cost as it would to use RC."

Bostech's holistic approach enables it to offer clients competitive rates, custom rig and support trucks; leading innovation in drilling technologies; mobile maintenance and priority turnaround.

"Through our in-house Engineering and Manufacturing Divisions we design, build and maintain all of our rigs and most of our down-hole equipment," he said.

"As industry leaders, we will ensure our clients reach their drilling requirements, first time, every time."

A large fleet of white drilling trucks is parked in a lot. The trucks are equipped with various drilling rigs and equipment. The background shows a clear blue sky and some trees.

THE DRIVING FORCE IN EXPLORATION DRILLING

Orbit Drilling has completed more than 100 projects and built a leading reputation in providing services to clients locally and in remote locations throughout Australia.

Orbit Drilling is pleased to introduce the 1800 series Diamond Drilling Rigs to its fleet.

67 Mather Drive, Neerabup, WA
(08) 9405 3516
admin@orbitdrilling.com.au
www.orbitdrilling.com.au

The logo for Orbit Drilling Pty Ltd, featuring a stylized orange and white circular design next to the company name.

Advanced drilling service provider

WATSON Drilling is a leading, innovative resource and water drilling organisation deploying a modern universal fleet of drilling rigs and support equipment in Australia.

Established in Maryborough, VIC in the 1930s, Watson Drilling is currently run by fourth generation family members Dave and Rex Watson, who hold 68-plus years of experience between them.

The company is a leading, innovative resource and water drilling organisation holding some of the most modern and technically advanced fleet of drilling rigs and support equipment in Australia.

Its fleet comprises of 11 multi-purpose all terrain drill rigs, backed by a huge inventory of support equipment.

This includes, water trucks, front end loaders, excavators, generators, lighting towers, auxiliary mud-pumps, high pressure air compressors and mobile camps.

Watson Drilling has staff and equipment for turnkey drilling operations throughout Australia.

The company is proud to employ a very experienced team of licensed drillers, offsidiers, and maintenance staff; whose skills and knowledge ensure safe, efficient and productive field operations.

The company has licensed drillers able to drill in the Great Artesian Basin, with endorsements for mud-rotary, diamond coring, DHH and RC drilling, specialising in large diameter bores.

It is also an industry leader in groundwater investigation and development, for irrigation, exploration and dewatering.



Watson Drilling are experts in water drilling.

EXPLORATION DRILLING - EQUIPMENT - GROUND WATER INVESTIGATION

Specialist Drilling services across Australia including the Great Artesian Basin

Our services include:

- Down-hole Hammer
- Pump Testing
- Exploration
- Wireline Coring / Conventional Coring - to depths of 1500m
- RC Drilling
- RAB
- Mobile Camps
- Licensed Waterwell Drillers across Australia including the Great Artesian Basin.
- Additional plant and equipment available for hire, including back hoe excavator, mud pumps, generators, light towers, test pumps and more.



400 - 410 Ochertyre Street
PO Box 733
Deniliquin NSW 2710

P: +61 3 5881 4699
David Watson: 0428629380
Rex Watson: 0428267164

E: drilling@watsondrilling.com.au
W: www.watsondrilling.com.au



Heavy duty labour

ESTABLISHED in 2006, WA-based Elphinstone Mechanical Services (EMS) delivers highly qualified labour hire, support equipment and effective maintenance solutions to the mining and construction sectors.

Over the years, the company has grown significantly, from servicing the North West region of WA, to all across Australia, with provisions to the international market.

Its fundamental services include field service (rapid response), site supervision, planners, shutdown coordinators and long-term labour hire.

EMS' field services offer short-term, backlog and contingency labour hire contracts along with supervised major shut down crews.

By having a mobile fleet of 35 field service vehicles, EMS is able to respond swiftly to customers requirements.

The fleet is complete with the latest diagnostic equipment and specialised tooling designed to minimise any downtime to a business.

From minor oil leaks right through to the change out and repair of major components, the EMS team are able to solve any unfavourable situation.

The company's extremely qualified site supervisors are able to manage daily and



EMS supplies the mining industry with ready-to-work qualified labour.

long-term maintenance of mobile equipment, maintenance contracts and technical support for its site based personnel.

EMS's heavy duty mechanics must come from an OEM background or possess specialised experience in the repair of heavy mobile equipment to the mining industry.

