WESTERN AUSTRALIA'S INTERNATIONAL RESOURCES DEVELOPMENT MAGAZINE

September - November 2008 $3 (inc GST)

PROSPECT

Manufacturing excellence

Western Australian manufacturers tackle the resources expansion

Print post approved PP 665002/00062

From the Director General

Planning for growth

As the new Director General of the Department of Industry and Resources (DoIR) it is a pleasure to welcome you to my first issue of *Prospect* magazine, which, you may have noticed, has a new and more contemporary design.

I come into the position at an interesting time, with the resources industry driving the Western Australian economy's stellar growth.

One of my priorities will be for DoIR to ensure this expansion is managed in a way that is environmentally and socially responsible, and that its benefits are shared by all Western Australians.

The success of such a plan will largely depend on how well we can engage and interact with industry and the community.

This issue of *Prospect* features an update on a project that is doing this with great success – the Memorandum of Understanding between the State Government and Rio Tinto Iron Ore for Aboriginal employment in the Pilbara.

In planning for the future, it is encouraging to see that Western Australia's manufacturing sector is keeping pace with the resources industry's output, as the stories on Fenner Dunlop and Pacific Industrial Company attest.

New energy developments such as geothermal energy and tight gas featured in this issue will form another important part of the way forward.

With major expansions tipped for iron ore, natural gas and other resources sectors during the next few years, all Western Australians can look forward to an exciting future.

Anne Nolan

DIRECTOR GENERAL

Prospect
Western Australian *Prospect* magazine is published quarterly by the Western Australian Government's Department of Industry and Resources (DoIR).
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***Cover photo:** Fenner Dunlop equipment in use at BHP Billiton's Yandi mine (photograph owned and provided by Leighton Contractors Pty Ltd).*

*Production of this issue of **Prospect** commenced prior to the Western Australian election on 6 June.*

State Government personnel or policies mentioned within may therefore have changed by the time of publication.

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Manufacturing excellence

Fenner Dunlop and Pacific Industrial Company are two Western Australian manufacturers rising to the challenge of servicing the State's expanding resources industry. *Pages 2-4*

Lauren Kane, Department of Industry and Resources

WA steel cord belt to service global industry

Western Australia will soon be home to the world's largest and most technologically advanced conveyer belt manufacturing facility.

Fenner Dunlop Australia plans to construct a new A$70 million plant to produce and supply high performance heavyweight conveyor belting using steel reinforced rubber, also known as steel cord belt.

The facility will be the first new conveyor belt plant built in Australia in more than 60 years and will service the global resources industry, with a particular focus on the Western Australian iron ore sector.

Construction on the 4.6 hectare Kwinana site is expected to begin soon and is scheduled to be completed by April 2009, with production planned to start in the second quarter of 2009.

The Investment Attraction Division of the Department of Industry and Resources (DoIR) worked with Fenner Dunlop to secure this significant investment for Western Australia.

DoIR Acting Director of Investment Attraction Geoff Collins said it was a very exciting project that would bring many benefits to the State.

"This important investment was attracted at no cost to the State Government, and will result in a contribution of A$35 million to our economy each year," he said.

"The final investment will be around A$70 million and will create 50 construction jobs and 30 permanent full-time jobs, as well as an additional 150 jobs for on-site maintenance and equipment servicing to clients.

"It will also help generate significant new export revenue for the State from overseas markets including the German coal and South American iron ore markets, as well as a number of Asian markets."

Fenner PLC Chief Executive Mark Abrahams said Australia was an ideal country for the development due to its central location to growth markets in China, India and Africa.

"Australia itself is also an important market and our Australian team headed by David Landgren has proven know-how and expertise to ensure they build the best conveyor belts anywhere in the world," Mr Abrahams said.

Mr Collins said having easy access to high quality conveyor belts would create significant benefits for the Western Australian resources industry.

"Having a local manufacturer will dramatically reduce lead times associated with transportation and delivery, as well as significantly reduce down-times associated with belt installation, belt replacement or belt servicing," he said.

"This will result in increased production from mine sites, improved materials handling at ports and increased export capabilities for resources companies."

The new Fenner Dunlop facility will create conveyer belts that are wider than any other belt in the world. It will produce steel cord belt and rubber ply belt up to 3200 mm wide and 50 mm thick.

The facility's initial production capacity of 330,000 m² is equivalent to 103 km of 3200 mm belt.

The installation of wider belts on mine sites and at port facilities as a result of the facility will create productivity gains due to the increased throughput of materials.

This production of wide conveyor belts will also add a new capability to the Western Australian manufacturing industry.

In addition to the manufacturing facility, Fenner Dunlop has also committed to a research and development centre of excellence for conveyer and materials technology, and a modern training school.

"The centre of excellence and training school will have many benefits for Western Australia including increasing the State's technology capability, and increasing opportunities for technology transfer," Mr Collins said.

"This has the potential to provide new opportunities for the capture and retention of local talent, and the development of new expertise."

Fenner Dunlop Australia Executive Director David Landgren said as well as a state-of-the-art press to build the biggest and best quality belt, the new plant would have the right front-end and back-end systems and processes to ensure exacting tensioning methods, delivering flawless belts even quicker than previously considered possible.

"Fenner Dunlop has selected world-leading German and Italian technology for the plant," Mr Landgren said. "The steel cord line comes from Siempelkamp and has the world's largest press with dimensions spanning 3420 mm and a press length of 18.5 m.

"Due to the expertise required to make such an important belt for our customers, these kinds of belts must be made using a highly skilled and qualified team, just like those in Australia," he said.

"Our customers demand exacting standards, not just for excellent belts, but also excellence in the manufacturing process and value added service.

"Our safety standard as well as our adherence to quality processes means that using expert workers in industrialised countries is the best way to guarantee we meet their growing service and performance expectations."

This project represents a long-term commitment by Fenner Dunlop to Western Australia, with the plant having an operational life of up to 50 years.

FAR LEFT Workers at Fenner Dunlop's new A$70 million plant will service the Western Australian iron ore sector.

LEFT Fenner Dunlop's new centre of excellence and training school will create new expertise and increase worker retention.

BELOW The new Fenner Dunlop facility will create conveyer belts that are wider than any other in the world.

Fenner Dunlop's new facility

• Cost: A$70 million • Expected completion: April 2009 • Production capacity: 330,000m², or 103 km of 3200 mm belt • Employment: 230 construction, full-time, maintenance and service jobs • Economic contribution: A$35 million per annum

WA manufacturing expertise on world stage

Western Australia's growing reputation in the global manufacturing industry has been further enhanced by a local company being selected from an international tender to fabricate equipment for Fortescue Metals Group (FMG).

