

ONCE IN A LIFETIME

New strategy to capitalise on lithium opportunities for WA

P
R
O
S
P
E
C
T





2018 has marked several milestones so far, and this edition of *Prospect* covers 125 years since gold was first discovered in Kalgoorlie (story page 4).

Since the heady days of Western Australia's first gold rush period, gold has risen as a major export commodity for our State and it continues to shine brightly for Western Australia.

The Western Australian Industry and Export Awards mark their 30-year anniversary this year, with the awards honouring and acknowledging WA businesses achieving success in international trade, while also recognising the achievements of our industry and exporters across a diverse market sector. Applications for the 2018 awards are now open (story page 24).

Western Australian iron ore company, Fortescue Metals Group (Fortescue), celebrates 15 years since the company was first established, as well as major milestones in iron ore production and shipping this year (story page 16).

Through hard work, dedication and innovation, Fortescue has become a major global iron ore producer in just 15 years and we congratulate them while welcoming the announcement of a new Fortescue Pilbara iron ore mine with the potential to create thousands of WA jobs.

Creating jobs for Western Australians is this Government's priority and we are keen to promote our State to the world. Western Australia is open for business.

A focus on growing business ties and investment in our State has been the push behind recent overseas delegations by the Western Australian Government to our major trading partners.

Overseas visits have included China, the United States (story page 8), the United Kingdom and Germany (page 9), the United Arab Emirates (page 8), as well as State Government representatives travelling to Argentina (page 10) and Africa (page 11).

Hard work, dedication and innovation are attributes common to Western Australians and our State is well placed to seize opportunities in the resources sector as well as the many and diverse sectors that power the Western Australian economy.

Mark McGowan

PREMIER; MINISTER FOR STATE DEVELOPMENT, JOBS AND TRADE

Bill Johnston

MINISTER FOR MINES AND PETROLEUM

ISSN 1037-4590

Prospect

Western Australian Prospect magazine is published quarterly by the Western Australian Government's Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Jobs, Tourism, Science and Innovation (JTSI).

JTSI Editorial management: Rebecca Atkinson, JTSI Communications and Marketing Division.

Tel: +61 08 9222 0417 • Fax: +61 08 9222 0505

DMIRS Editorial management: Beau Pearson, DMIRS Corporate Communications Division.

Tel: +61 08 9222 3736 • Fax: +61 08 9222 3862

Subscriptions: www.dmp.wa.gov.au/prospect. Tel: +61 08 9222 3333

Disclaimer

Prospect has been compiled in good faith by the Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Jobs, Tourism, Science and Innovation (JTSI). Opinions expressed in *Prospect* are those of the authors and do not necessarily represent the views, or have the endorsement of DMIRS and JTSI. DMIRS and JTSI has used all reasonable endeavours to ensure the material contained in this publication is correct, but it is intended to be general in nature. No representation is made with regard to the completeness or accuracy of the information contained herein. DMIRS and JTSI disclaims any or all liability for loss or damage whatsoever suffered or incurred resulting from the use of or reliance on information contained herein. Readers of this publication should make and rely on their own enquiries, research and judgements in making decisions affecting their own or any other persons' interest.

All currency figures in *Prospect* are in Australian dollars unless otherwise specified.



Cover Photo: Talison Lithium Greenbushes Operations. Copyright Hugh Brown 2012

Opposite Page: 08 Royal relations: Premier McGowan with royals of Abu Dhabi.

Scan this QR code to view links to all the department's publications

DEPARTMENT OF JOBS, TOURISM, SCIENCE AND INNOVATION

International Education, Trade and Investment

Level 6, 1 Adelaide Terrace

East Perth, Western Australia 6004 • AUSTRALIA

Tel: +61 8 9222 0555 • Fax: +61 8 9222 0505

Email: invest@jtsi.wa.gov.au • www.jtsi.wa.gov.au

INTERNATIONAL OFFICES

Europe — London

Government of Western Australia – European Office

5th floor, The Australia Centre

Corner of Strand and Melbourne Place

London WC2B 4LG • UNITED KINGDOM

Tel: +44 20 7240 2881 • Fax: +44 20 7240 6637

Email: agent_general@wago.co.uk • www.wago.co.uk

[twitter.com/@wagoEU](https://twitter.com/wagoEU)

India — Mumbai

Western Australian Trade Office

93 Jolly Maker Chambers No 2

9th floor, Nariman Point • Mumbai 400 021 • INDIA

Tel: +91 22 6630 3973

Email: india@jtsi.wa.gov.au • www.watoindia.in

Indonesia — Jakarta

Western Australia Trade Office

Level 48, Wisma 46, Jalan Jenderal Sudirman Kavling 1

Jakarta Pusat 10220 • INDONESIA

Tel: +62 21 574 8834 • Fax: +62 21 574 8888

Email: invest@jtsi.wa.gov.au

Japan — Tokyo

Western Australian Government Office

14th floor, Imperial Tower

1-1-1 Uchisaiwai-cho Chiyoda-ku

Tokyo 100-0011 • JAPAN

Tel: +81 3 5157 8281 • Fax: +81 3 5157 8286

Email: wa.tokyo@wajapan.net • www.wajapan.net

Japan — Kobe

Western Australian Government Office

6th floor, Golden Sun Building 4-3-6 Nakayamate-dori

Chuo-Ku • Kobe 650-0004 • JAPAN

Tel: +81 78 242 7705 • Fax: +81 78 242 7707

Email: wa.kobe@wajapan.net • www.wajapan.net

Middle East — Dubai

Western Australian Trade Office

106, Emarat Atrium

PO Box 58007 • Dubai • UNITED ARAB EMIRATES

Tel: +971 4 343 3226 • Fax: +971 4 343 3238

Email: info@wato.ae • www.wato.ae

Kenya — Nairobi

Western Australian Trade Office

Kenya Representative Office

PO Box 25567

Nairobi 00603 • KENYA

People's Republic of China — Shanghai

Western Australian Trade and Investment Office

Level 22 • CITIC Square

1168 Nanjing Road West

Shanghai 200041 • PEOPLE'S REPUBLIC OF CHINA

Tel: +86 21 5292 5899 • Fax: +86 21 5292 5889

Email: invest@jtsi.wa.gov.au • www.westernaustralia.cn

Singapore

Western Australian Trade and Investment Office

6 Temasek Boulevard #20-02

Suntec Tower Four

Singapore 038986 • SINGAPORE

Tel: +65 6836 5626 • Fax: +65 6836 5698

Email: invest@jtsi.wa.gov.au

South Korea — Seoul

Western Australian Trade and Investment Office

Unit 702, 7th floor, Kwanghwamoon Building

149 Sejong-daero, Jongno-gu, Seoul, 03172

REPUBLIC OF KOREA

Tel: +82 2 722 1217 • Fax: +82 2 722 1218

Email: invest@jtsi.wa.gov.au • www.westernaustralia.or.kr

In this issue



02 Shine on

It's 125 years since gold was first discovered in Kalgoorlie and it's still shining for WA.

06 Lithium leader

New taskforce to lead WA to lithium success.

08 Royal relations

Western Australia is strengthening ties with the United Arab Emirates and other key trading partners.

17 Automating operations

Rio Tinto setting the pace in minings' push towards automating operations.

22 Exploration extended

WA's Exploration Incentive Scheme (EIS) extended for long-term viability of State's resources sector.

28 Healthy FIFO

Ensuring mentally healthy resources industry workers.





GOLD SHINES FOR WA

Lithium and battery metals may be the new heroes of Western Australia's rebounding resources sector, but the State's second most valuable mineral is shining brightly.

Western Australian gold sales broke the 200-tonne mark in 2017 for the first time since 1999 on a calendar-year basis, with the sale of 210 tonnes.

"The increase, in conjunction with a stable Australian-dollar gold price, delivered a four per cent increase in the value of the sector from \$10.6 billion in 2016 to \$11.1 billion in 2017," the Department of Mines, Industry Regulation and Safety Executive Director Geoscience and Resource Strategy, Jeff Haworth said.

"In April this year, a lower Australian dollar improved gold's price to an average of \$1741 an ounce."

In 2017, Western Australia produced almost seven per cent of the world's gold and 72 per cent of Australia's gold.

"According to the United States Geological Survey, Australia last year had the world's largest

estimated gold reserves with 9800 tonnes – 18 per cent of the world's total gold reserves of 54,000 tonnes," Mr Haworth said.

"South Africa and Russia are estimated to have the next largest gold reserves at 11 and 10 per cent respectively."

The number of gold producing projects worth more than \$5 million a year increased from 33 in 2014–15 to 43 in 2016–17.

The top eight producers in 2017 were Newmont Australia, Barrick Gold, Gold Fields, Northern Star Resources, AngloGold Ashanti, Newcrest Mining, Regis Resources and Saracen Mineral Holdings.

The gold industry in Western Australia achieved a record spend of \$550 million on exploration investment in 2017, a 23 per cent increase on the \$445.9 million spent in 2016.

Companies have sunk \$791 million into projects that are committed or under construction, and a further \$728 million have been invested in planned or possible projects.

"Mining companies have welcomed the Western Australian Government's decision to extend the popular Exploration Incentive Scheme (EIS) beyond 2019–2020," Mr Haworth said.

"A total of \$10 million dollars a year has been allocated in the 2018–19 State Budget with a further \$10 million a year to be included from 2019–20."

Co-funding drilling through the EIS will continue with funding of \$5 million dollars a year and the remaining \$5 million will go to acquiring high-quality pre-competitive geoscience data that is easily accessible and free.

Mr Haworth said that the acquisition and delivery of high-quality pre-competitive data that included 100 per cent coverage of the State by radiometric and aeromagnetic surveying helped junior, mid-tier and major companies refine their drilling targets.

