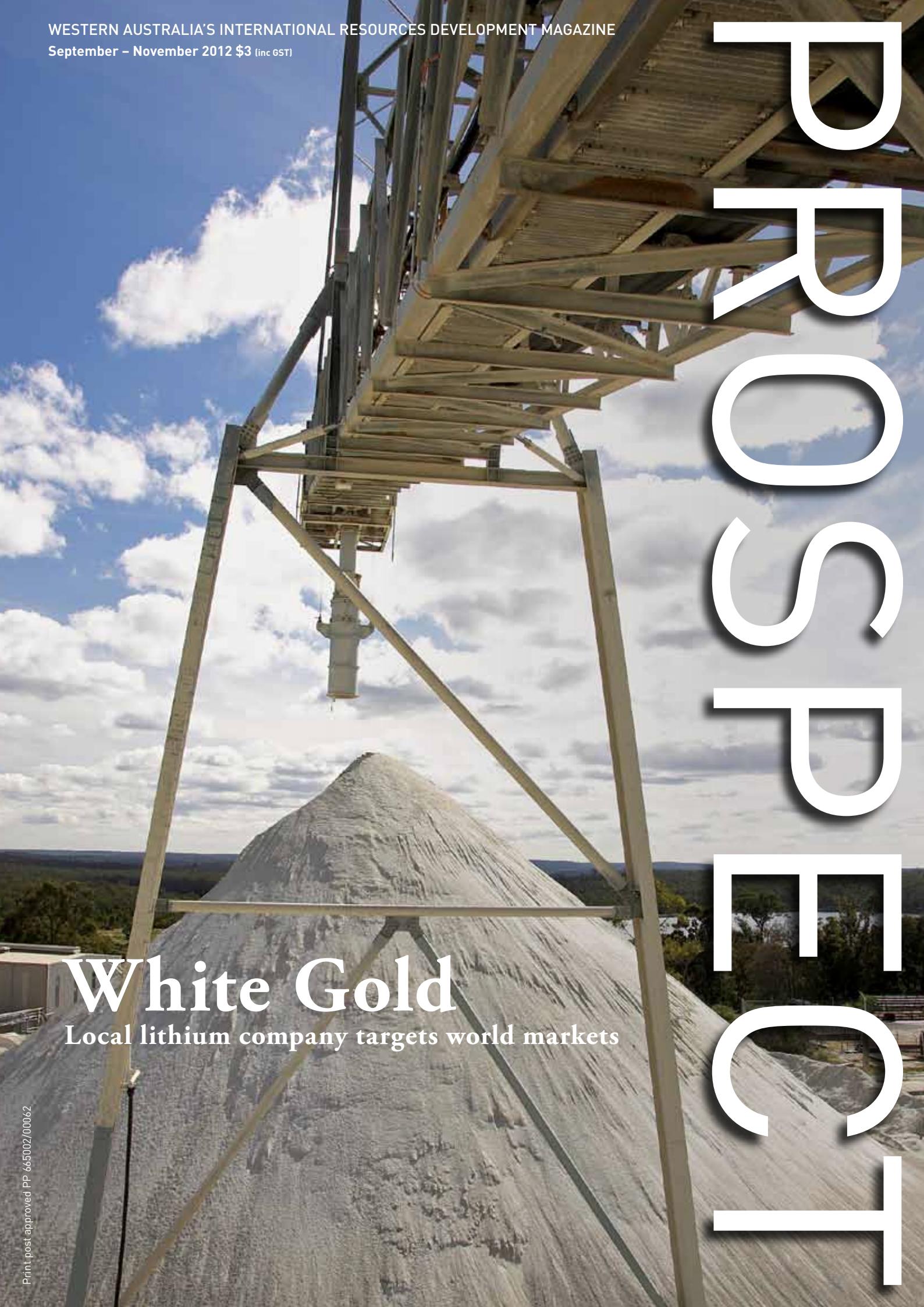


# White Gold

Local lithium company targets world markets





## What lies beneath

Scratch the surface and you'll find the depth and breadth of Western Australia's resources sector, and the skills of the people who work within it.

When you realise the scope of the work people do in the many industries, directly and indirectly within the sector, you can't help but be impressed.

This magazine has been recording the evolution of resources in WA for the past 34 years. During that time, the State's economy has continued to grow to the stage where we now power the nation.

While most of that success is measured in dollars, the articles within *Prospect* also highlight the people who work across the trades and professions which help enhance our way of life.

Such is the content in this issue, highlighted by a lithium mine in WA's south, where staff range from drillers, blasters, excavation operators, electricians, computer operators, accountants, managers, laboratory technicians and scientists. They all work and live side-by-side to produce something so necessary in today's modern world, yet something we never think about.

The innovative nature of people's work can be found on most pages; from a world-first program to replant seagrass, to university research into safer subsea engineering.

From it all, local business continues to prosper from the work that emanates from resources projects operating in WA.

While we continue to show the world how we can deliver massive resources projects, there are other areas of equal importance where we also shine, some on the international stage, and others closer to home.

Our relationships with China and Japan continue to go from strength to strength, as evidenced by the material in this issue. Managers from major Chinese companies continue to study here under a unique exchange program, while WA's links with Japan, our second-largest trading partner, also blossom, not only economically, but also in other areas, such as education, the arts, fashion and culture.

WA can certainly take pride in the people that participate in the resources sector.

### Colin Barnett

**PREMIER OF WESTERN AUSTRALIA & MINISTER FOR STATE DEVELOPMENT**

### Norman Moore

**MINISTER FOR MINES AND PETROLEUM**

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*Cover photo: Lithium stockpile at the Talison lithium plant, Greenbushes.  
Photo: Talison. Story, page 2.*

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# Lithium in its element in WA



*The finished produce, the highest-grade lithium concentrate in the world. Photos: Talison*

You've got it in your smart phone, so you probably can't live without it. Lithium is the buzz element in Asia. Also used in conventional applications like melting glass, making ceramics and in pharmaceuticals, Lithium is an increasingly-valuable commodity, particularly when there are few places in the world that have lithium reserves and few companies mining it (Australia has eight ASX-listed companies that do). The world's largest lithium producer can be found in a picturesque, little town of 400 in Western Australia. As *Prospect* discovered, this company is well and truly 'on its bike' when it comes to developing the resource.

Supplying 30 per cent of the world's demand for a commodity is an impressive statistic, particularly when that demand includes providing around 80 per cent of China's requirements.

That's what emanates from down in the deep south of Western Australia, where lithium has been mined for more than 25 years and by Talison Lithium since 2007.

The company has recently completed an expansion that will reinforce its position as one of the world's leading producers of the element, obtained from the Greenbushes pegmatite deposit, which is approximately 2,525 million years old. The Lithium ore (spodumene) is drill-and-blast mined from fresh, unweathered zones exposed in open pits.

It has just completed an expansion of its Greenbushes operation, 250km south of Perth, where it has two processing plants – the original one, which produces technical-grade lithium

concentrates, and the just-expanded plant, which produces chemical-grade lithium concentrate.

Greenbushes has reserves of 2.4Mt lithium carbonate equivalent (LCE) at a grade of 3.1 per cent Lithium Oxide. The final products sold by Talison range from 5 per cent to 7.5 per cent lithium oxide.

Talison, which also has a lithium brine exploration project in Chile (43 per cent of the world's supply), is progressing with resource-definition drilling at Greenbushes this year to support additional future expansions. The mine currently has a 22-year life, but the company is targeting an extension of this.

That augurs well for the mine (and the local Greenbushes community), with world demand for lithium increasing. Talison has experienced between 10-15 per cent increase in sales every year for the past decade.

Apart from the traditional uses for lithium, emerging and growth applications, such as its use in lithium batteries and for strengthening wind turbine blades, now account for about 30 per cent of the global market.

Of global lithium production last year, about 26 per cent was used to make lithium-ion batteries, 29 per cent glass and ceramics and 14 per cent lubricant greases. Much of the expansion in lithium battery use, according to Talison, will come from increased use in consumer batteries such as tablets and power tools, in addition to electric vehicles, including 'e-bicycles'.

The Greenbushes expansion will double the current capacity to produce spodumene concentrate. If Talison runs Greenbushes at full capacity, its production would roughly equal the size of the global lithium market two years ago.



The original crusher (left) which now processes the higher-grade lithium, and the new crusher (right).

However, the company says it will bring on new capacity progressively as the global demand for lithium grows.

In line with the positive outlook, the company also has plans to build Australia's first lithium carbonate plant at Kwinana, just south of Perth. At present the only lithium carbonate plants are in China. Lithium carbonate is the universal precursor for a number of lithium chemicals used in batteries.

The plant will convert approximately 20 per cent of the Greenbushes lithium concentrate production to produce 20,000tpa of lithium carbonate for global markets, with first production targeted in 2015.

By having a processing plant in WA, Talison will be able to make its own carbonate to sell directly to major markets, such as Japan and South Korea.

A final investment decision (FID) on the multimillion-dollar project is expected by the end of the year. If approved by the Talison board, it would be Australia's first move into downstream processing of lithium into lithium carbonate. WA's other lithium producer, Galaxy Resources, has a lithium carbonate plant but it is in China.

In preparation for the expansion, Talison has just completed construction of a test minerals conversion plant (MCP). The test plant is intricately linked to the company's research program into lithium production.

Greenbushes already has a state-of-the-art laboratory, with a staff of 17 analysing samples with X-Ray fluorescence, atomic absorption and optical emission spectrometers every six hours, 24 hours a day, ensuring the highest-quality product. This has recently been supplemented by the addition of two researchers, one a PhD.

Pat Scallon, General Manager Greenbushes, who has been with the company for more than 15 years, says the laboratory has a world-class reputation.

*"Our analysis, not just of lithium but also other elements, is more accurate than anywhere else," he says.*

Being able to accurately analyse samples is vital when you are dealing with a product that is going to be used in products that have to meet high industry standards, particularly in electronics.

The long-term world demand for lithium is exceptionally strong, according to the International Lithium Alliance, with the bulk of demand coming from use in batteries. The alliance estimates demand in this area will grow from the current 5500tpa to 20,000tpa by 2020.

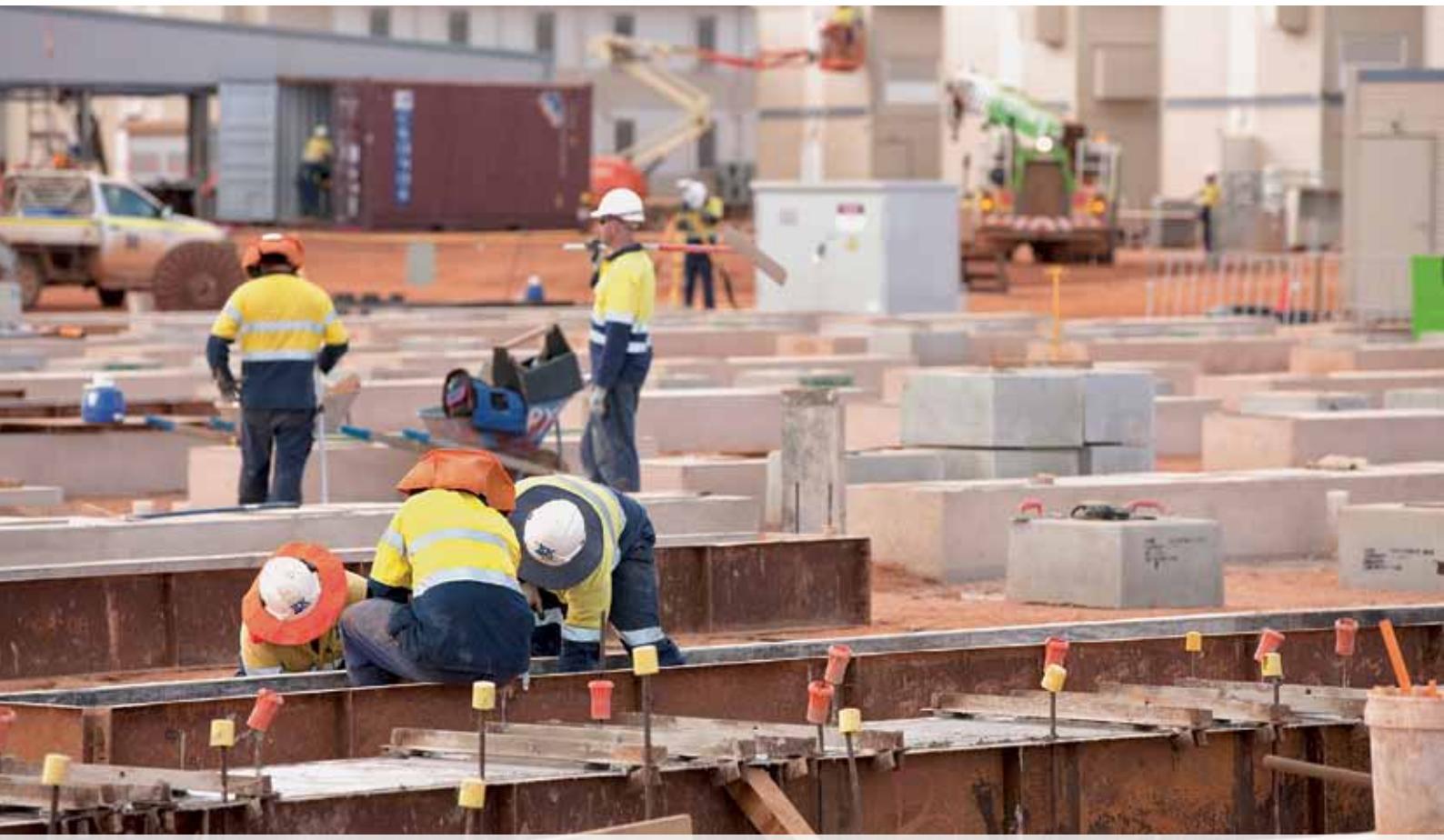
Perhaps the lithium-powered e-bicycle in Talison's foyer is a sign of things to come. ■



A lab technician prepares lithium for testing.

## History of mining at Greenbushes

- Greenbushes is the oldest mining site in Western Australia, with tin first being mined at the site in 1886.
- The population of the town reached its zenith of 3000 in the early 1900s.
- Tin runs out by 1970.
- Major tantalite and lithium deposits were discovered in 1980.
- By 1985 a lithium minerals concentrator was producing 30,000tpa. This increased to 70,000 in 1994.
- Talison takes over operations in 2007 and by 2009 increased production to 155,000tpa.



Local contracts are flowing through for work on major WA projects, such as Gorgon. Photo: Chevron

## WA companies ride the resources wave

Scores of privately-owned Western Australian service providers are enjoying phenomenal growth as a result of the resources boom. This is no more evident than on the Wheatstone project.

The Wheatstone camp will have more than 1,000 rooms, as well as kitchen and dining buildings, medical and recreational facilities, support utilities, and a wastewater treatment plant. The contract was recently expanded from 502 rooms and \$72 million to \$119 million.

Most of the rooms are being designed and built in Perth by Decmil Australia, one of the first contractors to be awarded work on the project.

The expansion has created extra work for both Decmil and nine sub-contractors it has engaged.

Decmil's 100-strong Wheatstone team will be augmented with Western Australian subcontractors to deliver services including electrical, screw piling and hydraulic services, temporary power generation and potable, fire and waste-water systems.

"Local Perth companies are helping build the rooms in Jandakot, and once completed, these will be transported to Onslow, where we will work with other local service providers to install and commission," Decmil Australia chief executive Ray Sputore said.

*"Importantly, this delivers on Chevron's commitment towards engaging local industry on works associated with the Wheatstone Project."*

Decmil has 100 workers on the project, and its sub-contractors include consulting group AECOM, Malaga businesses Complete Site Services, Applied Electro Systems and Pile West, trucking firm Ontraq Haulage, Tristar Water Solutions, SAS Telecom, Screw Pile Australia, and Outback Trees of Australia.

Wheatstone has awarded 27 contracts to WA suppliers in the first quarter of this year.

One of the local sub-contractors to experience the flow-on effect from Wheatstone is the Complete Group.

The almost doubling of the order for construction camps meant Complete received \$30 million worth of work from Decmil.

Complete Group founder Emanuel Dillon, said the order was a major achievement by a WA manufacturer for work that could have gone offshore.

"They've seen how we operate and how quick a medium-sized West Australian business can react," he said.

"The work was earmarked to go to China," Mr Dillon said. "We managed to get to decision-makers to renegotiate our margins and keep the project in Western Australia."

