

RESPECT

NOVA SHINES BRIGHT
.....
Milestone marks exploration incentive success





As we head towards 2018, the State Government remains committed to creating opportunities in Western Australia's resources industry, whether it is attracting investment, reducing red tape or encouraging employment.

Innovation will play a critical role in Western Australia's economic future, particularly within the resources sector.

The annual Awards for Excellence (page 26), Maritime Australia Limited Innovation Awards (page 22) and the Agriculture and Aquaculture Entrepreneurship Program (page 23) all recognise and celebrate Western Australian innovation in their respective fields.

The State Government is also helping drive innovation by supporting the establishment of an innovation hub in Kalgoorlie (story page 15).

In October, the State Government introduced a new jobs bill to support Western Australian-based businesses get a bigger share of work on government contracts (see story page 12).

The recent extension to the Channar State Agreement (story page 4) will ensure a new chapter is added to the story of a project which recently celebrated its 30th anniversary.

The State's minerals sector has grown over the past year and the volumes, and overall value of the industry's sales, was more than \$100 billion and the third highest total on record (story page 13).

Western Australia is the nation's destination of choice for mining investment. With a strong and sustainable resources sector, built on world-class knowledge and expertise, the State is well positioned for the future.

Mark McGowan

PREMIER; MINISTER FOR STATE DEVELOPMENT; JOBS AND TRADE

Bill Johnston

MINISTER FOR MINES AND PETROLEUM

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Cover photo: Independence Group's Nova Nickel Project officially opened in September (story page 8).
Photo: IGO

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The first shipment of LNG set sail from the Chevron-operated Wheatstone Project in October. Photo: Chevron

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FIRST WHEATSTONE GAS EXPORTS DEPART

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The first shipment of liquefied natural gas (LNG) set sail from the Chevron-operated Wheatstone Project on 31 October 2017, marking a major milestone for the project proponents and for Western Australia.

The Wheatstone Project is one of Western Australia's largest resources projects, with an estimated cost of US\$34 billion.

Construction began on the project in December 2011 and first LNG production was announced at the beginning of October 2017.

Since 2009, the project has seen more than \$20 billion spent on local goods and services through 300 different Australian companies, and created more than 7000 jobs during construction.

The project includes two LNG processing trains with a total capacity of 8.9 million tonnes per year, plus a 200 terajoules per day domestic gas plant.

At full capacity, Chevron expects the project to contribute about six per cent of the Asia Pacific region's total future LNG production.

The Wheatstone Project is a joint venture between the Australian subsidiaries of Chevron, Kuwait Foreign Petroleum Exploration Company, Woodside Petroleum and Kyushu Electric Power Company, together with PE Wheatstone, part-owned by JERA (among the world's largest buyers of LNG and one of Chevron's foundation buyers).

The first Wheatstone LNG cargo – delivered by the Asia Venture, one of six new state-of-the-art LNG carriers recently added to Chevron's operating fleet – is for JERA for delivery into Japan.

The company stated that a single Chevron cargo of LNG from the Wheatstone Project could power Japan for approximately nine hours.

Chevron Australia Managing Director Nigel Hearne said, "The first shipment of LNG from the Wheatstone Project signifies our commitment to be a safe and reliable long-term supplier of cleaner-burning natural gas for our customers in the Asia-Pacific region."

"The first Wheatstone cargo also represents the significant contribution of our partners, contractors and suppliers and efforts of thousands of people onsite, throughout Australia and around the world during the engineering, construction and operations phases."

First national LNG hub

The Wheatstone Project is located at Ashburton North Strategic Industrial Area, about 12 kilometres west of the town of Onslow.

Offshore facilities for the project will gather and partially process gas and associated condensate and deliver it onshore for further processing. Key components include:

- well infrastructure and subsea installations
- a gas processing platform in 73 metres of water
- a 225km trunkline to transport gas from the platform to the onshore facilities.

Gas will be gathered from the Wheatstone, Iago, Brunello and Jumilar gas reserves off the coast of Western Australia.

Key components of the Wheatstone Project onshore processing facility include:

- a slug-catcher to separate the gas and liquids
- an initial two-train LNG processing plant
- a domestic gas plant and pipeline connecting to the Dampier-to-Bunbury Natural Gas Pipeline
- LNG and condensate storage tanks
- marine facilities including a shipping channel, turning basin, harbour and export jetty, and material offloading facility.

The Ashburton North Strategic Industrial Area is being established by the Western Australian Government as a multi-use hydrocarbon processing and heavy industry precinct with a land use plan that includes::

- three larger sites for major gas processing proponents
- secondary processing sites
- areas for general support industries and supply base operations
- a port with common user facilities to be managed by the Pilbara Ports Authority
- common user access and infrastructure corridors.

Under the State Development Agreement for the Wheatstone Project, the proponents have funded the full construction of the State-owned Port of Ashburton.

The multi-million-dollar port development includes 312 hectares of common user area, an infrastructure corridor and 250 square kilometres of port waters.

The start of LNG exports from the Wheatstone Marine Terminal within the Port of Ashburton triggered the handover of the new port facilities from Chevron to the Pilbara Ports Authority.

Pilbara Ports Authority will have full responsibility for the shipping channel, including the turning basin, and within the next 12 months, will take over all remaining areas that are not leased to Chevron. ■



Loading arms transfer the first cargo of Wheatstone LNG to the Asia Venture. Photo: Chevron

Wheatstone Gas

- At full capacity, the Wheatstone Project's two train LNG facility is expected to contribute around six per cent of the Asia Pacific region's total future LNG production, delivering 8.9 MTPA of LNG for export customers in Asia.
- The Wheatstone Project's domestic gas plant also has the capacity to produce 200 terajoules per day of domestic gas for the Western Australian market.
- At full capacity, the Gorgon and Wheatstone facilities have the capacity to produce 500TJ/d of domestic gas, around 50 per cent of current supply in Western Australia.



The Wheatstone Project is one of Western Australia's largest resources projects. Photo: Chevron



Gas will be gathered from the Wheatstone, Iago, Brunello and Jumilar gas reserves off the coast of Western Australia. Photo: Chevron

CHANNAR EXTENSION



Rio Tinto and China's Sinosteel Corporation have agreed to extend their historic Channar Mining Joint Venture, which will see an additional 10 million tonnes of iron ore delivered into the joint venture from Western Australia.

Rio Tinto made the announcement in November, marking the third extension of the joint venture, with the agreement confirmed in Beijing by Rio Tinto Chief Executive Jean-Sébastien Jacques and Sinosteel Chairman Xu Siwei, and conditional upon approvals from the Western Australian, Australian, and Chinese Governments.

Rio Tinto Iron Ore Chief Executive Chris Salisbury said, "The Channar joint venture is one of Australia's most significant trading partnerships and has helped pave the way for the incredibly strong relationship we have forged with China today.

"This extension represents another milestone in our 30-year partnership that has seen more than 250 million tonnes of iron ore delivered from the Pilbara to China."

The original Channar joint venture was signed in 1987 and provided for the production of 200 million tonnes of iron ore.

Rio Tinto stated that the third extension would increase the life of the joint venture to cover production totalling 290 million tonnes of iron ore.

The announcement followed the introduction of legislation into the Western Australian Parliament in October to vary the Iron Ore (Channar Joint Venture) Agreement Act 1987 to extend the term of the agreement by up to 15 years.

The Channar mine is located 22 kilometres from the town of Paraburdoo and produces up to 10 million tonnes of iron ore per year, which is exported through Rio Tinto's Cape Lambert and Dampier Port operations.

The Channar project, which employs more than 140 workers, is owned by subsidiaries of Rio Tinto and China's Sinosteel Corporation.

The variation will extend the agreement's expiry by 10 years to February 2028, with provision for a further extension of five years beyond.

The extension is expected to cover the completion of approved mining activities, as well as decommissioning and rehabilitation of the area once mining has concluded.

The variation also underpins the continued operation of the Channar Mining Joint Venture, which was China's first ever mining joint venture in Australia.

Western Australian Premier and Minister for State Development, Jobs and Trade, Mark McGowan, said the Channar agreement variation would ensure ongoing jobs.

"This is an important piece of legislation to extend the operation of the Channar Mining Joint Venture for 10 years with an option for a further five years," Mr McGowan said.

"More than two thirds of workers at Rio Tinto's Greater Paraburdoo operations, of which Channar is a part, are residential.

"The McGowan Government is committed to supporting local jobs for regional communities." ■

Landmark Channar

- The Channar Joint Venture was the first large-scale mining initiative between China and Australia, and formed the basis of many agreements and investments to follow in the mining and liquid natural gas sectors.
- The joint venture is 60 per cent owned by Rio Tinto (through Hamersley Iron) and 40 per cent by Sinosteel.
- The Channar mine produced 9.7 million tonnes of iron ore in 2016.



IRON ORE HAS IRON GRIP AS TOP COMMODITY

Iron ore is Western Australia's dominant mineral commodity.

During the past eighteen months, there has been an increasing focus on gold and lithium in Western Australia.

Commodity price rises and increases in demand are driving this focus, but announcements such as the Channar State Agreement extension are a reminder of the importance of Western Australia's iron ore sector.

Iron ore is still the dominant commodity in Western Australia – and by some margin.

Thirty years ago, when the Channar project first started shipping Western Australian iron ore to China, the State's annual iron ore production was 78 million tonnes.

The same amount is now produced every six weeks, and in 2016–17 Western Australia produced a record total of 790 million tonnes (see chart).

Western Australia is the world's largest exporter of iron ore and accounted for more than a third of global production last year.

In 2016–17, iron ore sales were worth \$63.7 billion and accounted for 74 per cent of mineral commodity sales and 61 per cent of overall sales for the resources sector.

Iron ore projects were also the dominant employer and accounted for more than 52,000 workers, or 50 per cent of resources sector jobs.

According to Western Australian Treasury forecasts, iron ore sales are set to increase to 835 million tonnes by 2020-21.

Western Australia's iron ore industry remains globally competitive with high quality reserves, low cost production and established, long-term markets in China, Japan, Korea and Taiwan.

Current estimated reserves are approximately 81 billion tonnes of hematite, goethite and limonite ore, and 43 billion tonnes of primary magnetite ore.

Hematite is the main type of iron ore mined in Western Australia. Most of the hematite exported from Western Australia has an iron content of between 56 and 62 per cent.

Western Australia is among the world's lowest cost iron ore seaborne exporters.

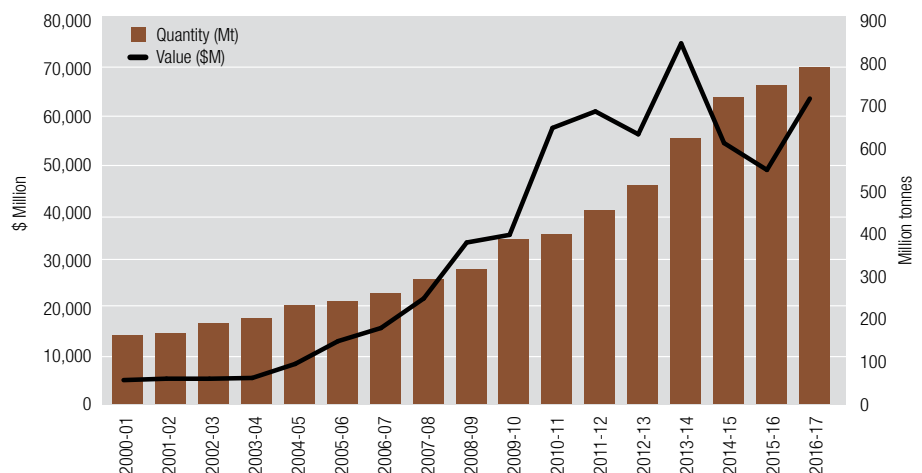
After normalising the production costs of different iron ore products to a common benchmark, the average total cash cost of Western Australia's iron ore exports in 2016 was US\$22 a tonne.

On this measure, Western Australia was the third lowest cost iron ore seaborne exporter in 2016, behind Brazil and South Africa.

However, Western Australia's major iron ore ports are close to the largest iron ore importers in Asia, reducing shipping costs relative to competitors.

The annual average spot freight rate from Western Australia to China and Japan was US\$6.20 a tonne in 2016–17, 49 per cent lower than the freight rate from Brazil (US\$12.20 a tonne).

The combination of low-cost production and proximity to key markets, ensures iron ore will continue to be a significant mineral commodity for Western Australia. ■



Source: DMIRS

Chart: Iron ore quantity and value by year.



A total of sixteen companies were honoured at the 2017 Western Australian Industry and Export Awards.

INDUSTRY AND EXPORT AWARDS CELEBRATE WA'S BEST AND BRIGHTEST

A total of sixteen companies have been honoured at the Western Australian Industry and Export Awards 2017.

The awards celebrate the State's most innovative and forward-thinking companies and exporters, and the 2017 awards, held in October, marked 29 years of the successful awards program.