"EIS-funded aeromagnetic data was used by industry to define gold targets at the Gruyere Gold Project before its big find in 2013," he said. ■

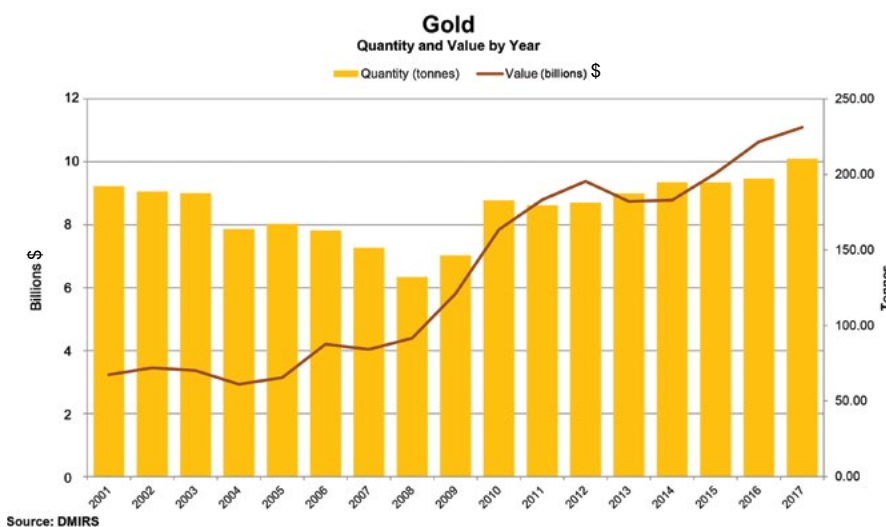


Gold projects at an advanced stage of development

- Mining is planned for Coolgardie Minerals' Geko open pit project in October this year.
- Full production is expected at Gruyere in 2019, making it Australia's largest new gold mine. It has an estimated 13-year mine life.
- Initial site work is planned for Capricorn Metals' Karlawinda project in the final quarter of this year.
- The first underground mine development at Millennium Minerals' Nullagine gold project is expected to begin production by the end of the year.
- The first gold pour at Mincor Resources Widgiemooltha project is expected in the third quarter of this year.
- Several historic mines have also been revived or expanded:
 - Dacian Gold poured its first bar of gold at the Mt Morgans Gold Project in March this year, following a rapid 11 months of construction.
 - St Barbara is extending its Gwalia mine.
 - Hawthorn and Gel Resources started mining in December 2017 at the historic Anglo Saxon gold mine now operating as the Trouser Legs mine.



Photo: Doray Minerals



The annual gold production and value in Western Australia 2001 – 2017.



The city of Kalgoorlie-Boulder celebrated 125 years since gold was discovered.

City of gold celebrates 125th birthday

On Thursday 14 June, the City of Kalgoorlie-Boulder celebrated the 125th anniversary of the day Paddy Hannan struck gold and made Western Australia a mecca for miners and prospectors.

They were followed by a horde of bankers and builders, engineers and entrepreneurs, and saints and sinners.

Now their colourful stories and antics are all part of the rich tapestry of history and legend that is being celebrated all year as part of the Goldfields 125th anniversary celebrations.

The festivities included a photographic exhibition and walking tour, a motorcross, gala ball and mining dinner, a special race event called the Mayoral Cup and a performance by the Australian Chamber Orchestra.

A highlight was the launch of the Kalgoorlie discovery trail, a high-tech journey into the history of the Goldfields complete with audio stories, videos, widgets, timeless photos and interactive games. ■



The famous statue of Paddy Hannan in Hannan Street, Kalgoorlie. Photo: Wikipedia Commons.



The "Hannans" mining warden tent in 1894, one year after the Kalgoorlie-Boulder gold discovery.



Kidman General Manager Chris Williams, SQM Vice President Development & Planning Pablo Altimiras, SQM Chairman Luis Eugenio Ponce Lerou, SQM CEO Patricio de Solminihac Tampier and Kidman Managing Director Martin Donohue in Perth.

NEW KWINANA LITHIUM REFINERY

Joint venture Western Australia Lithium (WA Lithium) is proceeding with plans to build a new lithium refinery in Kwinana, south of Perth, in a move that will potentially create hundreds of jobs for Western Australians.

WA Lithium is a 50/50 joint venture between Chilean chemical company Sociedad Química y Minera de Chile and Kidman Resources.

The joint venture signed an agreement in May to enter into an Option to Lease with LandCorp for the selected site.

The refinery will produce about 40,000 tonnes per annum of lithium carbonate and/or lithium hydroxide from the mineral processed at the proposed mine and concentrator at Mt Holland, southeast of Southern Cross.

Almost 400 jobs will potentially be created during the construction of the refinery, which is expected to start in mid-2019.

Additionally, the company's lithium mine and concentrator will create about 300 jobs during construction and 150 jobs during the operational phase.

The Western Australian Government welcomed WA Lithium's decision to proceed with their plans, subject to satisfactory studies.

"Creating and supporting jobs is my Government's number one priority," Premier and Minister for State Development, Jobs and Trade, Mark McGowan said.

"A new lithium refinery will bring significant investment to the State and local economy, including construction and operational employment opportunities."

The Premier, and Mines and Petroleum Minister, Bill Johnston, also announced the State Budget would include provisional funding of \$5.5 million to the Minerals Research Institute of Western Australia (MRIWA), to support development and manufacturing of technology metals and renewable energy sources.

MRIWA will invest the funds, if successful, in its bid to establish a New Energy Industry Cooperative Research Centre (CRC) in Western Australia.

The New Energy Industry CRC's objective will be to create value, through industry-led research, and drive global demand for local products, services and solutions.

"The State Government will continue to support the development of renewable energy technologies, and the \$5.5 million in provisional funds will be made available to MRIWA if it is successful in the bid to establish a New Energy Industry Cooperative Research Centre in WA," Mr McGowan said.

Mr Johnston highlighted the State's strengths in the lithium and energy minerals resources sector.

"Western Australia is the world's largest producer of lithium, and the announcement today cements our State as an investment destination for downstream processing," he said.

"Our reserves of lithium, nickel, cobalt and other metals, required for new energy technologies, combined with our technical skills and our close proximity to Asia, means WA is well-placed to capitalise on the growing battery market." ■



Altura Mining's Pilgangoora project in Western Australia's Pilbara Region. Photo: Altura Mining

WA WORLD-LEADING LITHIUM INDUSTRY

Western Australia is the world's leading producer of lithium and, with lithium-ion batteries hugely popular and their use increasing around the world, the State is well placed to capitalise on opportunities in the production and processing of lithium and other energy materials.

With this in mind, the Western Australian Government made the announcement in late May to establish a dedicated taskforce to oversee a new Lithium and Energy Minerals Strategy for Western Australia.

The strategy will focus on building Western Australia's competitive advantages to develop a world-leading energy materials industry that maximises benefits for the State and creates jobs.

Minister for Mines and Petroleum, Bill Johnston, is the chair of the new taskforce, which includes Chief Scientist Peter Klinken, as well as senior government representatives and representatives from the Mineral Research Institute.

The taskforce will engage with industry and will be informed by an industry stakeholder reference group. There will be an industry engagement forum in mid-July where the Government will be seeking input - details will be available on the Department of Jobs, Tourism, Science and Innovation website (www.jtsi.wa.gov.au).

It is expected the taskforce will present recommendations to the State Government within six months.

"The availability of lithium and other energy materials in Western Australia creates a once-in-a-lifetime opportunity for our State," Premier and Minister for State Development, Jobs and Trade, Mark McGowan said.

"My Government is committed to the development of this industry to boost our economy and create long-term jobs for Western Australians.

"The taskforce will do the work, in consultation with industry, to ensure our State is front and centre in production of battery technologies, and will also work to make sure these materials can be processed here in WA to maximise local jobs."

Western Australia is seen as having enormous potential to increase downstream processing of lithium and other energy materials.

"Lithium-ion batteries are among the most popular batteries in use today," Mr Johnston said.

"Western Australia possesses all the elements required to produce these batteries such as lithium, nickel, graphite and cobalt, meaning we are in the box seat to capitalise on the growth of this industry.

"This isn't just about extracting resources from the ground. It's also about processing them here in WA to create jobs for Western Australians.

"We are determined to make the most of the opportunity, and the taskforce will set out a clear plan to establish Western Australia as a world leader in this industry."

As part of the State Budget, the Western Australian Government announced \$5.5 million in provisional funding to the Minerals Research Institute of Western Australia (MRIWA), to support development and manufacturing of technology metals and renewable energy sources.

MRIWA will invest the funds, if successful, in its bid to establish a New Energy Industry Cooperative Research Centre (CRC), in Western Australia.

The New Energy Industry CRC's objective will be to create value, through industry-led research, and drive global demand for local products, services and solutions. ■



PLAN TO POWER THE PILBARA

A massive array of photovoltaic panels and wind turbines are planned to generate the hub's nine gigawatts of renewable energy. Photo: Asian Renewable Energy Hub

It has plans in place to be almost three times the size of Bali, would cost many billions of dollars to build, and have the potential to power Western Australia's Pilbara region with renewable energy.

The proposed Asian Renewable Energy Hub (AREH) would occupy 70 sq km of land in the East Pilbara midway between Port Hedland and Broome, near Eighty Mile Beach.

Its massive arrays of wind turbines and photovoltaic panels are planned to generate three gigawatts (GW) across new high voltage AC transmission lines to large energy users in the Pilbara.

Originally conceived as a hub to provide Indonesia with six GW of renewable energy, the consortium delivering the project has expanded its capacity.

The consortium, which includes Intercontinental Energy, Vestas – the largest wind turbine company in the world – and CWP Energy Asia, is working with the Pilbara Development Commission to ensure the AREH project delivers maximum economic benefit to the Pilbara.

It is expected the Environmental Impact Assessment for the project will be submitted to the Western Australian Government in mid-2018, the financial arrangements to be closed in 2020–21, and construction to start in 2023.

The energy generated for Indonesia would be delivered by subsea electrical cables with the potential to provide power for more than seven million homes in Indonesia.

The consortium expected almost 1.5 billion tonnes of carbon dioxide would be offset over the life of the project.

"The most important step in developing a project is finding the best site," InterContinental Energy Managing Director Alexander Tancock said.

"We spent two years investigating the entire northwest coast of Australia, and found this incredible location.

"It has a unique geography and topography that gives it far higher wind and solar resources than the average in that area.

"And those resources are perfectly complementary, with lots of sun during the day and high wind speeds in the morning, evening and night."

The expansion of the hub to power the Pilbara would allow mine expansions, upscale value-added processing, and the potential to produce hydrogen for domestic and export markets.

Pilbara Development Commission Chairperson Brendan Hammond welcomed the project's expansion, calling it an exciting opportunity to boost the business competitiveness of the Pilbara by significantly lowering the cost of energy.