Its heavy duty mechanics must hold a Heavy Duty Mechanic certification, together with a minimum of five years experience in the mining industry.

EMS ensure all maintenance and repairs on heavy equipment is conducted to manufacturer's specifications and standards.

The people with EMS are of the utmost importance to the company.

Employees are put through a comprehensive recruitment process and relative induction programs with ongoing training, ensuring EMS perform to industry standards and beyond.

A company you can trust, top class service, competitive rates.



FIELD SERVICE

Our mission is to deliver quality labour hire, support equipment and effective maintenance solutions minimising costly downtime from the equation.

LABOUR HIRE

We specialise in supplying labour to the Mining & Earthmoving industry. We can fill positions from heavy duty plant mechanics to auto electricians.

SPARE PARTS

EMS have a large number of suppliers with excellent creditability for supplying the parts we need to get the job completed without down time.

WORKSHOP REPAIRS

Our mission is to deliver quality labour hire, support equipment and effective maintenance solutions minimising costly downtime from the equation.

Innovative truck body drives productivity

AUSTIN Engineering, the world's largest non-OEM designer and manufacturer of truck bodies, has welcomed a new design to its fleet that is set to take the mining industry by storm.

Custom designed to suit the individual requirements of miners, the new JEC LD mining truck body was born from Austin Engineering's continuous improvement of its designs based on internal learnings and feedback from customers.

"We've taken things we've learnt in the past about areas of the body that require high-maintenance or are inefficient in their use of steel and we've engineered these in a more efficient way, resulting in a lighter body and overall increased productivity in carrying more payload, as well as keeping the maintenance costs of the body at a minimum," Austin Engineering executive general manager - Strategy and Development Tim Ekert said.

"Our latest model is much lighter and can be designed to suit any commodity, any truck, and is available in all the regions that Austin operate.

"It's only recently been recently released within Australia, predominately in iron ore where it has been very successful, and we're just in the process of delivering our first order into a copper mine in Chile."

Mr Ekert said the body didn't have to be put on a new truck, as it could be used to replace a mine's existing body in the field to economically increase productivity.

"Overall, total life cost of the LD body is lower because it's lighter and more efficient to manufacture, and it has low ongoing maintenance costs throughout its life," he said.



Austin Engineering is the world's largest non-OEM truck body manufacturer.

IMPORTANT INFORMATION

FOR ALL PURCHASING OFFICERS,
MINE MANAGERS,
MINING DECISION MAKERS



www.minesuppliersonline.com.au

Contact: Brad Francis t. (08) 6314 0303 e. brad@miningoilgas.com.au

 Mine Suppliers Online



WR100 Underground Charging Unit.



Elphinstone WR820 Underground Agitator Truck.

Elphinstone returns to its roots

AUSTRALIAN-based manufacturer Elphinstone has returned to the global underground mining industry after signing a unique deal with Caterpillar. The agreement between Elphinstone and Caterpillar has paved the way for Elphinstone to re-establish its world-renowned brand and begin manufacturing specialised underground mining support vehicles from its home base in Tasmania. The Elphinstone name has been closely linked with Caterpillar since company founder Dale Elphinstone joined Victorian and Tasmanian Cat dealer William Adams as an apprentice in 1966. Using his father's shed to modify Cat surface mining equipment for underground applications, he started Elphinstone in 1975, and entered a 50/50 joint venture with Caterpillar in 1995. Five years later, Caterpillar exercised its option to purchase the remaining 50 per cent of the business. While a return to manufacturing support equipment for underground mining had been contemplated by Elphinstone, the move was hastened by Caterpillar's 2015 announcement that it would complete the relocation of its

Burnie based manufacturing operations to Thailand at the beginning of 2016. "We have bought back our Elphinstone brand from Caterpillar and commenced manufacturing support vehicles for the underground mining industry," Elphinstone sales and marketing manager Zak Brakey said. The company's new range of underground mining support vehicles is based on two platforms; the 10-14 tonne Elphinstone WR810 and the 20 tonne Elphinstone WR820. The vehicles use majority Cat components and are sold and supported via the global Caterpillar dealer network. A range of purpose built support equipment is available across the two platforms including; concrete agitators, tilt trays, personnel carriers, shotcreters, cable handlers, charge units, cassette trucks, scissor lifts, rock breakers, scalers, and water and service trucks. Elphinstone has been designing and manufacturing heavy equipment for the global mining industry for over four decades. Along with its existing range of Haulmax and Railmax products, the company is proud to be building underground support vehicles once again.