Pacific Industrial Company (PIC) was selected by a North American engineering designer to produce a mobile conveying system for FMG – the first of its kind to be used in Australia's iron ore industry.

The automated system will be used in FMG's Pilbara operations, and is expected to provide significant operational savings. It will allow continuous conveying and stacking, with a capacity of 8000 tonnes per hour.

PIC Managing Director Marco Mosole said the company was pleased to have won the project against stiff local and international competition.

"PIC committed a great deal of energy and resources to bid for this project and it has clearly paid off," he said.

"We undertook several trips to North America to meet with engineering designer FLSmidth RAHCO.

"Serious effort was expended in winning the client's confidence and convincing them that a project of this size and importance could be undertaken and completed halfway around the world with minimal input from the client, other than the design.

"Winning projects like this against global competition helps to highlight Western Australia's manufacturing capabilities and ensures the State is on the global bid list."

Mr Mosole said PIC's achievement in successfully completing the mobile conveying system on time, on budget and according to quality standards, would assist other Western Australian companies bidding for international projects.

PIC, established in 1969 and based at Western Australia's Naval Base, is involved in all aspects of steel fabrication and construction including engineering, procurement, fabrication, installation, commissioning, and related electrical, instrumental and civil works. Its main clients are involved in the resources and industrial sectors, but it has a broad customer base.

Department of Industry and Resources, Industry Development Deputy Director General Joe Ostojich said the fact that PIC had been selected by a North American engineer from a global tender was testament to the outstanding quality of local fabrication.

"It's great to see that Western Australia's involvement in local projects is continuing to increase and I commend the global alliance established between PIC and its northern associate, which has allowed the State to participate in the local FMG project," he said.

"Participation by Western Australia's manufacturing industry in projects such as this helps clear false perceptions that local industry is fully committed and has limited capacity.

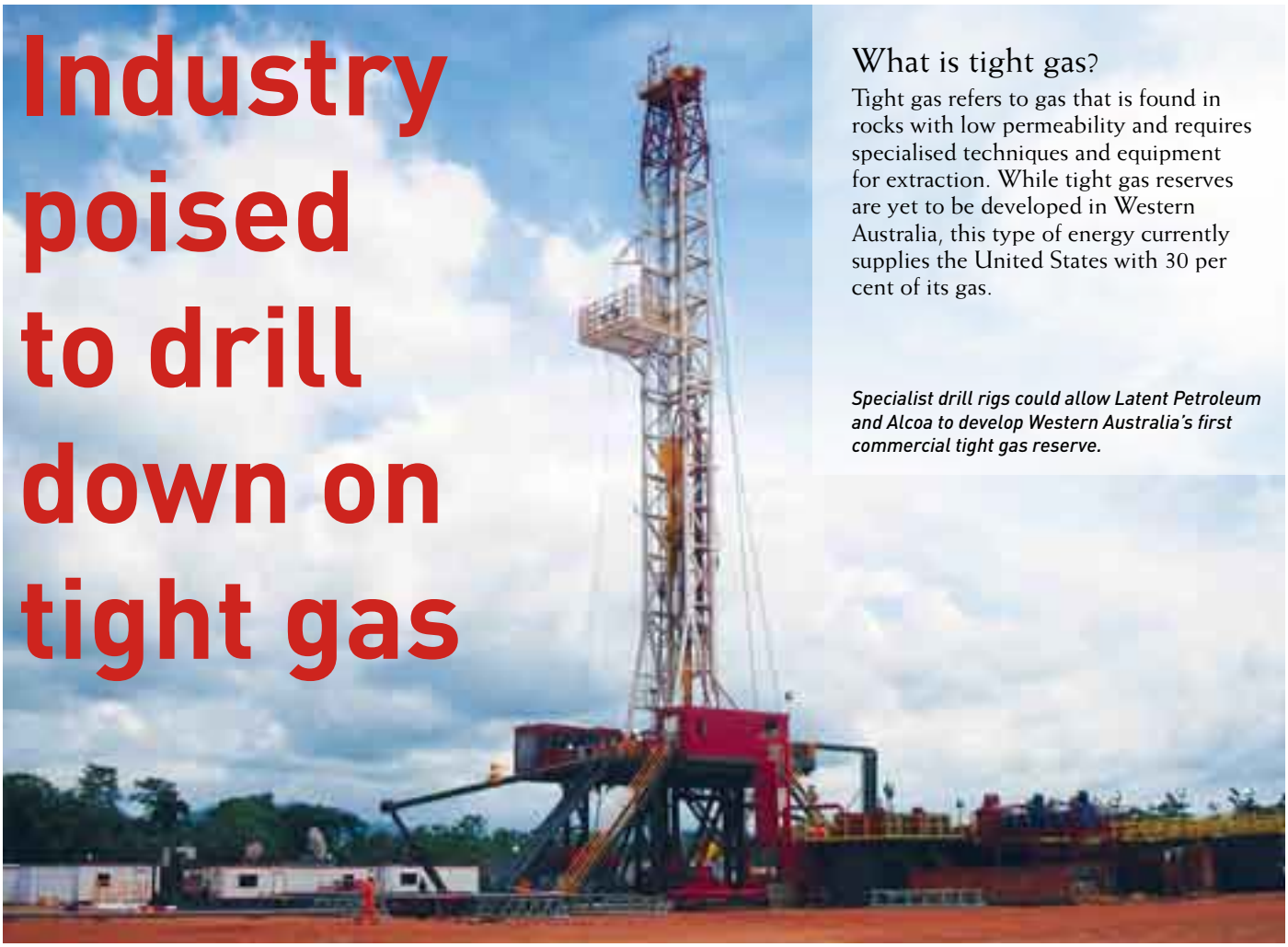
"It also helps our State to create a competitive edge in the global marketplace."

Installation of the mobile conveyer system at FMG took place in August with commissioning scheduled for late November. A second system is scheduled to come on-line four months later.

"Winning projects like this against global competition helps to highlight Western Australia's manufacturing capabilities and ensures the State is on the global bid list."

Pacific Industrial founder Erasmo Mosole surrounded by a section of the Western Australian-fabricated mobile conveyor.

Industry poised to drill down on tight gas



What is tight gas?

Tight gas refers to gas that is found in rocks with low permeability and requires specialised techniques and equipment for extraction. While tight gas reserves are yet to be developed in Western Australia, this type of energy currently supplies the United States with 30 per cent of its gas.

Specialist drill rigs could allow Latent Petroleum and Alcoa to develop Western Australia's first commercial tight gas reserve.