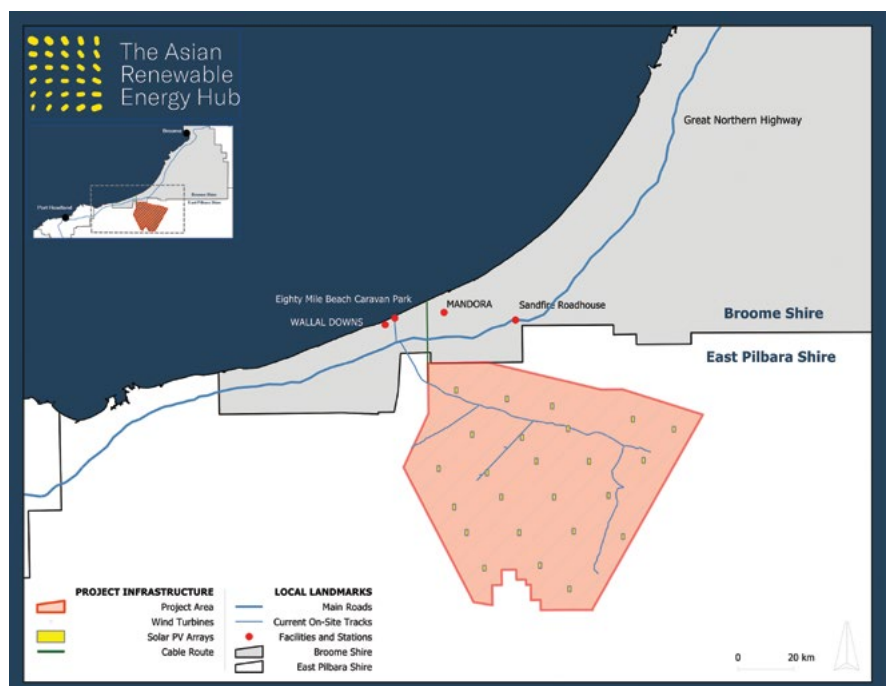
"Such an outcome will result in the extension of existing mineral and oil/gas reserves, bring

new extractive opportunities into play, and allow a diversified downstream economy that is independent of natural resource exploitation to be built both regionally and statewide," he said.

The AREH project continues to gather momentum with the completion of onshore site ecology surveys and seabed surveys for the cables, the lodgement of environmental referrals to the WA and Commonwealth governments, and the opening of a consortium office in Jakarta.

The hub would be built on the traditional lands of the Nyangumarta people, who have been closely engaged in the project since its inception, and have taken part in site ecological studies.

The project has the potential to create equipment manufacturing jobs in Western Australia, and about 4000 jobs during construction, and 400 during its 60-year operating life. ■



A map showing the proposed location of the 70 sq km Asian Renewable Energy Hub. Photo: Asian Renewable Energy Hub



WESTERN AUSTRALIA STRENGTHENS TIES WITH THE US AND UAE

Western Australian Premier Mark McGowan discussing trade and investment opportunities with The UAE Minister for Economy H.E. Sultan bin Saeed Al Mansoori.

Western Australian Premier and Minister for State Development, Jobs and Trade, Mark McGowan, celebrated the centenary of bilateral relations between the United States of America and Australia by attending a '100 Years of Mateship' event in Washington DC in February.

Organised by the bipartisan National Governor's Association, members are the Governors of the 55 states, territories and commonwealths in the United States.

Prime Minister Malcolm Turnbull led the Australian delegation, which included Premiers of three states, and Chief Ministers of the two territories.

While in Washington, Mr McGowan met with the Governor of Texas, Greg Abbott, to explore mutually beneficial initiatives between Texas and Western Australia, including the possibility of establishing a Sister State relationship.

Western Australia's links to Texas and Houston in particular, are of many decades standing. The cities of Perth and Houston have been Sister Cities since 1983 and both are foundation members of the World Energy Cities Partnership.

The Premier also met with the United States Navy Secretary and Chief of Naval Research to offer Western Australia as a location for crew shore leave and ship maintenance.

"Our relationship with the USA is strong and I plan to draw on that relationship to highlight our capacity to host U.S. Navy ship visits in the future," Mr McGowan said.

"Additional U.S. Navy ship visits will inject millions of dollars into the local economy and will create jobs for Western Australians."

The Premier also took the opportunity to meet senior officials from major US companies from the resource sector to reaffirm relationships at a senior level, including Conoco Phillips, Chevron, Alcoa and Albemarle.

On his return from the USA, the Premier visited the United Arab Emirates to strengthen existing relationships and forge new trade ties.

Visits by UAE key officials to Perth, and by the Premier to the UAE, were organised by the Government of Western Australia Office in Dubai.

Commissioner Pankaj Savara described the ongoing connection to be reflective of the "meaningful and growing" relationship between the two countries.

"Agriculture and food, including food security, education, innovation in transport and infrastructure, are all major areas of interest between UAE and WA," he said.

"These industries are of interest not only to boost trade but for the exchange of knowledge and expertise."

During what was the Premier's first visit to the UAE, he had meetings with long-standing partners of the State including; His Highness Sheikh Ahmed bin Saeed Al Maktoum, Chairman and Chief Executive, Emirates Airlines Group, and the Dubai Expo 2020 committee; Sultan Al Mansoori, UAE's Minister of Economy; Ahmed

Bin Sulayem, Dubai Multi Commodities Centre (DMCC) Executive Chairman; key members of the executive management of Emirates Global Aluminum (EGA); and His Excellency Sheikh Nahyan Mubarak Al Nahyan, Minister of State for Tolerance.

The Premier also addressed 90 investors at a business luncheon hosted by the Government of Western Australia Dubai Office and the Australian Business Council in the UAE.

Talks with the UAE's Minister of Economy focussed on strengthening the economic ties between the two countries.

Exports between Western Australia and UAE have grown from \$900 million in 2012–2013 to \$1.54 billion in 2016–2017.

The Minister has visited Perth several times and the reciprocal visit by the Premier demonstrated Western Australia's commitment to the UAE as a key commercial and innovation partner.

Discussions included key areas of innovation within transport, renewables, and infrastructure industry sectors.

The largest single export from Western Australia to the UAE is alumina. The meeting with EGA, Western Australia's biggest customer in the UAE, was to reaffirm these strong commercial bonds.

The opportunity was also taken to explore other areas of interest such as the resource sector and Western Australia's expertise in mining technology and training. ■



Premier Mark McGowan in Germany visiting world-leading shipbuilder Lürssen.

DIVERSIFYING WA: LINKS WITH UK AND EUROPE

Premier and Minister for State Development, Jobs and Trade, Mark McGowan, and Minister for Tourism and Defence Issues, Paul Papalia, were guests on the inaugural Qantas Dreamliner direct flight from Perth to London in March.

"This historic flight opens up a new era of travel, meaning that for the first time, Europe and Australia have a direct air link, so instead of travelling through Asia or the Middle East, visitors can start their holiday in WA," Mr Papalia said.

"Perth is now officially the western gateway to Europe and we are looking forward to increased numbers of visitors from Europe to experience Perth and our extraordinary State."

Before departure and after arrival in the United Kingdom, both the Premier and Minister were actively involved in numerous initiatives to raise Western Australia's tourism profile in the UK.

Their trip included a visit to the Government of Western Australia European Office, based at The Australia Centre in London.

Agent General John Atkins then joined the Premier on a visit to Bremen in Germany to meet the world-leading shipbuilder Lürssen.

The Federal Government had awarded the \$3.5 billion Offshore Patrol Vessel program to Lürssen, and the Premier was keen to ensure that the program's supply chain requirements and Western Australia's potential as a base for exports into the Asia-Pacific region were acknowledged and pursued.

"We have identified defence as a key pillar for diversifying Western Australia's economy, creating more jobs for Western Australians," Mr McGowan said.

"I know firsthand that our State already boasts an experienced shipbuilding industry with the expertise and capability to build vessels for the Australian Navy and for export.

"Western Australia welcomes Lürssen as the design partner for the new Offshore Patrol Vessels for the Royal Australian Navy.

"Lürssen will establish a local supply chain for the program, which will greatly benefit our defence industry and create WA jobs."

The Western Australian Government's Europe Office will soon be welcoming new Agent General Commodore Mike Deeks as he takes the reins this July and will apply his wealth of defence and oil and gas industry knowledge across the UK and EU.

Agent General John Atkins is leaving his role after almost three years leading the European Office. He is leaving a considerable legacy behind, in particular his advocacy for Western Australia's battery minerals sector, in a time where the world is gearing up for the increased consumer demand for electric vehicles and battery storage.

The Europe Office will continue to build on the strong relationships that Mr Atkins has shaped.

The Europe Office welcomed Jeetj 'Jeet' Jandu as the new Senior Trade & Investment Manager in April. Jeet comes from the Department for International Trade in the UK and brings extensive trade and investment experience.

For more information on trade and investment opportunities in Western Australia, visit the Department of Jobs, Tourism, Science and Innovation website www.jtsi.wa.gov.au ■



Minister for Mines and Petroleum Bill Johnston.

WA BUILDS RESOURCES BRIDGE WITH ARGENTINA

The Western Australian Government strengthened its ties with Argentina by signing a Memorandum of Understanding (MoU) with the South American nation in May.

The MoU will help develop a mutually beneficial partnership by sharing specialist knowledge, technical skills and regulatory know-how.

Mines and Petroleum Minister Bill Johnston said the mining sector provided an excellent basis for deepening the relationship between the two jurisdictions.

“Western Australia has a world-class system of legislation and regulation governing the mineral resources industry,” Mr Johnston said.

“We look forward to sharing our expertise with Argentina, and will work closely together on a range of important areas including environmental approvals, mining rehabilitation and occupational health and safety.”

This new relationship will encourage investment between Western Australian and Argentinian companies, and increase export opportunities for the State’s mining, equipment, technology and services sector.

“The agreement will build relationships and open new markets for Western Australian goods and services,” Mr Johnston said.

“This will bring many benefits to local companies and provide an opportunity to grow business throughout the State.”

Mr Johnston signed the agreement with Argentina’s Under Secretary of Mining Sustainability, Juan Biset, who was attending the Latin America Down Under Conference in Perth. ■



DMIRS Systems and Analysis Manager, Vince D'Angelo and DMIRS General Manager Resource Tenure Division, Tony Bullen in Cairo with Lisa White, Deputy Head of Mission and charge d'affaires, Australian Embassy Cairo, Ayman El Saiey, Chairman, Egyptian Mineral Resources Authority, Ministry of Petroleum & Mineral Resources and Lamia M. Anass, Senior Engineer, Egyptian Mineral Resources Authority, Ministry of Petroleum & Mineral Resources.