Australia's leading manufacturer of underground mining vehicles

Elphinstone Pty Ltd is a leading manufacturer of quality heavy vehicles for the global underground, surface mining and rail maintenance industries. Current products include underground mining support vehicles; an extended distance, off-highway haulage truck for the surface mining industry; and technologically advanced road-rail maintenance equipment. Based in Tasmania, Australia, Elphinstone is an established Caterpillar Original Equipment Manufacturer with over 40 years' experience in the mining industry.

ELPHINSTONE
Underground Support Solutions

HAULMAX
Extended Haulage Solutions

RAILMAX
Rail Maintenance Solutions



p +61 3 6442 7777 w www.elphinstone.com

Heavy duty dust collectors

CLEANTEQ Aromatrix is at the forefront of environmental air quality management, and provides a range of innovations and technologies that are based on more than 25 years of research and experience.

Its technology suite comprises dust filtration along with odour and fume treatment through the use of biological air treatment systems, activated carbon scrubbers, Regenerative Thermal Oxidisers (RTOs), fibreglass ducting and cover systems.

CleanTeQ can meet the needs of the simplest dust and odour reduction problem to the most complex of emissions for strict environmental compliance.

Within the area of dust treatment, CleanTeQ offers a comprehensive range of fabric and cyclonic filter designs, ensuring the optimum configuration for your application.

Its dust collectors are designed using corrosion resistant heavy duty materials making them effective and robust units.

CleanTeQ's experience gives its clients the confidence that their dust problems will be dealt with using the latest technologies and to a high performance and quality standard.

Effective dust suppression with low water usage

TWO major issues facing mining today are water resources and dust emissions.

Respirable dust under 10 micron (PM10) in size poses a health hazard and is considered the main contributing factor to lung disease in mining.

Dust generation points such as truck dumps and hoppers, conveyor transfers, train load-out, screens and shiploaders contribute to dust emissions and require an effective control method to eliminate the problem.

MARC Technologies supply DSI Dry Fog systems; the only systems on the market that produce water particles less than 10 microns, which scrub out fugitive dust by agglomeration of like-sized particles.

Water sprays and high-pressure misting systems only average 30 micron at best, and add a significant amount of water to the process.

Dry Fog uses a unique low pressure air assisted ultrasonic nozzle that consumes around a third of the water compared to a traditional water spray, producing a fog that is dry to touch and helps avoid associated issues with carry back and belt wear, and also reduces decreases thermal penalty in coal power applications.

Dual filtration systems as standard take care of dirty water supply. UV filtration and explosion proof enclosures are also available.

Dry Fog has been used in more than 400 installations worldwide; the US EPA lists it as a best demonstrated technology for suppression of sub-bituminous and lignite coal dust and is listed as a control technology for new CCR Rules in the USA in relation to fly ash and coal residuals handling.

MARC Technologies has been



More information can be found at www.marctech.com.au.

successfully delivering dust control solutions to the mining and industrial sectors since 1995, including wet scrubbers and dust collectors as well as

solid waste conveying.

The company is a wholly owned subsidiary of the Brisbane based ALS, which provides a global presence.



DRY FOG PROVIDES EFFECTIVE RESPIRABLE DUST CONTROL ACROSS THE MINING PROCESS

- TRUCK DUMPS AND PRIMARY CRUSHERS
- HOPPERS, CONVEYORS AND TRAIN LOADOUT
- STACKERS, RECLAIMERS AND SHIPLOADERS
- LOW PRESSURE, LOW WATER USAGE
- LOW CAPITAL COSTS, LOW MAINTENANCE
- ADDS UNDER 0.1% MOISTURE, NO NOZZLE BLOCKAGES
- PROVEN EFFECTIVE REDUCTION IN RESPIRABLE (PM10, PM2.5) AND VISIBLE DUST LEVELS