Mr Dillon is so confident in the Kimberley's future, he invested \$15 million to open a new hotel in Derby in April.

## Local business benefiting from major projects

- Hagstrom Drilling has contracts on the Wheatstone gas project, Roy Hill iron ore mine and Rio Tinto's Cape Lambert port expansion. Staff numbers have doubled in the past three years. It is now expanding its work into environmental drilling, where its equipment is used to assess contamination in soil or groundwater.
- OTOC started with a bobcat and a truck, offering electrical services. It now builds camps for the big miners. Last year it was listed on the ASX.
- ECM Global Project Partners' staff numbers across its structural, mechanical and electrical contracting services have increased from 100 to more than 500 in the past three years.
- Bhagwan Marine began as a rock lobster fishing venture in Geraldton and is now a 50-vessel operation which services the oil and gas industry.
- The McNally Group, run by four brothers, turned over \$439 in its first year of business in 2008-09. This year the modular building construction firm will turn over \$40 million, with some of its clients including Fortescue Metals Group, Apache Energy and Rio Tinto.
- Australian Pressure Testing Services performs work for some of the largest gas projects in WA.
- Samson Maritime has built itself from a one-boat operation to running an oil and gas support base from Dampier. Co-founder Jeremy Williams sold the business in 2011 for \$47 million but has remained as managing director.
- Raw Hire once managed its lone four-wheel drive vehicle from a Karratha caravan park. Now it has more than 1000 vehicles and has preferred-supplier status for the Gorgon and Wheatstone projects.
- AME Offshore Engineering began with \$60,000 of private investment in 2002 and now turns over up to \$15 million.
- Seacorp was a one-man Fremantle operation. Craig Thompson's shipping agency-brokerage has expanded from servicing Pilbara iron ore producers to having 50 employees and 14 branches around the world. ■

## Award nomination highlights inter-agency teamwork



An interagency project that is improving the accuracy of registered Aboriginal heritage sites was recognised as a finalist in a recent awards ceremony.

The Aboriginal heritage project, a joint effort between the Department of Mines and Petroleum and the Department of Indigenous Affairs, was a finalist in the WA Institute of Public Administration achievement awards.

The project was a finalist in the Practice in Collaboration – across government agencies in the same jurisdiction category.

Department of Mines and Petroleum Director General Richard Sellers said the nomination was recognition for the two departments involved in the project.

"Improving the accuracy of the Aboriginal Heritage Register has increased the level of protection of these sites in Western Australia," Mr Sellers said.

"During the 1960s and 70s the State Government identified areas important to Aboriginal heritage across Western Australia.

"However, the boundaries of some large sites introduced an element of uncertainty for some development project proposals, with the uncertainty impacting on stakeholder relationships."

The Aboriginal Heritage Project addressed this issue by reviewing all large site boundaries to improve the accuracy of registered Aboriginal heritage sites.

*"As a result the Aboriginal community is now more confident that the register more accurately reflects actual site boundaries, reducing potential conflict between land developers and Aboriginal communities," Mr Sellers said.*

"It also provides more certainty for mineral and petroleum tenement holders as the spatial boundaries of heritage sites are more clearly identified."

The project involved a review of 531 historical Aboriginal heritage sites which resulted in a reduced area of 13,380 square kilometres, while one site increased from 100 sq kms to 5415 sq kms.

The project was initiated by DMP's Aboriginal Heritage Working Group as part of the department's approvals reform program.

The project was funded through DMP's Exploration Incentive Scheme (EIS) as a part of the State Government's Royalties for Regions program.

The winner of the award was the Department of Corrective Services Regional Youth Justice Services project. ■

# Strengthening regulation of unconventional gas

One of the most recent activities as part of the Department of Mines and Petroleum's (DMP) continuous process improvement is the introduction of new environmental and resource management regulations under the *Petroleum and Geothermal Energy Resources Act 1967*.

The Petroleum Environment Regulations, which are expected to be gazetted by the end of August, aim to ensure petroleum and geothermal operations are carried out in accordance with best industry practice and ecologically sustainable development.

A key approval document for the petroleum and gas industry is the Environment Plan, which must demonstrate that environmental impacts are reduced to as low as is reasonably practicable.

The department has identified the need to improve public transparency for unconventional gas decision-making.

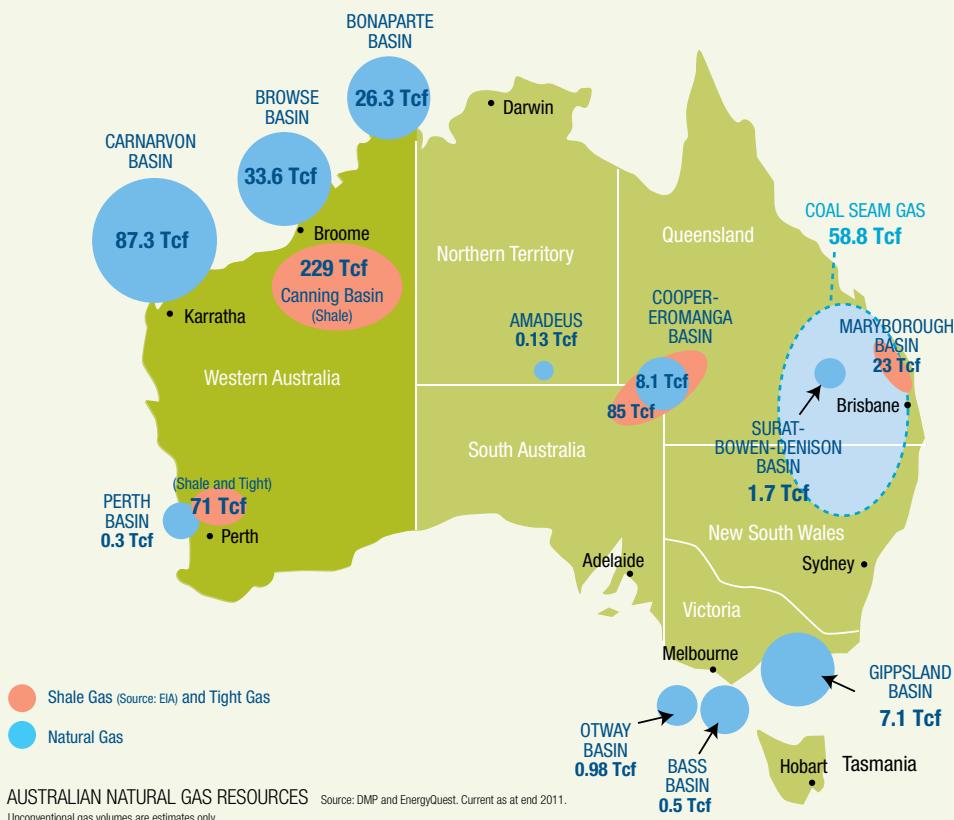
This objective is reflected in a key element of the regulations, which mandates public disclosure of any chemicals introduced into a well or formation, which will be made available on the DMP website.

The regulations also increased reporting requirements, with monthly reporting against Environment Plans performance objectives. In addition, Environment Plans are required to be revised by the operator every five years.

The Resource Management and Administration Regulations are anticipated to be available for public comment in the second half of 2012.

The changes follow an independent review of the regulatory framework for unconventional gas activities in WA in 2011 that include shale, tight and coal seam gas.

Conducted by petroleum law expert Dr Tina Hunter, the review concluded that although the current regulatory processes are stringent and supported by skilled and dedicated staff, further strengthening was required



to improve legal enforceability. The report recommended the introduction of new environmental and resource management regulations.

## Interagency working group

To guide this process DMP established a government interagency working group comprising the State Government Departments of Water, Environment and Conservation, Health, Agriculture and Food, and the Office of the Environmental Protection Authority (EPA).

The EPA will continue to work with DMP, which it considers is well-placed to manage the issues associated with the industry, to ensure the community and industry have appropriate information and guidance.

The changes reinforce a Western Australian Government commitment to a regulatory regime that ensures responsible development of gas resources, while protecting the environment, groundwater resources and public health.

DMP regulates onshore petroleum activities through the *Petroleum and Geothermal Energy Resources Act 1967*, the *Petroleum Pipelines Act 1969* and the *Petroleum (Submerged Lands) Act 1982*.

The DMP website contains simple, reliable and accurate facts about unconventional gas in Western Australia. Material available includes fact sheets, current drilling projects, useful links, guidelines and reports: ([www.dmp.wa.gov.au/onshoregas](http://www.dmp.wa.gov.au/onshoregas)). ■

# Shale and tight gas potential

The unconventional gas industry, regulated in WA by DMP, is in the very early exploration phase, with current activities categorised as small scale 'proof of concept' proposals.

Unconventional gas describes shale, tight and coal seam gases, which differ from conventional natural gas as the gas cannot move through the reservoir rock formation. This prevents the gas from flowing freely through the rock to allow recovery. The rock requires hydraulic fracture stimulation (known as fracking) to allow the gas to be released.

Unconventional gas resources have been known around the world for decades. Advances in horizontal drilling and hydraulic fracture stimulation technology in the past two decades have made unconventional gas commercially viable.

However, potential commercial developments in WA are a number of years away from consideration, which provides the State with an opportunity to understand the resource and make necessary changes to strengthen regulation, building on the experience in other parts of the world.

A 2011 report released by the US Energy Information Agency (EIA) estimated that Western Australia holds an estimated 288 trillion cubic feet of shale gas resources. This estimate is more than double the amount of identified natural gas reserves and resources in WA adjacent offshore areas.

One trillion cubic feet of gas is enough energy to supply a city of one million people with electricity for 20 years. WA currently produces around one trillion cubic feet of gas per year for export and domestic gas supply.

In addition to shale gas, conservative estimates for tight gas resources in the Perth Basin, indicate that up to 12 trillion cubic feet of tight gas could be recovered in that basin alone.

It should be noted that Western Australia has no known, potentially commercial, coal seam gas resources because of the State's geology and character of its coals. This limits Western Australia's exposure to issues of high volumes of produced water and associated salt disposal confronting overseas and eastern Australia coal seam gas production. ■

## In the news

### Rio commits \$3.6b to Pilbara

Rio Tinto has committed \$3.64 billion to expand its massive iron ore operations in WA's Pilbara region.

The company will spend \$1.97 billion over the next four years on port-and-rail developments that will expand its production capacity in the Pilbara to 353 million tonnes a year from 2015.

A further \$1.67 billion will be spent to extend the life of the Yandicoogina mine in the Pilbara to 2021 and expand its capacity by six million tonnes a year.

Rio Tinto has already received conditional approval from the WA government to expand its Cape Lambert port, which when completed will see the state's iron ore exports surge to 133 million tonnes a year.

Premier and Minister for State Development Colin Barnett said the port construction workforce is set to peak at more than 1700 employees, with the finished facility to host around 100 full-time jobs.

"Investment on this scale in key port infrastructure is excellent news for the Pilbara and for Western Australia," he said.

"It underlines the increasingly significant role that expanded iron ore production and a dynamic Pilbara are having in shaping the economic and social future of our State."

The Cape Lambert port expansion will take three years to complete. Rio Tinto recently announced a \$300 million investment to expand the nearby town of Wickham in order to house the port workforce. - PerthNow, 20 June. ■



Cape Lambert - set for expansion. Photo: Rio Tinto

### Port sets record

THE world's biggest bulk export port, Port Hedland, handled a record 247 million tonnes of commodities last year as iron ore miners led by BHP Billiton and Fortescue Metals Group boosted production in the Pilbara to meet strong Chinese demand.

Figures released by the Port Hedland Port Authority show the facility increased throughput by 23 per cent over the 199 million tonnes that were shipped in 2010-11.

The value of the iron ore exported from Port Hedland last year is likely to have exceeded \$30 billion.

This follows more than a million tonnes of iron ore leaving Port Hedland on a single tide – a record for the port.

Six ships left the port between 5am and 10:15am on Monday 18 June, carrying a combined total cargo of 1,040,062 tonnes, according to the Port Hedland Port Authority (PHPA).

Five loaded cape-size vessels came from BHP's berths and were headed to China. The sixth vessel was a post-panamax loaded by Mineral Resources at Port Hedland's Utah Point facility, and was headed to Japan.

The previous record of 914,881 tonnes was set in July 2011.

Meanwhile, Fortescue Metals Group is confident of tripling production at its Pilbara operations by next year after the company's newest shipping berth was opened. The new berth at Port Hedland's Herb Elliot Port, dubbed AP3, is part of a \$US2.4 billion program to expand the port to support Fortescue's expanding Christmas Creek mines. – Business News (9 July), Australian Journal of Mining (21 June), Pilbara News (6 June). ■



Port Hedland... continues to lead the world. Photo: Port Hedland Port Authority

# Geothermal project benefits from funding

An Esperance geothermal project in the State's south will use Western Australian Government funding of \$120,000 to progress its drilling program later this year.

The grant has been provided to Greenpower Energy Limited on a dollar-for-dollar basis under the WA Royalties for Regions funded Exploration Incentive Scheme (EIS), and will be used for the completion of two drill holes to 400m.

The EIS is administrated by the Department of Mines and Petroleum (DMP).

The holes will be drilled on tenements that extend from the coast at Esperance northward to Salmon Gums.

The company is exploring a granite body with an area in excess of 600 square kilometres with strong geothermal potential.

Analysis of basic geological information has revealed heat-generating granite rocks occur in the Esperance district.

## Geothermal exploration

In 2010 the State Government granted two new permits to Greenpower Energy

for geothermal exploration near Esperance, covering an area of more than 10,000 square kilometres.

The company planned to spend more than \$42 million exploring the area over a six-year period.

The south-east region of WA is the third area in the state to be opened up for geothermal exploration.

Mines and Petroleum Minister Norman Moore said the permits were another step towards creating a robust geothermal exploration sector.

"We're going to hope that they find it because it's a renewable energy source, it works extremely well if you can get the right circumstances and because the heat under the earth's surface is there constantly, it's a matter of just pumping water down to create steam and that then provides you with energy," he said.

"It's a totally sustainable energy source."

## Electricity generation

The company said developing and harnessing geothermal energy was a significant opportunity for electricity generation in the area.

The area to be drilled is a hot dry rocks (HDR) geothermal target in radiogenic granites near Mt Ridley, 80km north of Esperance.

The company plans to use local drillers where possible and will engage with local stakeholders, the community and traditional owners.

The company did not expect to conduct work until possibly the summer of 2012-13.

Greenpower had looked at the radiogenic granite and noted it had the necessary ingredients to generate heat. If the high temperatures do exist, there is a potential to develop a power station in the area.

The company said the site was well placed to add power to the South West Interconnect Transmission Link, a proposed future grid that would connect to Kalgoorlie one way and to Ravensthorpe the other way. This link would work best with power stations placed along the grid. ■

## EXPLORATION INCENTIVE SCHEME

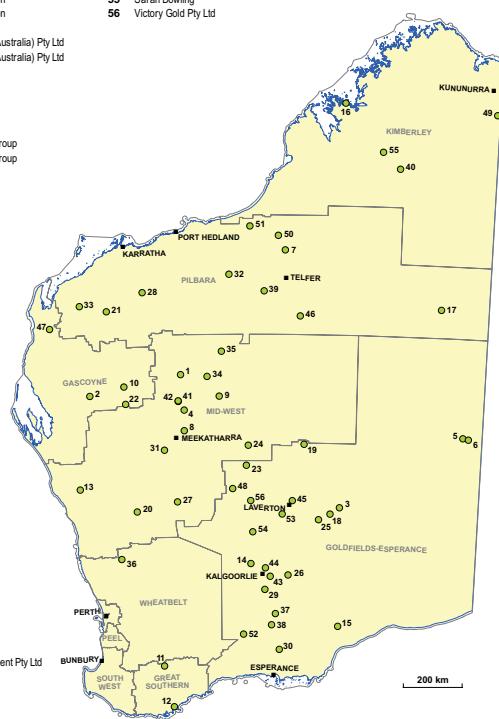
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- 3 Almeco Mining And Exploration
- 4 Alchemy Resources Ltd
- 5 Anglo American Exploration (Australia) Pty Ltd
- 6 Anglo American Exploration (Australia) Pty Ltd
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## EIS continues to promote WA as an investment destination

The State Government has further boosted Western Australia's reputation as an attractive resources investment destination with a 2012-13 Budget commitment of \$37.5million over two years from 2014-15 for the Exploration Incentive Scheme (EIS) - Phase 2.