AFRICAN WORKSHOPS SHOWCASE WESTERN AUSTRALIAN RESOURCE SECTOR REGULATION

Western Australia's world-leading experience in resource sector regulation came to the fore during a series of workshops earlier this year in Africa.

The Department of Mines, Industry Regulation and Safety (DMIRS) visited Sudan, Egypt, Nigeria, and Ethiopia as part of its commitment to the State's Memorandum of Understanding with the Common Market for Eastern and Southern Africa (COMESA).

The two-day workshops were hosted by DMIRS General Manager Resource Tenure Division, Tony Bullen and Systems and Analysis Manager, Vince D'Angelo, who were part of a Western Australian delegation of government officials sponsored by the Australian embassies in Egypt and Ethiopia and the Australian High Commission in Nigeria to deliver capacity-building workshops.

"We used an agenda designed by DMIRS to present the key principles considered fundamental in the successful administration of a sustainable mining sector in Western Australia," Mr Bullen said.

"The first workshop in Sudan was very well received and the audience engaged us with questions focused mainly on prospecting activities in Western Australia, community engagement, displaced communities and compensation.

"They were also particularly interested in the Western Australian experience in environmental regulation compliance, stakeholder engagement and an oversight of royalties and the Australian taxation system."

Mr Bullen said that the next workshop in Cairo attracted about 60 delegates, including representatives from Australian companies Allied Gold Corporation and Resolute Mining Limited, which sponsored the workshop.

"They delivered interesting presentations about their African projects and some of the challenges they face," Mr Bullen said.

"We discussed many of the topics we covered in Sudan and also talked about royalty and tax arrangements in Western Australia, and the approval of titles and environmental works."

In Nigeria, the team followed a different agenda inspired by a previous visit by DMIRS in 2016 and followed up on issues raised by the Nigerian Government, including dispute resolution, the Warden's Court system in regional WA, and engagement with traditional owners.

The third workshop was held in the Ethiopian capital of Addis Ababa, and included presentations to the country's Ministry of Mines, Petroleum and Natural Gas, the government corporate bodies, and industry representatives.

Mr Bullen said that the Ethiopian workshops covered similar themes and issues, but also discussed corporate social responsibility and dealing with corruption.

"Throughout our African tour, we received positive feedback from workshop participants and the African government representatives were encouraged by our ongoing contribution to the Australian mission," he said.

More workshops are planned for Kenya, Madagascar, Tanzania and Uganda in 2018. ■

GOVERNMENT OF WESTERN AUSTRALIA INTERNATIONAL OFFICES



Government of Western Australia International Offices



China
Stuart Crockett
 Commissioner
 Shanghai,
 People's Republic of China



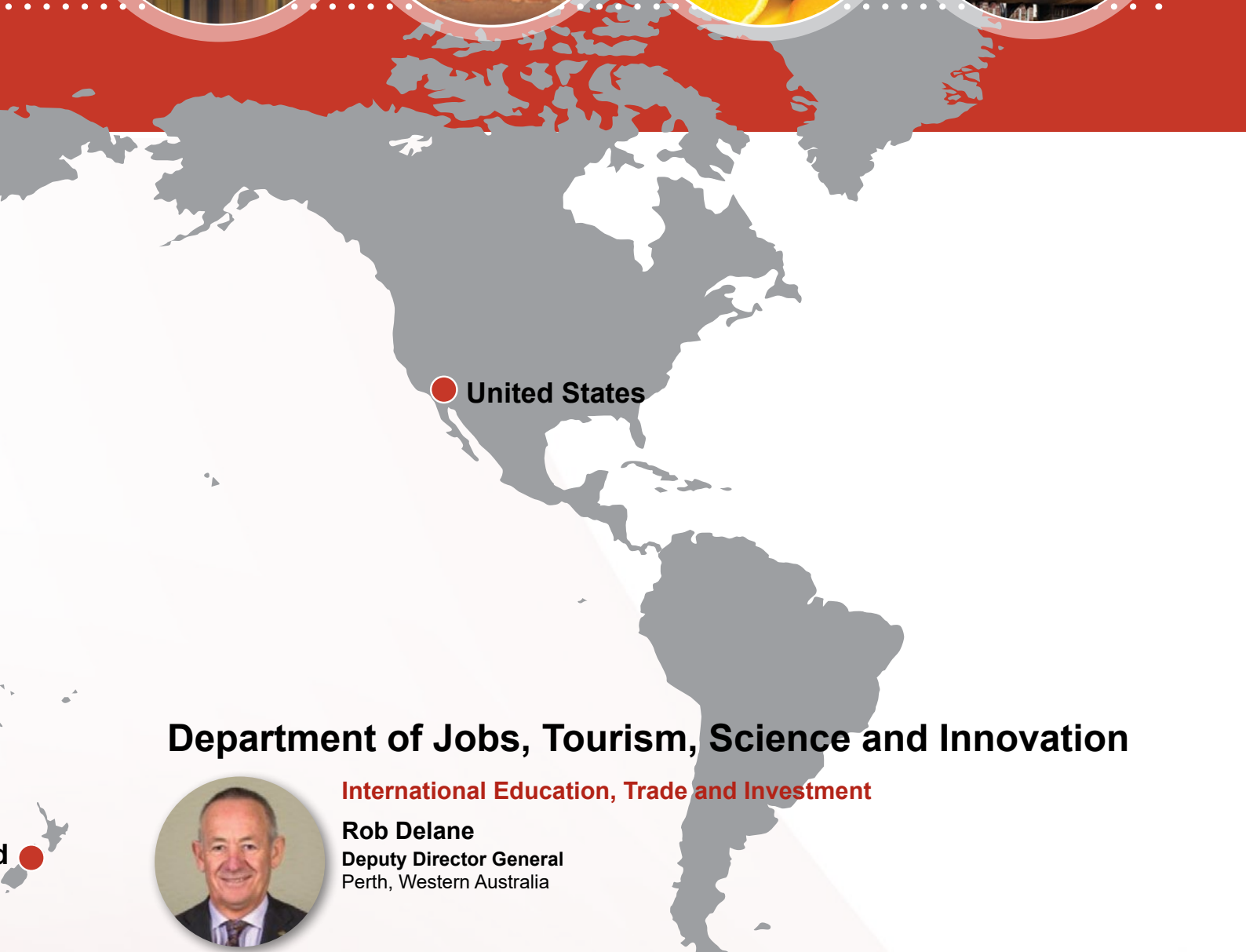
Europe
Mike Deeks
 Agent General
 London, United Kingdom



India
Peter Baldwin
 Commissioner
 Mumbai, India



Middle East and Africa
Pankaj Savara
 Commissioner
 Dubai, United Arab Emirates



● United States

Department of Jobs, Tourism, Science and Innovation

International Education, Trade and Investment



Rob Delane
Deputy Director General
Perth, Western Australia



Indonesia
Jennifer Mathews
Commissioner
Jakarta, Indonesia



Singapore
John Catlin
Commissioner
Singapore



Japan
Craig Peacock
Commissioner
North Asia Agency
Tokyo, Japan



South Korea
Jean Ough
Commissioner
Seoul, Republic of Korea



Premier Mark McGowan visiting Western Australian business Pacific Industrial Company.

WA INDUSTRY LINK: WA JOBS

A new era in job creation in Western Australia has been firmly established, supported by new legislation and strong links between Government and industry.

The Western Australian Government's new Jobs Act was passed by Parliament earlier this year with the purpose of ensuring that the \$27 billion spent annually on State Government procurement creates opportunities for Western Australian businesses and workers.

The Jobs Act, to be applied across the board on 1 October 2018, is the first piece of legislation that applies to almost all State Government agencies and forms of procurement in Western Australia.

Central to the Jobs Act is the WA Industry Link, launched in March by Premier and Minister for State Development, Jobs and Trade, Mark McGowan.

The WA Industry Link connects government and industry, helping local businesses, in particular small and medium enterprises, to secure work on government contracts.

"Small to medium-sized businesses represent the lion's share of business activity in Western Australia and around the nation," Mr McGowan said.

"They are key, job-creating drivers of the local economy, and the State Government is determined to provide them with the support they need to continue to flourish, long into the future."

The WA Industry Link initiative has four elements: the development and implementation of the Western Australian Industry Participation Strategy (WAIPS), an Industry Link Advisory Service, regionally based Local Content Advisers, and an online portal.

As part of the Jobs Act, prospective suppliers of government contracts will be required to submit participation plans as part of their tender.

The plans require suppliers to provide information on levels of local business engagement as well as the jobs, apprenticeships and traineeships that will be created and retained.

The plans will then be incorporated into the contracts of successful suppliers to ensure the promised local jobs are delivered.

Successful bidders will also be required to report on the fulfilment of their plans.

Pilot projects (see box right) are being rolled out under the new system, with the new laws to be applied across the board from October.

"The State Government spends billions of dollars each year on goods and services and infrastructure," Mr McGowan said.

"Through local industry participation plans, the State Government will ensure that WA jobs are maximised on this spending."

An Industry Link Advisory Service has been set up to provide a range of services to help local businesses and State Government agencies to understand the Western Australian Industry Participation Strategy.

Nine regionally based Local Content Advisers have been introduced to provide support and advisory services to businesses in regional areas.

An innovative online portal has been created as another key element of the WA Industry Link initiative.

Nine pilot projects are underway as part of the WA Industry Link initiative, with the Western Australian Government's Jobs Act to be applied across the board on 1 October 2018.

The pilot projects include:

- METRONET Railcar Procurement
- Stage 1 of the design and construction of the York Wastewater Treatment Plant Upgrade
- Berth 3 Deck Replacement at the Port of Port Hedland
- Bunbury Regional Prison Expansion
- Casuarina Prison Expansion
- New Museum Project Stage 2
- Reid Highway Dual Carriageway Project
- Southern River College upgrade
- Melville Senior High School Theatre Upgrade.

For more information, visit the WA Industry Link portal: www.industrylink.wa.gov.au ■



Ahead of the launch of WA Industry Link, Premier and Minister for State Development, Jobs and Trade, Mark McGowan, visited Coastline Kitchens and Pacific Industrial Company – both local Western Australian businesses that supply products and services to State Government projects.

"I'm pleased to see local business hiring local apprentices, and teaching them a trade and skills that will provide them with more opportunities in the future," Mr McGowan said.

The portal – www.industrylink.wa.gov.au – is the central information source on how opportunities for local businesses to supply to the State Government can be maximised.