The winners represent the diversity of Western Australian industry and the State's position as a leading export economy: in 2016–17, the State accounted for close to half of Australia's merchandise exports (42 per cent).

Winner of the major award – WA Exporter of the Year 2017 – was drug discovery company Epichem that exports to about 35 countries worldwide.

"The WA Industry and Export Awards provide a unique opportunity to celebrate the breadth and diversity of the State's business community," Premier and Minister for State Development, Jobs and Trade, Mark McGowan said.

"While the winning companies are vastly different in industry, focus and size, they all share a commitment to be the best in their field and create jobs and opportunities for Western Australians."

Winners of the export category awards will represent the State at the 55th national Export Awards, to be held in December. ■

Industry Awards	
Category	Recipient
C.Y. O'Connor Award for Excellence in Engineering and Technology	Australian Mud Company (AMC)
Innovation	Vekta Automation
Export Awards	
Category	Recipient
Business Services	Linear Clinical Research
Creative Industries	Scitech
Digital Tech	Robertson Technology
Education and Training	Stanley International College
Environmental Solutions	Blue Ocean Monitoring
Health	Epichem
Manufacturing	Gelflex
Minerals, Energy and Related Services	Imdex
Regional	Western Australian Honey
Small Business	Kwik-Zip Spacers
WA Exporter of the Year	Epichem
WA Only Awards	
Category	Recipient
Emerging Exporter	AGRIFresh
WA Women in International Business	Health World Pharmaceuticals Australia
Defence Exporter	Austal

INVESTMENT NEEDED FOR A GOLDEN FUTURE



In order to maintain gold production at current levels in the longer term, the Australian gold industry will need to double the amount spent on exploration or double its discovery performance.

This was one of the major findings of a study by MinEx Consulting looking at the long-term forecast of Australia's mineral production and revenue.

The research is being supported by industry and a number of government agencies, including the Geological Survey of Western Australia. The first report *The outlook for gold: 2017–2057* was released in October.

The study found existing mines dominate production over the next five years.

Report author and Adjunct-Professor at the University of Western Australia's Centre of Exploration Targeting, Richard Schodde, said output from these mines would remain steady for the next two years and then quickly decline.

It is projected that in forty years' time only four of the current 71 mines will still be operating – with most forecast to close down over the next two decades.

This includes iconic mines such as the Kalgoorlie Super Pit and Telfer. The study forecasts that by 2057, the remaining mines will produce less than 400,000 ounces of gold per year. That is less than half the current annual production of the Super Pit.

The report forecasts that in forty years' time almost all of Australia's future gold production will come from exploration successes.

"It is significant to note the model predicts in 15 years' time half of Australia's gold production will come from mines yet to be discovered," Mr Schodde said.

"However, a serious concern is that the weighted average delay between discovery and development for a new discovery is 13 years. There are also indications it is getting harder and slower to convert a discovery into a mine.

"Consequently, government and industry need to support exploration today."

Mr Schodde said Australia runs the real risk of a significant supply disruption in the medium term.

"We only have the next couple of years to properly identify and address ways to improve our exploration performance," he said.

Mr Schodde estimates that for the Australian gold industry to maintain production at current levels in the longer term, it will need to double the amount spent on exploration or double its discovery performance.

"The incremental benefits of reaching this target will be an extra 4.05 million ounces of annual production, an extra \$6.23 billion in revenues and additional 7160 jobs," he said.

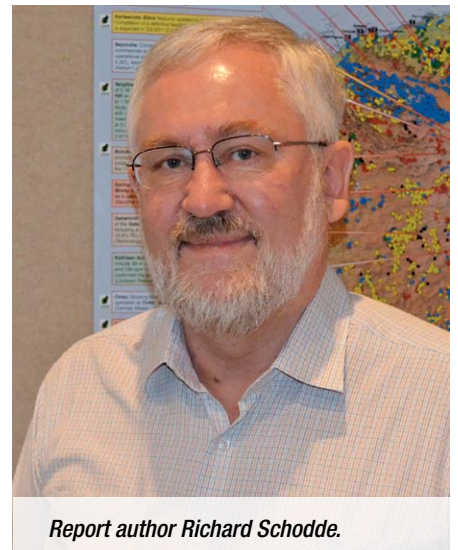
"The opportunity exists for industry and government to take the initiative to invent its

own future. In addition to developing policies that encourage and stimulate exploration, the opportunity also exists to be more efficient and effective at making discoveries.

"The challenge is that many of these initiatives require effort (and money) and will take several years to bear fruit.

"Given the long lead times involved for research and development, discovery and mine development, there is an urgent need to start the process now."

The full report is available from www.minexconsulting.com ■





NOVA NICKEL MILESTONE MARKS EIS SUCCESS

The Nova project successfully received funding through the Co-Funded Drilling Program. Photo: IGO

The eighth of September marked an important milestone in the history of Western Australia's Exploration Incentive Scheme – it was the official opening of Independence Group's (IGO) Nova nickel project.

Most people know the story of the discovery of the Nova nickel-copper deposit east of Norseman. In just over five years, Nova advanced from a greenfield exploration discovery to commercial production.

What people may not know is that three parts of the Exploration Incentive Scheme supported the Nova discovery. Regional geochemical sampling and airborne magnetics data showed an interesting eye-shaped anomaly, which guided initial exploration in the Fraser Range.

The project then successfully received funding through the Co-Funded Drilling Program for a deep

hole, which helped plan the subsequent drilling program. This drilling program led to the discovery of the Nova deposit.

At a special event, Mines and Petroleum Minister Bill Johnston officially opened Western Australia's newest nickel-copper-cobalt mine.

"On behalf of the McGowan Government, I congratulate all Independence Group staff, project partners, stakeholders and the Ngadjju people, on the official opening of Nova," Mr Johnston said.

"We are proud to have played a part in successfully bringing the project to life, the first diamond drill hole at Nova received co-funding from the Exploration Incentive Scheme.

"Production commencing at Nova is excellent news for the mining sector, especially as this is the first mine of its scale in the highly prospective Fraser Range."

About 200 delegates, staff and media were there to celebrate the official opening.

IGO Managing Director and CEO Peter Bradford said it was an outstanding achievement – a feat made possible only by the quality of the project and the quality of the teams involved.

Mr Bradford also acknowledged the Traditional Owners of the land, the Ngadjju people, who facilitated the rapid approval of the project.

"I would like to thank the many contributors to the exploration and development of Nova and to reiterate IGO's commitment to delivering long term value to all our stakeholders, especially our local communities," Mr Bradford said.

"Our people, whether employed directly by IGO or by our contractor partners, are the lifeblood of IGO, and it is through their focus, commitment and hard work that Nova has been delivered to commercial production within five years of when the Sirius

exploration team, led by Mark Bennett, drilled that now-famous discovery hole back in July 2012.

“Today, Nova is our flagship asset and represents the type of operation that IGO wants in its portfolio – a quality asset that is high margin, with scale and a long mining life, which anchors our presence in the Fraser Range where we are actively exploring to find the next Nova.”

Nova is a fly-in-fly-out operation with approximately 400 people employed on site who are a combination of IGO direct employees, contractors and sub-contractors.

The company is an active participant in the community through investments including scholarship, trainee and apprenticeship programs.

The company also advocates increasing employment numbers from the local community, with 21 people of Ngadju indigenous heritage employed at Nova and an additional 12 Ngadju students who received trainee scholarships in the 2017 financial year. ■

The Nova project

Independence Group NL (IGO) became the owner of Nova in September 2015, following the acquisition of Sirius Resources NL. Project development commenced in January 2015 followed by underground mining in May 2015.

Nova achieved first ore concentrate in October 2016 and declared commercial production in July 2017. Nova is currently ramping up to full nameplate capacity, which is approximately 125,000t per month.

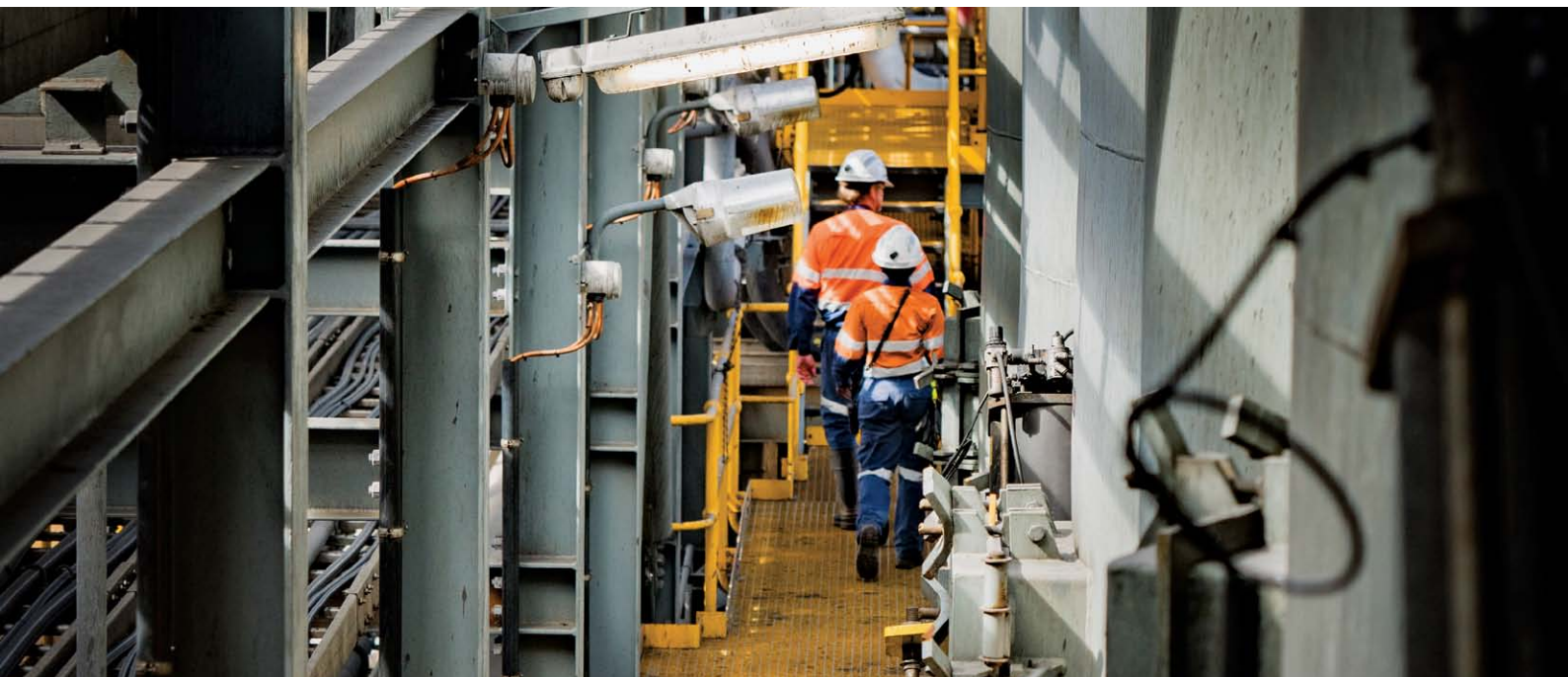
IGO has provided Nova production guidance for the 2018 financial year of approximately 25,000t nickel, 11,000t copper and 925t cobalt contained in concentrate.