Mines and Petroleum Minister Norman Moore said the new funding would build on the highly successful EIS Phase 1.

"The government anticipates the EIS Phase 2 will enhance the take-up of greenfields exploration acreage resulting in new mineral discoveries in more remote and regional areas," Mr Moore said.

The government recognises the need to build the State and invest in its future to ensure WA remains globally competitive and an attractive place to live and work for future generations. ■

The Minister said EIS Phase 1 had attracted the first major subsurface mineral exploration programs into the Eucla region, seen the first remote greenfields uranium discovery in 30 years, and led to the discovery of the Yeneena zinc-lead-copper and the Tropicana East gold deposits which had assisted the reopening of the Mount Magnet mine.

Phase 1 also co-funded the seismic survey near Harvey that located the first drill hole to test the CO<sub>2</sub> storage potential of the Perth Basin and part-funded the Harvey 1 Well in early 2012.

A host of products and services have also been released during Phase 1 of the EIS and many other activities will be able to continue as a result of further funding. ■



Prof. Ian Callahan

# University engineering students step closer to reality

Curtin University has taken another step to ensure its engineering students are among the world's best by providing access to more than 50 commercial-grade software applications for designing, building and operating infrastructure within the resources sector.

The university has joined Bentley Institute's Academic Subscription program, offered through its Be Careers Network, granting students, researchers and faculty at Curtin University campuses unlimited worldwide access to the programs.

With the ongoing skills shortage in WA, particularly among mining and infrastructure sectors, the school's new Academic Subscription Program will strongly position students for the next step in their infrastructure career. The program will initially run for three years, and is designed to ensure a wide range of tertiary students graduate with hands-on experience and up-to-date technology skills across industry-standard software.

The applications can be accessed worldwide, including on all campus computers, as well as deployed on student and facility PCs. The programs also provide a variety of learning resources, including manuals, textbooks,

hands-on live training, and on-demand self-study offered through the Bentley LEARN Server, along with opportunities for scholarships.

Scott Lofgren, Bentley's Global Director, Be Careers Network, said the wide selection of programs exposes educators and students to the same technology used in infrastructure projects.

*"There's an array of products and technologies across many engineering and infrastructure disciplines, including road and bridge design, mining, oil and gas, structural, and more; with more than 60 software titles in multiple disciplines," Mr Lofgren said.*

Professor Ian Callahan, Curtin University vice-president of Corporate Services said the Academic Subscription program is a strategic addition to developing Curtin's information and communications technology initiatives.

"With seamless access to the software, our students will graduate with the strong skills and knowledge that their prospective employers need to establish or maintain leadership in the design, development, maintenance, and operation of built assets around the world," Prof. Callahan said.

Leading infrastructure, mining and energy-related organisations, including Ausenco, Western Power, WorleyParsons and Hatch, are among organisations using the software.

Western Power spokesperson Janette Edwards said the use of one of the products, MicroStation, would make engineering graduates more marketable to utilities, as they can "enter the business and add value immediately". ■

# Building bridges: lessons in China-Australia awareness

Groups of young Chinese middle managers are receiving some world-class training in a unique exchange program facilitated by the Department of State Development (DSD). More than 150 resources industry businessmen and women have undertaken the program in the past 12 years.

The Australia China Natural Gas Technology Partnership Fund symbolises the unique and close relationship between Western Australia and China.

Created in 2005, the fund provides the means for Chinese middle managers to learn about WA's resources industry on a number of levels.

"This program provides the Chinese with a whole new way of seeing the world and doing business," says the program's manager, Tracey Lim.

*"Many of the people that come here on the program have gone on to become senior decision-makers in China, so what they learn in their time here will hopefully have a lasting effect on how they approach the way they do business at home."*

The program is a three-way partnership between North West Shelf Australia LNG Pty Ltd, the Commonwealth Department of Resources and Energy and Tourism and DSD.

It has several aims, foremost among them to create an understanding of Australia and, more specifically, its energy sector.

The 'trainees' undertake a program in one of three areas – leadership, economics or management, in either a three or two-month program.

"In reality, it's an intensive executive management course," says Ms Lim.

In previous years the program trained one group of managers over six months, resulting in only 13-15 per year. These days the program is run in three overlapping groups of 12 to 17.

"The Chinese National Development and Reform Commission wanted to extend the program, so as a result we're training three times the numbers now," said Ms Lim

This year 39 Chinese will have undertaken the various programs, including the dozen undertaking a leadership program when *Prospect* met them at their 'home' base, the Australian Centre for Natural Gas Management at Curtin University's Business School in the heart of Perth.

The group consisted of a variety of business managers in trading, contracts and supervision, from six companies and four cities.

They spend most of their time at the centre, attending lectures and seminars

conducted by some of Australia's brightest academics and business people. This particular week they had been tutored in the Australian gas sector by Canberra-based Adam Smart from Acil-Tasman, who has been involved for the past seven years.

In between, there are visits to major resources projects. For this group it was a visit to the North West Shelf oil and gas project in Karratha.

Of course, there are also the obligatory (and necessary) trips to tourist hot spots, such as the Great Ocean Road in Victoria and WA's Pinnacles.

The trainees spend their first two weeks undertaking an intensive English class and briefings on Australian culture at Curtin's Australian Centre for Natural Gas Management.

"The English and cultural components are extremely important, because that's what allows them to operate independently," says Ms Lim, who has overseen the program since 2008.

"Little things, like letting them know about the differences in driving (and not just on the other side of the road) help make the transition easier."

"We ask them to do a lot. Think about how you would get on if you were asked to operate in China, because that's what we ask them to do."



**Norman Moore**  
Minister for Mines and Petroleum

## Major boost to WA petroleum

Regulation of the State's petroleum sector has been given a major boost thanks to a \$2.28 million injection in the State Government 2012-13 Budget.

As part of the funding, \$1.65 million over two years from 2012-13 will be provided to ensure a smooth transition, with the State Government now handing back regulatory control of Commonwealth offshore waters to Federal authorities.

Mines and Petroleum Minister Norman Moore said the funding would enable the State Government to develop cooperative working arrangements with the Federal bodies.

"This will ensure the best possible outcome is achieved for the State's petroleum sector, as the new Federal regulators take control to ensure offshore resources will continue to be managed to high standards and that Western Australia



As part of their study program in Australia, Chinese managers visited the North West Shelf Gas project's plant at Karratha.

Topics covered include macroeconomics (courtesy of Professor Daniel Packey, the Director, of Curtin's Department of Mineral and Energy Economics), background briefings on the LNG industry and an introduction to Australian politics, which included a visit to the federal parliament. While in Canberra, they also visited the Department of Resources, Energy and Tourism and the Chinese Embassy.

On the social side, they jog, play tennis, workout, watch Australian Football (everyone's a Dockers fan) and visit local landmarks. Following a barbecue on a rural property outside Canberra many of the group expressed a wish to live there.

"It's been a great experience," said Allen, one of the group. "It's only when you're in a foreign country that you can really feel you are a Chinese person. Your every move represents your homeland."

We now have a profound understanding of the cultural differences between China and Australia.

"While the culture is different, most of our values such as equity, justice, integrity, honesty, punctuality and thrift, are common to the people of both nations."

The program isn't one-way. Each year 14 Australian executives who represent the three funding parties (six joint-venture partners) undertake a two-week tour of China, which has also proved just as invaluable.

"There was one petroleum company executive who had been dealing in contracts with China for seven years, yet had never been there," said Ms Lim. "It certainly changed the way he thought about China and helped him immensely in his dealings with his counterparts over there."

The program has been judged to be an overwhelming success, with approximately 25 per cent of its graduates being promoted once they return home. Other nations, including Qatar, have also looked closely at the model, with a view to establishing similar programs.

"I don't know of any other country that has this type of program," says Ms Lim.

"Importantly, we are seeing tangible benefits, certainly to them, but in other ways. For example, most have relatives (wives or parents) who visit here before they finish the program, so the understanding spreads. Some of them send their children here to study."

"But at the end of the day, they are learning about us and we learn about them. It might be a tiny drop in the overall scheme of things, but it can contribute to changes in the way they do business." ■

## sector

is fully informed when any petroleum is transported onshore," he said.

"We will negotiate and manage service-level agreements with the Federal Government for data management, access to drill core and other advisory services currently provided to Federal authorities."

The remaining \$625,000, provided in 2012-13, will also help the State Government effectively regulate safety for the petroleum sector in State offshore

waters, which reverted to State control on 1 January 2012.

The State Government plans to boost the number of petroleum safety inspectors during 2012.

"It's all part of the Liberal-National Government's plan to transform the State and build the vision for our future," Mr Moore said.

*"We recognise the need to build our State and invest in our future, to ensure we remain globally competitive and an attractive place to live and work for future generations." ■*

# WA's safety reform recognised as national best

Western Australia's State mining engineer Simon Ridge has been recognised with a national award for his outstanding contribution to safety and reform in the Western Australian mining industry.

The prestigious Australasian Institute of Mining and Metallurgy's (AusIMM) Jim Torlach Health and Safety Award was presented in Adelaide.

Mines and Petroleum Minister Norman Moore said the award was a significant achievement that highlighted the extensive work the Department of Mines and Petroleum (DMP) had undertaken.

"Mr Ridge has been with the department for a total of 16 years and has been a central figure over the past

three years, driving changes to safety in the mining industry," Mr Moore said.

*"He has helped implement significant changes as part of the department's Reform and Development at Resources Safety Strategy (RADARS), which supports cultural change across industry."*

As part of the strategy, Mr Ridge oversaw the appointment of 25 additional mines safety inspectors at DMP during 2010-11.

The department also expects to recruit a further 10 mines safety inspectors by the end of this year, along with additional petroleum inspectors.

"I congratulate Simon on his efforts: it is a great achievement, not just for Simon, but for everyone who works in the mining industry, which will be safer because of the work he has driven," the Minister said.

"Not only has he managed the recruitment of qualified and experienced safety staff, he has also designed and overseen new inspector induction programs and introduced a new team concept tailored to suit the State's diverse and geographically dispersed mining." ■



DMP's Simon Ridge receives the Jim Torlach Health and Safety Award from AusIMM President Alice Clark.

# Government welcomes Burrup Nitrates project go-ahead



The Burrup technical ammonium nitrate plant. Photo: Yara International

The go-ahead for a significant new processing investment on the Burrup Industrial Estate is a strong sign of confidence in the future of Karratha and the Pilbara, says the Premier and State Development Minister Colin Barnett.

Mr Barnett welcomed the announcement by Burrup Nitrates Pty Ltd that it had made a final investment decision to proceed with building a technical ammonium nitrate (TAN) plant at an estimated investment of US\$800million.

*"Value-adding to the Pilbara's existing resources is an important factor in ensuring Karratha's continuing growth as a major regional centre, as part of the State Government's Pilbara Cities Vision," the Premier said.*

"This announcement is especially significant because it is essentially a manufacturing project based on the natural gas resource.

"As well as creating at peak 600 construction jobs, and 60 operational positions when it is commissioned in

2014, the Burrup Nitrate plant will generate significant additional local business opportunities and employment during its expected 40-year lifespan, during which the plant will produce 330,000 tonnes per annum of ammonium nitrate.

The project will take ammonia, produced from natural gas, at the nearby Yara Pilbara Fertilisers plant to produce a base ingredient for explosives, used by the region's iron ore industry and other mining operations.

The new plant will join one of the world's largest ammonia production facilities and two operating LNG facilities on the Burrup, strengthening the Pilbara as a major Western Australian resources processing region.

Mr Barnett said the Department of State Development, as the Government's lead agency, had worked with relevant agencies to help Burrup Nitrates meet approvals requirements and secure land for the project. He congratulated project partners Yara International ASA, Orica Limited and Apache Energy Ltd for their commitment to the region. The project obtained State and Commonwealth environmental and Aboriginal Heritage approvals in 2011.

Meanwhile, the lead company, Yara International, is gearing up for the development of the plant with the appointment of a new boss.

Mark Loquan is the new chief executive officer of Yara Pilbara, a subsidiary of Yara International that will manage construction and ongoing operation of the TAN plant.

The plant is a joint venture between Yara (45 per cent), Orica (45 per cent) and Apache Corp (10 per cent).

Mr Loquan has 30 years' experience in ammonia and chemical plants, with 20 of those working in Trinidad, Africa and Europe.

"I am looking forward to the Burrup moving to the next level as a producer of ammonium nitrate products to feed the mining growth in the Pilbara region," Mr Loquan said.

Meanwhile, Orica's Managing Director and CEO Ian Smith said: "This is an extremely important project for Orica.

"Together with our partners, we have a clear vision for servicing the fast-growing Pilbara iron ore market". ■

# Research finds skilled migrants crucial to resource projects

Ground-breaking research into the use of migrant workers in Australia's resource industry has been unveiled at a Perth conference dedicated to overcoming specialised skills shortages in mining, oil and gas operations.

Releasing interim findings from the industry-first study, researcher Dr Susanne Bahn, from Edith Cowan University, told an audience of resource employers that temporary migrant workers play an essential role by filling highly-skilled vacancies that cannot be met domestically in the short term.

Dr Bahn was speaking at the AMMA Migration and Labour Sourcing Conference in Perth.

"This study is the first of its kind in Australia and shows that although the resource industry prefers to employ Australian workers first, some of the skills required are specialised and only taught in one or two institutions globally, which means the skill set required is simply not available," Dr Bahn said.

"Due to the lack of specialised skilled workers in Australia these companies are using their global workforce and employing them where and when they are needed."

AMMA executive director industry Minna Knight, said Dr Bahn's findings dispelled



Dr Susanne Bahn

any misinformation that migrant workers on 457 visas were preventing Australians from gaining resources jobs. She reiterated skilled migrants ultimately created jobs for Australian people in the long-term.

"Highly-specialised overseas workers are utilised as a short-term solution to ensure resource projects move through construction and into the operational phase where employment and training opportunities will be generated for decades to come," Ms Knight said.

"Contrary to misinformation from some in the union movement, it costs employers significantly more to hire overseas workers, with employers also required to implement training programs to ensure key skills are passed onto the local workforce and remain in Australia."

Ms Knight also said the research results call for a 'genuine discussion about labour mobility' as employers are relying on temporary migrant workers to fill jobs that skilled Australians won't relocate to. She said improving social services and infrastructure is one way of attracting Australian workers to the west, but this strategy is unlikely to address the issue entirely.

Dr Bahn's research backs this position, with the study finding some skilled Australian workers based in the eastern states are reluctant to relocate to Western Australia.

"We identified cases where recently retrenched workers declined to relocate to WA and this was due to a range of reasons, from social and family commitments, to the cost of living and a lack of infrastructure in some areas," she said.

The study, titled 457 Visa Workers in the WA Resource Industry: The benefits and costs for business, migrant families, and the community, is a joint initiative of the ECU School of Management and resource industry employer group AMMA.

A final report will be released towards the end of 2012. ■

## New register office for Mount Magnet

The State Government has committed \$1.33 million to build multi-purpose government offices to replace the Mount Magnet Registrar's Office.

Mines and Petroleum Minister Norman Moore said the new modern building would continue to provide vital services to the Western Australian mining community, as well as other services by the Department of Transport, Department of the Attorney General, Western Australian Electoral Commission and Department of Racing, Gaming and Liquor.

*"Mount Magnet is an important regional office that is conveniently located at a close proximity to mine sites in the State's Mid-West and Gascoyne region," Mr Moore said.*



Current Mt Magnet Office.

"A presence in Mount Magnet meets the needs of the local community with prospecting, exploration and operations anticipated to continue into the future.

"The 115sqm of office space will also enable other services, such as such

as licensing functions on behalf of the Department of Transport, and court administration activities and paperwork for the Department of the Attorney General."

The funding was announced in the government's 2012-13 State Budget. ■



Home-grown ingenuity ... Scott Draper, Qin Zhang and David White of UWA's Centre for Offshore Foundation Systems check the model pipeline at the bottom of the O-tube cyclone simulator.

Earlier this year, Prospect looked at how Western Australia's oil and gas industry trained workers to develop the key skills necessary for the future of the sector. But it's not just industry showing the way, so is the university sector.

# Cyclone simulator provides cutting-edge pipeline solutions

Contained in what looks like a giant fish tank in a suburban Perth shed is a piece of equipment helping to dramatically improve safety and reduce costs in the oil and gas industry.

The O-tube is helping the oil and gas industry develop the skills and knowledge to build better, safer offshore pipelines, capable of withstanding the effects of cyclones and other hazards.