The portal also provides an avenue for local industry to share feedback and seek advice, helping to ensure that the State Government tender and contracting process remains open, accountable and transparent.

"Creating jobs for Western Australians is my number one priority," the Premier said.

"WA Industry Link represents a new, innovative era in the way government contracts are awarded.

"The portal will link local businesses to government contracts, and provide them with all the information and support they need to give them the best chance of securing contracts."

Over time, information and resources will be added to the online portal, which will help streamline the tender, contracting and reporting processes, and make it easier for local businesses and agencies to fulfil the requirements placed upon them.

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



Premier Mark McGowan at Pacific Industrial Company.

FORTESCUE MARKS MILESTONES & NEW MINE ANNOUNCED



Fortescue Metals Group has reached a number of milestones in 2018, including shipping its one billionth tonne of iron ore. Photo: Fortescue Metals Group

Western Australian iron ore producer Fortescue Metals Group (Fortescue) recently celebrated several significant milestones, while also announcing a new Pilbara mine development.

Fifteen years after Founder and Chairman Andrew Forrest AO established Fortescue, the company has grown to become the world's fourth largest iron ore producer.

In 2018, Fortescue also celebrated shipping its one billionth tonne of iron ore; as well as 10 years since first ore was shipped and arrived into China.

The company held an event in Perth in late May to celebrate with customers from around the world, suppliers, employees and key stakeholders, including pastoralists, native title partners and local communities.

Mr Forrest and Fortescue Chief Executive Officer Elizabeth Gaines were joined at the event by Premier and Minister for State Development, Jobs and Trade, Mark McGowan.

"The first commercial shipment of iron ore from Fortescue's operations of 180,000 tonnes was on 15 May 2008, to China," Mr McGowan said.

"Total iron ore shipments for that year were around 15 million tonnes.

"Fortescue's shipments have now grown to around 170 million tonnes per annum, quite a feat in just 10 years with the one billionth tonne shipped on 27 April 2018 aboard Fortescue's ore carrier, *FMG Sophia*."

Mr McGowan said the resources sector and the Western Australian economy had been transformed in the 50 years or so since iron ore exports commenced and Fortescue had played a strong and more recent part in that process.

"The Western Australian Government has a strong focus on maximising local content, jobs and training opportunities for Western Australians," Mr McGowan said.

"Fortescue through its iron ore operations makes a significant contribution to Western Australia's economy through its 4200 direct jobs, purchase of local goods and services (which creates many additional jobs), royalty payments, regional development and export income."

Mr McGowan noted that indigenous employment at Fortescue's operations runs at about 15 per cent.

"I would like to congratulate Fortescue on these important milestones – 15 years of operation is a fantastic achievement," he said.

"It is a testament to companies such as Fortescue and its staff, whose hard work, dedication and innovation have seen it become a major global iron ore producer in just 15 years."

In late May, Fortescue announced the Board's approval for the development of the Eliwana mine and rail project in Western Australia's Pilbara region.

The US\$1.275 billion project will consist of a new 30 million tonnes per annum mine, including an ore processing facility, associated infrastructure and 143 kilometres of rail, with production expected to commence in December 2020.

A definitive feasibility study has been completed by the company, and the approvals process is now underway.

"Fortescue's announcement is welcome news for WA jobs and our local economy," Mr McGowan said.

"This project alone has the potential to create up to 1900 construction jobs and provide 500 ongoing jobs once in operation." ■



Premier Mark McGowan and Minister John Johnston attended an anniversary dinner celebrating 15 years for Fortescue.



One of Rio Tinto's automated trains. Photo: Rio Tinto

RIO TINTO GEARS UP FOR FULL AUTOMATIC

Rio Tinto is setting the pace in mining's push towards automating operations.

The company has almost doubled its fleet of autonomous production drills and has been granted accreditation by Australia's Office of the National Rail Safety Regulator for the autonomous operation of its trains in Western Australia.

The autonomous train program called Autohaul, is expected to cut 20 per cent off the time required to carry iron ore from the company's Western Australian mines to port.

The automated trains travel faster than human operated trains because the artificial intelligence system devises driving strategies that calculate topography, curvature of the railway, carriage weight and the interaction of these factors.

Up to the end of the first quarter of 2018, about 65 per cent of all train kilometres – more than three million kilometres – were completed in autonomous mode with drivers on board overseeing the technology.

Once fully operation, the Autohaul network will be the world's first heavy haul, long-distance autonomous rail operation.

The near doubling of the company's autonomous drills in its automated blast-hole drill system has further increased productivity because of the increased number of hours the machines operate as well as the numbers of metres the drill achieves per hour.

The company also believes there is a significant safety advantage by reducing the number of employees exposed to potential hazards and fatigue levels, as well as limiting exposure to dust, noise and vibration.

All drills are monitored remotely by operators in Rio Tinto's operations centre in Perth, more than 1500 km away, and to date have operated injury free.

The company is operating 11 automated rigs in the Pilbara – four at the Yandicoogina mine and seven at the West Angelas mine – and has drilled more than 5000 km.

A further nine drills will be deployed by the end of this year, bringing the total fleet to 20.

The first successful test proving the feasibility of an autonomous drilling system was conducted at the West Angeles mine in 2008.

Today, an operator using a single console at a location remote from the machinery to operate multiple drill rigs from multiple manufacturers. ■



Autonomous drilling at Rio Tinto's West Angelas mine in the Pilbara. Photo: Rio Tinto



Premier Mark McGowan onsite at Rio Tinto's Silvergrass Mine. Photo: Rio Tinto

AUTOMATION QUALIFICATIONS ON-TRACK FOR WA

Australia's first formal qualifications in automation are on-track for development in Western Australia, with the State working to ensure its workforce has skills required for the future.

In April, the State Government announced a Western Australian vocational education and training (VET) alliance to encourage input and involvement from the mining and resources industry in the development of the new qualifications.

The alliance, to be chaired by industry leader Jim Walker, will focus on curriculum development, education opportunities and strategies to build new skills and capabilities of the Western Australian workforce.

The result will be Australia's first nationally accredited courses in automation (accreditation is a two-step process with State accreditation followed by national accreditation), with a Certificate II course primarily aimed at secondary students, and a Certificate IV course to support jobs of the future.

The VET alliance is the next step in a collaboration between the Western Australian Government, Rio Tinto and South Metropolitan TAFE, announced in October last year, to further develop training courses to meet the future needs of industry.

As part of its contribution to the collaboration, Rio Tinto previously committed up to \$2 million

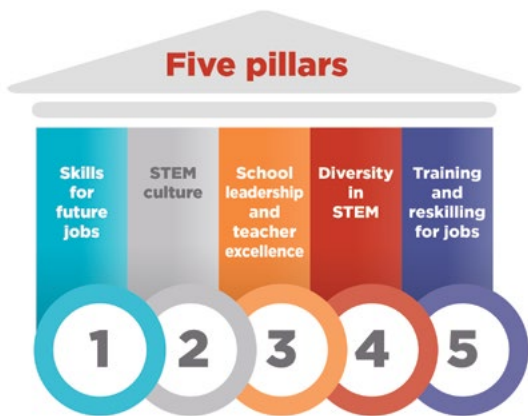
to develop the new qualifications that will see Australia's first certificate courses in automation available at Western Australian TAFE Colleges from next year.

Similar programmes will also be made available through VET pathways in Western Australian high schools from 2019.

Rio Tinto Iron Ore chief executive Chris Salisbury and Education and Training Minister Sue Ellery attended an "unprecedented resource industry gathering", held at Scitech in West Perth in April, to invite industry to join the VET collaboration.



Scitech CEO Deb Hancock; Rio Tinto Iron Ore Chief Executive Chris Salisbury; and Scitech Chief Operations Officer Nick Wood at the resource industry gathering. Photo: Josh Fernandes 2018



The Future jobs, future skills “five pillars of action” have been developed by a STEM Advisory Panel.

In attendance were industry representatives from leading resources companies including BHP, Woodside, Chevron, Alcoa, Monadelphous, Komatsu, Roy Hill, Caterpillar and many others with a strong interest in strengthening STEM (science, technology, engineering and mathematics) capabilities and educational pathways.

“Automation, technology and innovation will transform a range of industries and create new opportunities, and we need to be ahead of the curve to ensure our workforce can take advantage of that,” Ms Ellery said.

“Creating clear education and training pathways is key to maintaining our competitive advantage as a leader in automation technology.

“By partnering directly with industry, we can ensure the new curriculum future-proofs jobs by training Western Australians with the skills we know industry will need.

“This is a great example of industry working collaboratively with government to ensure our training sector creates a highly skilled workforce.”

Mr Salisbury began his address at the industry gathering stating, “Jobs are changing. They have and they always will.

“What makes things different today is the speed of change across our workforce – a dramatic acceleration caused by technology.

Continued next page...

On 20 May 2018, the Western Australian Government announced funding of \$3.359 million over four years to kick-start delivery of some initiatives under the State’s STEM (science, technology, engineering and mathematics) skills strategy.

The funding will be used for professional learning for teachers at priority schools, as well as a campaign to encourage take-up of STEM careers; mentoring to develop STEM culture in schools; and enhanced access to informal digital and technology programmes.

Future jobs, future skills – Driving STEM skills in Western Australia aims to build a globally competitive and innovative workforce with the skills to drive Western Australia’s technological future and create new job opportunities.

The Future jobs, future skills “five pillars of action” have been developed by a STEM Advisory Panel, chaired by Western Australia’s Chief Scientist, Professor Peter Klinken, and comprising experts from the school education, industry, vocational education and training, university, and community sectors.

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



An “unprecedented resource industry” gathering including government and industry was held at Scitech in May.

“The purpose of the VET collaboration led by the State Government and Rio Tinto is to ensure Western Australia’s workforce has the skills that industry will need, for the jobs automation technology is creating.

“This is not only about retraining existing workers to transition to new jobs, it is also about building on the skills of the people that power Western Australia’s diverse industries and developing talent pipelines to ensure the State’s workforce is prepared for the changes and opportunities that will emerge.

“Western Australia is a global leader in automation, with Rio Tinto leading the way with its adoption of autonomous trains, trucks and drills. These innovations position Western Australia to take full advantage of the many opportunities automation is expected to deliver to industry and the state’s economy.

“The courses will also be consistent with the priority the State Government is placing on STEM and will help build a much-needed bridge between STEM in education and STEM in the workplace.”

Innovation and ICT and Science Minister Dave Kelly said that research showed that 75 per cent of the fastest growing occupations in Australia require STEM skills.