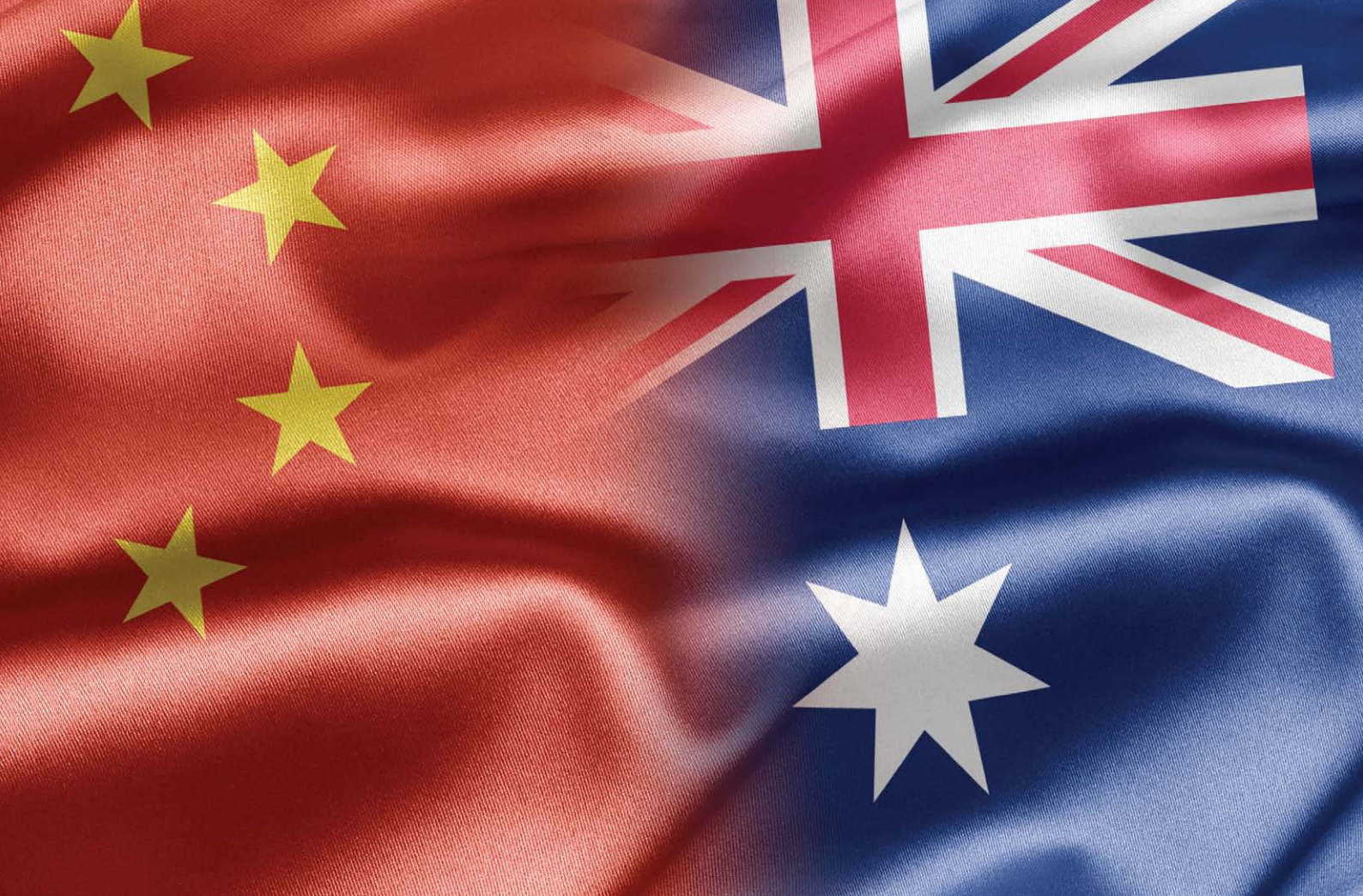
Nova achieved first ore concentrate in October 2016. Photo: IGO



Mines and Petroleum Minister Bill Johnston, and Independence Group Directors Peter Bradford and Peter Bilbe at the official opening. Photo: IGO



The Nova project employs approximately 400 people onsite. Photo: IGO



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POWERING GROWTH: AUSTRALIA–CHINA NATURAL GAS TECHNOLOGY PARTNERSHIP FUND

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In 2002, amidst intense competition, Australian secured China’s first long term resources contract with a foreign nation, for Australia to supply liquefied natural gas (LNG) to China over 25 years.

As part of that agreement, the Australia-China Natural Gas Technology Partnership Fund (“the Fund”) was established, aimed at establishing genuine, long-term partnerships between the two partners within the energy sector.

The Fund supports a range of activities based on providing opportunities for training, research and technology transfer between Australia and China in the natural gas and LNG industry.

The Fund is a joint initiative of the Western Australian Government, the Commonwealth Government, and North West Shelf LNG Project (comprising Woodside Energy Ltd (Operator), BHP Billiton Petroleum Pty Ltd, BP Developments Australia Pty Ltd, Chevron Texaco Australia Pty Ltd, Japan Australia LNG Pty Ltd and Shell Development (Australia) Pty Ltd.)

China’s National Development and Reform Commission (NDRC) is the Chinese partner to the Fund.

The Fund pursues all activities under the aim of forming partnerships that create positive economic and environmental outcomes, increase knowledge and skills, particularly in the LNG industry, and enhance the relationship between Australia and China.

Executive Gas Training Programs were one of the Fund’s early initiatives. Training is provided in Australia for Chinese executives employed in the gas industry in China.

The program is open to senior managers and officers of major Chinese oil and gas corporations, and the Chinese Government, and combines English language training and cultural orientation, as well as management, specialist and operational training.

The first group of trainees participated in the program in 2005, with training provided during 2005–2014 through The University of Western Australia (UWA) and Curtin University.

Since 2014, training has been provided through the Australian Training Centre, operated by UWA’s Business School, and the Australian Institute of Management, based in Perth.

North West Shelf LNG Project delivers operational training.

Western Australia’s LNG industry has grown rapidly over the past decade – in size and scale, and in technological innovation and expertise – and the Australia-China Natural Gas Technology Partnership Fund has continued to fulfil its goals year after year.

At the heart of the Fund is the opportunity for growth, which has attracted increasing numbers of potential participants to apply for the Fund’s Executive Gas Training Program.

Prospect magazine spoke to four participants in the 2017 intake about their experience and opinions on the program (see next article). ■

Q & A with Gas Fund 2017 executives

Ms Yin Lu – Assistant Manager/Beijing Gas Group Co Ltd (First time in Australia)

How did you hear about the program?

“At first, not many people in my company were at the program but now in the last year the director heard about it through the G20 Natural Gas Day and the company sent two higher level colleagues and they got a lot from this program and many benefits.”

“At first, with communication, the professors talked very fast and now as our language develops it has been very good and the homestays help with communication.”

“The program... has been very special and helpful and useful to learn about regulations and government, which is very different to government regulations in China.”

Ms Liu Chun Ying – Buyer/distribution/ Guangdong Dapeng LNG Co Ltd
(Has travelled to Australia previously)

What do you see as beneficial about the program and coming to Australia versus doing a program, perhaps, online?

“There are many benefits from being in a group setting and learning from the group and through the homestays.”

“We make many friends here, within our student group and within companies.”

What would you consider a highlight of the program?

“Firstly, the homestays – I live in an apartment in China; here I am in a very big house near the beach (Cottesloe!)”

“Also, being immersed in Australian language and culture and the way the program is presented and seminars and teaching style – different techniques, such as interviews and seminars, different economic model and online simulation.”

Mr Mao Huayu – General Manager/COSCO Shipping LNG Investment (Shanghai) Co Ltd
(First time in Australia)

“This program is very well organised and covers all aspects of the LNG industry, downstream, midstream and upstream. We have 25 people from all across China in our group – from shipping, government, LNG buyers. The program is quite comprehensive and very useful.”

How has it been useful for you, what do you see as beneficial about the program?

“Very good experience of Australian culture and being here.”

“Homestays are a major benefit of the program – and very good teaching methods.”

“They select homestays very carefully. My host is the CEO of his own oil and gas company and a very experienced engineer. We have discussed the many common languages of the LNG industry. We will still have a connection when I go back to China.

“Before I came to Perth, I thought three months for the program was too long, now – very good! This program is totally above my expectation.”

“Academic staff are engineers, professors, lawyers, consultants, government, and those who run their own companies.”

“The program is very good and has been running a long time.”

When asked as a group what benefits they would take home with them from the program, the participants all agreed that networking, making friends within the program and through the program, the homestays and being immersed in Australian culture and language were the overwhelmingly positive aspects of the program.

Only one participant jokingly suggested a “downside” – public transport in Perth on a Saturday and Sunday is not like China! ■

LNG Fund in WA

- The Australia-China Natural Gas Technology Partnership Fund is a joint initiative of the North West Shelf Project and the Western Australian and Australian Governments.
- The Fund is a practical demonstration of the desire of Australia and China to develop long-term mutually beneficial partnerships across the energy sector.
- Under the Fund, training for Chinese executives employed in China's gas industry, is available in Australia and China.
- Training in Australia includes English language and cultural orientation, generic management training, specialist gas industry training, and operational training delivered by North West Shelf Australia LNG.
- The Fund has also supported joint study and research projects relating to the LNG and natural gas industries, funded an inaugural LNG Forum in China, sponsored exchange visits, and contributed towards postgraduate study scholarships focussed on the natural gas and LNG industries.

For more information, visit: www.jtisi.wa.gov.au/gasfund



Organisers and participants in the 2017 Australia China Executive Gas Program.

NEW BILL OPENS BETTER OPPORTUNITIES FOR BIGGER SHARE OF GOVERNMENT CONTRACTS

Legislation that supports Western Australian-based businesses getting a bigger share of work on government contracts is a step closer to finalisation following the passage of the State Government's Jobs Bill through the Parliament of Western Australia in early December 2017.

Premier and Minister for State Development, Jobs and Trade, Mark McGowan, said the passage of the Jobs Bill through the Legislative Assembly paved the way for more jobs for Western Australians.

The Bill will give Western Australian-based businesses a better opportunity to get a bigger share of work on State Government contracts, helping to create more jobs for local workers.

Under the Bill, prospective suppliers of government contracts will now be required to submit local participation plans as part of their tender. These plans will then be incorporated into the contracts of successful suppliers to ensure the promised jobs are realised.

Dedicated staff within the Department of Jobs, Tourism, Science and Innovation, and the Department of Primary Industries and Regional Development, will proactively engage with local businesses, making it simpler and easier for them to understand how to tender for a government contract.

Under the Jobs Bill, the government can also declare a major project a 'project of strategic significance for the Western Australian economy', requiring these projects to have extra local benefits – with the potential of more jobs.

"The Jobs Bill was a key election commitment," Mr McGowan said.

"Under the Bill, work flowing to WA-based businesses on big government projects will be maximised, creating more jobs for Western Australian workers.

"This is all about giving WA businesses every opportunity to compete for work on important State infrastructure like schools, hospitals and public transport, and giving them the tools they need to do so.

"The Jobs Bill will support small and medium businesses and, in turn, local workers will benefit from supplying to Government."

The Premier said the Bill would provide the legislative clout needed to increase local content on government contracts and create more jobs for Western Australians.

"This is all about making sure local jobs are maximised from the billions of dollars the State Government invests into services and infrastructure across WA," he said.

"Our Jobs Bill will mean my Government, and every Government that follows, will always support Western Australian jobs." ■

GREEN LIGHT GIVEN FOR DEVELOPMENT OF NEW SAFETY BILL



Mines and Petroleum, and Commerce and Industrial Relations Minister Bill Johnston.

The State Government has given the green light to develop a modernised Work Health and Safety Bill for Western Australia.

Based on the national Work Health and Safety Act, the Bill will improve consistency with the rest of Australia and provide the primary legislation for workplace safety and health across all Western Australian industries.

The Bill will be supported by a number of industry specific regulations to suit the State's unique conditions, enabling the resources sector to continue to use a risk-based approach.

Petroleum and major hazard facility industries will continue to operate under a safety case approach.

The State Government's contemporary, single Act approach has been adopted following collaboration between the former departments of Commerce and Mines and Petroleum (now amalgamated as the Department of Mines, Industry Regulation and Safety).

Consistent with the Government's commitment to reduce red tape, the Bill will replace three Acts: *Occupational Safety and Health Act 1984*, *Mines Safety and Inspection Act 1994* and *Petroleum and Geothermal Energy Safety Levies Act 2011*.

The development of the Bill will involve extensive consultation with stakeholders and the community, before its expected introduction to State Parliament in mid-2019.

Mines and Petroleum, and Commerce and Industrial Relations Minister Bill Johnston said the safety and health of workers is a high priority for the government.

"Occupational, health and safety legislation in WA is 30 years old and is out of date," Mr Johnston said.

"This is why we're taking action – the new Bill is an important step in updating and improving the regulation of workplace health and safety." ■



More than \$63 billion of iron ore was exported from Western Australia in 2016-17.

RECORDS REACHED FOR IRON ORE AND LNG PRODUCTION

The value of the Western Australia's mineral and petroleum industry exceeded the \$100 billion mark, recording sales of \$105 billion in 2016-17.

This was a 19 per cent increase compared to the 2015-16 overall sales value. Iron ore sales increased by 31 per cent, LNG was up 18 per cent and gold sales up by seven per cent.