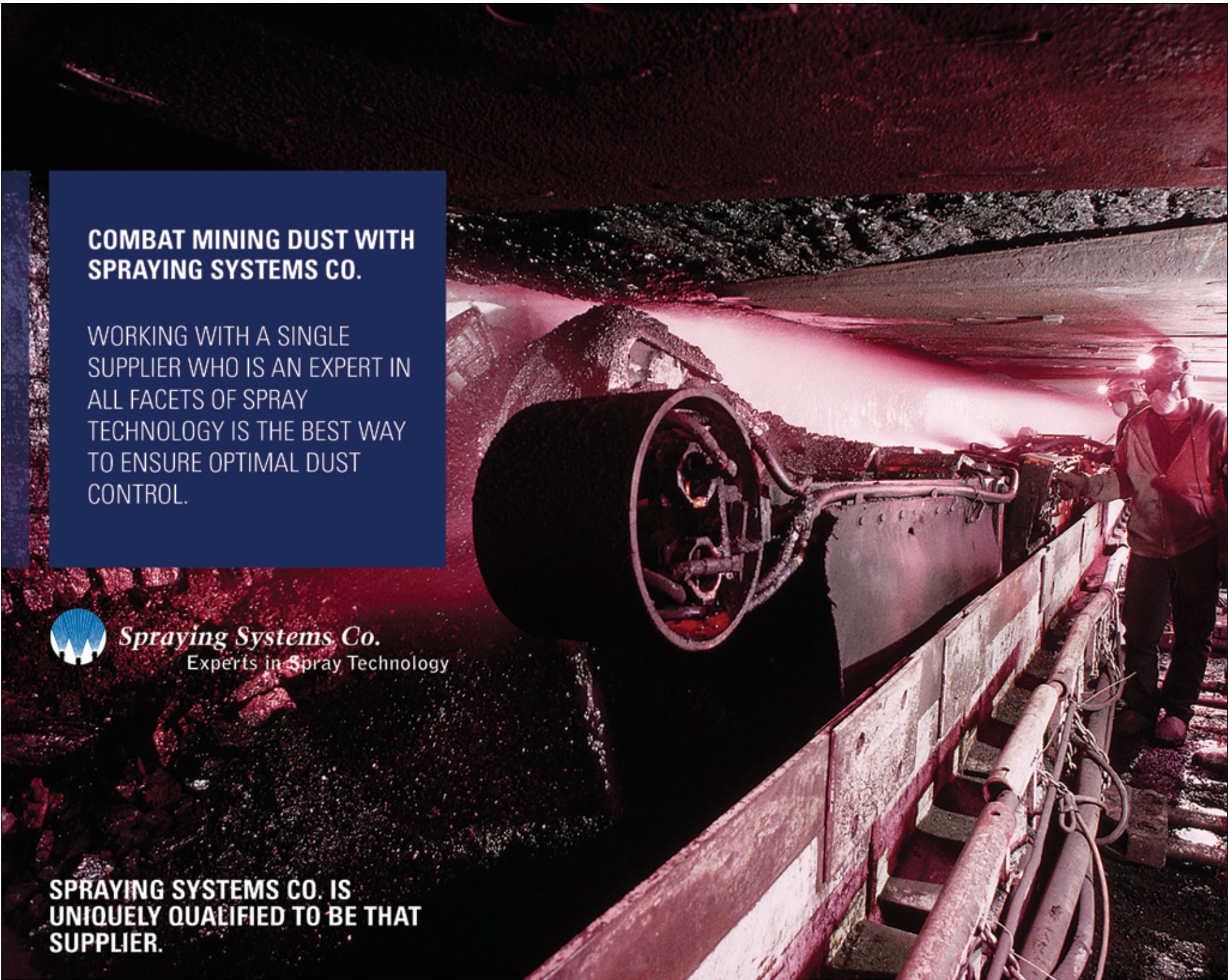


www.nodust.com



www.marctech.com.au
info@marctech.com.au





**COMBAT MINING DUST WITH
SPRAYING SYSTEMS CO.**

WORKING WITH A SINGLE
SUPPLIER WHO IS AN EXPERT IN
ALL FACETS OF SPRAY
TECHNOLOGY IS THE BEST WAY
TO ENSURE OPTIMAL DUST
CONTROL.