“That is why as a priority, the McGowan Government is developing a State STEM strategy to lift the profile of STEM and to ensure every Western Australian has an equal opportunity to the jobs of the future,” Mr Kelly said.

“However, a ‘STEM ready’ WA workforce cannot be delivered by Government alone. That is why this initiative by Rio Tinto, working with TAFE, is so important.”

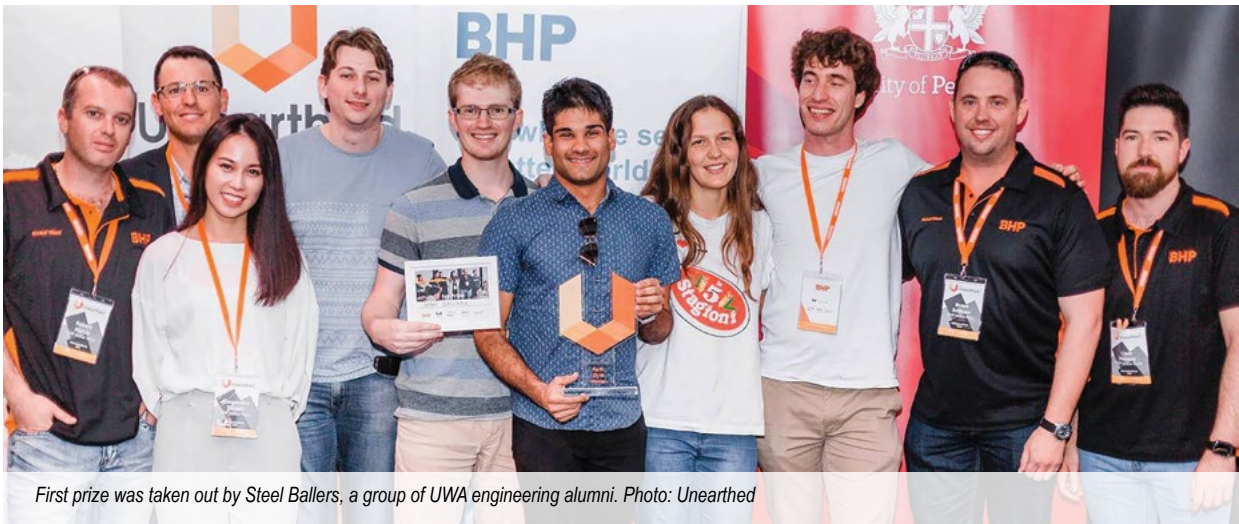


Industry and government are collaborating on a vocational education and training alliance.

The full list of companies that attended the industry gathering at Scitech with the State Government is below:

- Alcoa
- BHP
- Caterpillar
- Chevron
- Citic Pacific Mining
- CME
- DTWD
- Flux
- Komatsu
- LinkForce
- Monadelphous
- Quadrant
- Rio Tinto
- Roy Hill
- Scitech
- SM TAFE
- Sodexo
- South32
- Woodside
- Workpac
- Yara

For more information on the Western Australian Government’s STEM skills strategy, visit the Department of Jobs, Tourism, Science and Innovation website at www.jtsi.wa.gov.au/what-we-do/science-and-innovation ■



First prize was taken out by Steel Ballers, a group of UWA engineering alumni. Photo: Uearthed

WA'S BRIGHTEST MINDS TACKLE MINING CHALLENGES

More than 100 innovators tackled four real operational challenges from BHP Nickel West at the 2018 inaugural resources technology hackathon staged in Perth, Western Australia

First prize in the 54-hour Uearthed Perth event at the CORE Innovation Hub was taken out by a team of University of Western Australia (UWA) engineering alumni.

The team developed Unleashing SAG2, a simulation and genetic algorithm in response to improve Nickel West's Mt Keith semi-autogenous grinding (SAG) circuit.

"We used machine learning to unleash a digital model of the SAG crusher, which was then used along with a genetic algorithm to adjust operator-tuneable parameters to increase the processing throughput of an ore-crushing circuit by three per cent," team member Rohan Mehra said.

The UWA team won \$2500 in cash and will work with Nickel West staff at the company's Kwinana refinery to see if the improvement can be implemented.

Nickel West Head of Integrated Operations Karl Stokes said that working with Uearthed Perth

was a great opportunity to connect with some of the best minds in technology and data science.

Students and professionals from disciplines involving science, engineering, business, software development and mathematics put their skills to the test, creating 21 solutions to Nickel West's operational challenges.

Since it began in 2014, more than 4000 competitors have taken part in Uearthed Perth, forming part of a network of innovators in Australia, South Africa, the US, Canada and South America. ■



Second place winners Team Eclipse at Uearthed Perth 2018. Photo: Uearthed



The people's choice award winners were Team SENSE-U-ALL. Photo: Uearthed



Team Rush Hour took out the young innovator award. Photo: Uearthed



Team ECU were winners of the CORE Start award. Photo: Uearthed



The May State Budget includes continued funding for the Exploration Incentive Scheme.

STATE GOVERNMENT EXTENDS EXPLORATION INCENTIVE SCHEME

In the May State Budget, the State Government announced its continued support for the popular Exploration Incentive Scheme (EIS) to assist the long-term viability of the Western Australian resources sector.

Mines and Petroleum Minister Bill Johnston said he was delighted the scheme was continuing.

“The EIS helps to increase the number of new mineral and energy discoveries, which will strengthen the State’s economy for years to come,” Minister Johnston said.

“The co-funded drilling program will continue to provide a total of \$5 million per annum to industry, and a further \$5 million will be for the acquisition of high-quality, pre-competitive geoscience data by the Geological Survey of Western Australia.”

Department of Mines, Industry Regulation and Safety EIS Coordinator Charlotte Hall said the State Government’s decision to continue the scheme was good news for the WA resources sector.

“For the past ten years the EIS has supported projects, which have significantly improved our understanding of WA geology,” she said.

“The EIS encourages exploration in remote and underexplored greenfields areas by providing explorers with geological information to reduce their risk.”

The co-funded drilling program offers a refund of up to 50 per cent of direct drilling costs through a highly-competitive application process, which is open for applications twice a year.

While stating the Government’s ongoing support of the EIS, Minister Johnston also announced the successful applicants for Round 17 of the drilling program.

Round 17 will provide a total of \$5.2 million to 42 recipients for projects to be drilled in the 2018–19 financial year.

The successful applicants are targeting a diverse mix of commodities including traditional metals such as gold, copper and silver, and scarcer resources such as lithium, base metals, manganese, graphite and heavy rare earth elements.

The project locations are equally diverse with sites in the South West, through the Gascoyne and Pilbara, and from the west Kimberley to the remote eastern margins of the State.

Now in its 10th year, the co-funded drilling program has supported more than 430 ventures, which have drilled more than 630,000 metres and contributed to more than 25 resource discoveries.

Co-funded drilling success stories include the Nova nickel–copper–cobalt mine east of Norseman, Rox Resources’ Camelwood nickel deposit, and Encounter Resources’ copper–gold discoveries in the Paterson Range.

An independent economic impact review of the EIS released in 2015 found that every \$1 million invested in the EIS generated a net benefit to the State, in terms of higher GNP, of \$23.7 million. ■



Successful applicants for round 17 of the Co-funded drilling program were announced by the State Government.



DMIRS Acting Deputy Director General Dr Phil Gorey (centre) with Acting Executive Director Resource and Environmental Compliance Division, Karen Caple, and Executive Director Resource Tenure, Rick Rogerson, signing the AS/NZS ISO 9001:2015 Certificate of Registration

BIG TICK FOR DMIRS BY LEADING INTERNATIONAL AUDITOR

A rigorous three-week audit by a top international company has reinforced the Department of Mines, Industry Regulation and Safety's (DMIRS) commitment to maintaining the high standards expected of a world-leading regulator.

Independent certifying body SGS Australia, spent time in DMIRS' regional offices in Kalgoorlie, Leonora, Southern Cross and Mineral House in Perth in April before awarding a certificate of registration for the combined Quality Management Systems (QMS) of the Resource and Environmental Compliance and Resource Tenure divisions.

The systems have been integrated as part of the amalgamation of the former Department of Mines and Petroleum and Department of Commerce to form DMIRS.

DMIRS Acting Executive Director Resource and Environmental Compliance Karen Caple, said the internationally-recognised accreditation known as AS/NZS ISO 9001:2015 was the gold standard for demonstrating that DMIRS' systems and services were compliant with the latest regulations and standards.

"The Western Australian community can be assured that our regulatory framework remains robust by having our processes regularly scrutinised by a world-renowned auditor," Ms Caple said.

DMIRS Acting Deputy Director General Dr Phil Gorey said that integrating the QMS processes would improve the services DMIRS provided to its customers.

"The AS/NZS ISO 9001:2015 Certificate of Registration may be a daunting title, but it confirms that the quality management systems comply with the standard for regulatory services to the minerals and petroleum industries and the community, and policy advice to the Minister for Mines and Petroleum," Dr Gorey said.

"These two business areas have adopted a customer-focused quality assurance strategy to enhance the effectiveness of all their activities to maximise reliability and performance."

Dr Gorey said that the strategy involved continuous improvement, system documentation and regular internal audits. "It will be expanded in the near future to include the department's

Geoscience and Resource Strategy Division, enabling all three divisions in the Resource and Environmental Regulation Group to be accredited under quality management standard AS/NZS ISO 9001:2015," he said.

The department welcomes all industry feedback and any suggestions can be submitted on the feedback and complaints system section of the DMIRS website. ■



CELEBRATING 30 YEARS OF THE WA INDUSTRY AND EXPORT AWARDS



This year marks the 30th anniversary of the Western Australian Industry and Export Awards, which have grown over the past three decades to become the State's most prestigious business awards.

The awards honour and acknowledge Western Australian businesses achieving success in international trade, and recognise the achievements of Western Australia's industry and exporters across a diverse market sector.

"The Western Australian Industry and Export Awards program is now in its 30th year, and during that time WA's exports have grown significantly," Premier and Minister for State Development, Jobs and Trade, Mark McGowan said.

"Annual export figures have grown from \$7 billion in 1988 to over \$123 billion in 2018, making the State a major contributor to the nation's export industry, accounting for 41 per cent of Australia's merchandise exports in 2017.

"Western Australians are successfully competing on the global stage, and the Government is committed to continuing this success story as we grow and diversify the State's economy.