Tight gas looms as an exciting new Western Australian resource as part of efforts to increase and diversify the State's energy supplies.

Earlier this year Latent Petroleum and Alcoa announced they had formed a joint venture to appraise and develop the Warro gas field near Jurien. If successful this would be Western Australia's first project to develop tight gas, which is found in low permeability rock and must be extracted with specialised equipment.

The Department of Industry and Resources (DoIR), in partnership with the Western Australian Energy Research Alliance, is also focusing on increasing interest in the sector. The organisations hosted a tight gas workshop in August, bringing together all parties that have an interest in tight gas development.

"The WA Tight Gas Workshop provided a forum for industry, research organisations and government to network and discuss Western Australia's tight gas industry," DoIR Petroleum and Royalties Director Bill Tinapple said.

"It was the first time all principal technical, business, financial and government tight gas proponents were assembled in the one place.

"They included both local and international speakers from a range of petroleum companies such as ARC Energy, Latent Petroleum, Origin and Chevron, through to representatives of major petroleum equipment suppliers including Baker-Hughes, Halliburton, GMI and Schlumberger."

Mr Tinapple said the interest in the workshop indicated the importance of developing alternative sources of energy supply in Western Australia.

"We are looking down the barrel of a potential domestic gas shortfall from as early as next year to 2012, and tight gas has the potential to be a significant supply alternative for the State," he said.

The workshop was part of DoIR's strategy of developing upstream energy security through creating alternative sources of supply.

The three fields of Warro, Whicher Range and West Erregulla could produce up to 12 trillion cubic feet of tight gas – enough to satisfy the State's needs for up to 30 years.

The Warro field 200 km north of Perth is about 7000 hectares in size and is estimated to contain between two and four trillion cubic feet of recoverable gas, about 4 km below the surface.

Drilling is expected to commence in the fourth quarter of 2008 when a new rig will arrive from the USA, along with other equipment from overseas.

Latent Managing Director Stephen Keenihan said the recent price rise for Western Australian domestic gas, combined with the successful application of appropriate technology and Alcoa's long history in underpinning energy infrastructure, encouraged Latent's investigation of the Warro field.

Latent is hoping to begin gas production by the first quarter of 2009, allowing more gas to soon be pumped into South West homes and businesses.

DoIR's Petroleum and Royalties Division has met with key participants in the tight gas industry to ascertain tangible ways of assisting industry in the exploration and development of tight gas resources.

The department has also been actively identifying unconventional gas acreage blocks and developing them for release.

Last year it released the West Erregulla field and awarded it to Warrego Energy Limited, while Whicher Range is being considered for extended production tests.

Development of geothermal infrastructure in the Pilbara and Gascoyne regions could provide a clean source of energy for mining and petroleum projects.

Geothermal energy a hot option for Pilbara and Gascoyne

Plans for a major geothermal energy industry in Western Australia have been bolstered by the release of a second acreage area for exploration, in the Carnarvon Basin.

The new acreage released by the Department of Industry and Resources (DoIR) in August covers the onshore Pilbara and Gascoyne regions, where much of Western Australia's resources industry development takes place.

This new release follows successful bidding for acreage in the Perth Basin earlier this year and is the latest instalment in the systematic release of all onshore acreage in Western Australia.

Industry has been given the chance to bid for 81 application areas of about 6400 km^2 each, with applications closing at 4pm on 12 February 2009.

DoIR Petroleum Exploration Geologist Richard Bruce said the new release was of strategic importance to the State.

"The Carnarvon Basin release is well situated for Western Australia's buoyant resources industry," Mr Bruce said.

"It is close to important regional towns, ports and infrastructure and the numerous mining, petroleum and industrial projects that operate within the Pilbara and Gascoyne regions."

He said geothermal energy had the potential to produce large amounts of renewable energy to meet Western Australia's growing demand for green power.

"It could supply remote and rural communities and operations with safe, distributed baseload energy," Mr Bruce said.

Successful bidders for the new acreage will need to drill at least one shallow well (to a depth of about 400 metres) during the first two years of the geothermal titles, which will be awarded based on work programs.

The bidding process for the Perth Basin release suggests there will be a positive industry response to the Carnarvon Basin acreage. That release attracted 64 valid bids from nine geothermal explorers. These covered 38 application areas in a combined area of 12,160 km^2.

The available bidding area covered 495 blocks of 320 km^2 each in an area that took in Perth and important South West communities.

Australian Geothermal Energy Association Secretary Alan Knights said geothermal energy was the only renewable energy that could provide continuous power and the only true potential substitute for coal and gas-fired power stations in southern Western Australia.

He said industry response to the Carnarvon Basin release would depend on factors such as comprehension of the area's potential, the nature of government requirements and the potential market for energy.

"The financial markets have deteriorated significantly since the Perth Basin acreage was announced, making the ability for companies to raise funds for deep geothermal exploration more difficult," Mr Knights said.

"However on the flip-side, Australia is closer to reintroducing the Mandatory Renewable Energy Target, and the Emissions Trading Scheme, which will assist."

Mr Knights said releasing the whole of Western Australia to geothermal exploration allowed market forces to drive development, with companies weighing up the geological potential of certain areas against their economic potential.

"It will be the enterprising spirit and great persistence of what are the industry's pioneers that will drive the development of Western Australia's geothermal industry," he said.

Some 627,361 km^2 or 25 per cent of Western Australia has now been released to geothermal exploration and DoIR hopes to release the remainder of the State in two further packages during the next six months.

Full application details for the acreage can be found on DoIR's website at:

www.doir.wa.gov.au/acreage_release

The Geothermal Centre of Excellence will provide new knowledge to accompany the development of a geothermal industry in Western Australia.

Focus on renewable energy through geothermal excellence

The opening of the Western Australian Geothermal Centre of Excellence this year will mark the beginning of a new era of renewable energy development in Western Australia.

The centre, a joint venture between CSIRO, the University of Western Australia and Curtin University, will build capacity and knowledge within Western Australia to undertake exploration and development of geothermal resources.

The State Government allocated A$2.3 million in February this year to fund the centre, to accompany successive releases of geothermal exploration acreage.

The centre will be led by Professor Klaus Regenauer-Lieb, a geothermal expert and Premier's Research Fellow in Multi-scale Earth System Dynamics,who said the centre would provide a seed for addressing a global problem.

"Developing countries are now using conventional carbon dioxide emitting technologies to power their industrialisation," Professor Regenauer-Lieb said.

"The centre will devise and disseminate modern zero-emissions concepts with the mission of mitigating a global crisis in resources and environment."