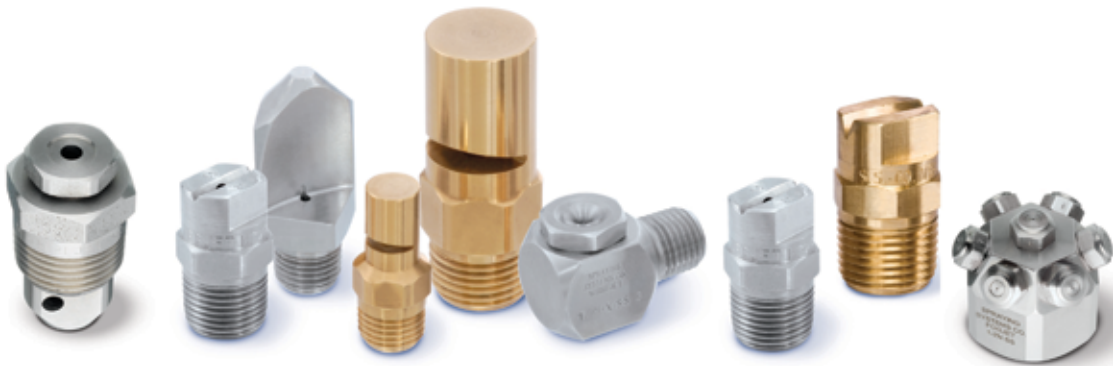


Spraying Systems Co.
Experts in Spray Technology

**SPRAYING SYSTEMS CO. IS
UNIQUELY QUALIFIED TO BE THAT
SUPPLIER.**

WE HAVE:

- A complete range of product solutions:
 - Spray nozzles
 - Accessories
 - Spray bars/headers
- Automated spray controllers and systems
- Decades of experience with dust control in a wide range of industries
- A global sales organization dedicated exclusively to spray technology
- A strong commitment to improving the environment



Nozzles produce drops to collide with dust particles that are already airborne. The moisture weighs the particles down so they are returned to the material source or ground.

TYPICAL OPERATIONS

Operations requiring dust prevention:

- Dumping
- Transport
- Transfer points
- Stockpiling/reclaiming

In these operations, moisture can be applied to the material when it is stationary, moving or both.

Operations requiring airborne dust suppression:

- Conveying
- Shearing
- Continuous mining
- Crushing and screening
- Dryers
- Transfer points
- Packaging/filling

- **Free on-site audits** conducted by our dust control experts who will then provide you with a detailed report outlining any areas for improvement and their recommendations.
- **Lunch and Learn workshops**

1300 877 431 | sales@spray.com.au | www.spray.com.au

Dust management strategies

THE key to effective dust management is identifying and understanding solutions most suited to an individual problem in order to successfully minimise and eliminate that problem.

Applying the correct dust suppression and prevention methods are critical in stopping dust at the source.

The broad product range and vast experience of Spraying Systems Co. within the mining industry is why the company is able to call itself the expert in spray technology.

With more than 79 years of experience, no other supplier is able to match its product range, expertise or the relationships it has forged with customers.

A commonly reported issue amongst mine site workers is when fine fragments of ore become trapped beneath conveyor belts – this is referred to as conveyor carry-back.

Fine ore dust can accumulate in the conveyor structure at multi storey heights until it is dislodged by strong winds which cause uncontrolled dust emissions.

Airborne dust can not only cause damage to the conveyor structure and guide rollers, but it can also significantly impact the health and safety of workers as dust inhalation can cause temporary and permanent illnesses.

There are many causes of conveyor carry-back.

A few examples include damaged belt scrapers, worn out spray nozzles and over-wetting of the ore as it passes onto the conveyor.

Spraying Systems Co. has specially designed solutions to combat each of these problems.

The AutoJet Belt Cleaning System uses a High Pressure Low Volume (HPLV) water wash to ensure that all fragments of ore are



More information can be found at Spraying Systems Co's website.

completely removed.

The system uses sprays of water to remove debris instead of traditional scrapers which can cause damage to the belt and risk premature failure of the roller bearing.

The system also features dual filtration which automates the filtration process to allow one filter to self-clean while the other circuit carries a constant flow of clean water to the nozzles without needing to stop the cleaning operation.

Filtration is critical when working with highly contaminated water, such as the water used in mining operations which is a major cause of valving and nozzle blockages.

Occasionally, mine site operators are not aware that their spray nozzles are over-wetting the ore thus creating conveyor carry-back.

This can be due to the fact that the spray nozzles used have become worn resulting in excess water usage or the operators are using a type of nozzle that isn't suitable for wetting applications.