The O-tube was designed and built by researchers at the University of Western Australia's (UWA) School of Civil and Resource Engineering and the university's Centre for Offshore Foundation Systems (COFS).

To the casual observer, it looks like an oversize fish tank, some 20 metres long by two metres high.

Inside it, a section of 200mm diameter pipe – which acts as a model offshore pipeline – rests on seabed soil at the bottom of the tank.

The tank is completed by a giant tube that connects each end of the tank. This tube is connected to a powerful propeller, which rapidly circulates 60 tonnes of water back and forth within the tank, simulating the conditions at the seabed during a cyclone.

The research into pipeline stabilisation is crucial. During a big storm, if the seabed soil liquefies, a pipeline might float up or down; or if the soil scours away, the pipeline may be exposed, and also wash sideways.

There's a lot at stake.

Professor David White of COFS, says an estimated 3,000km of pipeline, costing more than \$15 billion, is due be installed offshore Australia during the next 10 years.

*"About 30 per cent of the cost relates to stabilisation measures, so any minor reduction in stabilisation requirements yields significant cost savings," Prof White said.*

The O-tube is a unique Australian invention, conceived, designed and assembled by UWA.

"We're very proud of the O-tube," says Prof White.

"There's nothing else like it in the world. It's an Australian-designed experimental facility which can simulate and monitor ocean-seabed-pipeline interactions."

The O-tube program is a good example of industry and the university sector working together to overcome the challenges associated with the unique soft seabed soils off WA.

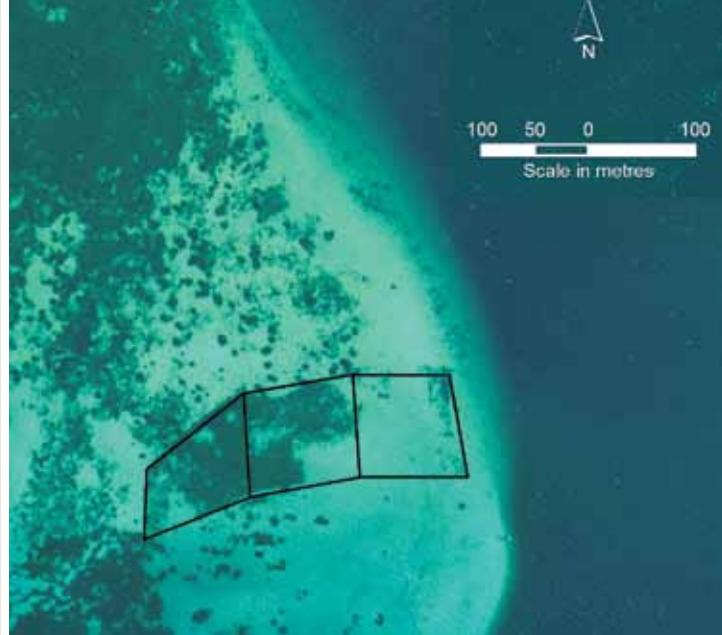
Woodside recently announced that the O-tube research program had already yielded a greater than 10:1 return on its investment. In addition, the O-tube program led to the creation of a unique facility within WA, which is becoming a worldwide hub for research and industry activity, and engineer training.

The O-tube program was initiated by UWA, led by Professor White and his colleague Professor Liang Cheng, in partnership with Woodside, Chevron and the Australian Research Council, with support from local engineering consultancies Atteris and J. P. Kenny.

"The O-tube has been used to support pipeline design for Chevron's Wheatstone LNG project being built near Onslow, as well as Woodside's Browse LNG development," says Professor Liang Cheng.

"It has also been used to re-assess the condition of an existing pipeline located offshore Australia." ■

# Creating meadows under the ocean



An aerial view of the seagrass regeneration at Cockburn.  
Photo: Oceanica Consulting

An environmental transformation has taken place on the seabed of Cockburn Sound. Adjacent to one of Western Australia's major industrial areas, an area of seagrass, once denuded by industrial activity, has been brought back to life in the largest project of its type in the world. *Prospect* takes a look at the science behind the nine-year research and rehabilitation program.

Seagrasses – as the name implies – are the marine counterparts to terrestrial grasses. They are true flowering plants (unlike seaweeds), and have roots, rhizomes, leaves, flowers and fruits. Seagrasses form extensive meadows on sandy seabeds. They transform bare sandy areas into a complex three-dimensional habitat and are also a source of food for animals such as crustaceans and fish. The richness of seagrass species in Perth's coastal waters is the highest in Australia, with 13 of the 50 known species of seagrasses found worldwide growing in Perth's coastal waters.

Seagrass rehabilitation refers to the process of returning seagrass to an area where it previously existed. The natural survival and growth of seagrasses is affected by different factors in different environments. Seagrasses typically occur in shallow waters, and can be lost due to a number of factors including agricultural and industrial discharges and pollution, marine and shoreline activities as well as dredging and land reclamation. While rehabilitation of land in the wake of mining activities is commonplace, the rehabilitation of impacted marine areas is far less advanced and a relatively rare occurrence.

## A joint effort

Areas of the seabed in Owen Anchorage (immediately north of Cockburn Sound) are rich in shell sand, which is dredged by Cockburn Cement Ltd to produce lime for WA's cement and minerals processing industries. The development of the Jervoise Bay Southern Harbour for the Australian Marine Complex Common User Facility and the Northern Harbour Ship Building precinct, by the Department of Commerce (DoC) – previously the Department of Industry and Resources (DoIR) – has also required significant dredging and land reclamation in Cockburn Sound.

Stringent environmental management conditions for these projects were placed on the two organisations, due to the industrial development impacts on seagrass meadows in and adjacent to Cockburn Sound.

Cockburn Cement and DoC joined forces to establish and fund the highly successful collaborative Seagrass Research and Rehabilitation Plan (SRRP). The SRRP is directed at meeting the environmental management condition to: *"develop and implement seagrass rehabilitation procedures that are economically feasible and environmentally sustainable"*.

The overall project team, working in collaboration, includes three WA universities, the Kings Park Botanic Gardens and Parks Management Authority, WA environmental consultants and a WA marine engineering firm. Marine science consultancy, Oceanica Consulting Pty Ltd, has been project managing the various research and rehabilitation activities since it commenced in 2003.

## Achievements surprise scientists

The achievements of the largest seagrass rehabilitation project in the world and certainly the most successful in Australia – the SRRP – have surprised even the WA marine scientists working on the project. The SRRP, underway in Cockburn Sound and also in the Albany region, is world leading in terms of the seagrass species and the planting techniques used.

The SRRP has involved the successful implementation of large-scale rehabilitation (using manual techniques) in Albany (Oyster Harbour) and Cockburn Sound. The SRRP has replanted 3.1 ha of seagrass in Cockburn Sound and 1 ha in harbours in the Albany region, with high survival rates around 50-90 per cent and flowering occurring about four years after planting. The rehabilitated areas can be clearly seen in aerial images.



(a)

(b)

*Seagrass rehabilitation techniques showing (a) harvesting of seagrass material, (b) sprig prior to burial.*

It has been confirmed that rehabilitated meadows can develop the same ecological functions as natural meadows, and that donor beds can recover from the harvesting of seagrass sprigs. The SRRP has also included the development of a mechanical extraction and planting tool concept. Overall, the SRRP has clearly demonstrated that seagrass rehabilitation can be undertaken in a practical and ecologically meaningful manner and for

the first time that large scale seagrass rehabilitation, especially in difficult marine environments, is feasible.

#### The future

The SRRP recently received a 'completed' status from the compliance section of the Office of the Environmental Protection Authority (EPA), indicating that the SRRP had been successfully implemented. However the completion of the SRRP will not signal an end to Cockburn Cement's

commitment to seagrass research, with future work likely to focus on:

- Producing a seagrass transplanting manual for use by other seagrass researchers in both Western Australia and other temperate environments worldwide.
- Trialling seagrass transplants in deeper areas of the seabed in Owen Anchorage which have been dredged by Cockburn Cement. ■

# Global research centre opens in Perth

Western Australia has a new global mining research and development centre.

Funded by BASF, the Australian Minerals Research Centre (AMRC) in Perth will study specific innovation needs for mineral processing and metal production, to help reduce energy and reuse water at mines.

The AMRC site is part of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency and one of the largest and most diverse research agencies in the world.

Speaking at the official opening, Federal Minister for Resources and Energy, Martin Ferguson, said the centre's research would contribute to the global competitiveness of the Australian mining industry, particularly in Western Australia.

With a team of six advanced material researchers to be located at the centre by the end of 2012, and about 20 researchers over the next five years, focus topics will



[L to R] Dr Martin Brudermueller (Vice-Chairman of the Board of Executive Directors of BASF SE), The Hon. John Day MLA (WA Minister for Planning; Culture and the Arts; Science and Innovation) and Ross Pilling (Chairman and Managing Director of BASF Australia and New Zealand) at BASF's official R&D centre opening in Perth.

include advanced rheology modifiers for the improvement of the thickening process for valuables and tailings, as well as modification of the crystallisation process in alumina production. ■



# New Pilbara infrastructure development proposed

*The Henderson Maritime Complex, which will form the model for the proposed Pilbara Maritime Common User Facility.  
Photo: Department of Commerce*

The Western Australian Government has appointed a steering committee to oversee the progress of a proposed Pilbara Maritime Common User Facility (PMCUF) in the state's north west.

The PMCUF steering committee will be chaired by Richard Muirhead and includes representatives from the departments of Commerce, Regional Development and Lands, State Development and Transport, with members from LandCorp and the Port Hedland and Dampier Port Authorities.

Mr Muirhead had extensive experience in industrial development, and major project management. He was instrumental in the development of the Australian Marine Complex Common User Facility in Henderson, which has delivered more than 360 projects worth more than \$900 million since opening in 2003.

The Henderson CUF is an integrated fabrication and assembly area leased to multiple, concurrent users for specific projects. It includes a floating dock and anchors a shipbuilding, defence support and resources development hub that draws manufacturing, fabrication,

assembly and technology capabilities from about 150 companies who have set up business in four linked precincts.

The government is using the AMC as a template for the proposed PMCUF, arguing the project will not only provide infrastructure, including wharves and ship-lifting and maintenance operations, able to support both commercial and naval vessels, but also help develop a regional services industry that could be worth up to \$250 million a year and relieve pressure on Henderson.

*"The Pilbara Maritime Common Use Facility is a concept that was developed in response to increasing demand for facilities to service both the offshore oil and gas market and the defence industry in the region," Commerce Minister Simon O'Brien said.*

"I have appointed an experienced and highly-credentialed steering committee to provide guidance and co-ordinate the delivery of this exciting project."

"The steering committee will be involved in progressing four detailed feasibility studies looking into market demand, economic benefit, front-end engineering and design and financial viability," he said.

"This information will form the basis of a business case that will then be presented to the government for further consideration."

Mr O'Brien said the need for the complex was now "compelling enough" to warrant \$5 million of State Government funding through the Royalties for Regions program.

Funding for the Pilbara development will be examined as part of myriad studies, including market demand, front-end engineering and design and economic benefit analysis, to be co-ordinated by Mr Muirhead's nine-member government committee.

"We know that this capacity is essential to develop WA's potential and because of its importance to national productivity, it merits investment by the Federal Government," Mr O'Brien said.

The PMCUF will provide access to common-use infrastructure for all regional businesses with capabilities in the support and operation of commercial vessels servicing the offshore oil and gas projects, housing and construction, and requirements of the Royal Australian Navy.

Regional Development Minister Brendon Grylls said a common-use facility would provide more opportunities for the State's regional communities to flourish, in line with the government's commitment to developing regional areas.

Mr O'Brien said the proposal was the latest in a series of steps undertaken by the Government to maximise the benefits for WA-based industry from the continued expansion of the State's minerals and energy sector.

"A key plank of the Government's Local Industry Participation Framework includes upgrading the availability of public infrastructure that local industry can utilise to reduce costs, enhance productivity and enter new markets," he said.

*"We anticipate that the PMCUF will be an important economic development mechanism for the region by creating jobs and diversifying the industrial and economic base in the north west."* ■

## Go-ahead for Port Hedland Airport Village

The Western Australian Government has welcomed approval for BHP Billiton Iron Ore's Airport Village development, near Port Hedland's international airport.

The Western Australian Planning Commission granted a preliminary approval to subdivide the land required for the project.

The Airport Village will be built to accommodate the construction workforce to support BHP Billiton Iron Ore's growth plans and its proposed Outer Harbour Development.

Premier and Minister for State Development Colin Barnett said the go-ahead for construction of the accommodation facility was a positive sign for Port Hedland's future and for Western Australia.

"Though BHP Billiton has yet to finally decide on a timetable for building its proposed outer harbour, the Airport Village project will see a significant

expansion of civil infrastructure that will have a valuable role, beyond its use as a construction camp," he said.

*"The Airport Village, which will house up to 2,000 construction workers in stage 1, will help relieve pressure on residential and short-term accommodation in Hedland."*

"In the longer term, it will become the basis for a premium commercial area, servicing an expanding local population, as Port Hedland transforms into the major regional centre envisaged in the Western Australian Government's Pilbara Cities program.

The Department of State Development worked with BHP Billiton Iron Ore, the Town of Port Hedland and relevant agencies to ensure approval processes for the Airport Village proposal fitted the company's tight decision-making timelines.

"Other key approvals from the Port Hedland Council, and the Joint Development Assessment Panel were finalised in June," Mr Barnett said

"Both the Town of Port Hedland and the company have been positive, and willing to negotiate to achieve this outcome.

Mr Barnett said changes to BHP Billiton Iron Ore's State Agreements, passed by the Western Australian Parliament last year, are facilitating the company's expansion plans. ■



*A Royal Flying Doctor Service aircraft on the tarmac at Port Hedland.  
Photo: Simon Phelps, www.facebook.com/pages/Simon-Phelps-Photography*



# Gas conference an eye-opener

The Prime Minister of Malaysia, Datuk Seri Najib Razak (seated), officially opens the 2012 World Gas Conference. Photo: Joe Faizal

The overarching message to emerge from the WGC was the use of gas is changing, with markets more positive about its future.

The world of gas that we are used to thinking about – a long-term supply baseload that goes into market, forecast for 20 to 30 years – doesn't exist anymore," said Marco Arcelli, the executive vice president, upstream gas division, at Italy's Enel Energia said.

Instead, gas will have to be used flexibly to support intermittent renewable energy supplies – mostly from wind and solar – whose falling cost means they are going to be increasingly widespread, regardless of how quickly coordinated clean energy policy develops around the world.

"We need a back-up that is environmentally sustainable affordable and more importantly can pick up load fast – and gas, of course, is the natural answer to this," Mr Arcelli said.

The mood of producers had changed from the previous meeting in 2009 (the world was still in the middle of a severe global financial downturn) to become more positive.

GDF Suez's Jean-Marie Dauger, in his keynote address on the final day, said the industry had regained confidence.

*"Natural gas now appears as the 'natural choice for a sustainable future,' he said.*

DMP's Richard Sellers said there was a steady flow of interest in the DMP stand, with gold and energy of major interest.

Mr Sellers gave two presentations on 'The Resource and Energy potential for Western Australia' and 'Innovations in Environment and Safety Regulation in WA'.

He was also on a panel with Mines and

Petroleum Minister Norman Moore, and the head of Noble Minerals Resources, fielding questions from the 25 media outlets in attendance.

Throughout the forum, a reoccurring theme appeared regarding investors considering middle eastern money as a potential opportunity.

"The presentations highlighted the opportunity for investors to access money from the middle east through the event, as this money does not traditionally flow through the Hong Kong or Singapore capital markets," Mr Sellers said.

"The feeling was that there is significant interest in investing in the resource sector, and that this forum may grow into an excellent opportunity for investment-ready Australian projects to access new capital." ■

# Perth forum attracts 3,500 visitors

The recent inaugural Australian Gas Technology (AGT) conference and exhibition, sponsored by the Department of State Development, drew more than 200 delegates.

Norman Moore, the Minister for the Department of Mines and Petroleum and Simon O'Brien, the Minister for Finance, Commerce and Small Business, led discussion on how Western Australia could position itself as a leader in oil and gas technology.

A major conference theme examined opportunities for global collaboration that attracted capital, research and development and industry partners. A second theme explored how companies were improving training to increase the number of skilled workers.

Other points from the conference included:

- An anticipated 30 per cent growth in world energy demand during the next 30 years.
- Gas will be the only fossil fuel to increase its energy share over that period.
- The importance of labour and construction costs, and migration bottlenecks.