"Growing the State's economy through diversification and innovation will help to create jobs and lead to more exports."

The awards complement the Australian Export Awards (AEA) program, conducted nationally each year.

Applications for this year's WA Industry and Export Awards opened in early May, with winners to be announced at a gala event on 18 October, 2018.

The awards have 18 categories for small, medium and large companies located in Western Australia. Of the 18 categories, 13 are export categories aligned with the AEA.

There are three State exporter categories, including the Defence Exporters Award, and two industry awards.

The awards are managed by the State Government and the Export Council of Australia, along with corporate sponsors including Austrade, Australian Border Force, Rio Tinto, Department of Foreign Affairs and Trade WA, Efic, Business Foundations and Core Hub.

"For 30 years, these awards have helped to open doors for emerging and established exporters, while providing well-earned recognition for companies that are true leaders," Mr McGowan said.

"Companies include Argyle Diamonds, Austal Ships, Mount Romance Australia, Wild Child, Proteomics International, Scitech; and Hall of Fame winners Metrocount, Matrix Composites and Epichem."

To apply for the awards and for more information visit www.exportaward.com.au/wa ■



Vibroseis trucks conducting a survey.

SEISMIC SURVEY TO REVEAL DEEP GEOLOGY OF CANNING BASIN

A high-tech seismic survey underway in the Pilbara's Kidson Sub-basin will help provide a better understanding of the region's geology.

The Department of Mines, Industry Regulation and Safety (DMIRS) Executive Director Geoscience and Resource Safety, Jeff Haworth said the Kidson Sub-basin survey would provide important clues about the region's geological evolution.

"The Kidson deep crustal seismic reflection survey is an important collaborative research project between DMIRS and Geoscience Australia," Mr Haworth said.

"It's part of a larger mission to establish the subsurface geology of the Canning Basin and the size and nature of its sub-basins, including Kidson".

Co-funded by the State Government's Exploration Incentive Scheme (EIS), the survey will identify any regional faults and other key structural elements, and unearth important information that will help develop Western Australia's resources sector.

"Learning more about the region's geological evolution will allow for more informed and efficient exploration of the State's mineral and petroleum resources, and may also locate groundwater," Mr Haworth said.

The project involves a 900km survey along the main road connecting Kiwirrkurra in the east and Marble Bar in the Pilbara, one of the least understood geologically regions in Australia.

Three large, specialised Vibroseis trucks will vibrate the ground and generate seismic reflection waves that travel down through the Earth and identify geological strata and fault structures that mark changes in rock type.

"Geophones spread out along the survey line record the return of the reflected seismic waves; the seismic waves take longer to return from deeper reflectors so the depth of each layer can be determined," Mr Haworth said.

"As the survey progresses an image is compiled, which is a vertical slice through the Earth's crust.

"Listening for short periods at each recording point allows us to image to depths of 40 km below surface."

The survey will take 10 to 12 weeks, depending on weather conditions and potential mechanical issues, and will run through June to August 2018.

The project represents one of a series of deep crustal seismic reflection surveys that researchers are conducting across Australia as part of a National Collaborative Framework Agreement. ■



Geophone array being laid out by hand.



Dominique Van Gent at the South West Development Commission's inaugural energy conference.



Drilling a stratigraphic well for the South West Hub project.

CARBON CAPTURE EXTENDS COAL'S ENERGY ROLE

Coal is not dead. That was the message delivered at the South West Development Commission's inaugural energy conference in June by Department of Mines, Industry Regulation and Safety (DMIRS) Carbon Strategy Coordinator Dominique Van Gent.

WA Energy Minister Ben Wyatt officially opened the Critical Horizons conference in the coal-mining town of Collie, about 200 km south of the Western Australian capital, Perth.

Mr Van Gent, who is closely involved with the South West Hub project that is collecting and analysing data on carbon capture and storage (CCS), was one of a number of presenters from industry, community and government who spoke on changing energy needs and the role renewable energy will play.

"I covered a range of topics, but my main message was to companies seeking to reduce the amount of CO₂ they're putting into the atmosphere from industrial generators, that they need to look at a range of strategies to address this, including CCS," he said.

"People talk a lot about the energy 'trilemma' – affordability, security and reliability – and we are all concerned about low emissions, so I

looked at how coal can provide the first two of these components, but doesn't quite tick the low emissions box.

"When you add carbon capture however, and storage to coal, it can produce low emissions."

Mr Van Gent said that he also addressed the issue of reliability, because in his view, renewable energy was intermittent and needed a stable back-up.

"Coal energy can operate 24 hours a day, 365 days a year but then you have a CO₂ problem," he said.

Mr Van Gent told the conference that coal was not a dead industry as many believed.

"It does have a reduced function, I agree on that, but it is still going to be used in the world's energy mix, particularly in South East Asia," he said.

"Japan for example, has committed to building 25 new coal-fired power stations and here in Australia, the Finkel report showed there is still a demand for coal, even under emission intensive schemes.

"As soon as you add policy factors such as taxation and renewable energy targets to the equation, then coal energy production allied with

CCS becomes a significant player in the energy market."

In his overview of other potential coal uses, Mr Van Gent spoke about the growth of the hydrogen economy, saying: "It is becoming increasingly important to a diversified economy to view coal as an asset, with a range of uses and opportunities, rather than purely as an input to power generation."

The presentation concluded with details on carbon capture and storage studies and modelling based on data from the drilling of a series of stratigraphic wells near Harvey in the South West.

More information on DMIRS carbon capture and storage project can be found at www.dmp.wa.gov.au/CCS ■



DMIRS Petroleum Exploration Geologist Richard Bruce at the department's booth at the APPEA National Conference.

KEY PLAYERS TO GIVE BIRD'S EYE VIEW OF INDUSTRY AT WA PETROLEUM DAY

Representatives of State and Federal petroleum industry regulators, industry and peak bodies will come together at the Department of Mines, Industry Regulation and Safety (DMIRS) inaugural Western Australian Petroleum Day in September to discuss the state of the industry.

The petroleum conference and expo on Thursday 14 September 2018 in Fremantle is being modelled on the format of last year's Petroleum Open Day, which introduced a robust panel session which will this year focus on Western Australia's future energy mix.

"The Petroleum Day will take a birds-eye view of the petroleum industry across the State and will bring all of the regulatory bodies together to discuss changes in policy, legislation, financial assurance and world-wide trends in safety,"

DMIRS Executive Director Geoscience and Resource Strategy, Jeff Haworth said.

"We had some very stimulating conversations last year and I'm looking forward to hearing key professionals from across industry and government have their say on what energy supply will look like in WA, and the challenges and opportunities that lie in wait."

Mr Haworth said that the Western Australian oil and gas industry started the conversation about sharing infrastructure and competitively developing remote fields in the North West Shelf at the 2018 APPEA Conference and Exhibition in Adelaide earlier this year.

"Industry's social licence to operate was another key APPEA conversation and I expect it will be an emerging theme at WA Petroleum Day," Mr Haworth said.

"While corporate social responsibility is not something that can be regulated, there is a strong feeling across the sector particularly among offshore operators, that this is an area that needs a stronger focus."

More information about WA Petroleum Day can be found at www.dmirs.wa.gov.au/wapetroleumday ■



SAFETY STRATEGY HAS A SHARP FOCUS ON MENTAL HEALTH

The mental health of resource sector workers is a vital part of the Towards 2020 Regulatory strategy being developed by the Department of Mines, Industry Regulation and Safety (DMIRS).

DMIRS Mines Safety Director Andrew Chaplyn, said that industry is being encouraged to manage psychosocial hazards by applying the principles of physical risk management.

To assist industry, DMIRS is developing a Code of Practice for mentally healthy workplaces for fly-in, fly-out (FIFO) workers in the resources and construction sectors.

"We recently consulted on a draft code and are now in the process of assessing all the feedback received and will be conducting further consultation," Mr Chaplyn said.

"Improving mental health and wellbeing requires a whole of community and government approach.

"We all have a role to play and it is important that we all make the best contribution we can, within our area of expertise

"For us in mining, our unique contribution is to focus our energy as high up the hierarchy of control as possible - on elimination, prevention and promotion strategies at work."

Mr Chaplyn said that to encourage mentally healthy workplaces, industry needed to:

- learn about psychosocial hazards – what they are and how to identify them;
- manage psychosocial hazards in accordance with the hierarchy of controls i.e. the highest level of control and prevention is the most effective; and
- create workplaces that promote wellbeing.

"Investing in mental health promotion and prevention strategies has a positive impact on workers' mental health and wellbeing, which then has flow-on benefits for productivity," Mr Chaplyn said.

Towards 2020 is an evolving snapshot of DMIRS' vision for a safe and healthy resources sector.

The strategy builds on existing commitments to work with industry to reduce the number and severity of serious accidents and incidents, and fosters positive cultural change as part of the 2009 Reform and Development at Resources Safety (RADARS) strategy.

Towards 2020's three key goals are world-leading regulation, smarter systems, and a well-informed industry.

"One of the defining characteristics of a mature safety and health culture is a commitment to continuous improvement across all areas that impact on the safety, health and wellbeing of employees," Mr Chaplyn said.

He said that this included exposure to hazards with the potential to impact on:

- employees' immediate or short term physical health e.g. crush hazards or a fall from height;
- employees' mental health e.g. poor organisational justice or inappropriate behaviours;
- employees' long term health e.g. exposure to fibrous materials or heavy metals; and
- the greater community e.g. dangerous goods.

"Thorough risk assessments will inform industry where to direct their attention and how to prioritise projects as part of their operations," Mr Chaplyn said.

A key area of Towards 2020 focuses on how DMIRS uses and shares health and safety data.

"The department contributes to the assessment, management and prioritisation process by collecting and analysing data from across industry," he said.

"This gives a 'birds-eye view' of current concerns and emerging themes and it also gives the department an opportunity to provide guidance and direction on areas we know to be in need of attention." ■



The development of the South Flank project will enhance the quality of BHP's Western Australia Iron Ore production. Photo: BHP

NEW MINE TO SET IRON ORE PRODUCTION RECORD FOR BHP



BHP President Operations, Minerals Australia, Mike Henry. Photo: BHP

A new mining development in the Pilbara will be the single largest annual production iron ore mine ever developed by BHP.

Premier Mark McGowan welcomed the announcement by BHP and its joint venture partners that it would develop the South Flank mine in the central Pilbara.

"I congratulate BHP and its joint venture partners on this significant announcement, which will provide thousands of jobs for Western Australians," the Premier said.