A great way to find out if a spray nozzle is causing conveyor carry-back is to have an on-site audit carried out by one of the expert sales engineers at Spraying Systems Co.

They will be able to assist in choosing the right spray nozzle type, spray angle and capacity needed for optimal performance at a mine site.

After the visit, clients will be provided with a detailed report outlining recommendations for improvement, general maintenance tips, and suggested spray products and automated systems.



The Beenyup Waste Water Treatment Plant.

Quality environmental management

CLEANTEQ Aromatrix is at the forefront of environmental air quality management, and provides a range of innovations and technologies that are based on more than 25 years of research and experience.

Its technology suite comprises biological air treatment systems, activated carbon scrubbers, Regenerative Thermal Oxidisers (RTOs) together with fibreglass ducting and cover systems.

CleanTeQ can meet the needs of the simplest odour reduction problem to the most complex of emissions for strict environmental compliance.

The company recently completed the installation of an odour control system for Melbourne Water's Eastern Drop Structure, a regenerative thermal oxidiser for Nestle and is currently in the design phase for a chemical scrubber at Sydney Water's North Head Wastewater Treatment Plant.

This experience gives CleanTeQ the confidence that an odour or fume problem will be dealt with using the latest technologies and to a high performance and quality standard.

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Donhad's new East Coast technical sales manager Paul Quan.

New appointment reflects Donhad's optimism

MARKET leading grinding media manufacturer and distributor, Donhad, has demonstrated a positive commitment for its minerals processing division by appointing Paul Quan to the newly created position of East Coast technical sales manager.

Mr Quan will operate out of the company's new Brisbane office and will be responsible for assisting both current and new customers by providing in-market technical support to improve their grinding mill productivity performance levels.

Donhad now offers a wider range of grinding media than ever before, designed to keep it ahead of its competition by providing significant improvements to customers' mill operation efficiencies.

Paul has more than 30 years' experience – many at senior management level – in the mining, quarrying, industrial and heavy engineering, CSG, dredging, dewatering and waste water management sectors.

He has also worked in various geographical regions nationally and internationally, with a strong focus on performance and safety, infrastructure and management, from the boardroom to the mine site.

Commenting on the appointment, Donhad's sales and marketing Asia Pacific director Noor Crookshanks emphasised the ongoing developmental growth in the company's innovative technology pursuits.

"Creating this new senior role for a suitably qualified person like Paul confirms our direction of providing more technically-focused people and services to ensure we're always ahead of the others," Mr Crookshanks said.

"Last year was quite successful for us and we see this trajectory continuing even more during 2017 and beyond."

Product Range	Features		Sizes	Applications
Reddon	Low Price Security of Supply Secure Specification	Donhad Innovation Donhad Quality	52mm to 78mm	Ball milling
Classic	Market Standard Security of Supply Secure Specification	Excellent Wear Performance Excellent Cost Performance Donhad Quality	25mm to 150mm	Ball and SAG milling
Hi Carb	Market Leading Security of Supply Secure Specification	Superior Wear Performance Superior Cost Performance Donhad Quality	52m to 125mm	Ball and SAG milling
Rods	Med/Hi Hardness Security of Supply Secure Specification	Tailored Lengths Excellent Wear Performance Donhad Quality	75mm, 90mm, 100mm	Rod Milling

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Samuel Bennett

WSP | Parsons Brinckerhoff

Director of Resources, Australia & New Zealand

Cameron Drummond spoke with Mr Bennett about the current climate of the Australasian mining sector, and the influence of regional players such as China.

Q. Describe your education and professional background.

I'm originally a farmer's son from Essex in the UK. From an early age, I was interested and involved in farm life and my first job was picking potatoes at the age of seven! I have fond memories of those early days in particular, of the people living and working on and around the farm.

Later I studied Civil Engineering and after graduating I joined UK-based contractor, Balfour Beatty, as a site engineer. Life with a contractor offered great diversity and I enjoyed project management roles on a number of very different projects in the UK, the Middle East, South East Asia and ultimately, Australia.

Along with the move to Australia came an introduction to the resources industry. I joined Parsons Brinckerhoff in Perth, prior to the company being acquired by WSP. Most recently, I was project director for our project management contractor role on the \$10 billion Roy Hill project.

Q. You were appointed director of resources for Australia & New Zealand in January. What led you to this point in your career?