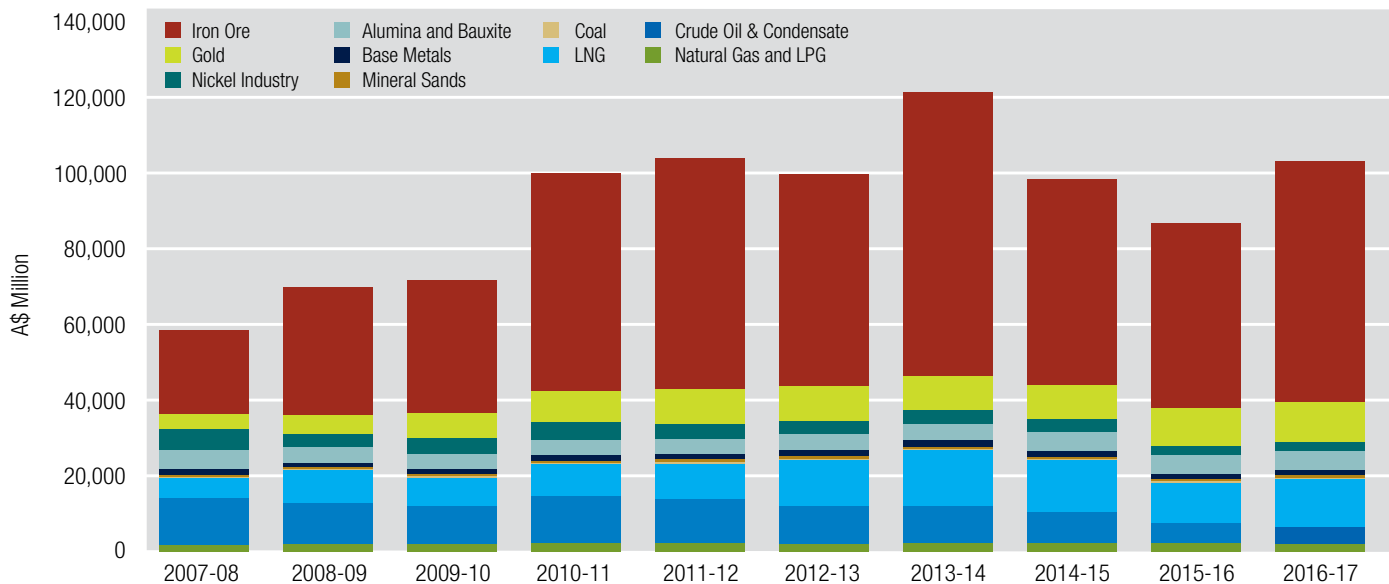
Gold sales broke the 200 tonne mark for the first time since 2000-01 with 205 tonnes mined (6.6 million ounces) worth \$10.1 billion.

Iron ore sales volumes increased six per cent to reach a record 790 million tonnes, valued at \$63.7 billion.

The volume of LNG produced reached a record 28.7 million tonnes, following the start-up of Chevron's Gorgon LNG project and record production from the North West Shelf and Pluto LNG projects. LNG volumes have increased by 45 per cent in the past five years.

The average number of Western Australians employed in the minerals sector in 2016-17 was 108,769 – an increase of four per cent compared to last year. Direct employment remains high, relative to 10 years ago, when the average number of people employed was 62,117 (an increase of more than 75 per cent). ■

Major commodities by value (historic)



Source: DMIRS



2017 MRIWA scholarship recipients with Mines and Petroleum Minister Bill Johnston (centre back), MRIWA Chief Executive Mark Woffenden (front right) and MRIWA Chair Peter Lilly (back left).

INCREASE IN FUNDING FOR MRIWA

The State Government has committed to providing an additional \$2 million in funding to the Minerals Research Institute of Western Australia (MRIWA).

An additional \$1 million will be provided in the 2017–18 financial year (bringing the total to \$3 million), and \$1 million for the 2018–19 financial year (increasing the total to \$2 million).

The government made the announcement in the September State Budget. Treasurer Ben Wyatt said investing in research and development to find minerals increases the recovery of valuable metals and minerals, improves productivity and develops new mineral products and markets.

“The MRIWA is a key example of the State Government’s plan to foster and promote collaborative research and innovation for the Western Australian resources industry,” Mr Wyatt said.

“The additional funding aims to encourage greater investment and could help find the next big mineral discovery, which could create more jobs for our State.

“Creating and supporting jobs for Western Australians is the McGowan Government’s number one priority.”

Mines and Petroleum Minister Bill Johnston said the funding would help WA stay at the forefront of exploration and mining technologies.

“We recognise the mineral and petroleum industries are the backbone of the Western Australian economy and key drivers for job creation,” Mr Johnston said.

“MRIWA has worked with Western Australian companies, universities and the CSIRO to promote interest in minerals research and improve the processes for mineral recovery.” ■

The Minerals Research Institute of Western Australia

The Minerals Research Institute of Western Australia’s (MRIWA) primary function is to provide and administer funding grants to carry out minerals research. The Institute is able to collaborate with local, Australian and worldwide research and scientific institutions, and may also undertake and procure minerals research itself.

As well as directly supporting minerals research projects, MRIWA funds are available for projects, programs and events that promote public awareness of, and interest in, minerals research. The funds may also be used to support related academic activities.

MRIWA also has a scholarship program for PhD candidates and for final year students’ Honours projects.

The expertise of MRIWA is available to the State Minister and the WA Government to foster and promote minerals research for the benefit of Western Australia.



Curtin University's WA School of Mines is one of the founders of the hub.

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GOLDFIELDS INNOVATION HUB TO DRIVE RESOURCES GROWTH

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A new mining innovation hub in the Western Australian Goldfields that will help stimulate growth and innovation in Australia's minerals industry has been lauded by the State Government.

Located at the Chamber of Minerals and Energy's office, the hub was founded by Curtin University's WA School of Mines, the Minerals Research Institute of WA (MRIWA) and the Cooperative Research Centre for Optimising Resource Extraction (CRC ORE).

The government-funded MRIWA invested \$600,000 towards the CRC ORE, which contributed to designing and establishing the new hub.

The hub will address some of the mining industry's biggest challenges in the Goldfields, such as limitations of knowledge and technical resources in the region.

It will also test and develop novel ways to optimise the extraction of precious minerals and ensure WA retains its credentials as a world leader in the minerals industry.

In announcing the hub, Mines and Petroleum Minister Bill Johnston said the government was committed to supporting the resources sector.

"This mining innovation hub will help boost economic prosperity in WA," Mr Johnston said.

"Creating and maintaining jobs for Western Australians is our number one priority and this hub will offer workers development training from Australia's best scientists, engineers and mining experts.

"The hub will increase the focus on bridging new science and technology for the mineral sector, and increase the attractiveness of doing minerals research in WA."

Other hub partners include METS Ignited (an Industry Growth Centre funded by the Australian Government), the Chamber of Minerals and Energy, Central Regional TAFE and the City of Kalgoorlie-Boulder.

Chamber of Minerals and Energy CEO Reg Howard-Smith said Kalgoorlie-Boulder's close proximity to several operating mine sites made it a natural choice for the new hub.

"This new hub will strengthen Western Australia's reputation as a world-leader in the extraction and processing of precious metals and cement our standing as a centre of excellence in mining education and research," he said.

"Ultimately, we are looking to ensure Western Australia produces the highest quality product at the lowest cost with minimal environmental impact, and it is through the use of new technologies that we can achieve this." ■



WA SIGNS FEDERAL FUND AGREEMENT TO BOOST STATE'S NORTH

Western Australia has signed an agreement with the Federal Government that will increase infrastructure in northern Australia.

Western Australia has signed an agreement with the Federal Government that will increase infrastructure in Northern Australia, helping to create jobs while diversifying the State's economy.

The Western Australian Government signed a Master Facility Agreement (MFA) with the Commonwealth Government, announced in early November, that will see eligible infrastructure projects in Western Australia receive Northern Australia Infrastructure Facility (NAIF) loan funding.

The agreement sets out the legal and financial obligations when projects receive debt funding arrangements from the NAIF.

The NAIF is a major long-term Federal Government initiative to develop Northern Australia, with offers up to \$5 billion over five years in concessional finance to encourage and complement private sector investment in infrastructure that benefits Northern Australia. For the purposes of NAIF, Northern Australia includes all of the Northern Territory, and those parts of Queensland and Western Australia north of or adjacent to the Tropic of Capricorn, including the Kimberley, Pilbara and Gascoyne regions, and the Shires of Wiluna and Meekatharra in Western Australia.

Projects may include developments in airports, communications, energy, ports, rail, and water, with a NAIF Board making investment decisions based on several factors but with a clear mandate to create local job opportunities.

With 5.5 per cent of Australia's population, Northern Australia makes an important contribution

to the national economy, accounting for 11.7 per cent of Australia's GDP (Australian Government, www.naif.gov.au).

Federal Minister for Resources and Northern Australia Matthew Canavan said that, to date, there were 140 potential NAIF projects in the pipeline, with 10 in due diligence and execution, including three in Western Australia.

"Signing the MFA with WA was the final important step in the process that will allow funds to flow from the Northern Australia Infrastructure Facility to these nation-building projects," Mr Canavan said.

The signed agreement between the Federal and State Governments followed the announcement of the NAIF Board's first investment decision, for the Onslow Marine Support Base project in Western Australia.

The decision includes a proposal by NAIF to offer financial assistance of around \$16.8 million for the multi-user infrastructure port and marine supply project.

The Onslow Marine Support Base is a privately funded project to develop a service hub for vessels operating throughout northwest Western Australia's offshore oil and gas fields.

It is anticipated the completed project will be a world-class marine supply base with the capability to cater for any size vessel, while providing employment for hundreds of people.

The first stage of the project, involving the construction of a berth pocket in Beadon Creek to form a land-based wharf facility, has been completed, with the State Government assisting

the project by providing improved infrastructure such as roads, services and a laydown area.

State Transport Minister Rita Saffioti described the project as, "transformative, providing a significant economic boost to Onslow and substantial benefits to the offshore oil and gas industry."

"The State Government has an important role to play in facilitating private investment where possible and the Onslow Marine Support Base is a real success story," Ms Saffioti said.

Western Australian Premier and Minister for State Development, Jobs and Trade, Mark McGowan, said the State Government would be formally reviewing the NAIF Onslow proposal following the signing of the MFA with the Federal Government.

"This agreement will assist the ongoing development of the State's North West," Mr McGowan said.

"The State Government is committed to diversifying the Western Australian economy and creating new jobs, and development in our regional areas will play a critical role in this task.

"We've taken our time to negotiate an agreement with the Commonwealth for the NAIF that does not expose Western Australia to unnecessary financial risk," he said.

"I'm delighted to see a Western Australian project as the first proposal to receive conditional NAIF support, and the State Government will be formally reviewing the Onslow proposal in coming weeks." ■

NEW INDUSTRIES FUND TO SUPPORT INNOVATION AND CREATE WA JOBS



Premier Mark McGowan, and Innovation and ICT Minister Dave Kelly unveiled a \$16.7 million New Industries Fund.

Western Australian Premier and Minister for State Development, Jobs and Trade, Mark McGowan, and Innovation and ICT Minister Dave Kelly unveiled a \$16.7 million New Industries Fund in November, delivering on an election commitment to create Western Australian jobs through innovation.

The fund will support and accelerate new and emerging businesses in Western Australia through a series of new initiatives, including Innovation Hubs and Science Industry Fellowships, designed to increase collaboration across industry, academia and government.

"It's vital that WA is an active player in the innovation economy, and that as a Government we ensure new industries have every opportunity to thrive and grow," Mr McGowan said.

"I am pleased to announce the launch of the New Industries Fund which will support and accelerate

new and emerging businesses, to diversify the economy and create WA jobs.

"The fund is a key component of the State Government's Plan for Jobs, which will create a more vibrant and diversified economy for the benefit of all Western Australians."

One of the first initiatives to be supported by the fund is the Joondalup Innovation Hub, which will bring together the public, private and research sectors to work in an area of existing strength for Western Australia – cyber security.

Minister Kelly acknowledged Edith Cowan University as a world-leader in cyber security research and training, and the City of Joondalup as a longstanding supporter of innovation and economic development.

"Innovation Hubs bring a critical mass of people together with access to expertise and facilities, making better use of talent and technology," Mr Kelly said.

"This Joondalup Innovation Hub will capitalise on the rapidly growing cybersecurity industry and our local competitive advantages to create WA jobs and educational opportunities."

The Western Australian Government is providing \$800,000 from the fund to support the establishment of the Joondalup Innovation Hub.

In the future, spending from the fund will be guided by input from the innovation sector including \$4.5 million allocated to regional areas.

Current successful initiatives such as the Innovator of the Year and Innovation Vouchers programs will also be supported by the fund, but with a renewed focus on creating Western Australian jobs.

For more information, visit www.newindustries.wa.gov.au ■



The China–Australia Mineral Investment Seminar was held in Beijing.

BATTERY METALS POWER VISIT TO NORTH EAST ASIA

Battery metals are a hot topic in North East Asia, and Western Australia can play an important role in meeting future demand.

This is one of the key messages the Department of Mines, Industry Regulation and Safety (DMIRS) Geological Survey Executive Director Dr Rick Rogerson relayed after visiting China, Korea and Japan in September.

“There was a strong battery metals flavour to the questions we were asked in each country as policies for low carbon emissions and new technologies continue to drive demand,” Dr Rogerson said.

“New technology metals are clearly generating a lot of interest as investor enquiries were spread across the entire value chain, from exploration, to scoping and feasibility stage project investments, direct investments into companies, and offtake of product.

“Metals in particular demand were lithium, cobalt, nickel and graphite.”

During the Chinese leg of the visit, Dr Rogerson and Minerals Promotion Manager Dr Gaomi Trench attended several events and spoke to a range of companies and investors.

“The 2017 China Mining Conference was more upbeat than the last few years with more Chinese groups visiting the Australia booth, and we also fielded a number of investment inquiries from other countries in the region,” Dr Rogerson said.

“At the China-Australia Mineral Investment Seminar in Beijing, the Vice Minister of Land and Resources Mr Cao Weixing emphasised the One Belt-One Road Initiative, and said the upcoming review of the China–Australia Free Trade would include the METS (Mining Equipment, Technology and Services).”