"This project alone will create approximately 2500 jobs during peak construction and more than 600 new jobs once in operation.

"The investment is welcome news for Western Australia, and yet another sign that the economy is turning the corner and jobs are being created for Western Australians."

The company will invest \$4.7 billion to develop South Flank.

BHP President Operations, Minerals Australia, Mike Henry, said the South Flank project will fully replace production from the Yandi mine which is reaching the end of its economic life.

"It will enhance the average quality of BHP's Western Australia Iron Ore production and will allow us to benefit from price premiums for

higher-quality lump and fines products," Mr Henry said.

The South Flank project expands the existing infrastructure at Mining Area C, and involves construction of an 80 million tonne per annum crushing and screening plant, an overland conveyor system, stockyard and train loading facilities, procurement of new mining fleet and substantial mine development and pre-strip work.

First ore from South Flank is targeted in the 2021 calendar year, with the project expected to produce ore for more than 25 years. ■

IRON ORE PROCESSING

Pilbara – Cape Preston – Sino Iron
CITIC PACIFIC

The Sino Iron project is located at Cape Preston, 100km southwest of Karratha. The project is the largest magnetite mining and processing development in Australia, with a mine life of more than 25 years. Six processing lines are now operational. The first shipment of magnetite concentrate to China occurred in late 2013. The project comprises in-pit crushers, a 29km slurry pipeline, with an annual capacity to produce up to 24Mt of magnetite concentrate. The downstream processing facility has required significant investment in dedicated supporting infrastructure including a new port facility, a 51GL desalination plant and a 450MW combined cycle gas fired power station.

Expenditure: \$16b.

Employment: Construction: 4000
Operation: 1000

OIL & GAS DEVELOPMENTS

Pilbara – Wheatstone LNG Development
CHEVRON AUSTRALIA PTY LTD

Chevron Australia Pty Ltd as Operator of the Wheatstone Project is completing construction of two LNG trains and a domestic gas plant at the Ashburton North Strategic Industrial Area near Onslow. The Project, which includes a deepwater port, 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, and the first export shipment left on 31 October 2017.

Expenditure: \$40b.

Employment: Construction: 7200
Operation: 400

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.

Employment: Construction: 7200
Operation: 400

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. Drilling and completion activities have been successfully completed. Subsea construction will commence in Q2 2018. 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 Offshore Basin – Barrow Island – Gorgon Project

GORGON JOINT VENTURE

The Gorgon Foundation Project on Barrow Island 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/lo 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. Commissioning of the CO₂ injection project is expected in Q4 2018. injection project is expected in Q4 2018.

Expenditure: \$55b.

Employment: Construction: 8000
Operation: 300

Pilbara - Eliwana Mine and Rail Project
FORTESCUE METALS GROUP PTY LTD

Fortescue Metals Group announced a financial investment decision on 28 May 2018 for the development of its Eliwana mine and 143 kilometre railway project. The \$1.7 billion project has an expected mine life of over 20 years and an average production rate of 30 million tonnes per annum. The company is targeting construction to begin in mid-2019, creating up to 1900 jobs during construction with 500 full-time site positions once operational.

Expenditure: \$1.7b.

Employment: Construction: 1900
Operation: 500

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, 1000ha 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 Mineral Sands Project STRANDLINE RESOURCES LIMITED

The Coburn mineral sands project, located south of Shark Bay and approximately 250km north of Geraldton, contains probable ore reserves of 308Mt at an average grade of 1.2 per cent heavy minerals. 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-leucosxene over its 19 year mine life. In June 2018, Strandline announced that it had commenced a full Definitive Feasibility Study. Expenditure: \$173m. Employment: Construction: 170 Operation: 110

IRON ORE

Pilbara – Balla Balla Infrastructure Project BALLA BALLA JOINT VENTURE

BBI Group (BBIG) is proposing the Balla Balla Infrastructure project (BBIP), a rail and port development, which when constructed will comprise an integrated port and rail infrastructure system that will provide a new gateway to the iron ore rich Pilbara region in Western Australia. Initial planned annual capacity of the rail and port is 50Mtpa. The Balla Balla port is located halfway between Dampier and Port Hedland. The proposed infrastructure for the BBIP includes a train loading facility at the central Pilbara iron ore source, a 165km single-track standard gauge railway and a multi-user port facility. The Railway (BBI Rail Aus Pty Ltd) Agreement 2017 was ratified in December 2017.

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 130km 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 subject to a number of internal and external approvals.

Pilbara – West Pilbara Iron Ore Project – API Port/Rail

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

Shire of East Pilbrara – 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 40Mtpa of iron ore requiring the development of a new mining area at Koodaideri, crushing, screening, stockpiling and rail load out infrastructure plus a 170km railway. Rio Tinto is currently undertaking a project feasibility study that is focusing on obtaining consents and providing data to validate the project.

Expenditure: \$3b.

Employment: Construction: 1600
Operational: 600



Prospect ONLINE

Did you know you can register for the digital edition of *Prospect* for free by signing up to the RSS feed on the *Prospect* page of DMIRS's website? Once registered, you will receive notification as soon as a new edition of *Prospect* is available to view online.

Just go to:
www.dmp.wa.gov.au/prospect
to sign up.

Are your contact details up-to-date?

If your contact details are changing or have changed you can now update them online.

www.dmp.wa.gov.au/prospect

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\$126 billion worth of projects either committed or under consideration for the State during the next few years. These would create more than 24000 construction jobs and about 3700 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 March 2018

	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	16000	4000	1000
Koodaideri Iron Ore Mine and Infrastructure Project	3000	1600	600
FMG/TPI Eliwana Mine and Rail Project	1700	1900	500
BHP South Flank	n/a	n/a	n/a
Sub Total	27500	9000	3000
Oil, Gas and Condensate			
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
Sub Total	99000	15200	700
TOTAL	126500	24200	3700

All currency figures are in Australian dollars unless otherwise specified.

Abbreviations Key

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

Prospect goes digital for subscribers

For forty years *Prospect* has helped promote the innovation, strength and resilience of Western Australian industries.

For the past 12 months, *Prospect* has suspended hard copy subscription renewals.

Starting from the June 2018 edition, the Department will no longer provide hard copy editions directly to subscribers and is encouraging current subscribers to sign up for the free digital version of the magazine.

Hard copies of the magazine will still be available for collection from front reception areas at DMIRS' Mineral House building in East Perth and JTSI's office at 1 Adelaide Terrace in East Perth.

In order to download your digital version free of charge visit www.dmp.wa.gov.au/prospect and sign up to the Prospect magazine mailing list.

Thank you for your continued support of *Prospect* Magazine.

Sign up to receive your **FREE** digital copy of *Prospect* magazine at www.dmp.wa.gov.au/prospect



Major Resource Projects

June 2018



Mineral symbols		Commodities	
◆ Precious metal	Au (or as shown)	Ag..... Silver	Au..... Gold
◆ Steel alloy metal	Ni (or as shown)	Cu..... Copper	Fe..... Iron
◆ Speciality metal	Ti-Zr (or as shown)	K..... Potassium	Kln..... Kaolin
▲ Base metal		Li..... Lithium	LNG..... Liquefied natural gas
● Iron		LPG..... Liquefied petroleum gas	Mag..... Magnetite
● Alumina	All sites are bauxite	Mn..... Manganese	Mo..... Molybdenum
● Coal and lignite		Ni..... Nickel	Pb..... Lead
● Industrial mineral		Phos..... Phosphate	REE..... Rare earth elements
⊠ Processing plant		Sid..... Silica sand	Ta..... Tantalum
		Ti..... Titanium	Tlc..... Talc
		V..... Vanadium	W..... Tungsten
		Zn..... Zinc	Zr..... Zirconium
Petroleum symbols			
● Gas field			
● Oil field			
● Oil and gas field			
▲ Significant oil 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 (NOPATA) at <info@nopata.gov.au>



Project labels:

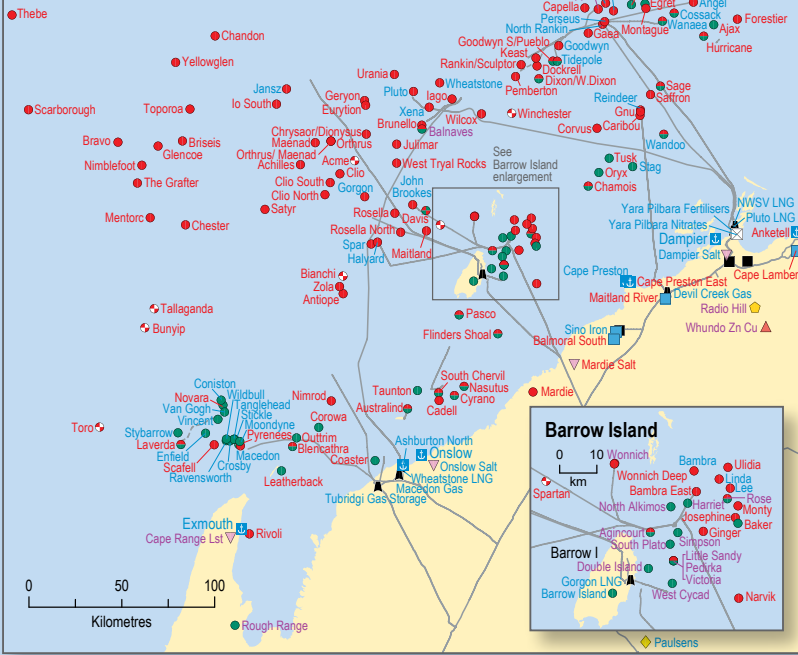
Projects operating or currently under development with an actual or anticipated value of production greater than A\$10 Million are shown in blue

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

Mineral Projects under care and maintenance and petroleum fields that are shut-in are shown in purple



North West Shelf



Major Resource Projects June 2018

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

Mineral Projects under care and maintenance and petroleum fields that are shut-in are shown in purple



Commodities

- Ag..... Silver
- Au..... Gold
- Co..... Cobalt
- Cu..... Copper
- Dmd..... Diamond
- Dmd..... Diamond
- Fe..... Iron
- Fl..... Fluorite
- Gp..... Gypsum
- Gr..... Graphite
- Grt..... Garnet
- K..... Potassium
- Kln..... Kaolin
- Li..... Lithium
- LNG..... Liquefied natural gas
- Lst..... Limestone
- Mag..... Magnetite
- 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 Diamond
- ◆ 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@nopota.gov.au>



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