The conference attracted 3,500 visitors and 120 exhibiting companies, including GE, Woodside, Chevron, GHD, Dow Chemicals, Leighton, Wood Group and Transfield.

The "new-born" AGT is a sibling to the annual Australasian Oil and Gas (AOG) exhibition, Australia's largest annual oil and gas industry forum, to be held in Perth from 20-22 February 2013. ■



# Japan and WA: a two-way 'street'

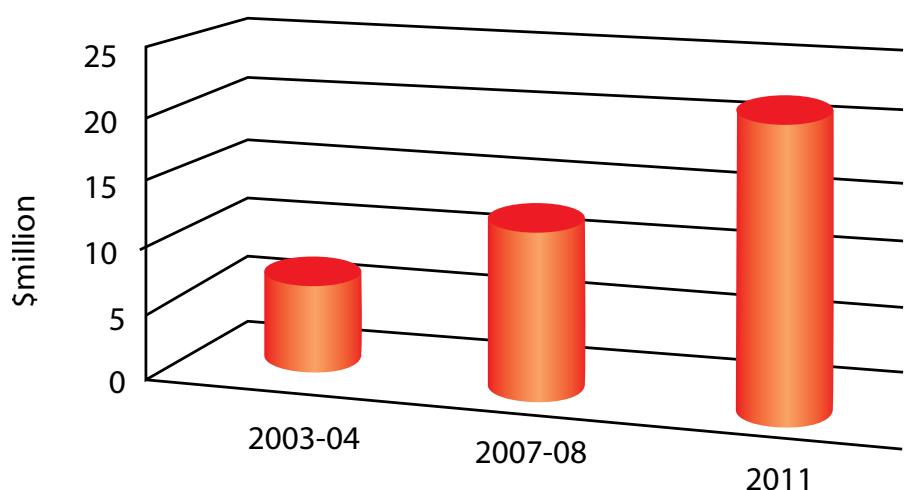
While major domestic resources projects form the backbone of the Department of State Development's core business, the Western Australian Government assists local businesses and investors to capitalise on other opportunities through its International Trade and Investment division (ITI). With offices located in 10 of the State's key trading regions, ITI aims to drive economic growth by facilitating exports and investments, and promoting education and cultural ties. In this issue we look at our second-largest trading partner, Japan. The Government of Western Australia has two offices in Japan, located in Tokyo and Kobe. The Tokyo office was established in 1968, the first state government office to be established in Japan, to assist the carriage of the massively important iron ore trade. A second office was established in Kobe in 1989 to support the expanding sister state relationship, but this office is now a fully-fledged trade and investment support vehicle, focussing on the Kansai region. These offices assist Western Australian businesses access export opportunities in Japan, and Japanese companies to identify investment opportunities in WA.

Of all our trading partners, none have been more vital to the development of Western Australia than Japan. Without foundation investment from Japan, our iron ore and LNG sectors would not be at today's levels.

A snapshot of trade between Australia and Japan shows almost half (44.8 per cent) of all exports comes from WA, with the bulk of that (49.8 per cent) being in iron ore and concentrates.

Japan relies on WA for 60 per cent of its iron ore imports and 20 per cent of its liquefied natural gas imports – a sector which looks set to experience stronger than average growth. In fact, Japan is by far WA's largest export market for LNG and this will not change in the foreseeable future.

While China may have overtaken Japan as Western Australia's main trading partner, Japan has been the number two principal export destination for WA products since 2006.



*Seven years of increasing WA export growth to Japan.  
Source: Australian Bureau of Statistics.*

WA's reliance on Japan as an export market is constant. The value of WA exports to Japan has continued to increase from \$6,937 million in 2003/04 to \$12,904 million in 2007/08 and \$22,600 million last year.

There are also strong cultural ties, enhanced by a sister-state relationship with Hyogo province, and nine sister-city relationships.

*Continued page 22*



# Japan and WA: a two-way ‘street’



*Prof Abu Siddique*

## Resources: the foundation

Trade between Japan and Western Australia reaches back more than 100 years, with the commencement of fishing and pearling activities in the State. A trip north to Broome is all one needs to be reminded of the Japanese connection.

The trade relationship between the two countries had a rocky start in the 1930s and only became officially established in the early 1960s. There was some mining trade in 1937 (ore from Koolan Island in Yampi Sound) but politics intervened, along with a survey of national reserves which concluded Australia did not have enough iron ore to export (only 264 million tonnes). How times, and statistics, have changed.

Japan’s demand for raw materials has been a key factor in the economic growth of the state and, indeed, the nation. These exports have fuelled both countries’ growth.

Australia and Japan have been involved in the resources trade, notably iron ore, since the 1960s, when WA’s huge iron ore deposits were fully revealed, and preceded by the lifting in 1959 of a federal embargo on the export of iron ore to Japan.

While the business partnership was founded on iron ore, a factor that continues to be a mainstay, there has been an expansion into many other products and sectors, including gas, agriculture and education.

It’s not all one-way traffic, with imports of semi-processed and finished goods from Japan significant for Western Australia.

According to Associate Professor Abu Siddique, from the University of Western Australia, it’s a highly complimentary relationship.

The WA and Japanese economies mirrored each other in rapid growth during the 1960s and 70s and slowed from the mid-70s to late 1980s. From the late 1980s through to the early 1990s an increase in Japanese steel production led

to a recovery of the WA iron ore industry. Another period of low Japanese economic growth, and downturn in iron ore exports followed.

“The boom times from Western Australia’s iron ore exports corresponded with the boom times for the Japanese economy,” says Prof. Siddique, who, along with WA Premier and Minister for State Development Colin Barnett, contributed to the 2009 publication, *An Enduring Friendship. Western Australia and Japan: Past, Present and Future*.

“The start of the trading relationship between Western Australia and Japan corresponds with Japan’s high economic growth. The combination of the discovery of vast iron ore deposits in Western Australia and the rapid expansion of the Japanese economy led to the opportunity and realisation of an extremely profitable trading relationship.

*“Quite simply, Japan’s demand for iron ore initiated the WA mining industry, while our exports provided an essential fuel for their industry-based economic development.”* ■



*WA Premier Colin Barnett at the opening of the Bank of Tokyo branch in Perth.*

## Premier strengthens bonds

Today, the relationship continues to underpin the prosperity of both nations.

Highlighting the importance of the relationship, Mr Barnett made Japan his first overseas stop on becoming Premier in 2009. Late last year he brokered a trade co-operation deal

with Japan’s overseas development bank, the Japan Bank for International Cooperation (JBIC). This was the first Memorandum of Understanding (MoU) between a Japanese government bank and a non-national government. The first official meeting pursuant to the MoU is scheduled to take place in Tokyo in September this year.

“Japanese investment is critical for developing our resources and visitors from Japan are an important and very welcome part of our tourism market,” Mr Barnett said.

“I expect this closer relationship will reinforce JBIC’s support for Japanese companies’ investment activities in Western Australia, particularly in the minerals, energy and other natural resource sectors.”

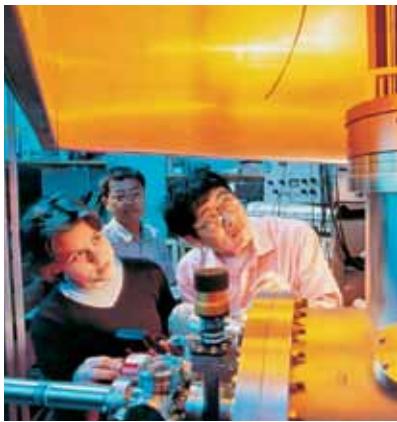
Craig Peacock, the WA Government’s representative in Tokyo for the past 10 years, says the Japanese place great importance on long-term relationships.

“They are focused on the long-term and developing a win/win outcome for all parties, a significant difference in how they do business compared with some of our other Asian trading partners,” said Mr Peacock.

There are other aspects of trade with Japan that many people are unaware of.

“There has been a substantial decrease in the time taken to reach investment decisions,” said Mr Peacock.

# Japan and WA: a two-way ‘street’



## Education: a pathway to the future

The figures don't lie. Clearly there is a strong bond between WA and Japan, particularly in education.

In the past 31 years, the sister state relationship between Western Australia and Hyogo has brought more than 7,000 students and teachers to Western Australia.

These activities are enhanced by agreements between the Department of Education Western Australia and the Hyogo Board of Education. Additionally, there are 19 WA primary and secondary schools that have sister-school relationships with Japanese schools.

"Partially this is due to recent tragic events in Japan, but the trend had been occurring for quite some time prior to that. The Japanese are recognising they need to secure resources in a competitive offtake market."

"This is particularly true for iron ore and now in energy, reflected in increased demand for LNG, which is good for WA."

"There's also tremendous potential in the agricultural sector, where the Japanese are not self-sufficient. There has been quite a noticeable increase in the uptake of all grains, with the exception of rice, of course."

One businessman who has seen the change in WA's economic relationship with Japan is Keizo Sakurai, the general manager of Mitsui and Co Australia's Perth iron ore division.

Mr Sakurai is on his third term of working in Australia for Mitsui – a company which first established a presence in WA trading wool at Fremantle in 1901. He was here for three months in 1983 and from 1986 to 2001.

Japanese is taught in 104 primary and 38 WA secondary schools by 150 teachers (40 of whom have Japanese backgrounds). At the year 11 and 12 level there are more students studying Japanese in public schools than any other language.

The WA Department of Education's Principal Consultant for Languages, Dr Gayathri Hathotuwa-Gamage, said the year 11 and 12 program continued to grow, with a 40 per cent increase from 2009 to 2011 (inclusive).

*"The main aim is to encourage cultural understanding of Japan and, like having any second language, it increases a student's job prospects," said Dr Hathotuwa-Gamage.*

At a tertiary level, the University of Western Australia has collaborated since 2008 with Kobe University (Hyogo) and China's Zhejiang University in health science and bioengineering, with annual forums a feature of the partnership. ■

"While Perth hasn't changed much visually, there have been many changes in business," said Mr Sakurai, who is also chairman of the Japan Chamber of Commerce and Industry (JCCIP) in Perth.

"We are seeing a lot more Japanese utility companies establishing offices here now. This reflects Japan's growing need for energy supplies."

Through the JCCIP, which has 51 members (both Japanese and Australian members) Perth-based Japanese firms share information and attend seminars on Australian business – the most recent being on industrial relations.

"The aim is to enhance our understanding of the Australian landscape, both in business and in culture," said Mr Sakurai.

*"Western Australia is a tremendous place to do business. It is stable politically and industrially. And importantly it brings prosperity to both partners."* ■



Designer Jonte Pike, who travelled to Japan to study textiles in Banshu.

## Fashion: WA students make their mark

The WA Government's Kobe office has had success in facilitating the Banshu Project, a textile design program, which is now in its second year.

Each year students from WA design schools are selected to participate in the project, which enables winners to participate in the Nishiwaki Fashion Festival and work with world-class Japanese textile manufacturers in the city of Banshu (Hyogo prefecture). Banshu textile is made by a unique method where yarns are dyed in advance and patterns are woven with the dyed yarns. It is suitable for a wide range of garments and is distributed worldwide to high-end fashion houses such as Hermes, Louis Vuitton and Giorgio Armani.

"This scholarship program is another example of how the State Government is working to strengthen the ties between WA and Hyogo," said WA Premier Colin Barnett. "It helps our fashion and design graduates develop important links with Japan, which boasts one of the biggest fashion industries in the world."

Jonte Pike, a former student of the WA Institute of Fashion and Textiles who based her winning designs on Turkish fashion, received one of the scholarships in 2011.

"I loved being immersed in the Japanese culture and their textiles are awesome," she said. "We visited all the Banshu factories so we could understand the textile processes, which assist us when we come to do our designs." ■



# Japan and WA: a two-way ‘street’

## Steady growth in resource agreements

The results of Premier Barnett’s most recent visit to Japan brought rapid results. Both JBIC and the Bank of Tokyo-Mitsubishi UFJ Ltd (BTMU) signed a \$302 million co-financing loan agreement with Osaka Gas Gorgon (OGG), a wholly-owned Australian subsidiary of Japan’s Osaka Gas Company

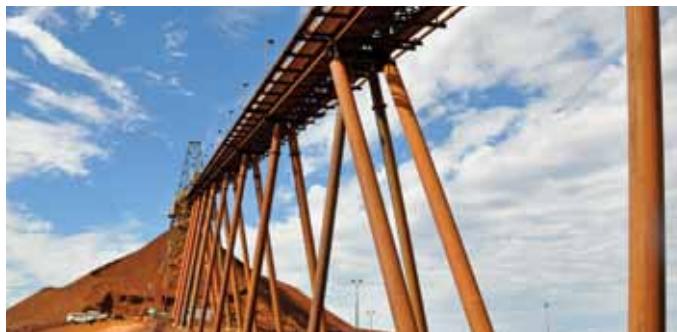
(Osaka Gas), for the mega Gorgon LNG (liquefied natural gas) project in Western Australia. BTMU subsequently opened a branch in Perth in 2012.

Recent investment by Japanese companies in WA resource projects include:

Company	Project
Kobe Steel	Southdown magnetite project
Mitsubishi Development Pty Ltd	Oakajee Port and Rail Pty Ltd
Marubeni Corporation and STX Corporation	Roy Hill Iron Ore Project
Tokyo Gas and Kansai Electric Power Company Inc. (KEPCO)	North West Shelf LNG
Inpex Corporation	Oil and gas in the Carnarvon, Browse and Bonaparte basins, Van Gogh (53km north of Exmouth) and Ravensworth (45km off Exmouth) oilfields.
JX Nippon Oil & Gas Exploration (Australia)	Sulphur crude oil from the Mutineer and Exeter oilfields.
ITOCHU Australia Ltd	Iron ore, biodiesel and renewable energy, copper and red zinc, forestry, pulp and woodchips joint venture.
Mitsui	Iron ore operations in the Pilbara including Mt. Newman, Yandi and Mt. Goldsworthy, Robe River.
Nippon Steel (10.5 per cent) and Sumitomo Metal Industries	Robe River iron ore.
KEPCO and Sumitomo	Bluewaters 1 and 2 coal-fired power stations near Collie.
Tokyo Electric Power Company and Japan Oil, Gas and Metals National Corporation	Wheatstone liquefied natural gas project.

In the wake of the Fukushima nuclear accident, Japanese companies have moved to secure gas supplies. In May a consortium, which includes TEPCO, the operator of the crippled Fukushima nuclear plant, and state-backed Japan Oil, Gas and Metals National Corporation (JOGMEC) announced they would take a \$356 million stake in the Wheatstone liquefied natural gas project. This comprises an eight per cent stake of the onshore liquefaction facilities and 10 per cent in field licences.

While resources comprise the bulk of WA’s economic activity with Japan, other sectors provide significant input. ■



*Mitsui has a 33 per cent share in the Robe River Iron JV. Iron ore from Mesa A mine is conveyed for loading onto a train. Picture: Rio Tinto*

## Culture: Japan by the (City) Beach

Cultural activities also have an important part to play in the WA-Japan relationship, with a little slice of Japan to be found in the Perth suburb of City Beach.

The Hyogo Prefectural Government Cultural Centre was established in 1992 to commemorate the 10th anniversary of the Hyogo-WA sister-state relationship, now in its 31st year.

The centre, the only one of its kind in Australia, promotes Japanese language and culture, and assists in exchange programs in sport, education and the arts, while providing a large resource library and conducting various seminars, workshops and activities for all age groups and interests.

Staffed for the past 13 years by Deputy Director, Melissa Luyke, the centre, which has been at the former City Beach High School since 2009, is fully funded by Hyogo Prefectural Government.

The centre’s recently-arrived Director, Akira Yoshida, says while Hyogo has a long history of being economically-focused (companies such as Kawasaki, Canon, Kobe Steel and Panasonic have headquarters there) it also knows the importance of culture and the arts.

“We are one of the most advanced industrial areas in Japan,” said Mr Yoshida, who is a former director of the Kobe arts centre and tourism.

One of the biggest and most successful programmes run in the centre is the Japanese language immersion workshops for students. These are coordinated by the WA Department of Education’s Japanese Language Advisor, Ms Yuko Fujimitsu, and presented by professional actor and language educator from Sydney, Shingo Usami, together with a team of local professionals.

Students cover many aspects of Japanese society, culture, language and cuisine. Last year the centre hosted more than 1,600 students from 90 schools. ■

# Japan and WA: a two-way ‘street’



WA Department of Agriculture wheat researchers with Japanese counterparts.