The research to be undertaken at the soon-to-be-opened centre is organised into three interlinked programs.

The first will be an assessment of Perth Basin geothermal opportunities using presently available data. Researchers will employ state-of-the-art geological, hydrogeological and geophysical methods for assessment of underground heat.

Supercomputers will be utilised for 3-D modelling of geothermal systems, making it possible to drive geothermal research into directions that were previously out of reach in Australia.

The second program the centre will explore is the optimal use of geothermal resources, with a specific focus on direct heat use in populated centres where exploitable heat, typically from hot ground water at about 90°C, is directly available.

Professor Regenauer-Lieb said that by exploring and utilising low-grade heat in a permeable sedimentary environment, his team proposed to significantly broaden the footprint of direct geothermal heat energy utilisation.

"Direct geothermal heat use is a neglected opportunity for displacing large scale electrical consumption. Through the recent addition of new technologies, usable thermal power from direct heat has grown exponentially," he said.

"The Centre of Excellence will develop the next technology for direct heat use. The introduction of these new technologies to the geothermal sector could trigger a new wave of utilising direct heat.

"We have filed a provisional patent for geothermally driven desalination and are preparing a patent submission for geothermal cooling, refrigeration and air-conditioning."

The third program to be undertaken will be the identification of future potential through deeper exploration, and is expected to deliver fundamental insights into the fracturing, geochemistry and permeability of hot rocks.

John Libby, managing director of geothermal explorer New World Energy Solutions, said the Geothermal Centre of Excellence presented a fantastic opportunity for WA to develop a successful geothermal industry.

The research conducted by the centre will result in a much better assessment of the geothermal potential of areas and will lead to faster discovery and development of geothermal resources," Mr Libby said.

"Geothermal has the greatest potential of all the renewable energy sources and is particularly pertinent to WA as the development of geothermal resources will increase the State's diversity of energy sources, while making a significant contribution to meeting renewable energy targets," he said.

Acreage for geothermal exploration was released early this year, covering the Perth Basin. A subsequent Carnarvon Basin area has also been released (details on page 6).

Eneabba Gas has ordered four GE LM6000 gas-fired turbines, similar to the units pictured, to generate 168 MW of power.

Eneabba Gas Managing Director Mark Babidge.

Mid West power on track with port and rail

The developer of the proposed A$200 million Centauri 1 power station says it will need only 14 months from the start of construction to begin generating power for Mid West iron ore miners.

Perth-based Eneabba Gas has committed to building the 168 megawatt facility near Dongara to cater to demand created by the region's burgeoning iron ore sector and proposed Oakajee deepwater port.

Oakajee Port and Rail was announced in July as the preferred developer of the port, which is expected to gain feasibility approval mid-way through next year.

Eneabba Gas Managing Director Mark Babidge said his company expected to sign "take-or-pay" power contracts with customers and start construction of Centauri 1 as soon as the go-ahead was given for the port and its associated rail infrastructure.

Mr Babidge said the power station would be developed well within the expected two years it would take to construct the Oakajee port and rail infrastructure, and for Mid West iron mines to achieve more substantial tonnages.

"Eneabba Gas is the only power station project proponent in the Mid West which has all necessary approvals and equipment orders in place for an immediate start-up," he said.

"The Centauri 1 project is located on company-owned land, making development quicker and easier.

"Our freehold land also contains ten 100 per cent-owned tenements with significant coal deposits, which are being proved up as a possible source of cheaper, Greenhouse-friendly energy reserves suitable for coal gasification."

Gas for Centauri 1 will initially come from the Dampier-to-Bunbury Natural Gas Pipeline and the company has signed a Memorandum of Understanding with Verve Energy to swap gas for operational flexibility.

The project will be capable of supplying power into the South West Interconnected System but will be focused on the Mid West iron ore sector.

Eneabba Gas has received necessary approvals for the project from the local Shire of Irwin, the Environmental Protection Authority and the Department of Industry and Resources.

"A key approval which places Eneabba Gas in a unique position is that we are the only holder of an Economic Regulation Authority generation licence in the Mid West," Mr Babidge said.

"This allows us to supply electricity in the additional volumes required to service the region."

Mr Babidge said the location of the proposed plant would eliminate efficiency losses for customers of up to 20 per cent if they sourced their electricity from Perth.

Eneabba Gas has orders in place for four GE LM6000 gas-fired turbines to generate 168 MW of power.

Rare geology prime for coal gasification

The Eneabba Gas land near Dongara has a large underlying low-grade coal resource and holds Western Australia's only known underground resource of accessible coal seam methane gas.

The company has completed a preliminary seven-hole drilling program of the tenements to survey the extent of the resource, which is located about 200 m below the surface.

The survey work returned positive results and encouraged the company to seek Department of Industry and Resources approval for an expanded drilling campaign of 20 further holes.

Eneabba Gas believes the drilling program will confirm a resource that could have a life of 40 years.

If coal gasification proves possible, the company will be able to generate and deliver electricity for a substantially lower price.

Eneabba Gas has already held discussions with a number of mining and infrastructure companies seeking energy in the Mid West.

The plenary sessions of the Australian Earth Sciences Convention attracted great interest.

Earth sciences converge in Perth

More than 900 geoscience experts from around the globe gathered in Perth in July to hear the latest research on major challenges affecting life on Earth.

International speakers, industry leaders and key decision makers came together to attend the 2008 Australian Earth Sciences Convention.

With the convention held in Perth for the first time since 1994, this year's focus was on mineral exploration and potential discoveries in Western Australia.

Australian Earth Sciences Convention Program Director, Dr Jon Hronsky said the most significant aspect of this year's event was the fact it was the only geological meeting in Australia that brought together under the one roof, all the diverse aspects of geoscience.

"The convention is effectively several major conferences wrapped into one," he said.

"It addresses mineral resources, petroleum, geo-hazards, CO_2 sequestration, planetary geology, studies of the earliest fossil life, environmental geology, geo-tourism and geoscience information.

"Held every two years, it's the Olympics of Australian geoscience."

The five-day convention was hosted by the Geological Society of Australia and the Australian Institute of Geoscientists.

Dr Hronsky said the convention succeeded in showcasing a number of issues of great importance to the broader community.

"Plenary keynote papers addressed issues such as Australia's energy future, recent advances in our understanding of the geology of Mars and the tsunami risk to Australia," he said.

"The resources industry was a very significant part of the program, with many presentations covering a diverse range of topics surrounding the industry.

"The main theme was how to be smarter in applying good science to mineral exploration success. Dr Nick Hayward from BHP Billiton presented an integrated model for the genesis of iron oxide copper-gold deposits, a category which includes the giant Olympic Dam copper-gold deposit in South Australia.