It might sound strange to some, but I believe the foundations of my career were laid during my days on back on the farm in Essex. Those experiences left me with a strong work ethic, an interest in working with people and a desire to produce something of substance.

Later, I remember being asked why I wanted to be a civil engineer. I always gave three reasons.

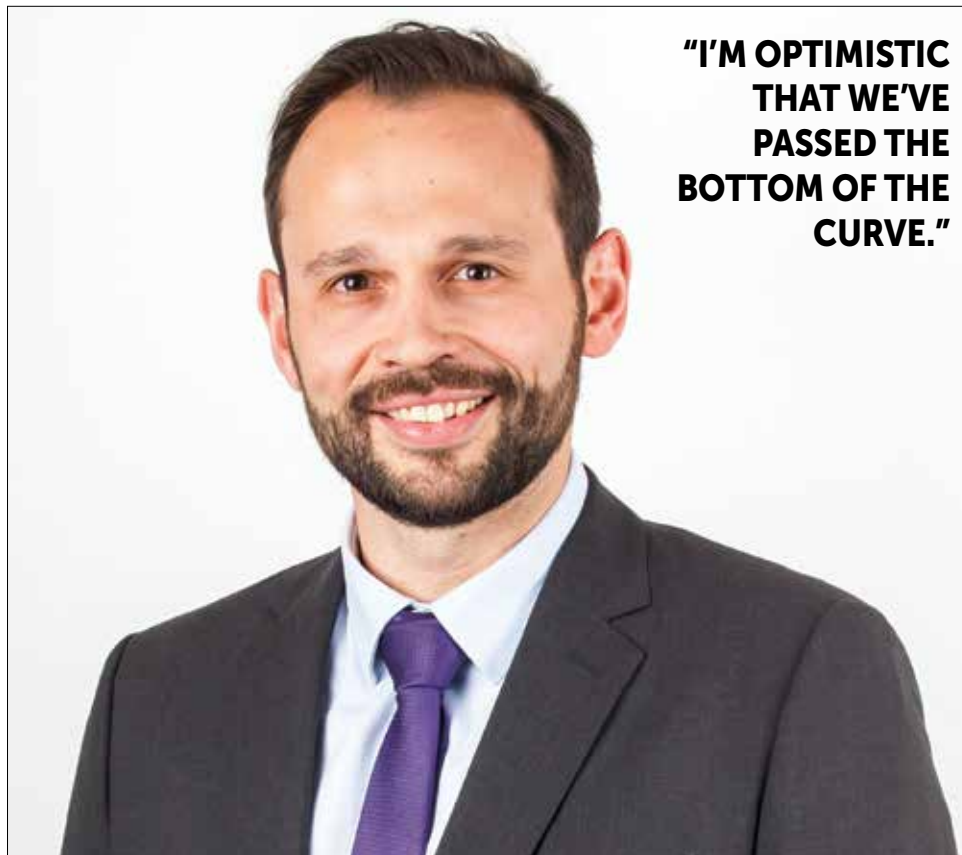
Number one, I wanted to work with people. Number two, I wanted to have the opportunity to work internationally. Number three, I wanted to contribute to the creation of real, tangible products that I could point at and be proud of.

The same aspirations survive within me today and I believe they have guided my decisions and career direction over the years. In the early years of my career I took the view that I would always put my hand up for a presented challenge, an adventure that exposed me to something different.

My first opportunity outside of the UK came at the age of 24, a short-term assignment to Indonesia. The experience was eye-opening in many ways. Huge cultural differences in my personal and professional life developed my appreciation for the importance of difference and my ability to adapt.

I moved to Perth in 2011 and spent the next six years in delivery leadership roles on two mega-projects in WA. Each of these projects, and the mining organisations involved, were very different but both taught me a great deal about the Australian mining industry, its history, its challenges, the demands on its supply chain and many of its exceptional people. Fortunately, both projects were delivered successfully and the rest is history.

Q. What do you see as challenges of your new role?



"I'M OPTIMISTIC THAT WE'VE PASSED THE BOTTOM OF THE CURVE."

Simply put, WSP | Parsons Brinckerhoff strives to be the best – this isn't easy! We want to be a great place to work for our people, we want to be the sustained market leader through close client relationships, always delivering on our commitments and providing genuine value, and we want the industry to see our quality wherever and whenever anyone interacts with us. This is all challenging and realising it for our resources business is a key aspect of my role.