## Agriculture: WA's main market

Japan rates as the main market for WA's agriculture sector, with the WA Department of Agriculture and Food (DAFWA) working closely with Western Australia's Japan offices to facilitate export opportunities.

WA's agricultural sector exports close to 50 per cent (\$940 million) of its products to Japan, the main ones being wheat \$373 million, barley \$106 million, hay \$65 million and malt \$23 million (woodchips – a forest product, but not considered agricultural – is the second largest export at \$262 million.

In comparison, China/Hong Kong is the second largest market at \$867 million.

The department's Director of Trade Development, Simon Johnson, says the Japan partnership, and that of other Asian nations, should never be underestimated.

"For a start, Japan is the world's third largest economy," says Mr Johnson.

"But more importantly, look how long we have been in business together and what they have done to develop the WA economy.

"We have a steady growth in trade with Japan, and it's a reliable market."

According to Mr Johnson, the agricultural sector can position itself to supply niche products to Japan. Such is the case with the \$500 million Japanese noodle market. Following poor production in 2010, Japan declared a strong demand for WA noodle wheat. However, because of poor growing conditions, the quality could not be met.

DAFWA and industry partners worked with their Japanese counterparts to ensure the blend returned. This, says Mr Johnson, demonstrates a difference in the Japanese market when compared to many others.

"The Japanese will pay a premium price for a high-quality product," said Mr Johnson. "However, it's not simply a case of just walking in and selling. Like any market, it takes time to establish relationships, but possibly more so in Japan.

"Certainly resources pave the way, so we can leverage from that. But each product will stand or fall on its own merits." ■



## Safety alert for small mine operators

The Resources Safety Division of the Department of Mines and Petroleum (DMP) is currently running an awareness campaign directed at all small quarry and sand pit operations in WA.

At present, some operators are unaware that small quarries and sand pits – specifically those that produce products for sale or commercial use – are considered to be 'small mines' and therefore may fall under the *Mines Safety and Inspection Act 1994*.

Any operation that falls under this Act must have an approved Project Management Plan (PMP) in place in order to operate.

The PMP is used to identify potential major safety risks for the proposed operations, and acts as a starting point for developing ongoing safety management strategies to address those risks.

If such a plan is not in place, the safety of workers may be compromised and the department's mines inspectors will suspend operations until a PMP is approved. Resources are available to assist operators to comply.

DMP State Mining Engineer Simon Ridge said that the awareness campaign was part of the department's drive to remain proactive in promoting improved safety and health outcomes for the mining industry.

*"It is our duty to ensure operators understand and adhere to the mines safety legislation, foremost to protect the people involved in these small mine operations," he said.*

"A PMP has a threefold benefit: it sets up a system to help keep people safe, it can improve workplace efficiency and it fulfils the legal obligations for mining operations.

"Our inspectors do have the power to temporarily shut down operations until these plans have been submitted and approved."

All 'small mines' are also required to notify Resources Safety's District Inspector of Mines before commencing, recommencing, suspending or closing site works.

In addition, local government authorities expect some quarries and sandpits to apply for an extractive industry licence, depending on site locations. ■

**For more information, log onto:**  
[www.dmp.wa.gov.au/14695.aspx](http://www.dmp.wa.gov.au/14695.aspx)



*Executive Director for Resources Safety, Malcolm Russell retires.*

# End of era for WA safety leader

One of the Department of Mines and Petroleum's (DMP) top resources safety experts announced his retirement earlier this year, following 10 years at the helm.

Outgoing Executive Director for Resources Safety, Malcolm Russell, called it a day in July.

Mr Russell, who has spent more than half of his career in safety regulation, started at the then Department of Minerals and Energy in 2002, staying with the WA resources regulator as it moved from the Department of Industry and Resources to the Department of Consumer and Employment Protection and then DMP.

He said his biggest challenge came when DMP was formed in 2008, requiring him to oversee the amalgamation of the mining, dangerous goods and petroleum safety inspectorates under the resources safety banner.

"I think a lot of people forget we put in a lot of effort to streamline the delivery of safety regulation services to these three related sectors," Mr Russell said.

"I mean, we managed to establish a dedicated agency to regulate the entire industry – and I couldn't be any more proud of how well we did this."

Once DMP was up and running, Mr Russell turned his attention to its Reform and Development at Resources Safety (RADARS) strategy, which was established in 2009.

Under RADARS, the department has strengthened its ability to regulate – introducing performance-based remuneration packages and a competency-based training and development program.

This has helped the department recruit more safety inspectors for its team.

Since the implementation of RADARS, 50 inspectors have been hired – nearly half of this total in 2011.

The department aims to appoint four petroleum Inspectors, along with three mines inspectors, later this year.

Despite the reform still being in full swing, Mr Russell said he is comfortable to hand over the reins.

*"Everything is set in motion, there is nothing standing in the way of the department's success right now – and I can take comfort in the fact that I helped it get there," he said.*

"In the end, the department strives to be recognised as a leading practice safety regulator and it now has the right mix of funding, training, competency and capacity to achieve this."

"I have every confidence that the commitment of individuals within the team will ensure RADARS is a complete success."

DMP Director General Richard Sellers commended Mr Russell on his work at the department, saying he would be missed.

"I reluctantly accepted Malcolm's resignation but I did so with great appreciation," he said.

"Malcolm has been instrumental in driving the necessary sweeping changes to safety reform at the department over the past three years and we could not have done it without him."

"We now have a legacy to build on and will achieve all of the long-term aims set out by Malcolm under his watch."

State Mining Engineer Simon Ridge, the department's previous Director of Mines Safety, has been promoted to Malcolm's role of Executive Director for Resources Safety.

Simon, who took out the prestigious Australasian Institute of Mining and Metallurgy's Jim Torlach Health and Safety Award in June (see story, page 12), said he was excited to take up the new position.

"My team and I have already achieved a great deal, so I am really looking forward to further strengthening safety regulation across the whole industry in the years to come," he said. ■

# Flashback

## Recession hits hard

Uncertain times and a slightly downbeat opening statement 'welcomed' readers on the front page of the third issue of *Prospect* for 1982, with Peter Jones, the Minister for Resources Development, highlighting the world recession and how it will impact Western Australia.

"Some industries are operating at under-capacity, a number of projects have been forced to cease operations and the implementation of new projects has been delayed," he wrote.

Then, as now, WA seemed largely unaffected by global activities, with the State "still maintaining a considerable rate of economic expansion, with investment in excess of \$1.25 billion underway and a large share of the contracts being awarded to local industries".

It was reported the "biggest piece of equipment for the North West Shelf gas project, the 22,000 tonne North Rankin A jacket arrived at Burrup ... and was towed to its planned location, some 130km off the coast from Dampier".

Commissioned in 1984, North Rankin A was then the largest gas production platform in the world. Today the platform produces gas and condensate from the North Rankin and Perseus fields and has 29 production wells – 22 intersecting the North Rankin field and seven intersecting the Perseus field. The platform has a daily production capacity of up to 51,000 tonnes of gas and 5,400 tonnes of condensate, with dry gas and condensate transported via a trunkline system to the Karratha Gas Plant for processing.

Several other contracts for the NW Shelf project were signed off, including \$8 million for administration areas, \$20 million for infrastructure and a contract for design and installation of the gas treatment complex.

The government invited proposals to establish a sugar cane industry on the Ord River irrigation area, despite deep opposition from existing sugar producers and the Queensland Government of Sir Joh Bjelke-Petersen. Production eventually began in 1995. Today, one third of the area's 117 km<sup>2</sup> of farmland is used for sugar cane cultivation. The current government is expanding the area, with the imminent release of 15,200 hectares of irrigable agricultural land near Kununurra.



### WA rides high on ocean waves

Shipbuilding was proving to be one of the major success stories for the WA economy in 1992, with the state dominating the nation's export figures in the sector. WA boatbuilders, awash with orders mostly from Asia, would record sales of more than \$240 million for the year. At the time, WA was producing 10 per cent of the world's lightweight passenger ferries. The success is ongoing through the vibrant shipbuilding precinct at Henderson, south of Fremantle.

Labour reforms were producing positive outcomes, with days lost through industrial disputes being halved in less than a decade. Staff were becoming more involved in day-to-day decisions, workplaces were seen to be more congenial and the old notion of narrowly-defined job definitions and rigid trade demarcations were disappearing.

Given today's current use of social media as a selling platform, it was interesting to read an article on companies starting to recognise the power of computers in marketing. Perth-based Interactive Presentations' Scott Balson developed disks for News Limited containing information on their 80 newspapers.

Two new gas projects were finding places in the energy market. *Prospect* reported the \$130 million Harriet project, 120km from Dampier, started delivering gas. This was the state's first 'gas-gathering' project [it collects gas associated with oil production previously burnt as waste, and gas from adjacent gas fields]. The Harriet startup came just two months after the commissioning of the \$9.4 million Beharra Springs project, 350km north of Perth. Late last year the operator, Origin, announced additional finds in the area.

### China gas deal sealed

The big news in the September-November issue of 2002 was partners in the North West Shelf Project securing a \$25 billion agreement to supply China's Guangdong Province with more than 3 Mt of liquefied natural gas annually for 25 years, from 2005-06. The then Minister for State Development, Clive Brown, said: "This could be just the tip of the iceberg in terms of our state's ongoing resources trading relationship with China."

Certainly the Chinese knew their investment would be safe, with Australia having just been rated by ResourceStocks magazine as the least risky country in the world to invest in, ahead of Canada and the US. Last year the magazine rated us sixth, behind Finland, Chile, Burkina Faso, Botswana/Sweden (eq.) and the US. Canada had slipped to eighth.

The magazine took an in-depth look at the Kwinana Industrial Area, which generated more than \$4 billion to the economy and provided direct employment for more than 3,600 people. Today the area contributes more than \$15 billion annually and 4,500 people are directly employed there.

Kwinana's 'next-door neighbour', the \$204 million Australian Marine Complex at Cockburn Sound (featured in the previous issue), was starting to take shape. In 10 years it has become Australia's leading area for shipbuilding and marine related industries, servicing Australia and international markets.

Exploration, as always, continued apace, with then 'hotspots' being shown as Jaguar Prospect (base metals, 70km south of Leinster), Nefertiti and Pandora gold (Kalgoorlie), Oombulgurri North Kimberley gold project, West Musgrave nickel, Waterloo nickel (48km south of Leinster) and the Waugh gold deposit (near Paraburdoo). ■

# Commenced Operations

## AGRICULTURE

### East Kimberley – Ord – Ord/East Kimberley Expansion Project

WA STATE GOVERNMENT

The State Government has committed \$311 million to increase the existing amount of irrigated land in the Kununurra region by adding 15,200ha in the Weaber Plains. This funding will provide the construction of irrigation channels, roads and off-farm infrastructure to service the future needs of the region's growing population and sustain economic growth. The Commonwealth Government has committed \$195 million of funding for social and common use infrastructure in the East Kimberley region through the East Kimberley Development Package (EKDP) National Partnership Agreement (NPA). Construction is well underway and some of the infrastructure projects are now complete such as the Wyndham Early Learning Activity Centre which was opened by Prime Minister Julia Gillard on 18 July 2012. The package will be fully implemented by June 2013.

Expenditure: \$506m.

Employment: Construction: 761

## BAUXITE

### Worsley/Boddington – Alumina Refinery – E & G Project Expansion – 3.5 to 4.6Mtpa

BHP BILLITON WORSLEY ALUMINA PTY LTD

BHP Billiton announced in May 2008 the go-ahead for the Efficiency and Growth expansion project at its Worsley alumina refinery. The expansion project will lift capacity of the refinery from 3.5 to 4.6Mtpa through expanded mining operations, additional refining capacity and upgraded port facilities. First production for the expansion project at the refinery was achieved in Q1 2012. The \$US3.4 billion construction project is complete and the ramp up phase is underway.

Expenditure: \$3.4b.

Employment: Construction: 1500; Operation: 200

## GOLD

### Boddington – Gold Mine

NEWMONT BODDINGTON GOLD PTY LTD

Newmont Boddington Gold Pty Ltd, on behalf of Newmont Boddington Pty Ltd (66.67%) and Saddleback Investments Pty Ltd (33.33%), has developed the Boddington Gold mine based on mining the extensive bedrock resource that underlies the mined-out oxide resource. Early in 2009, Newmont announced that it intended purchasing then joint venture partner, AngloGold Ashanti's 33 per cent interest in the project and this was finalised in June 2009. The first gold pour was reported on 20 September 2009 and the Company has also trucked its first shipment of copper concentrate to the port in Bunbury. Production will average around 800,000 ounces per annum of gold and about 30,000 tonnes per annum of copper in concentrates over a 24-year mine life.

Employment: Operation: 650

## INFRASTRUCTURE

### South West Region – Kemerton (HUILS – Heavy Use Industrial Land Strategy)

WA STATE GOVERNMENT

Kemerton Industrial Park, located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, only 90 minutes away by road. The estate comprises 7,543ha of land, including 2,019ha of industrial core, 293ha support industry area and 5,231ha buffer areas. It is accessible to the Port of Bunbury by road and planned rail link and is serviced by major road links to the metropolitan area. Under the Heavy Use Industrial Land Strategy, the Government is progressing Kemerton towards project ready status by undertaking environmental,

heritage and planning approvals for the estate. Work towards progressing approvals commenced in 2009 and is anticipated to be completed in 2013/14, by which time the structure plan and zoning adjustments will also have been completed.

## IRON ORE

### Mid West Region – Extension Hill Hematite Mine

MOUNT GIBSON IRON LIMITED

Mount Gibson Iron has developed a 3Mtpa hematite mining operation at Extension Hill, 260km south east of Geraldton. The ore is trucked to a rail head near Perenjori then railed to the port of Geraldton for export.

Expenditure: \$73m.

Employment: Construction: 150; Operation: 100

### Pilbara – FMG Chichester – Iron Ore Mine, Rail and Port Development

FORTESCUE METALS GROUP LTD

Fortescue Metals Group (FMG) operates iron ore mines at Cloudbreak and Christmas Creek in the Chichester Ranges of the eastern Pilbara, serviced by a multi-user railway and port facilities at Port Hedland with a current capacity of 55Mtpa. Port facilities are currently being expanded to the approved capacity of 120Mtpa. This is expected to be realised by the end of June 2013.

Expenditure: \$4b.

Employment: Operation: 3200

### Yilgarn – Koolyanobbing Iron Ore Upgrade

CLIFFS ASIA PACIFIC IRON ORE PTY LTD

In June 2012, Cliffs completed an upgrade of its Koolyanobbing iron ore operations from 8.5Mtpa to around 11Mtpa. Koolyanobbing is located 50km north east of Southern Cross and also includes the Mt Jackson and Windarling mines. The improvements comprised of enhancements to the existing Kalgoorlie-Esperance rail infrastructure, an increase in rolling stock and upgrades to various other existing operational constraints. As part of the increased production at Koolyanobbing, the development of the Mt Jackson J1 deposit, which contains 30Mt of iron ore reserves, was completed in Q1 2012.

Expenditure: \$320m.

## LITHIUM

### Ravensthorpe – Mount Cattlin Lithium Project

GALAXY RESOURCES LIMITED

Galaxy Resources Limited commenced commissioning of the Mt Cattlin lithium concentrate processing plant in September 2010. Galaxy produce at full capacity 137,000tpa of spodumene concentrate for export to China. Galaxy started exporting its product to China in the first quarter of 2011. Galaxy advised in July 2012 of a halt in its operations at the Mt Cattlin project in WA due to high internal inventory levels of spodumene ahead of the Jiangsu Lithium Carbonate Plant. In China, Galaxy will produce 17,000tpa of battery grade lithium carbonate at its Jiangsu chemicals plant. A large proportion of this will make its way into the growing markets of China and Japan.

Expenditure: \$75m.

Employment: Construction: 100; Operation: 100

## NICKEL

### Ravensthorpe – Ravensthorpe Nickel Operation

FIRST QUANTUM MINERALS AUSTRALIA NICKEL PTY LTD

FQM Australia Nickel (FQMAN) acquired the Ravensthorpe Nickel Operation (RNO) from BHP Billiton in February 2010. After 18 months of modifications and re-commissioning, FQMAN achieved commercial production in December 2011. RNO is an open cut mine and hydrometallurgical

process plant that produces a mixed nickel cobalt hydroxide intermediate product. FQMAN aims to produce 39,000tpa nickel metal for the first five years after recommencement and 28,000tpa nickel metal over the current anticipated mine life of 32 years.