"It was the first time that this model, which has significant implications for exploration, had been presented publicly.

"Rio Tinto also presented the results of their research and development work in developing an airborne gravity gradiometer which will be able to compete with the BHP Billiton Falcon System. The system is the first of its kind in providing new insights into buried geology and structure."

Dr Hronsky said exploration strategies which demonstrated a high level of technical work currently being conducted by junior WA explorers, were also discussed.

He said an update on the Tropicana deposit, the most recent large gold discovery in WA, was also presented by AngloGold Ashanti.

More than 135 presenters, 450 papers and a wide range of workshops and field trips were featured at the convention.

Department of Industry and Resources (DoIR) Executive Director of Geological Survey of Western Australia (GSWA), Dr Tim Griffin, said the division had a strong presence at this year's convention.

"Staff from GSWA delivered many technical talks, chaired sessions and led workshops and excursions that formed part of the conference," he said.

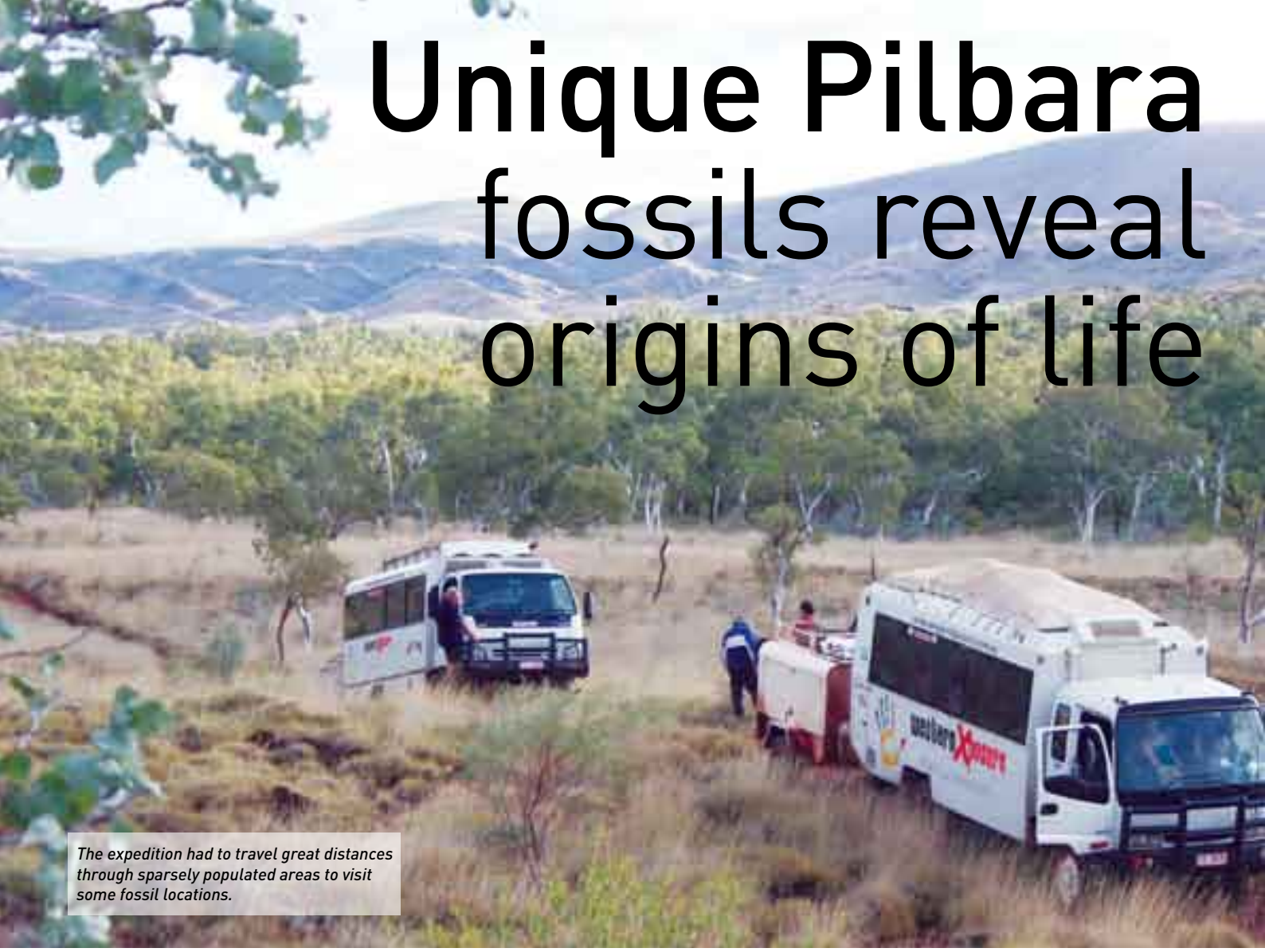
"DoIR's Petroleum and Royalties Division also had an exhibition which featured geoscience services as well as upcoming petroleum and geothermal acreage releases."

Dr Griffin said by having the convention in Perth, capacity in local geoscience and geoscience institutions was successfully showcased.

"The convention provided us with the opportunity to highlight Perth's exciting and world famous geological formations and mineral deposits including evidence of the earliest life forms," he said.

"The convention also helped cement Perth as the geoscience and resources hub in the Indo-West Pacific region."

Unique Pilbara fossils reveal origins of life



The expedition had to travel great distances through sparsely populated areas to visit some fossil locations.

Western Australia's geological prowess was showcased to a team of 31 international researchers that traveled to the Pilbara region this year to gain an insight into the origins of life on Earth.

The 12-day *Eendracht Expedition*, named after the ship in which Dutch explorer Dirk Hartog first surveyed the Western Australian coast, attracted postgraduate geology and astronomy students and staff from the Netherlands' Free University of Amsterdam and Leiden University. Participants from Curtin University, the University of Western Australia and Monash University also took part.

The expedition was led by Geological Survey of Western Australia (GSWA) Chief Paleontologist Dr Kath Grey and University of California Professor Stanley Awramik, who have spent many years exploring evidence of early life in Western Australia.

"WA is at the forefront of astrobiological studies because of its unique, well-preserved ancient fossils and the quality of its scientific institutions," Dr Grey said.

"An important aspect of future research in planetary science will be the ability to take a broad-based approach, so upcoming scientists need to understand the framework of other related disciplines.

"Participating students were carefully selected and came from a cross-disciplinary background that included geologists, paleontologists, sedimentologists, astronomers, astrophysicists, biologists, ecologists, organic geochemists and mathematicians."