During the Japanese leg of the visit Dr Rogerson attended the annual Japan - Australia Mineral Investment Seminar which attracted a wide variety of organisations, including large industrial conglomerates, trading companies, business analysts, finance providers and consultants.

“The State-owned Japan Oil, Gas and Metals National Corporation (JOGMEC) expressed keen interest in exploration stage lithium and cobalt projects and we will be sending them more information,” Dr Rogerson said.

“At a meeting with JOGMEC prior to the seminar, they told us that in Australia they were focussed on identifying and investing in early to middle exploration stage copper, cobalt, gold, zinc, lead and lithium, preferably near established mining centres.

“We also encouraged JOGMEC to open an office in Perth to provide it with better access to the battery metals boom in Western Australia and the broader mining sector.”

DMIRS’ itinerary in South Korea included a seminar entitled ‘Western Australia: World hub of gold and new technology metals’. Dr Rogerson



***Geological Survey Executive Director
Dr Rick Rogerson.***

said there were many inquiries and requests, particularly for information on lithium, cobalt, graphite, nickel and gold.

“It is clear China, Japan and South Korea are seeking to enhance their resource relationships with Western Australia,” he said.

“The experience from this trip will help shape Western Australia’s future collaboration with North East Asia, and further promote the State’s profile in the region.” ■



WA'S DECOMMISSIONING EXPERTISE

The Department of Mines, Industry Regulation and Safety has published new petroleum decommissioning guidelines. Photo: Woodside

Minister for Mines and Petroleum and Asian Engagement Bill Johnston recently travelled to Singapore to promote Western Australia's expertise for decommissioning petroleum wells and facilities.

Speaking at the Gas Asia Summit, Mr Johnston said it was estimated that 600 petroleum-producing fields will cease production in the Asia-Pacific region in the next 10 years.

"The State Government is building on Western Australia's world-class expertise in oil and gas by supporting a decommissioning joint research and development study by industry participants," Mr Johnston said.

"The decommissioning research centre aims to deliver innovative and transformative offshore decommissioning solutions, positioning Western Australia as a regional and global leader."

The research centre will provide access to a network of industry-leading organisations and government bodies.

Western Australia itself has a large number of producing petroleum assets that are at, or near, the end of their productive life and is approaching decommissioning in the region with an integrated response from government, industry and research partners.

"There is no doubt that decommissioning of offshore oil and gas infrastructure is an emerging global issue, and Western Australia can position itself as a global leader in this field," Mr Johnston said.

"Perth is already a global hub for oil and gas organisations and has the industrial capacity and expertise to address the demand for decommissioning services.

"The State's industrial base has proven decommissioning expertise and is available to help reduce the region's decommissioning liabilities." ■

Decommissioning guidelines

New petroleum decommissioning guidelines outlining regulatory obligations for registered petroleum title holders have been published by the Department of Mines, Industry Regulation and Safety (DMIRS).

DMIRS Executive Director Petroleum Jeff Haworth said the Petroleum Decommissioning Guideline will help operators, onshore and offshore of the State, to understand their broader responsibilities in the planning and submission of a decommissioning program.

"Western Australian petroleum legislation has defined procedures and responsibilities for the decommissioning of petroleum fields, and while registered holders should be familiar with this legislation, this guideline expands upon a number of the requirements," Mr Haworth said.

"The petroleum industry is increasingly acknowledging the broad issues surrounding decommissioning and progressively assessing its options.



Mines and Petroleum Minister Bill Johnston was in Singapore to promote Western Australian expertise.

"There's no doubt the decommissioning of petroleum fields in Western Australia is an emerging issue as a large portfolio of production assets near the end of their productive life.

"Best practice suggests early planning and budgeting of a petroleum project should include an assessment of a fields' decommissioning options, as this can significantly reduce future costs and increase reserve recoveries.

Mr Haworth said the new guideline, developed in consultation with industry, should form part of the assessment process.

The guideline includes, among other things, a regulatory overview covering Well Management Plans, Field Management Plans, Environmental Plans and Safety Case or Safety Management Systems.

There are also comprehensive sections that expand upon the legislative regulations in relation to infrastructure, 'best practice' decommissioning planning and the post-decommissioning phase.

DMIRS is the regulator for safety, environmental and resource management for petroleum activities in Western Australia.

THUNDERBIRD MILESTONES INCLUDE JOBS PLAN AND EPA APPROVAL



*Standing: Bala Suppiah (Nirrumbuk), Justin King (Sheffield) and Ambrose Phillips (Winun Ngari).
Seated: Joe Grande (Nirrumbuk), Stuart Pether (Sheffield) and David D'Antoine (Winun Ngari).*

Sheffield Resources' Thunderbird Mineral Sands Project is moving ahead having reached important milestones this year.

In August, the company signed an agreement with two Kimberley-based Aboriginal corporations for the development of a Construction Work Ready Program.

The company, Winun Ngari Aboriginal Corporation in Derby and Nirrumbuk Aboriginal Corporation in Broome announced the agreement.

During the construction phase, the program will provide Aboriginal people from the area with employment opportunities at Thunderbird.

The work ready program is also tailored to ensure participants have the skills to be meaningfully engaged in construction activities and then move to operational roles.

Winun Ngari CEO Susan Murphy and Nirrumbuk CEO Joe Grande issued a joint statement saying they were pleased to assist Sheffield with their first Aboriginal work ready program for the Thunderbird Project and the company's commitment to training and employing Aboriginal people from the West Kimberley.

"Our organisations have a long history in preparing people from the Kimberley for work in the construction and mining industry, and we look forward to supporting Sheffield in this program," the statement read.

Sheffield Resources Chief Operating Officer Stuart Pether congratulated Ms Murphy and Mr Grande on their shared vision for achieving long-term Aboriginal employment.

"Only with the support of the local community will Sheffield be successful in the development of the Thunderbird Project and for achieving our

Aboriginal employment targets and local business spend commitments," he said.

"The construction work ready program enables training and development to commence during the construction period, in addition to our commitment of employing skilled Aboriginal and local people.

"Traditionally, training of unskilled workers is difficult to achieve during the construction period, as most people are employed by short-term contractors with the focus of completing the job on time and budget.

"The construction work ready program will ensure training and development of Aboriginal employees will commence during the construction period as well.

"The West Kimberley's overwhelming support for the Project is very encouraging and I welcome and congratulate Winun Ngari and Nirrumbuk Aboriginal Corporations on our new partnership."

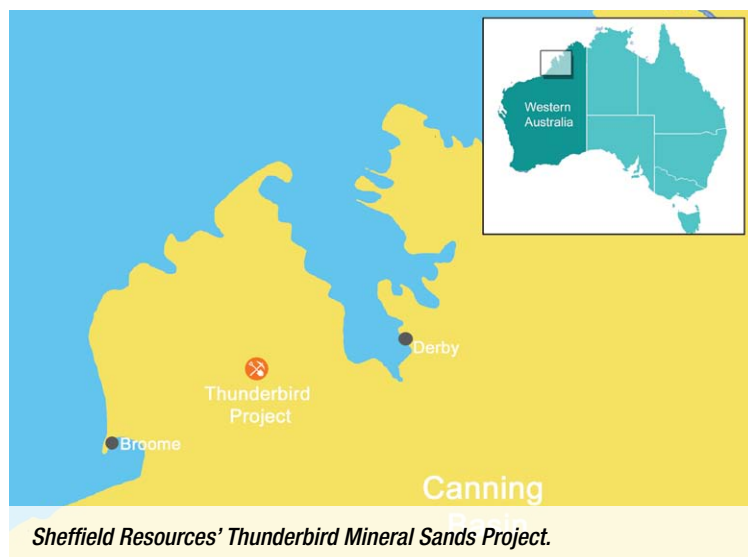
Another important milestone was reached in October when the Environmental Protection Authority (EPA) recommended approval for the project.

Sheffield's Managing Director Bruce McFadzean said it was a great outcome for the company.

"Throughout this process Sheffield has received a tremendous level of community support toward the development of the Thunderbird Project," he said.

"This was evident by the majority of public submissions made in favour of the Project earlier this year.

"With clear environmental management plans in place for Thunderbird, we now have the ability to deliver a project that will bring material benefits to all stakeholders." ■



Sheffield Resources' Thunderbird Mineral Sands Project.



The 2018 GSWA Open Day on 23 February is now open for online registration.

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GEOLOGICAL GEMS SHARED AT GSWA OPEN DAY

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The Department of Mines, Industry Regulation and Safety (DMIRS) is once again gearing up for the Geological Survey Western Australia's (GSWA) Open Day on 23 February 2018.

Now in its 18th year, the annual event showcases the Geological Survey's major geological activities and is a popular event for industry geologists and researchers alike.

DMIRS Acting Executive Director of the Geological Survey Western Australia, Don Flint said the event profiles all the latest information on the geological evolution of Western Australia and its mineral and petroleum systems.

"We present technical talks to a largely technical audience who come along to glean additional understanding about the State's geology and mineralisation," Mr Flint said.

"People like to stay abreast of our advances for the year, ask questions of our geologists, and catch up on the many products GSWA released in the past 12 months."

Mr Flint said the event is a good way for companies to stay informed.

"We provide a large number of highly informative poster presentations to provide progress updates and an overview of the variety and extent of GSWA's activities across the State," he said.

"The detail from the posters, along with the abstracts from all the talks, are provided on a USB to delegates on the day.

"There are also live demonstrations of our online systems to access data and information."

The GSWA Open Day will be at the Esplanade Hotel in Fremantle on 23 February 2018.

Full event details, including the presentation program for the day, will be available on the department's website in the new year.

The event costs \$110 and online registration is available at www.dmp.wa.gov.au/gswa2018. ■



Sailing the high seas – comfortably and safely at high speed – is the focus of Western Australian company Nauti-Craft, which recently took out a top national prize for innovation.

The Dunsborough-based research and development maritime company was the winner of the \$10,000 Civil SME Innovation Grant at the Maritime Australia Limited Innovation Awards, held in Sydney in October.

The national awards were developed by Industry Defence and Security Australia Limited to recognise the significant innovations of companies and young innovators operating in the commercial maritime and naval defence sectors.

The awards recognise and reward local companies and individuals at the forefront of naval and maritime innovation and carry with them a total of \$40,000 in cash prizes.

This year's awards were held at the Pacific 2017 International Maritime Exposition, a major defence and maritime exhibition that attracts industry leaders from around the world.

A total of 15 Australian civil and defence industry innovators were shortlisted for the awards across five categories.

Nauti-Craft received its award for the company's innovative approach to improving the ride, handling, comfort and safety of marine vessels, especially at high speeds and in high seas.

The company was founded by Chris Heyring who, about 12 years ago, began putting into practise his concepts of a marine suspension system – first

applying his thinking to a small sailing boat, then graduating to the development of a radical eight metre quadmaran that resembled a Formula One car on water.

An 8.5 metre catamaran followed, along with a further prototype, extensive sea trials and further research and development, leading to the company's novel suspension system.

Nauti-Craft's suspension system between the hulls and superstructure of a vessel works to improve ride comfort, handling and occupational health and safety for crew and passengers in high-speed craft, such as naval and police boarding parties.

The technology reduces the harmful effects of high levels of Whole of Body Vibration (WBV); helping to reduce injury and fatigue risk compared to conventional vessels while also enabling high speed vessels to travel faster in rough seas.

Mr Heyring, Chairman and company founder and inventor of the technology, along with Nauti-Craft Managing Director, Ken Johnsen, travelled to Pacific 2017 to accept their award from Federal Minister for Defence Industry, Christopher Pyne.

"It is a great honour to receive this prestigious award as it recognises the efforts of the dedicated team at Nauti-Craft in developing a technology that can deliver tangible workplace health and safety and operational benefits to vessels in the defence sector as well as a range of civilian applications," Mr Johnsen said.

Western Australian Defence Issues Minister Paul Papalia and WA Defence Advocate Rear Admiral (Rtd) Raydon Gates AO CSM also attended

Pacific 2017, meeting a number of prominent organisations and companies involved in the defence industry.

Mr Papalia congratulated Nauti-Craft on the company's award win.

"Western Australia's maritime and defence sector is innovative, competitive and modern, from major contractors to small and medium-sized enterprises," Mr Papalia said.

"Being here at Pacific 2017 with industry leaders from 35 countries has only reinforced my belief that our defence industry is ready to take its rightful place on the global stage.

"I congratulate Nauti-Craft on winning this prestigious award and look forward to seeing what comes next for this innovative WA company."

The Western Australian Government supported defence small to medium-sized enterprises (SMEs), including Nauti-Craft, South Metropolitan TAFE and others, at a WA booth at Pacific 2017.

The SMEs hosted on the stand represented a broad range of defence and maritime services and products, including engineering, underwater technologies and manufacturing.

The Western Australian Government's Office of Defence West was announced in May 2017 and works to facilitate, promote and attract new business to the range of specialised manufacturing support services primarily based at the Australian Marine Complex in Henderson, Western Australia.