Expenditure: \$300m.

Employment: Operation: 480

## OIL & GAS

### Carnarvon Basin – Pluto LNG Project

WOODSIDE ENERGY

Approved for development in July 2007, the Pluto LNG foundation project processes gas from the Pluto gas field, located about 190km north-west of Karratha in Western Australia, into LNG and condensate. The Pluto and Xena gas fields are estimated to contain 5 trillion cubic feet (Tcf) of dry gas reserves and an additional 0.2Tcf of contingent resources. The initial phase of the project comprises five subsea wells on the Pluto gas field connected to an offshore processing platform in 85m of water. Gas is piped about 180km to the onshore plant in a 36-inch pipeline. Onshore facilities at the Pluto LNG Park include a single LNG processing train with forecast production capacity of 4.3Mtpa, in addition to storage facilities and an export jetty.

Expenditure: \$15b.

Employment: Construction: 5000; Operation: 300

## AMMONIUM NITRATE

### Kwinana – Ammonium Nitrate Facility Expansion

CSBP LIMITED

In December 2011, the Wesfarmers Board gave final approval to proceed with the expansion of CSBP's ammonium nitrate production facility at Kwinana from its current capacity of 520,000tpa to 780,000tpa. CSBP received environmental approval for the expansion in October 2011. The expansion involves the construction of an additional nitric acid plant and ammonium nitrate plant, together with an upgrade of the existing prilling plant and other infrastructure work. Onsite construction is underway, with current project timelines indicating that the expansion will be completed in the first half of 2014.

Expenditure: \$550m.

Employment: Construction: 300; Operation: 10

### Pilbara – Burrup Industrial Estate Site D – Burrup Nitrates

YARRA INTERNATIONAL ASA

A heads of agreement has been signed between Yara, Orica and Apache to form a joint venture - Burrup Nitrates Pty Ltd (BNPL). BNPL has conducted a feasibility study into the construction of a 350,000tpa Technical Ammonium Nitrate (TAN) plant to be located on the Burrup Peninsula. Ammonia feedstock will be supplied from Yara Pilbara Fertilisers Pty Ltd (YPFPL), which operates its facility directly adjacent to the proposed location for the new TAN plant. Yara Pilbara will be the operator of the TAN plant and Orica will manage the product sales and distribution. Yara and Orica will each have a 45% interest in the joint venture and Apache the remaining 10%. It is expected that all manufactured product will be sold into the Pilbara region. Regulatory approvals have been finalised, a contract for the engineering, procurement and construction of the new plant has been executed and the company is aiming for operations to commence by Q4 2014.

Expenditure: \$600m.

Employment: Construction: 600; Operation: 65

# Committed Projects

## GOLD

### Kalgoorlie – Tropicana Gold

#### ANGLOGOLD ASHANTI/INDEPENDENCE GROUP JOINT VENTURE

AngloGold Ashanti, as Joint Venture Manager, has continued to progress development of the Tropicana Joint Venture gold mining project proposal 330km north east of Kalgoorlie. Following State and Commonwealth Environmental approvals in the second half of 2010, key State and local government approvals required for construction of a 225km road, bore field, pipelines, airstrip, accommodation village, power station and mine plant are either in place or in the final stages. Road construction is complete and a sealed 2.1km airstrip is operational. Plant construction has commenced and mining is scheduled to start Q3 2012. The project is on track for first gold production in 2013.

Expenditure: \$700m.

Employment: Construction: 700; Operation: 400

## HEAVY MINERAL SANDS

### Keysbrook – Heavy Mineral Sands Mine

#### MATILDA ZIRCON LIMITED

Matilda Zircon is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. It has ore reserves of 41Mt, containing 1.2Mt of heavy mineral concentrate. The project is expected to produce 80,000tpa of leucoxene products and 12,000tpa of zircon over its eight year mine life. The project has received environmental approval from the Minister for Environment, as well as development approvals and extractive industry licences from the Shires of Murray and Serpentine-Jarrahdale. In May 2012, the company entered into a strategic alliance whereby Doral will toll treat the Keysbrook ore at its mineral separation plant in Picton, near Bunbury, for the life of the project. Front End Engineering and Design (FEED) work on the wet plant and associated mine site infrastructure has commenced and is scheduled to be completed during Q3 2012. Matilda Zircon plans to start site construction in early 2013, with first production expected in late 2013.

Expenditure: \$50m.

Employment: Construction: 35; Operation: 30

## INFRASTRUCTURE

### Pilbara – Ashburton North Strategic Industrial Area

#### WA STATE GOVERNMENT

The State Government is developing the Ashburton North Strategic Industrial Area (ANSIA) as a hydrocarbon precinct in the Shire of Ashburton, 11km south west of Onslow, to enable the development of natural gas projects and associated industries to exploit the gas reserves in the Carnarvon Basin and Exmouth Gulf. In addition to the industrial area with proponent sites and general areas, the ANSIA includes a port with common user facilities, and common user infrastructure corridors. The ANSIA estate is intended to cater for the development of hydrocarbon processing, storage and exportation, with the overall vision of creating an industrial estate that successfully and safely manages the varied land uses in the area. Three foundation proponents, BHP Billiton, Chevron, and ExxonMobil have been allocated land within the ANSIA. Chevron made a final investment decision in September of 2011 and construction has commenced. Gas to market is scheduled for 2016. In Q3 2011, BHP Billiton commenced construction of the Macedon project, with gas production to commence in early 2013.

## IRON ORE

### Mid West Region – Karara Iron Ore

#### KARARA MINING LTD (GINDALBIE METALS LTD / ANSTEEL JOINT VENTURE)

The Karara Iron Ore Project is Karara Mining's cornerstone production project in the Mid West region. Construction commenced in November 2009. Karara will deliver some 10Mtpa of iron products by Q3, 2012, comprising 8Mtpa of high grade magnetite concentrate and blast furnace quality pellets and 2Mtpa of Direct Shipping Ore hematite. The Project is underpinned by a JORC compliant resource base comprising a 977Mt magnetite reserve, a 2.518Bt magnetite resource, a 10.9Mt hematite reserve and a 16.2Mt hematite resource.

Expenditure: \$1.975b.

Employment: Construction: 1500; Operation: 500

### Pilbara - BHPB – Inner Harbour Expansion – Port Hedland

#### BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.9 billion (BHP Billiton's share) to increase total inner harbour installed capacity to 220Mtpa with debottlenecking opportunities to 240Mtpa. The project is currently on schedule (overall project is 59%) and on budget.

Expenditure: \$1.824b.

### Pilbara – BHPB – Port Blending and Rail Yard Facilities

#### BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.4 billion (BHP Billiton's share) to optimise resource and enhance efficiency across the BHP Billiton WA iron ore operation supply chain. The project is currently on schedule (overall project is 22% complete) and on budget.

Expenditure: \$1.344b.

### Pilbara – Hope Downs 4 Iron Ore Mine

#### RIO TINTO IRON ORE

Rio Tinto and its joint venture participant, Hancock Prospecting Pty Ltd, are currently developing the Hope Downs 4 iron ore mine at an estimated capital cost of US\$1.2 billion. The new open-cut mine will have a production rate of 15Mtpa of high quality iron ore. The development of Hope Downs 4 also involves the construction of a 53km railway line to connect to the existing Hope Downs 1 rail spur and the construction of a 220kV electricity transmission line to connect to the existing Rio Tinto power network. The US\$425 million railway and power project is funded, constructed and operated by Rio Tinto. Construction is underway, with first production expected in Q2 2013.

Expenditure: \$1.6b.

Employment: Construction: 2100; Operation: 720

### Pilbara – Jimblebar Iron Ore Mine Expansion

#### BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$3.3 billion (BHP Billiton's share) to increase installed mining and processing capacity at Jimblebar mine to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The project is currently on schedule (overall project is 34% complete) and on budget.

Expenditure: \$3.168b.

## Pilbara – Solomon – Chichester expansion and Solomon Mine Project

### FORTESQUE METALS GROUP LTD

Fortescue is progressing with the expansion of its existing mines at Cloudbreak and Christmas Creek to 95Mtpa (including 5mtpa from BC Iron). The existing rail and port facilities are being expanded by the duplication of 120km of railway south of Port Hedland, installation of two new train unloaders, construction of two additional berths and associated infrastructure. Construction of supporting infrastructure, which includes the new 60Mtpa iron ore mine at Solomon and a 137km railway spur to Fortescue's existing Christmas Creek to Port Hedland rail line has commenced. The Solomon Hub is planned to initially involve at least two mining areas and two processing plants. First production from Solomon is anticipated by late 2012.

Expenditure: \$9b.

Employment: Construction: 7000; Operation: 6000

## IRON ORE PROCESSING

### Pilbara – Cape Preston – Sino Iron

#### CITIC PACIFIC

Citic Pacific Mining is constructing the Sino Iron project at Cape Preston, 100km south west of Karratha. The magnetic iron ore project will include a concentrator, 6Mtpa pellet plant, 25km slurry pipeline, combined cycle 450MW power station, new port and trans-shipment facilities, and a 51GL desalination plant. At full production up to 27.6Mt of magnetite concentrate and high-grade pellets will be exported each year. Ore production from the first and second, of a planned six production lines, is expected to commence in August and December 2012.

Expenditure: \$5.2b.

Employment: Construction: 4000; Operation: 500

## OIL & GAS DEVELOPMENTS

### Carnarvon Offshore Basin – Barrow Island – Gorgon Project

#### GORGON JOINT VENTURE

The Gorgon Joint Venture (GJV) made a final investment decision on the \$43 billion Gorgon Project on 14 September 2009. The GJV's foundation project on Barrow Island includes a three train LNG development capable of exporting 15Mtpa and a domestic gas project capable of delivering at least 300TJ (terajoules) per day of gas to the mainland. The development on Barrow Island also includes potentially the largest commercial geosequestration project in the world. The project obtained State and Commonwealth environmental approval in August 2009. The project is based on gas from both the offshore Gorgon and Janszlo gas fields. On-island activity commenced in late 2009 and the major construction work for the processing plant commenced in 2011.

Expenditure: \$43b.

Employment: Construction: 5500; Operation: 300

### Carnarvon Offshore Basin – North Rankin – North Rankin Redevelopment

#### WOODSIDE ENERGY

In March 2008 the North West Shelf Project participants approved funding of the A\$5 billion North Rankin Redevelopment which will recover remaining low pressure gas from the North Rankin and Perseus gas fields, and extend the field life to around 2040. The project involves the installation of a new second platform North Rankin B with gas compression facilities, low pressure separators, utilities and accommodation. North Rankin B will be connected by two 100 metre bridges to the existing North Rankin A platform and on completion both platforms will be operated as a single integrated facility known as the North Rankin hub. The North Rankin Redevelopment project also includes the necessary connections to North Rankin A and some refurbishment of the North Rankin A platform. North Rankin B is scheduled for start-up in 2013 and will support the North West Shelf Project's onshore gas requirements to supply future customer commitments.

Expenditure: \$5b.

## Committed Projects

### Pilbara – Macedon Domestic Gas Project BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

The Macedon gas field, about 100km west of Onslow, was discovered in 1992 during drilling of the West Muiron-3 well and is estimated to contain a gas resource of up to 600bcf. BHP Billiton Petroleum (Australia) Pty Ltd and Apache Energy Limited are currently undertaking construction of a domestic gas plant for Western Australia at the Ashburton North Strategic Industrial Area near Onslow. The development will involve a number of sub-sea gas wells connected to the gas field, offshore and onshore wet gas pipelines, an onshore gas processing plant 11km southwest of Onslow and a sales gas pipeline connected to the Dampier-to-Bunbury Natural Gas Pipeline. Daily production is expected to be in the order of 200TJ. Construction started in Q3 2011, with gas production to commence in early 2013.

Expenditure: \$1.5b.

Employment: Construction: 330; Operation: 8

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

Chevron has received necessary approvals and commenced early construction works for an LNG project based on its Wheatstone and Iago gas fields, to be located at Ashburton North, near Onslow. The project will also process gas from sub-economic third party fields in the Carnarvon Basin. Chevron entered FEED (Front End Engineering Design) in July 2009 and took the Final Investment Decision in September 2011. Gas to market is scheduled for 2016. The project will initially have two LNG trains with an 8.9Mtpa capacity, expandable to five or six, and a 250Mcfd per day domestic gas plant.

Expenditure: \$29b.

Employment: Construction: 5500; Operation: 400

## RARE EARTHS

### Mt Weld – Rare Earths Mine LYNAS CORPORATION LTD

The Mt Weld deposit is located about 35km south of Laverton and contains an estimated resource of 23.9Mt at an average grade of 7.9% for 1.9Mt rare earth oxides (REO). The development includes an open pit mine and a concentration plant, located 1.5km from the open pit mine. The first feed of ore into the 33,000tpa concentration plant occurred in May 2011 and the plant was officially opened in August 2011. The concentrate will be bagged and containerised on site, and trucked to the Port of Fremantle for export. It will be shipped to a \$500 million processing plant in Malaysia, which will have an initial production capacity of 11,000tpa REO scheduled to commence in Q3 2012 subject to Malaysian government approvals. Phase 2, which involves the expansion of the Mt Weld concentration plant to produce around 66,000tpa of concentrate, is underway and will meet the Malaysian processing plant's planned expanded production of 22,000tpa REO. Lynas expects all construction works associated with the Phase 2 production expansion in both Western Australia and Malaysia to be largely completed in 2012 and production output to ramp up to the targeted 22,000tpa of REO in 2013.

Expenditure: \$135m.

Employment: Construction: 145; Operation: 95

## Projects Under Consideration

### SILICON METAL

#### Kemerton – Silicon Metal Plant Expansion SIMCOA OPERATIONS PTY LTD

Simcoa announced in October 2009 its decision to expand the company's 32,000tpa capacity silicon metal plant at Kemerton. The first stage expansion, involving installation of a third furnace, will increase the plant capacity to 48,000tpa and is expected to come online in Q3 2012. Providing world demand for silicon continues to increase strongly, a second stage expansion, involving installation of a fourth furnace is under consideration and could take place by 2014 and increase plant capacity to 64,000tpa.

Expenditure: \$100m.

Employment: Construction: 120; Operation: 40

### AMMONIA/UREA

#### Shotts Industrial Park – Collie Coal to Urea PERDAMAN CHEMICALS AND FERTILISERS PTY LTD

Perdaman Chemical and Fertilisers Pty Ltd is developing a \$3.5 billion coal to urea plant at the new Shotts Industrial Park, near Collie. The plant will use proven coal gasification and fertiliser production technologies. Around 2.7Mtpa of coal will be used to produce approximately 2Mtpa of urea, primarily for export. The urea will be transported to Bunbury Port by rail. A 20-year off take agreement has been signed with Incitec Pivot. The coal supply contract is yet to be finalised. The company has received all its environmental and all other approvals from both the Western Australian and Commonwealth governments. Construction is expected to commence in late 2012 with the first shipment of urea planned for 2016.

Expenditure: \$3.5b.

Employment: Construction: 2000; Operation: 200

### HEAVY MINERAL SANDS

#### Happy Valley – Heavy Mineral Sands Mine BEMAX RESOURCES LTD

Located adjacent to the Bemax Gwindinup deposits south of Bunbury, the project will involve the mining of the Happy Valley North and South mineral sands deposits situated on private land and in State Forest. The two deposits contain over 750,000t of recoverable heavy mineral concentrate, with average production expected to be around 150,000tpa over a combined mine life of eight years. The concentrate will be trucked to Bemax's Bunbury Mineral Separation Plant for final processing. In February 2011, the EPA recommended that the Minister for Environment not approve the company's proposal to develop the Happy Valley mine. Bemax has lodged an appeal against the EPAs decision and the matter is currently with the Appeals Convenor.

Expenditure: \$35m.

Employment: Construction: 100; Operation: 30

#### Shark Bay – Coburn Zircon Project GUNSON RESOURCES LIMITED

Gunson proposes to develop the Coburn zircon project, located south of Shark Bay and approximately 250km north of Geraldton. It contains total ore reserves of 308Mt at an average grade of 1.2% heavy minerals, all of which lie within the portion of the project area that has received government environmental approvals for mining. The project is expected to produce 40,000tpa of zircon, 90,000tpa of ilmenite, 9,000tpa of rutile and 7,000tpa of leucoxene. At the proposed mining rate of 17.5Mtpa, the mine life is estimated to be 17.5 years. In November 2011, a non-binding term sheet was executed with South Korean company POSCO for it to earn a large minority interest in the Coburn project and its Board approval is targeted for mid-August 2012. Construction work on the mine access road commenced in May 2012 and, following its completion, construction of the remainder of the project is expected to start in Q4 2012.