The agenda included trips to explore modern stromatolites at Shark Bay and fossil stromatolites in the Pilbara aged up to 3.5 billion years old, to gain an understanding of the factors that gave rise to these early life-forms, as well as the conditions necessary to support life on other planets.

Dr Grey said the trip reflected a growing interest in space exploration in the European Union through the European Space Agency.

Free University of Amsterdam student Marineus den Hartogh participated in the *Eendracht Expedition* as part of his petroleum geology studies and said Western Australia had significant advantages over places such as Norway, where he had previously conducted research.

"These fossils are preserved here like no other place on Earth," he said.

"Because it's a desert-like environment, you don't have the vegetation or human interference of other areas so the fossils are quite easy to study."

The participants also experienced first-hand the challenges of conducting geological studies in Western Australia. The inclement weather forced much of the original trip agenda to be modified with trips to new and less well-known localities.

After successful visits to Lake Thetis and Shark Bay to examine the living

During a break in the weather students gathered for discussions about the origins of life on Earth.

stromatolites, exceptionally heavy rain set in when the party reached Carnarvon to camp for the night.

"During the night an unexpected storm flattened many of the tents, soaked everyone's gear and closed several main roads," Dr Grey said.

"The next day was spent trying to dry out and it was obvious that the bush tracks would be too boggy to allow access to Duck Creek, the first fossil locality on the itinerary.

"While the conditions were frustrating, the organisers were able to take some solace from the fact that these young researchers now know just how difficult it can be to collect data in remote areas of Western Australia.

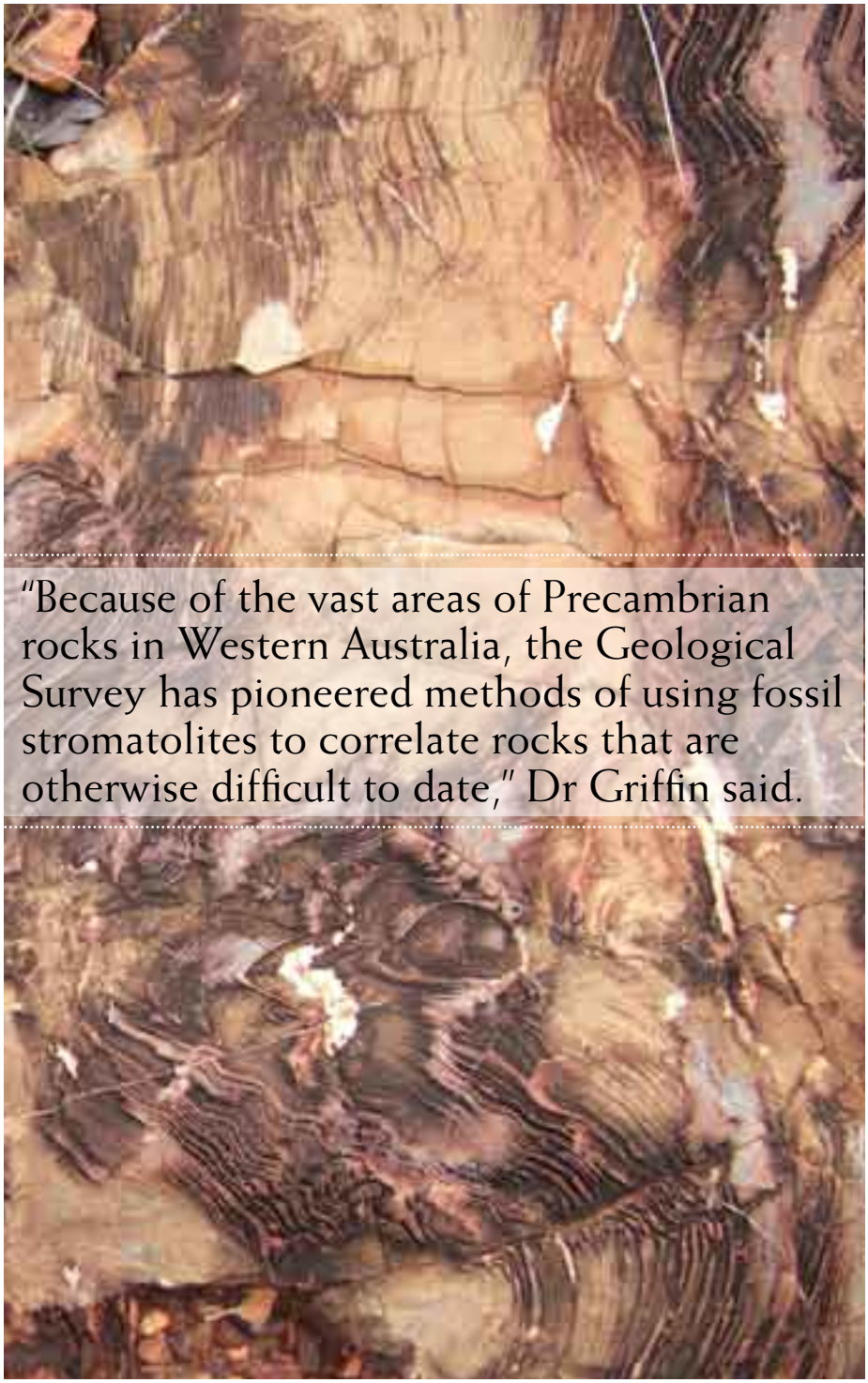
"All three vehicles used in the expedition were bogged at some point in the trip and the students were introduced to the joys of snatch-strapping and digging out vehicles."

Despite the weather, the expedition participants were able to examine a layer of spherules in the Hamersley Group, which provided evidence of a huge impact event. And after some heavy work with picks and shovels to repair previous cyclone damage, they were also able to reach the Trendall locality to see some of the oldest fossils in the world.

The mapping of a new stromatolite locality 60 km south of Marble Bar that has the potential to be a specialist geotourism and educational site had to be abandoned.

"But this at least allowed the party to examine Fortescue Group geological structures along the sealed Rippon Hills Road," Dr Grey said.

"And another rethink of our plans resulted in a morning spent at Marble Bar Pool engaged in lively discussion about the origin of life."



"Because of the vast areas of Precambrian rocks in Western Australia, the Geological Survey has pioneered methods of using fossil stromatolites to correlate rocks that are otherwise difficult to date," Dr Griffin said.

Before setting off on 6 June, expedition participants were given a tour of the GSWA Core Library at Carlisle, which archives drill-core samples and other materials acquired during mineral and petroleum exploration in WA.