For more information visit www.jtsi.wa.gov.au ■

SCHOLARSHIPS BOOST WA AGRICULTURE AND AQUACULTURE INNOVATION



Scholarships awarded as part of the Premier's Agriculture and Aquaculture Entrepreneurship Program are open to farmers and innovators in the agriculture and aquaculture sector.

Scholarships worth \$109,000 have been awarded to four innovative Western Australian companies engaged in the State's agriculture or aquaculture sector.

The scholarships form part of the Premier's Agriculture and Aquaculture Entrepreneurship Program, which is part of the \$3.4 million Science and Agribusiness Connect Initiative funded by Royalties for Regions.

The scholarships enable recipients to travel across Australia and internationally to learn from some of the world's most innovative producers, and establish valuable connections in their industry.

At completion of their travel and learning experiences, recipients share their knowledge and learning with industry in Western Australia.

The scholarship program is open to farmers and innovators in the agriculture and aquaculture sector outside of the Perth metropolitan area, although applicants from within Perth may be considered where their proposal can demonstrate a benefit to regional Western Australia.

2016 scholarship recipients travelled to South Africa, the United States of America, and Europe, covering projects as diverse as sub-soil acidity; drone technology for use in broad acre crop production; and marron production on commercial farms.

The 2017 recipients and their projects are:

- Justine Arnold from Indian Ocean Fresh Australia, who will lead a small team of experts to Japan to access the knowledge of Japanese kingfish farmers and researchers, as well as their management strategies and techniques developed for warm water kingfish culture, and to gain insights into skills and techniques required for the rapidly emerging aquaculture industry in Western Australia.
- Murujuga Aboriginal Corporation and Maxima Pearl Company, which have commenced a research and development project to trial rock oyster production in the Pilbara. The award will enable travel to established edible oyster production areas in South Australia, New South Wales and Tasmania to build networks and facilitate technology transfer from these areas to the local environment in the Pilbara.
- Tim Hyde and Rod Campbell of Indicina Pty Ltd, who will travel to Queensland, New South Wales, and the United States of America to gain an understanding of the Agtech sector with regard to the water and nutrient management requirements of various agricultural industries, and the potential integration of its technology SWAN Systems. The trip will also be an opportunity to discuss

business arrangements with potential resellers and to investigate data synergies within field hardware and the capacity to upload data onto SWAN Systems.

- Anthony Quinlan of Soil Dynamics, who will travel to Spain to investigate and develop a collaboration with a production company who will manufacture prototypes of micro fibre bands for use in food crop protection, and to China to investigate impregnation of the micro fibres with organic insecticides to improve efficacy of the product.

In announcing this year's scholarship recipients, Premier and Minister for State Development, Jobs and Trade, Mark McGowan acknowledged the diversity of the State's agriculture and aquaculture sector and its importance in growing and diversifying Western Australia's economy.

"The 2017 recipients of the Premier's Agriculture and Aquaculture Entrepreneurship Program reflect the depth and sophistication in these important industries for Western Australia," Mr McGowan said.

"The scholarships will assist the recipients to further develop their ideas and innovations in their industry through travel, and bring that knowledge home to WA." ■

LEARNING SAFETY LESSONS FROM THE PAST



The Hazard register for Western Australian mining fatalities was developed from reports and analysis of mining fatalities in WA since 2000.

A register containing fatal mining accident investigation findings for Western Australia's resources sector has been developed by the Department of Mines, Industry Regulation and Safety.

Mines Safety Director Andrew Chaplyn said the *Hazard register for Western Australian mining fatalities* grew from an analysis of 64 mining fatalities between January 2000 and December 2015.

"Our information included important details regarding the key hazards that contributed to those fatalities occurring, such as occupations, work tasks, locations, and the equipment or infrastructure involved," Mr Chaplyn said.

"It also detailed the root cause of the incident and any precautions or preventative measures that could have averted it occurring.

"This included the findings from coronial inquests."

Mr Chaplyn said employers and workers should use the data to assist in the development of safe work practices on mining operations.

"It is very important people understand some of the key hazards they are dealing with that have resulted in fatalities," he said.

"The register is quite clear and allows people to go through and look at their operations and the hazards they've got.

"It really should crystallise their thinking about these hazards and the controls that should be in place to ensure they don't result in fatalities or injuries."

Mr Chaplyn said while the register was not intended to be the sole source of information for developing site-specific hazard registers, it was a useful tool to check current risk registers and hazards.

"You may find something on our register that you haven't thought of or considered as a part of your safety systems," he said.

"It is a recent representation of what has happened here in Western Australia and it is quite applicable."

It is not just Western Australia that sees the value in the hazard register.

Earlier this year, the register was translated into Turkish.

Mr Chaplyn said it was important to take the good work being done in Western Australia and use it in other mining jurisdictions.

"Mining hazards are not that different around the world," he said.

"It is fantastic to see others are benefiting from this as well and hopefully it can result in safer mining around the world."

Mr Chaplyn said there would be further developments in the analysis and use of the department's safety information.

"We are looking at different ways of analysing our injury data particularly from the inspectorate side, and how we can use information from the different operations we work with to better understand the hazards we are dealing with," he said.

"Not only does this help train inspectors, it also helps to build a common understanding of what areas we need to work on." ■



Russell Brown during filming for the latest instalment of the department's Know Your Hazards video series.

SPOTLIGHT ON SAFETY FOR ROADSHOW

A roadshow to raise awareness about mining-related safety and health issues travelled throughout Western Australia during October.

The Department of Mines, Industry Regulation and Safety Mines Safety Roadshow started in Kalgoorlie and also stopped in Leonora, Newman, Cloudbreak, Tom Price, Karratha, Port Hedland, Bunbury, Mandurah and Geraldton, before finishing in Perth.

Resources Safety Division Director Mines Safety Andrew Chaplyn said the roadshows included the latest series of the *Know your hazards* safety videos.

"The roadshows are an important opportunity for mine inspectors, safety and health representatives and frontline supervisors to come together and discuss safety and health in the mining industry," Mr Chaplyn said.

"It is particularly important to get out into the regions and meet with a large audience who may not be able to get to a Perth-based event."

This year's roadshow saw more than 750 people attend one of the 13 events across Western Australia.

"The roadshow has continued to grow and it is an important opportunity for Resources Safety to collaborate with workers on significant safety and health issues," Mr Chaplyn said.

One of the themes for this year's roadshow was traffic management.

"Unfortunately we frequently see examples in Western Australia and around the world of serious incidents, injuries and fatalities involving vehicles on mine sites," Mr Chaplyn said.

"This is why we are concentrating on the importance of traffic management and how safe systems, safe vehicles and safe people can contribute to a safe mining operation."

The event included an update from the regulator on what is happening in mine safety and health in Western Australia.

"The roadshow is an opportunity to network with other safety personnel and meet some of the department's mines inspectors," Mr Chaplyn said. ■

Safety videos focus on traffic management

Traffic management was the focus of the Department of Mines, Industry Regulation and Safety's fourth installment of its Know your hazards video series.

One of the reasons for the focus was that traffic management incidents accounted for twenty-five per cent of Western Australian mining fatalities between 2000 and 2015.

Director Mines Safety Andrew Chaplyn said mine sites feature a range of vehicles as part of their operations, and traffic management was a critical part of safety for mining operations.

"When things go wrong with traffic management workers can be hurt or killed," he said.

Mr Chaplyn said the videos, produced by the department, highlight the importance of traffic management.

"The videos feature real-life stories, re-enactments and technical, factual material," Mr Chaplyn said.

"This series aims to help supervisors and work teams recognise common workplace hazards that have injured or killed people. In this case, the hazards associated with traffic management.

"Being able to correctly identify hazards is the first step towards reducing the risk of accidents in the workplace."

The videos premiered at the 2017 Mines Safety Roadshow and are now available to download from the department's website.



Department of Mines, Industry Regulation and Safety

AWARDS FOR EXCELLENCE

Golden Gecko • Community Partnership • Safety & Health

RESOURCES SECTOR INNOVATION SHINES BRIGHT AT AWARDS FOR EXCELLENCE

The innovations and advances made in Western Australia's resources sector were on show at the Department of Mines, Industry Regulation and Safety Awards for Excellence Ceremony held in October.

Five outstanding projects were recognised for adopting the highest standards to safeguard the environment, community, and the health and safety of workers, and ensure the sector is sustainable for the benefit of generations to come.

The Awards covered three segments of the sector – environmental excellence, significant and lasting community partnerships and innovations in safety and health.

The department's Director General, David Smith said the awards were an important aspect of advancing Western Australia's nationally significant resources industry.

"These awards bring to the forefront the world-class work that is being done in the resources sector and in the communities where resources companies are working," Mr Smith said.

"Celebrating the advances made in the industry helps promote our State as a destination of choice for technological and service-based solutions in the resources sector.

"Industry in Western Australia is continually improving and is at the forefront of social, safety and environmental outcomes, setting new standards both nationally and internationally."

The consistently high standard of entries reflects the strong commitment resource companies and their local communities have when working together to achieve positive outcomes. This year's entries include a wide range of resource companies from across the State, ranging from the South West and the Goldfields, to the Mid West and the Pilbara.

A free seminar was held prior to the ceremony, where a selection of finalists and entrants presented case studies on their projects, sharing key learnings and innovations with industry. Nominations for the 2018 Awards for Excellence will open in early February. For more information go to: www.dmp.wa.gov.au/awardsforexcellence. ■

THE 2017 AWARDS FOR EXCELLENCE WINNERS



Safety and Health Resources Sector Awards

Safety Representative Award

The Safety Barometer, Fortescue Metals Group

This award called for nominations for safety and health innovations and leadership by an elected Safety and Health Representative.

The judges commented that the winning project is a great innovation that empowers safety and health representatives.

There can be no doubt that Safety and Health Representatives are a key component in driving change and the achievement of safe work places relies on good information for good decision making.



This project provides Safety and Health Representatives with critical feedback information to help them perform their duties.

The Safety Barometer is about understanding the impact attitude and distraction can have on safety and provides a tool to target the way people are feeling in the workplace.

The Safety Barometer encourages self-diagnosis within work groups, builds an ownership of safety, identifies proactive action opportunities, provides a

platform that is not just about facts and data, and recognises human factors.

Since introducing the Safety Barometer, FMG has seen real results in identifying issues, creating greater unity and has advanced how their mobile maintenance team works.



Systems and People Award

The Iluka Resources Winston Partnership

The judges said there were a high number of quality submissions in this category that all scored well within the criteria set out.

The Iluka Resources Winston Partnership was successful because of its innovation and relevant focus on the mental health issues that present challenges for the community and industry.

The Iluka Resources South West Operations team has taken an innovative and unique approach to raising the awareness of mental health issues within their workforce, the resources industry and the wider community.



The team partnered with local Dardanup farmers, Peter and Judy Milton, sponsoring a steer called Winston.

Linking in with Iluka's volunteering program, employees provide support, enabling Winston to attend a range of high profile events.

Peter and Judy, along with health professionals, aim to raise the awareness of mental health issues and break down the stigma around such issues.

Winston has become an icon for mental health on the Iluka site and has enabled opportunities for all staff to contribute to the work the Milton family is doing in the community.



Engineering Award

Rail Mounted Working at Heights Platform, Rio Tinto

Nominees for the Engineering category were required to demonstrate innovation in maintenance, engineering and/or infrastructure to enhance safety and health.

The judges took into consideration that falls from heights and overexertion are in the industry's top ten list of incidents.

They said the winner created a unique and innovative solution which addressed this significant risk.



Rio Tinto's Rail Mounted Working at Heights Platform provides a safe, ergonomic work area for multiple operators to undertake the tasks required of them while preventing falls and minimising the need for bending, crouching or overreaching, addressing key issues for the industry.

While work platforms are nothing new, this solution adds the innovative approach of mounting onto the existing stacker rail allowing for easy relocation, easier access to the conveyor rollers, and reduces the falling from heights risk.



Golden Gecko

Banksia Woodlands – A Restoration Guide for the Swan Coastal Plain, Hanson Construction Materials and Kings Park and Botanic Gardens

This resource, which uses two decades of research, provides the first comprehensive overview for practitioners, researchers and policy makers to assist Banksia woodland restoration activities and decisions.

It is a solid platform from which to build future strategies so these iconic systems remain an important part of the ecosystem.

The South West of Western Australia is one of the world's 34 global biodiversity hotspots and Banksia woodlands represent an important part of that rich fabric of biodiversity.

Some 60 per cent of Banksia woodland across the South West has been lost or degraded, particularly



in the Perth Metropolitan area where only 10 per cent remains.

This restoration guide provides the platform to achieve this biodiversity protection, enhancement and restoration in the nutrient poor soils of the Swan Coastal Plain.

The restoration guide includes chapters from both restoration scientists and minesite managers which

is evidence of the support given to the project by the operational divisions of Hanson Construction Materials.

As well as this publication, Hanson has also been spreading the results of the research to government agencies, community open days and conferences.