Expenditure: \$180m.

Employment: Construction: 170; Operation: 110

### INFRASTRUCTURE

#### Dampier Peninsula – Browse LNG Precinct WA STATE GOVERNMENT

The State Government is developing the Browse Liquefied Natural Gas (LNG) Precinct approximately 60km north of Broome. By focussing development at a suitable location the Precinct will minimise the environmental footprint of gas processing and any social impacts in the region while maximising opportunities for the local community to benefit from the development of the Browse Basin gas fields. The Precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. Woodside Energy Limited, as the operator of the Browse Joint Venture, has committed to the Precinct as a potential foundation proponent. Browse Joint Venture participants are expected to make a final investment decision by mid-2013.

Expenditure: \$30b.

Employment: Construction: 6000; Operation: 400

#### Oakajee – Oakajee Midwest Development WA STATE GOVERNMENT

The Oakajee Port will include common user infrastructure (channel, breakwater, turning basin, navigational aids, provision for tug and pilot boat pens, port administration offices and roads and utilities) funded by the State and Commonwealth Governments and private use infrastructure (at least one Cape Class iron ore berth, as well as associated materials handling equipment and rail infrastructure) developed by Oakajee Port and Rail Pty Ltd. The Port will also include provision for a non iron ore berth in the future to provide import/export capability for value-adding industries in the Oakajee Industrial Estate. A northern railway will link the port to mines to the north-east of Geraldton and a southern railway will link to the mines in the south-east. The northern rail line will be operated by Oakajee Port and Rail though an open access regime.

Expenditure: \$4b.

Employment: Construction: 2000; Operation: 300

#### Pilbara – Anketell – Anketell Port and SIA (Strategic Industrial Area)

##### WA STATE GOVERNMENT

The Anketell project includes establishment of a multi-user, multi-commodity deepwater port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha. The port and corridor development will be a proponent-funded State owned Port managed by the Dampier Port Authority. The industrial land will fall under the jurisdiction of the Western Australian Land Authority. Three companies have expressed interest in developing facilities at Anketell: API Management Pty Ltd for its 30-40Mtpa West Pilbara Iron project, MCC Australia Sanjin Mining Pty Ltd for its 15Mtpa Cape Lambert Iron Ore project, and Fortescue Metals Group (FMG) for its 100Mtpa Central Pilbara project. Numerous other companies have expressed an interest in using the port facilities for bulk export.

### IRON ORE

#### Great Southern Region – Southdown Magnetite Mine GRANGE RESOURCES LTD

The Southdown Magnetite deposit is situated 90km north east of Albany, near Wellstead. Southdown is an advanced development project. Work completed includes engineering feasibility studies, an extensive drilling program, land acquisition and most major approvals. Results of the Definitive Feasibility Study were announced in Q2 2012. The project's joint venture owners are undertaking finance raising prior to making a Final Investment Decision. Production from Southdown is targeted to commence in 2015. Southdown has a resource of more than 1.2Bt, potentially supporting a mine life of 40 years producing 10Mtpa of magnetite.

Expenditure: \$2.88b.

Employment: Construction: 2000; Operation: 600

# Projects Under Consideration

## Mid West Region – Extension Hill Magnetite Mine

ASIA IRON

Asia Iron has primary environmental approval to produce up to 10Mtpa of magnetite concentrate, which will be transported by slurry pipeline to the port of Geraldton for export. The company is currently seeking secondary approvals and undertaking an implementation study for the project.

Expenditure: \$2b.

Employment: Construction: 1000; Operation: 350

## MID WEST REGION – JACK HILLS EXPANSION

CROSSLANDS RESOURCES

The Jack Hills Expansion Project will involve the development of a 25Mtpa hematite and beneficiation feed ore mine. The ore is proposed to be transported by a new railway to a new deepwater port at Oakajee. A bankable feasibility study for the project was finalised in June 2011.

Expenditure: \$2b.

Employment: Construction: 450; Operation: 350

## Pilbara – Cape Lambert Iron Ore Project

MCC AUSTRALIA SANJIN MINING PTY LTD

MCC Australia Sanjin Mining Pty Ltd is developing a 15Mtpa magnetite iron ore mine in the Pilbara and aims to ship its first ore in 2015 via the proposed multi-user 350Mtpa port at Anketell. The Project comprises a proven JORC compliant 1.9Bt iron ore resource, a beneficiation plant, power plant, desalination plant, port facilities for exporting concentrate and other related infrastructure. MCC has completed feasibility studies for the port, power supply, water supply, accommodation and general site infrastructure. The mine and processing studies are progressing. The company commenced native title negotiations with the Ngarluma Aboriginal Corporation in March 2010 and a native title agreement was reached in June 2011. An environmental scoping document was approved by the EPA in August 2011.

Expenditure: \$3.7b.

Employment: Construction: 3000; Operation: 1000

## Pilbara – Outer Harbour Development, Port Hedland

BHP BILLITON IRON ORE PTY LTD

In February 2012 the BHP Billiton Board approved US\$917 million (BHP Billiton share US\$779 million) in pre-commitment funding for the construction of an outer harbour facility. These funds will enable the Company to progress feasibility studies and procure long lead items. It will also allow for dredging to begin, subject to the necessary regulatory approvals. The proposed Outer Harbour Development, an iron ore export facility at Port Hedland, will potentially include a 4km jetty, eight-berth wharf, stockyards, rail loop and associated facilities. BHP Billiton's investment in the proposed Outer Harbour Development remains subject to market conditions, the receipt of all required government approvals and BHP Billiton Board approval.

## Pilbara – Roy Hill Iron Ore Mine & Infrastructure

HANCOCK PROSPECTING PTY LTD

Hancock Prospecting and key strategic investment partners are developing the Roy Hill iron ore project located 115km north of Newman. This project is expected to come into production in 2014 and will produce 55Mtpa of iron ore for 20 years following ramp-up. The project includes mine development, mine processing infrastructure, a new 340km railway, and significant new port facilities at Port Hedland's inner harbour. Environmental approval for Roy Hill mine Stage 1 was received in December 2009 and environmental approval for Stage 2 was received in March 2010. In July 2011, Roy Hill Infrastructure was granted a Special Railway Licence to develop a 340km railway from its mine in the eastern Pilbara to Port Hedland. All key approvals have been secured and major project works will commence later in 2012. Dredging of the new berth areas at South West Creek was recently finished ahead of schedule, the

airstrip and internal mine roads are underway, and development is proceeding for the construction of mine, rail and port accommodation villages.

Expenditure: \$9.5b.

Employment: Construction: 3600; Operation: 2000

## Pilbara – West Pilbara Iron Ore Project

API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 30Mtpa of direct shipping iron ore from its Red Hill and Mt Stuart mine sites located 35-80km southwest of Pannawonica. The ore will be transported by a new heavy haul railway for export via the proposed multi-user 350Mtpa port at Anketell. Subject to the successful completion of feasibility and environmental studies, and receipt of government regulatory approvals, the company anticipates that the first shipment of ore will occur in 2014/2015. Environmental approval for the mine and rail elements of the project was received in December 2011. The EPA is expected to finalise its assessment of the Anketell Port proposal in Q3 2012.

Expenditure: \$6b.

Employment: Construction: 3500; Operation: 1000

## Pilbara – Jinidi Iron Ore Mine

BHP BILLITON IRON ORE PTY LTD

The proposed Jinidi Iron Ore Mine Project is a greenfields iron ore mine. The Project will include the construction of open-pit mining and processing facilities, rail loading infrastructure and a rail loop, and associated non-process infrastructure. The proposed Project is to be located approximately 55km north-west of Newman in the Pilbara region of Western Australia and 22km east of the existing BHP Billiton Iron Ore Area C Mine. The proposed Project is subject to market conditions, the receipt of all required government approvals and BHP Billiton Board approval.

## Yilgarn – Deception Iron Ore Deposit

CLIFFS ASIA PACIFIC IRON ORE PTY LTD

Cliffs proposes to expand its Koolyanobbing Operation to include an additional iron ore mining area at the Deception Deposit, located approximately 150km north of Southern Cross. The Deception Deposit contains an estimated 7.1Mt of iron ore and is expected to have a mine life of around 8 years. The Deception Deposit received environmental approval in June 2012 and first production is expected in late 2014.

Expenditure: \$35m.

## NICKEL

### Mt Windarra – Windarra Nickel

POSEIDON NICKEL NL

Poseidon Nickel Ltd has submitted project development proposal for the redevelopment of the Mt Windarra underground nickel mine, the development of the new Cerberus underground nickel mine, the construction and commissioning of a nickel sulphide concentrator, a gold tailings re-treatment plant and associated project infrastructure at Mt Windarra, the historic site of previous mining and processing operations. Subject to obtaining all relevant approvals Poseidon is forecast to commence construction in Q4 2012 with operations to commence by Q4 2013.

Expenditure: \$250m.

Employment: Construction: 80; Operation: 180

## OIL & GAS DEVELOPMENTS

### Carnarvon Basin – Pluto Project Expansion

WOODSIDE ENERGY

The Pluto LNG Park provides the opportunity to consider both equity gas development and third party gas supply at the site. Discussions continue with third parties regarding the potential to process gas through additional trains at the Pluto LNG Park.

## URANIUM

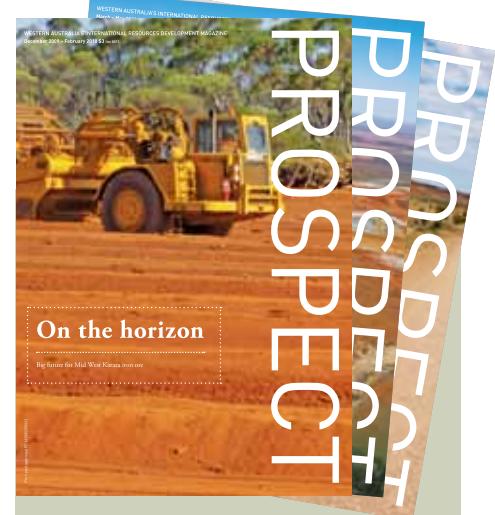
### Northern Goldfields – Yeelirrie –

Yeelirrie Uranium

BHP BILLITON YEELIRRIE DEVELOPMENT COMPANY PTY LTD

BHP Billiton proposes to develop the Yeelirrie Uranium Project in the North-eastern Goldfields, near Wiluna. The proposal entails open cut mining of shallow deposits of uranium ore, treatment in a plant to be established at the site, and development of associated infrastructure. The project will produce up to 3,500tpa uranium oxide concentrate over about 30 years. The uranium oxide will be transported to South Australia by road for export to overseas markets. The formal environmental impact assessment process was initiated in 2009 and the project Environmental Scoping Document was approved in June 2010. The project is subject to financial review and investigative project work is ongoing.

Employment: Construction: 700; Operation: 300



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## Significant resource projects in Western Australia

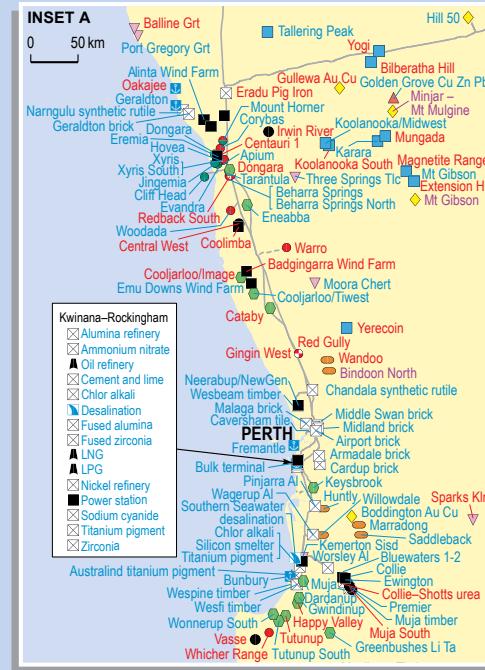
Western Australia continues to lead the way as Australia's premier resources investment destination. There are currently more than A\$180 billion worth of projects either committed or under consideration for the State during the next few years. These will create more than 50,000 construction jobs and more than 15,000 permanent jobs.

All conversions from foreign currencies were calculated at the latest available rate.

	Project Value (estimated A\$m)	Employment Construction	Employment Permanent
<b>Alumina</b>			
BHP Billiton Worsley Alumina – Refinery Expansion	3400	1500	200
<b>Sub Total</b>			
	3400	1500	200
<b>Iron and Steel</b>			
API Management Pty Ltd - West Pilbara Iron Ore Project	6000	3500	1000
Asia Iron - Extension Hill Magnetite Mine	2000	1000	350
BHP Billiton Iron Ore - Inner Harbour Expansion	1824	n/a	n/a
BHP Billiton Iron Ore - Jimblebar Mine Expansion	3168	n/a	n/a
BHP Billiton Iron Ore - Outer Harbour Development, Port Hedland	n/a	n/a	n/a
BHP Billiton Iron Ore - Port Blending and Rail Yard Facilities	1344	n/a	n/a
CITIC Pacific - Cape Preston Mine & Processing Projects	5200	4000	500
Cliffs Asia Pacific Iron Ore - Koolyanobbing Iron Ore Upgrade	320	n/a	n/a
Crosslands Resources - Jack Hills Stage 2 Hematite Mine	2000	450	350
Fortescue Metals Group - Chichester expansion and Solomon Mine Project	9000	7000	6000
Fortescue Metals Group - Mine, Rail and Port Project	4000	n/a	3200
Grange Resources Ltd/SRT Australia Joint Venture - Southdown Magnetite Mine	2880	2000	600
Hancock Prospecting - Iron Ore Mine - Roy Hill	9500	3600	2000
Karara Iron Ore Project	1975	1500	500
MCC - Cape Lambert Iron Ore Project	3700	3000	1000
Rio Tinto Iron Ore - Hope Downs 4 Iron Ore Mine	1600	2100	720
Rio Tinto Iron Ore - Hope Downs 4 Iron Ore Mine	1600	2100	720
<b>Sub Total</b>		<b>54511</b>	<b>28150</b>
<b>16220</b>			
<b>Lithium</b>			
Mount Cattlin Lithium Project	75	100	100
<b>Sub Total</b>		<b>75</b>	<b>100</b>
<b>100</b>			
<b>Nickel/Cobalt</b>			
Ravensthorpe Nickel Operation	300	n/a	480
<b>Sub Total</b>		<b>300</b>	<b>0</b>
<b>480</b>			
<b>Oil, Gas and Condensate</b>			
BHP Billiton - Macedon	1500	330	8
Browse LNG Precinct	30000	6000	400
Chevron - Wheatstone LNG	29000	5500	400
Gorgon Joint Venture Gas Processing Project	43000	5500	300
North Rankin Redevelopment	5000	n/a	n/a
Woodside - Pluto LNG Plant	15000	5000	300
<b>Sub Total</b>		<b>123500</b>	<b>22330</b>
<b>1408</b>			
<b>Other</b>			
AngloGold Ashanti/Independence Group - Tropicana Gold Project	700	700	400
Ashburton North Strategic Industrial Area	n/a	n/a	n/a
BGM - Boddington Gold Mine	n/a	n/a	650
BHP Billiton - Yeelirrie Uranium	n/a	700	300
Burrup Nitrates	600	600	65
CSBP - Kwinana Ammonium Nitrate Facility Expansion	550	300	10
Oakajee Port, Rail and Industrial Estate	4000	2000	300
Ord East Kimberley Expansion Project	506	761	n/a
Perdaman Chemicals & Fertilisers - Coal-to-Urea Plant	3500	2000	200
<b>Sub Total</b>		<b>9856</b>	<b>7061</b>
<b>1925</b>			
<b>TOTAL</b>		<b>191642</b>	<b>59141</b>
<b>20333</b>			



## **Major Resource Projects — September 2012**



### Project labels:

PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL  
OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$140 MILLION ARE SHOWN IN BLUE

PROPOSED OR POTENTIAL PROJECTS WITH A CAPITAL EXPENDITURE GREATER THAN

**PROPOSED OR POTENTIAL PROJECTS WITH A CAPITAL EXPENDITURE  
\$A20 MILLION ARE SHOWN IN RED**



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