GSWA Director Tim Griffin said the expedition showed there was great interest in Western Australia's Precambrian fossils.

"Because of the vast areas of Precambrian rocks in Western Australia, the Geological Survey has pioneered methods of using fossil stromatolites to correlate rocks that are otherwise difficult to date," Dr Griffin said.

In spite of the difficulties involved in the trip, Dr Grey said participants remained in good spirits throughout and learned a lot about the geology of Western Australia. She said many of the students expressed their determination to return to see some of the localities they could not explore this time.

"Some may even return to work over here," Dr Grey said.

"It seems that several who visited the Ironclad Hotel in Marble Bar were offered jobs on the spot because of the current shortage of geologists in the mining industry."

LEADING LIGHTS

WA INNOVATION & INVESTMENT CONFERENCE

This October, Western Australia will host some of the world's leading innovators and entrepreneurs as they come together to showcase the State's growing emerging industries.

The Leading Lights Innovation and Investment Conference will be held from 16 – 17 October and offers a unique opportunity to visit Perth and discuss business opportunities.

This is your chance to take advantage of WA's thriving economy and brilliant science minds.

Guest speakers include:

Steve Wozniak, Co-founder of Apple Computer

Steven Goh, Co-founder, mig33, San Francisco (established in Perth)

Peter Quinn, Premier's Fellow and Professor of Astronomy, UWA

Pete Bonee, Partner, Innosight Ventures, Singapore

The program features a mix of:

- presentations
- panel discussions
- case studies
- pitch sessions
- business matching activities

Who should attend:

- Entrepreneurs who need the right information to help secure capital
- Investors who want access to investment ready business ventures
- People with an interest in innovation

Where: Burswood Entertainment Complex

When: Thursday 16 October to Friday 17 October 2008

Conference cost: $495 until 8 October

Register now to avoid disappointment:
www.doir.wa.gov.au/leadinglightsconference

The Leading Lights Conference is part of the Western Australian Government's Brilliant West Week, being held from 12-18 October.

For researchers, entrepreneurs and businesses, Brilliant West Week will help develop the knowledge, skills and networks to take new products and services from idea to market.

LEADING LIGHTS
WA INNOVATION & INVESTMENT CONFERENCE

Government of Western Australia
Department of Industry and Resources

www.doir.wa.gov.au/leadinglightsconference

New DoIR Director General Anne Nolan says the growth of its resources industry provides Western Australia an opportunity to deliver lasting economic, social and cultural benefits.

New DG focuses on sustainable and continued growth

In 2007 Western Australia accounted for more than 36 per cent of Australia's total merchandise exports, shipping out a total of A$61.3 billion in goods.

The State is the powerhouse of Australia's economy and there is no doubt that its current economic prosperity is the envy of the world's developed nations. The rapid industrialisation of China has created an enormous opportunity for the biggest resources expansion in Australia's history.

This period of historic and momentous demand for Western Australia's commodities offers many opportunities and challenges for the State. And the new Director General of the Department of Industry and Resources (DoIR) is ready to tackle these challenges with gusto.

Anne Nolan took over the reigns at DoIR in July and says that as a State, Western Australia has an opportunity to ensure that the current and prospective resources growth delivers lasting economic, social and cultural benefits to all Western Australians.

"Western Australia is experiencing unprecedented levels of growth – it provides one-third of Australia's total exports, has Australia's lowest unemployment rate, among its fastest growth in retail sales and the highest business confidence levels," Ms Nolan said.

"With this growth comes challenges and it is more important than ever that we manage development in a sustainable manner.

"The Government must play a role in ensuring that the proposed resource expansions and new developments are sustainable and that they will return a dividend to all Western Australians to underpin our future.

"This is also important for our trading partners who want security of supply for many years to come as they continue to expand also."

Ms Nolan brings a wealth of experience in leading and developing public sector agencies, most recently as Deputy Director General at the Western Australian Department of Premier and Cabinet.

Her other government posts include Chief Executive at the Independent Market Operator, and the Coordinator of Energy at the Office of Energy. She has also held a number of senior positions within the Department of Treasury and Finance including the role of Executive Director (Economic).

Ms Nolan said she was looking forward to leading a department that had been significantly involved in Western Australia's unprecedented growth.

"Western Australia has a strong and diverse economy, so it will be a very exciting challenge to ensure this growth continues in a sustainable manner," she said.

"One of the important factors in that equation is cooperation between government and industry.

"Government and industry must work together because of the interactive nature of our economy.

"The community wants economic growth but they want it to occur in an environmentally sensitive way that is also socially inclusive and responsible.

"I am looking forward to ensuring DoIR delivers its services to best meet the needs of the Western Australian community, through balancing economic, social and environmental considerations."

There are several key issues on top of Ms Nolan's list of priorities for her time at DoIR. They include energy security, development in the Pilbara and the Kimberley, the streamlining of approvals processes and industry diversification.

"DoIR is responsible for issues that are critical to the ongoing development and prosperity of Western Australia," she said.

Ms Nolan has been appointed under a five-year term.

Indigenous employment goals in sight

Rio Tinto Iron Ore (RTIO) is well on its way to reaching its target of employing 100 indigenous workers within Western Australia in the 12 months since signing a Memorandum of Understanding with the State Government.

To date, 30 indigenous workers have been employed by RTIO from Karratha, Roebourne and Tom Price/Paraburdoo.

The Memorandum of Understanding (MoU) for the delivery of economic development for indigenous Western Australians was signed by the then State Development Minister Eric Ripper, the then Director General of the Department of Industry and Resources (DoIR) Dr Jim Limerick, and RTIO Chief Executive Sam Walsh.

The agreement has seen RTIO and DoIR work together on a range of training, pre-employment and employment programs, and business opportunities, to maximise the participation of indigenous people in the expansion of RTIO's Western Australian mining and related operations.

The aim is for RTIO to employ up to 300 indigenous workers in a range of occupations over the next two years.

DoIR Aboriginal Economic Development (AED) Director, Victoria Jackson said the MoU allowed traditional owners to benefit from the RTIO expansion. She said pleasing progress had been made in just a few months.

"We are working closely with RTIO's team and have formed a working group to map the recruitment processes and establish a pre-employment and job-based training program," Ms Jackson said.

"This group oversees the award-winning pre-employment Workstart program run by the Ashburton Aboriginal Corporation.

"The 16-week Workstart program is intensive. It's self-paced and picks up fitness for work, leadership, numeracy, and drivers' licences – the basics necessary to get indigenous people to the employer's gate.

"The Workstart training is just the beginning. That guarantees the trainees a job within the company, but once there they benefit from on-site trainers, mentors and other support structures to help them through the process."