**Community Partnership
Resources Sector Award**

**Community Partnership
Resources Sector Award**

KCGM and KBULG Environmental and Sustainability Partnership, Kalgoorlie Boulder Urban Landcare Group and Kalgoorlie Consolidated Gold Mines

Kalgoorlie Consolidated Gold Mines has been supporting the Kalgoorlie-Boulder Urban Landcare Group since 2005 and recently offered a three-year \$60,000 partnership.

The partnership has worked on a number of key cultural and environmental awareness events, including the Karlkurla Dreaming Culture Trail, the annual Community Tree Planting Day, the



Sustainable Garden Competition. Kalgoorlie-Boulder Clean-Up Day and the Reconstructed Art Competition.

The judges commented that this partnership went to great lengths to directly involve the community by forming a reference group in order to have direct community input into the projects and programs.

KCGM also demonstrated excellent involvement by embedding the project and activities in the culture of the business.

A key element of KCGM's social responsibility program is to contribute to the development and sustainability of the local community.

Other awards presented during the evening included:

**Safety and Health
Resources Sector Award**

Engineering Category Certificates of Merit

- Enhancing Electrical Safety Through DrawingBox, Aurecon
- Drill of the Future, FORACO Australia
- Elimination of excess temperature and high-risk levels of Legionella bacteria in eyewash safety showers, Heat Trap Solar Pty Ltd
- Improving the Safety and Reliability of Distribution Power Lines, Rio Tinto
- Safescape Edge Protector, Safescape

**Systems and People Category
Certificates of Merit**

- Innovative technology to manage onsite inductions, Aglime of Australia
- Onsite – Suicide Ideation Management, Fortescue Metals Group
- Unmanned Aerial System for Abandoned Pit Lake Sampling at Tallering Peak, Mount Gibson Mining
- Critical Risk Management – Fatality Elimination Program, Rio Tinto Safety Representatives Certificate of Merit
- Scenario based learning, Fortescue Metals Group

**Community Partnership
Resources Sector Award**

Special Commendation

- The Graham (Polly) Farmer Foundation – Rio Tinto Partnership

Certificates of Merit

- The Wiluna Martu Ranger Program, Tarlka Matuwa Piarku Aboriginal Corporation, Central Desert Native Title Services, Land and Community and Northern Star Resources
- Industry Road Safety Alliance South West – Shires of Boddington, Collie and Harvey, RoadWise, Main Roads WA, Road Safety Commission, WA Police, Department of Transport, Synergy, South 32 Worsley Alumina, Newmont Boddington Gold and Premier Coal
- Swan Alcoa Landcare Program, Perth NRM and Alcoa of Australia

**Golden Gecko Award
Certificates of Merit**

- Venturi Reverse Circulation Drilling Waste Removal System, Rio Tinto Iron Ore
- Utilising Mining Technology for the Tracking and Management of Rehabilitation Materials, Roy Hill Holdings



OIL & GAS DEVELOPMENTS

**Pilbara – Wheatstone LNG Development
CHEVRON AUSTRALIA PTY LTD**

Chevron Australia Pty Ltd as Operator of the Wheatstone Project is currently working towards the completion of two LNG trains, a domestic gas plant and port facilities at the Ashburton North Strategic Industrial Area near Onslow. The Project will initially produce 8.9Mtpa of LNG and have a 200TJ per day domestic gas plant connected to the Dampier-to-Bunbury Natural Gas Pipeline. First LNG production commenced on 9 October 2017.

Expenditure: \$40b.

Employment: Construction: 7200;

Operation: 400

POWER STATIONS

Boodarie Industrial Estate – South Hedland Power Station**TRANSALTA**

TransAlta Energy (Australia) Pty Ltd successfully commissioned its 150 megawatt power station in South Hedland's Boodarie Industrial Estate in July 2017 and is currently supplying energy to its customers. The plant consists of a combined cycle gas plant, featuring both natural gas and steam turbines. The plant has been designed to allow for expansion and there is a possibility that other customers may be added in the future.

Expenditure: \$570m.

Employment: Construction: 250;

Operation: 20

LITHIUM

**Kwinana – Tianqi Lithium Processing Project
TIANQI LITHIUM AUSTRALIA PTY LTD**

Tianqi Lithium Australia Pty Ltd holds a 51% interest in Talison Lithium, the operator of the Greenbushes mine in the South West of WA. The company has committed to a major expansion of the mine and the construction of a lithium hydroxide processing plant at the Kwinana Strategic Industrial Area, south of Perth. The processing plant will be constructed in two stages. The first stage will accommodate the production of 23,900tpa of lithium hydroxide and will occur between 2016–2018. The second stage will expand the plant to produce up to 47,800tpa of lithium hydroxide and will occur between 2018–2020. The final product will be shipped to customers in China. Lithium hydroxide is a highly-valued resource for industries involved in energy storage, hybrid vehicles, aviation and other technological industries.

Expenditure: \$608m.

Employment: Construction: 500;

Operation: 115

OIL & GAS DEVELOPMENTS

Carnarvon Basin – Greater Western Flank Phase 2**WOODSIDE ENERGY**

The Greater Western Flank 2 Project was approved in December 2015 and will develop gas and condensate from the Keast, Dockrell, Sculptor, Rankin, Lady Nora and Pemberton fields via a subsea tieback to the existing Goodwyn platform. The project has awarded most major contracts and commenced manufacturing and fabricating key project infrastructure. The project is expecting start-up from the initial tranche of five wells in 1H 2019, with the remaining three wells expected in 1H 2020.

Expenditure: \$2.8b.

Carnarvon Basin – Persephone Project**WOODSIDE ENERGY**

The Persephone project achieved start-up in July 2017, six months ahead of schedule. The Persephone field produces using subsea tieback to the existing North Rankin Complex.

Expenditure: \$1.2b.

Carnarvon Offshore Basin – Barrow Island – Gorgon Project**GORGON JOINT VENTURE**

The Gorgon Foundation Project on Barrow Island, now in its eighth year of construction, is a three train LNG development with a nameplate capacity of 15.6Mtpa and includes a domestic gas plant capable of delivering at least 300TJ/d of gas to the mainland. Cost estimates for the project construction are expected to total more than A\$55b. The project involves the processing of gas from both the Gorgon and Jansz/Io gas fields and includes potentially the largest commercial CO₂ geosequestration project in the world. Train one start up and first shipment of LNG commenced in March 2016. Train 2 produced first LNG in October 2016 and train three was commissioned in March 2017.

Expenditure: \$55b.

Employment: Construction: 8000;

Operation: 300

AGRICULTURE

**East Kimberley – Project Sea Dragon
SEAFARMS GROUP LIMITED**

Seafarms Group is a Queensland based producer of farmed prawns. Seafarms proposes to invest up to US\$1.45b over the next eight years in Project Sea Dragon, a large scale, integrated, land based aquaculture project to produce black tiger prawns for export markets in Asia. The aquaculture component of the project will be located in the Northern Territory and is planned as a staged development commencing with Stage 1, 1,000 hectares of ponds and supporting infrastructure. In Western Australia a founder stock and quarantine centre is operational in Exmouth, a processing plant is proposed for Kununurra, and subject to competitive tender Wyndham port will be utilised for export and import. The project will create approximately 300 jobs in the Kimberley during construction, 150 direct jobs in the region at Stage 1 building to 700 direct jobs when fully operational. Seafarms Group expect to commence development during 2018.

HEAVY MINERAL SANDS

**Shark Bay – Coburn Zircon Project
STRANDLINE RESOURCES LIMITED**

The Coburn mineral sands project, located south of Shark Bay and approximately 250km north of Geraldton, contains total ore reserves of 308Mt at an average grade of 1.2 per cent heavy minerals, all of which lie within the portion of the project area that has received government environmental approvals for mining. At a mining rate of 23.4Mtpa, the project is expected to produce 49,500tpa of zircon, 109,000tpa of chloride ilmenite and 23,500tpa of a mixed rutile-leucosene over its +19 year mine life. In November 2017, Strandline announced that it had initiated a funding and development strategy aimed at bringing the Coburn project into production. One option the company is pursuing is the formation of a special purpose vehicle with well-funded parties to oversee the funding, development and operation of Coburn.

Expenditure: \$173m.

Employment: Construction: 170;

Operation: 110

INFRASTRUCTURE

West Kimberley – Browse LNG Precinct WA STATE GOVERNMENT

The State Government is developing the Browse Liquefied Natural Gas (LNG) Precinct approximately 60km north of Broome. By focussing development at a suitable location, the Precinct will minimise the environmental footprint of gas processing and any social impacts in the region while maximising opportunities for the local community to benefit from development of the Browse Basin gas fields. The Precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. The State Government has acquired the land for the Precinct and will secure all relevant approvals to ensure the Precinct is 'project ready'.

IRON ORE

Pilbara – Balla Balla Infrastructure Project BALLA BALLA JOINT VENTURE

The Balla Balla Infrastructure project proposes to construct and operate a 165km railway connecting the Flinders Mines Ltd's Pilbara Iron Ore Project, located in the central Pilbara as its foundation customer, to a proposed transshipment port and stockyard facility at Balla Balla, situated midway between Karratha and Port Hedland. The Railway (BBI Rail Aus Pty Ltd) Agreement 2017 was executed between the State, the Company and the Guarantors in January 2017 and on 28 November 2017 was ratified by Parliament.

Expenditure: \$5.6b.

Employment: Construction: 3300;
Operation: 900

Pilbara – South Flank Project BHP BILLITON IRON ORE PTY LTD

BHP proposes to develop the South Flank sustaining mine project in the central Pilbara. Initial funding of A\$244 million has been approved for the project. The South Flank project will leverage and expand the existing Mining Area C hub and replace production from the 80Mtpa Yandi mine when it reaches the end of its economic life in the early-to-mid 2020s. The project is expected to be submitted for Board approval in the middle of 2018 calendar year, with the first ore targeted in the 2021 calendar year ramp up, timed to coincide with the closure of Yandi. Full development of South Flank would generate thousands of jobs during construction. South Flank is located approximately 130 km by road north-west of the town of Newman, and adjacent to the Company's existing Mining Area C operation. The proposed project would establish mining operations at South Flank and transport ore to an expanded Mining Area C hub for processing and onward logistics. The proposed project is currently in study phase and is subject to a number of internal and external approvals.

Pilbara – West Pilbara Iron Ore Project API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 40Mtpa of direct shipping iron ore from deposits, including Red Hill and Mt Stuart deposits, located 35-80km south west of Pannawonica. The ore is proposed to be transported by a 282km heavy haul railway for export via the proposed multi-user port at Anketell. State and Federal environmental approvals for the mine, rail and port elements of the project are in place. Subject to the successful completion of feasibility studies, and receipt of final regulatory approvals, the company anticipates construction to commence following a decision to proceed by the joint venturers and completion of funding arrangements.

Expenditure: \$6.8b.

Employment: Construction: 1500;
Operational: 900

PILBARA – Koodaideri Iron Ore Mine And Infrastructure Project

MOUNT BRUCE MINING PTY LTD

Rio Tinto is investigating the development of the Koodaideri iron ore deposit located about 110km north-west of Newman. The Koodaideri Project would have a capacity of about 40 million tonnes of iron ore per annum requiring the development of a new mining area at Koodaideri, crushing, screening, stockpiling and rail load out infrastructure plus a 170 km railway. Rio Tinto is currently undertaking a project feasibility study that is focusing on obtaining consents and providing data to validate the project. Potential for first ore production in about 2021.

Expenditure: \$3b.

Employment: Construction: 1600;
Operational: 600

OIL & GAS DEVELOPMENTS

Canning Basin – Buru Canning Basin Tight Gas

BURU ENERGY

The Buru Energy/Mitsubishi joint venture (JV) is appraising the commercial potential of the Laurel Formation, a large onshore natural gas resource located in the Canning Basin. Following the successful completion of the 2015 tight gas stimulation program on and near Noonkanbah Station, the joint venturers commissioned an independent assessment of the gas and liquids potential of the Laurel Formation in the Valhalla area. A declaration of location has been made within EP371. This independent assessment has confirmed that the region contains a significant wet gas accumulation. The JV recently executed native title Agreements with the Yungngora and Warlangurru people covering the recently tested Asgard and Valhalla wells. The agreements provide for, amongst other matters, the support of the Yungngora and Warlangurru people for the future grant of the tenure required for the further development of the gas resources in the area. The Yungngora agreement has now been registered with the National Native Title Tribunal. On 25 May 2017, Buru announced its intended assignment of its 50% interest in EP371 to DRF, with the resulting holding of EP 371 becoming 100% Mitsubishi. In exchange, Buru has obtained 100% of the other EP's under the State Agreement. On 27 November 2017 the Joint Venturers and the State executed the Natural Gas (Canning Basin Joint Venture) Agreement 2012 Termination Agreement, which was introduced into Parliament for ratification on 29 November 2017.

Expenditure: \$40m.