A significant benefit of the coming together of WSP and Parsons Brinckerhoff in late 2014 is the more comprehensive ways we can now serve our clients. For example, in addition to study and project management, technical advisory, engineering and environmental expertise, the company also includes software developers, system integrators and data analysts.

These sorts of skills will be increasingly important to the mining industry and one of the biggest challenges for me is to grab hold of all of our capability relevant to the resources sector and get the rubber on the road.

Q. What is your take on the current mining climate in Australasia, and what does it mean for WSP | Parsons Brinckerhoff?

I'm optimistic that we've passed the bottom of the curve. Analyst views are still mixed on the outlook for Australia's major mineral exports with most positions I've read recently ranging from moderate to positive for the next 24 months or so. China will obviously continue to heavily influence our fortune.

While their government's recent relaxation of the limitations imposed on domestic production early last year puts downward pressure on associated commodities, there's positivity in reports indicating increased

demand including expectations that Chinese steel production will increase by 2-3 per cent this year.

In the medium term, I remain confident that the basic trends of Chinese growth and urbanisation in the coming years, along with improvements in emerging markets across the region, including India, are positive for the Australian mining sector.

For me, one trend is a certain indicator for the future of the mining industry. That is the increasing drive of mining companies, of all shapes and sizes, to target development and operation cost reductions through the application of technology and innovation.

An obvious example of this is the increased collection and analysis of system data. Information gathered from continuously evolving control and condition monitoring systems is better informing designers and operators and providing increasing opportunity to optimise outputs, coordinate cost effective maintenance activities and push assets to maximise returns. Whether it's harnessing this system intelligence, investing in plant or vehicle automation, or simply rethinking more traditional procurement strategies, the importance of challenging established cost norms will continue to dominate the industry.

In terms of what this means for our business, it's clear that the professional service industry in Australia has been affected by the mining downturn in recent years.

WSP | Parsons Brinckerhoff has been in the fortunate position of having significant involvement in some of the bigger projects that have progressed during this period such as the Roy Hill project. Commissions such as this have supported the company's drive to retain key capability and maintain a mining sector focussed presence all across Australia. We believe that this positions us well to respond quickly as the market recovers.

Q. WSP | Parsons Brinckerhoff is one of the largest professional firms in the world. What is your take on its success?

Despite our size, we are lean and agile while maintaining appropriate governance. Combined with this is the company's entrepreneurial approach, where individuals are supported, empowered to do their jobs and held to account.

The success of the company can be judged on the most recent numbers – global third quarter results from 2016 outlined solid financial performance, revenue growth and improved EBIDTA margin from the same quarter in the previous year.

The company contributes to some of Australia and New Zealand's most significant infrastructure projects such as the Sydney Metro, Woolgoolga to and Ballina Pacific Highway Upgrade, Toowoomba Second Range Crossing, Roy Hill, Queen's Wharf in Brisbane and Waterview Connection in Auckland.

We truly are a people business, not many organisations see all their assets head home at the end of the day and hope they return the next! We remain focussed, primarily, on these assets and on our clients as, in the end, neither can exist without the other.

Another key attribute to our success locally and globally is our commitment to safety. We have embedded a culture of 'making safety personal' which means our people are accountable for fostering a safe workplace and ensuring that transcends beyond the office and through to our projects. The global and local leadership teams lead by example and try to strive for excellence.

Q. What advice can you give to people considering a career in the resources sector?

I'd say that despite recent adjustments in the market, the Australian resources sector is in a far better position than many, if not all, commentators predicted one or two years ago.

Long term fundamental trends are positive for the industry – it continues to need, and will continue to need, good people. Whether you're interested in working directly for a mining company or within the supply chain, the demands of the industry will continue to challenge and excite the most capable people.

While we may not see a return to the boom days of massive growth any time soon, newer trends facing the mining sector such as the pressure to reduce costs with innovation and technology or the need to replace depleted ore bodies to maintain production levels will continue to provide new opportunities on which to base a career.

The industry, for the most part, is making great strides in better understanding the importance of issues such as mental health, diversity and gender balance to a sustainable workforce and on this basis, more than ever, the opportunities are available to everyone with the appropriate skills and qualifications.

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