Employment: Construction: 100;
Operation: 30

URANIUM

Northern Goldfields – Yeelirrie – Yeelirrie Uranium

CAMECO AUSTRALIA PTY LTD

Cameco Australia proposes to develop the Yeelirrie project in the North-eastern Goldfields, near Wiluna. The project entails open cut mining of shallow deposits of uranium ore, treatment in a plant to be established at the site, and development of associated infrastructure. The project will process up to 2.4Mtpa of uranium ore over about 17 years. The resultant uranium oxide is to be transported to South Australia by road for export to overseas markets. The project received environmental approval on 16 January 2017. Cameco will advance the project at a pace aligned with market conditions. Cameco will advance the project at a pace aligned with market conditions.

Employment: Construction: 500;
Operation: 225



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Significant resource projects in Western Australia

Western Australia continues to lead the way as Australia's premier resources investment destination. There are more than A\$120 billion worth of projects either committed or under consideration for the State during the next few years. These would create more than 23000 construction jobs and almost 3500 permanent jobs.

This section is intended as an overview and does not constitute an exhaustive list of projects within the Western Australia resources industry. Based on company announcements.

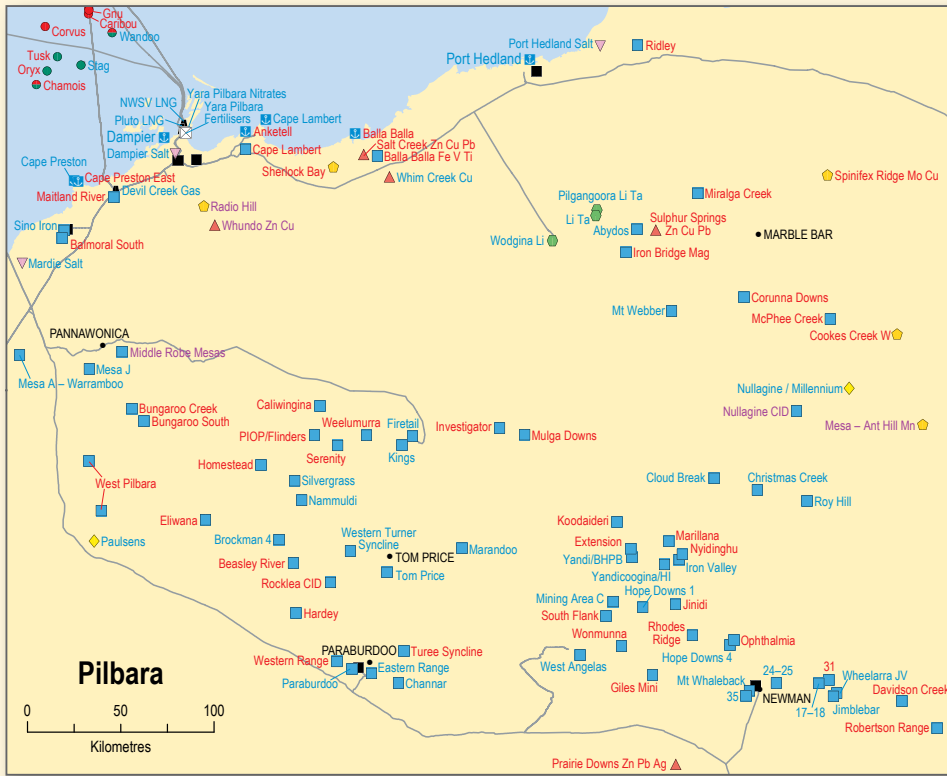
Significant Projects as at November 2017

	Project Value (estimated A\$m)	Employment	
		Construction	Permanent
Iron and Steel			
API Management Pty Ltd – West Pilbara Iron Ore Project	6800	1500	900
CITIC Pacific – Cape Preston Mine & Processing Projects	12000	4000	1000
Koodaideri Iron Ore Mine and Infrastructure Project	3000	1600	600
South Flank	n/a	n/a	n/a
Sub Total	21800	7100	2500
Oil, Gas and Condensate			
Browse LNG Precinct	n/a	n/a	n/a
Buru Energy – Buru Canning Basin Tight Gas	40	100	30
Chevron – Wheatstone LNG	40000	7200	400
Gorgon Joint Venture Gas Processing Project	55000	8000	300
Woodside Energy – Greater Western Flank Phase 2	2800	n/a	n/a
Woodside Energy – Persephone	1200	n/a	n/a
Woodside Energy – Persephone	1200	n/a	n/a
Sub Total	99040	15300	730
Other			
Cameco Australia – Yeelirrie Uranium	n/a	500	225
TransAlta – South Hedland Power Station	570	250	20
Sub Total	570	750	245
TOTAL	121410	23150	3475

All currency figures are in Australian dollars unless otherwise specified.

Abbreviations Key

b	billion	m	million
EPC	Engineering, Procurement and Construction	Mt	million tonnes
GL	gigalitres	Mtpa	million tonnes per annum
ha	hectares	MW	megawatts
JV	joint venture	t	tonnes
km	kilometres	THM	total heavy mineral
LNG	liquefied natural gas	TJ	terajoules
LOA	length overall	tpa	tonnes per annum



Mineral symbols		Commodities	
◆ Precious metal	Au (or as shown)	Ag..... Silver	
◆ Steel alloy metal	Ni (or as shown)	Au..... Gold	
◆ Speciality metal	Ti-Zr (or as shown)	Chert..... Chert	
■ Base metal		Cu..... Copper	
■ Iron		Fe..... Iron	
■ Alumina	All sites are bauxite	K..... Potassium	
● Coal and lignite		Kln..... Kaolin	
▽ Industrial mineral		Li..... Lithium	
▽ Processing plant		LNG..... Liquefied natural gas	
● Gas field		LPG..... Liquefied petroleum gas	
● Oil field		Mag..... Magnetite	
● Oil and gas field		Mn..... Manganese	
▲ Processing plant		Mo..... Molybdenum	
— Oil / gas pipeline, operating		Ni..... Nickel	
- - - Oil / gas pipeline, proposed		Pb..... Lead	
■ Power plant		Phos..... Phosphate	
■ Irrigation / water / desalination		REE..... Rare earth elements	
■ Port		Sid..... Silica sand	
		Ta..... Tantalum	
		Tlc..... Talc	
		Ti..... Titanium	
		V..... Vanadium	
		W..... Tungsten	
		Zn..... Zinc	

Enquiries for latest information for Commonwealth controlled waters is available from the National Offshore Petroleum Titles Administrator (NOPTA) at <info@nopta.gov.au>

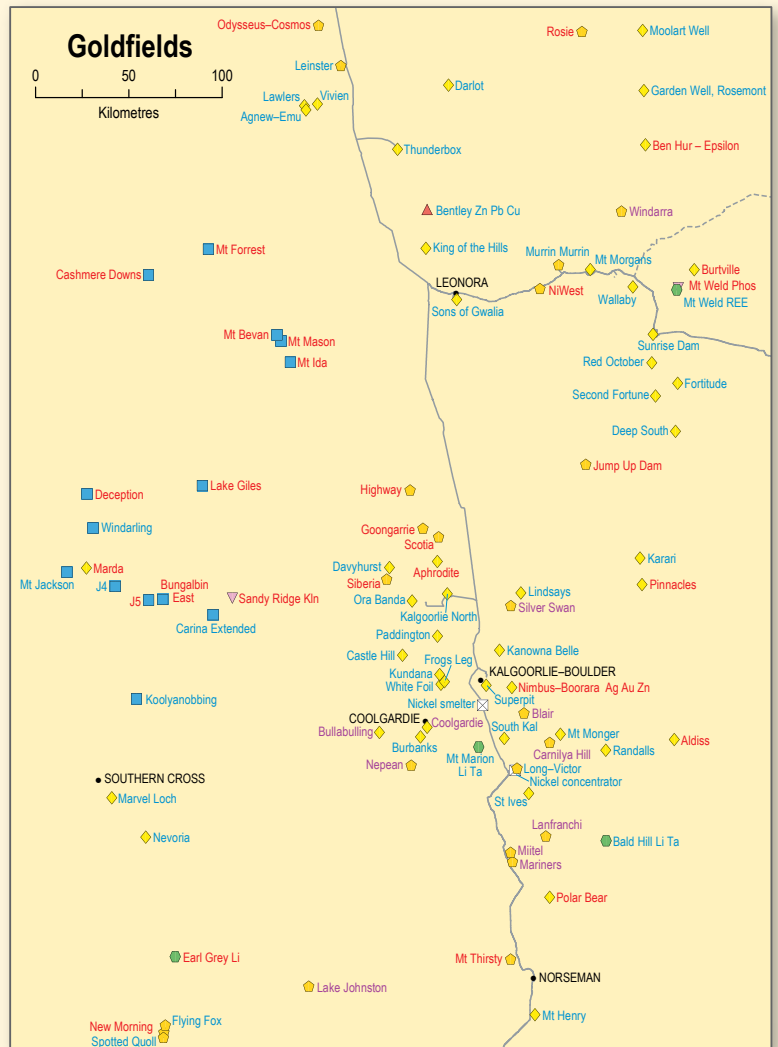


Project labels:

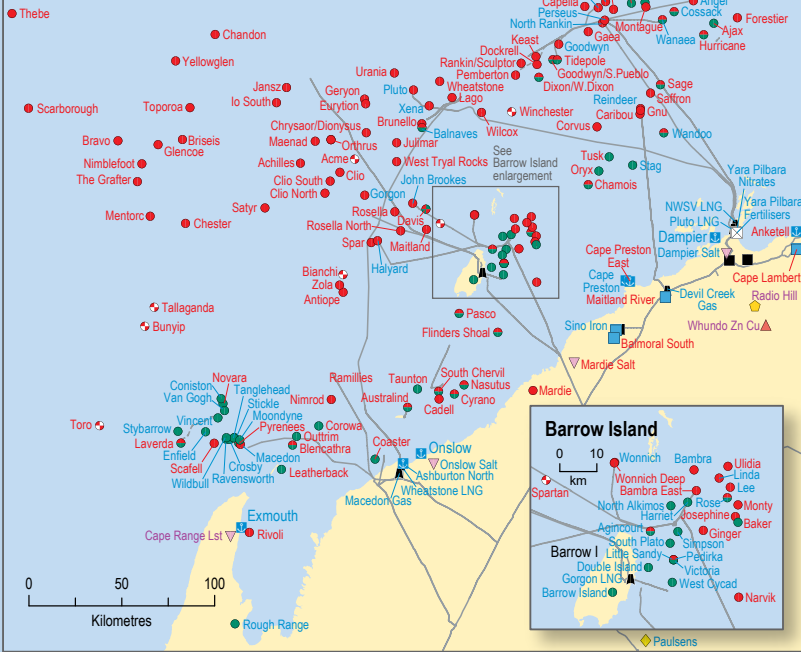
Projects operating or currently under development with an actual or anticipated value of production greater than A\$10 Million are shown in blue

Proposed or potential projects with a capital expenditure greater than A\$20 Million are shown in red

Projects under care and maintenance are shown in purple



North West Shelf



Major Resource Projects December 2017

Project labels:

Projects operating or currently under development with an actual or anticipated value of production greater than A\$10 Million are shown in blue

Proposed or potential projects with a capital expenditure greater than A\$20 Million are shown in red

Projects under care and maintenance are shown in purple



Commodities

- Ag..... Silver
- Au..... Gold
- Co..... Cobalt
- Cu..... Copper
- Dmd..... Diamond
- Fe..... Iron
- Fl..... Fluorite
- Gp..... Gypsum
- Gr..... Graphite
- Grt..... Garnet
- K..... Potassium
- Kin..... Kaolin
- Li..... Lithium
- Lst..... Limestone
- LNG..... Liquefied natural gas
- Mn..... Manganese
- Nb..... Niobium
- Ni..... Nickel
- Pb..... Lead
- Pd..... Palladium
- PGE..... Platinum group elements
- Pt..... Platinum
- REE..... Rare earth elements
- Ta..... Tantalum
- Ti..... Titanium
- V..... Vanadium
- W..... Tungsten
- Zn..... Zinc
- Zr..... Zirconium

Mineral symbols

- ☆ Precious mineral
- Dmd
- ◆ Precious metal
- Au (or as shown)
- Steel alloy metal
- Ni (or as shown)
- Speciality metal
- Ti-Zr (or as shown)
- ▲ Base metal
- Iron
- Alumina
- All sites are bauxite
- Coal and lignite
- Uranium
- ▽ Industrial mineral
- ⊠ Processing plant

Petroleum symbols

- Gas field
- Oil field
- Oil and gas field
- Significant gas discovery
- Significant oil discovery
- Significant oil and gas discovery
- ▲ Processing plant
- Oil / gas pipeline, operating
- - - Oil / gas pipeline, proposed

Infrastructure

- Power plant
- Irrigation / water / desalination
- Port

Enquiries for latest information for Commonwealth controlled waters is available from the National Offshore Petroleum Titles Administrator (NOPTA) at <info@nopta.gov.au>



Government of Western Australia
Department of Mines, Industry Regulation and Safety