The latest 21 trainees were recognised and acknowledged at a graduation ceremony held in Roebourne in July, where former WA Indigenous Affairs Minister Michelle Roberts presented graduates with certificates.

They will now move into employment, some with RTIO and some elsewhere.

"The priority area for the company in terms of recruitment is those traditional groups with which RTIO have land use agreements, followed by other Pilbara-based indigenous people, then indigenous people from elsewhere in the State," Ms Jackson said.

"There are eight tasks attached to the MoU document, and along with jobs and training, it is looking at establishing an environmental rehabilitation company.

"They want that to have indigenous engagement, involvement and preferably ownership of the company and the operations – that's employment and enterprise."

Ms Jackson said the DoIR and RTIO team were finalising where they would be targeting recruitment, how many people they would take from each group or location, and where they would be placed on RTIO sites across the Pilbara.

RTIO has appointed three part-time work ambassadors to help members of traditional owner groups gain employment.

"The primary role of the ambassadors is to provide a link between RTIO and its traditional owners,

Trainees from the Workstart program attended a graduation ceremony in Roebourne on 18 July, where former Indigenous Affairs Minister Michelle Roberts presented certificates with RTIO Organisation Resources Vice President, Joanne Farrell.

promoting employment and economic opportunities with the company and its contractors," Ms Jackson said.

"They will promote the benefits of work to Aboriginal people at the individual, family and group level; promote employment at RTIO's operations; mentor and support Aboriginal people who make a commitment to take up work or programs that prepare them for work; help them through the assessment and training process; and mentor them on the job."

The three ambassadors have been appointed to the Kurama Marthdudunera, Gobawarrah Minduarra Yinhawanga and Nyiyiparli Groups. RTIO will appoint further ambassadors for other traditional owner groups later in the year.

RTIO General Manager of Communities Bill Hart said the company was extremely excited about what was happening.

"We think it is a wonderful project, with collaboration between ourselves and the State and our partners, including the Ashburton Aboriginal Corporation," he said.

"It is exciting because we are working with long-term unemployed and we've got this opportunity to assist them into work.

"What has been particularly fascinating and exciting about this work is that through this collaboration, we are improving the way Workstart will work. It's continuous improvement in the way it is operating, because each time we are learning new things and adapting so that we can get the best results.

"It has been truly collaborative and we are very appreciative of the efforts of the staff from AED.

"It is a great model for future projects".

Mr Hart said it was not an issue for RTIO that some graduates were working with other companies.

"What's important is that this project is increasing the level of indigenous employment – it doesn't matter where they are employed," he said.

"We're delighted with the work ambassadors, who are making sure that people in the community help us to achieve good job outcomes."

Ms Jackson said that while RTIO benefited from the ability to train and recruit local indigenous people, the major benefit was to those who gained employment.

DoIR has established another program called Work Coach in partnership with the Bloodwood Tree Association, an indigenous employment agency in Port Hedland.

Ms Jackson said this initiative was also showing encouraging signs.

"It's designed to pick up people who have shown motivation," she said.

"They have the skills and willingness to engage in the labour market, but might be lacking in fitness or readiness for work, and need motivation and support to get to a level of fitness that will allow them to pass medicals.

"The Work Coach program has the flexibility to provide a supportive environment to assist trainees and provide encouragement in overcoming personal barriers to being work-ready."

AED has also recently begun work with mining company MetalsEx and traditional owner groups in the Ngaanyatjarra lands east of Warburton.

"We've been asked to put together an employment enterprise strategy from the outset for the Wingellina Nickel Project, and so we're working with the traditional owners and the mining company side by side," Ms Jackson said.

"We don't have a formal Memorandum of Understanding, but are doing similar work to bring to fruition the best opportunity for them to engage in the mainstream economy. It's wonderful to see the success of the MoU with RTIO spreading further afield."

"It is exciting because we are working with long-term unemployed and we've got this opportunity to assist them into work."

Mineral sands mined at Eneabba provide the basis of Iluka Resources' Mid West operations.

Iluka aims to maintain Mid West presence with A$60m expansion

Iluka Resources could secure its presence in Western Australia's Mid West region for years to come through the expansion of its Narngulu facility to process mineral sands from South Australia.

The Western Australian Government approved a variation in July to the State Agreement covering Iluka's Mid West operations, allowing it to use the Narngulu plant for processing ore mined from sources other than its Eneabba mining leases.

This variation will allow the company to import and process 600,000 tonnes of heavy mineral concentrate (HMC) from its Jacinth-Ambrosia deposit in South Australia each year.

The depletion of ore bodies from the Eneabba leases has threatened Iluka's contribution to the Mid West region, where it employs 385 permanent and 300 contract staff and contributes more than A$120 million annually.

Speaking at the announcement of the variation, the then Western Australian Premier Alan Carpenter said it would allow Iluka's considerable presence in the region to be maintained.

"The company is already the largest employer in the Geraldton community and will be able to offer longer-term security to its 240 full-time workers at Narngulu as well as new contract employment to many more engineers and transport workers," Mr Carpenter said.

"The proposed A$60 million expansion of the processing facilities to accommodate this plan will use predominantly local contractors and suppliers."

Iluka has also agreed to the removal of the unimproved value rating clause in the State Agreement, which will allow local government authorities to rate the company's operations on gross rental value as they would similar operations.

The Jacinth-Ambrosia deposit contains an estimated 6 million tonnes of HMC. It will supplement HMC sourced from the Eneabba mining lease.

Shipments of HMC should begin in early 2010 between the ports of Ceduna in South Australia and Geraldton in WA. The Narngulu facility is expected to produce approximately 300,000 tonnes of zircon from the South Australian mine each year.

Iluka spokesperson Robert Porter said the Mid West generated about 75 per cent of Iluka's overall production.

"While the Mid West remains a key part of the Iluka portfolio, there has been recognition for some years that the age of the ore bodies being mined meant that the mineralogy characteristics were declining," Dr Porter said.

He said there was excess processing capacity available at Narngulu and it made sense to consider how this could be best utilised.

"The company's intention to bring heavy mineral concentrate from the Jacinth-Ambrosia project in South Australia provides the logical means to utilise existing spare processing capacity in Western Australia and in doing so, extend the economic life of the Mid West processing facilities," he said.

The opportunity to process HMC from South Australia is expected to extend the life of the Narngulu facilities by at least 10 years, which is the current estimated economic life of the Jacinth-Ambrosia ore bodies.

Iluka also has an active exploration program within its Eneabba licence area and within the past 12 months has stepped up efforts to identify new deposits near existing facilities.

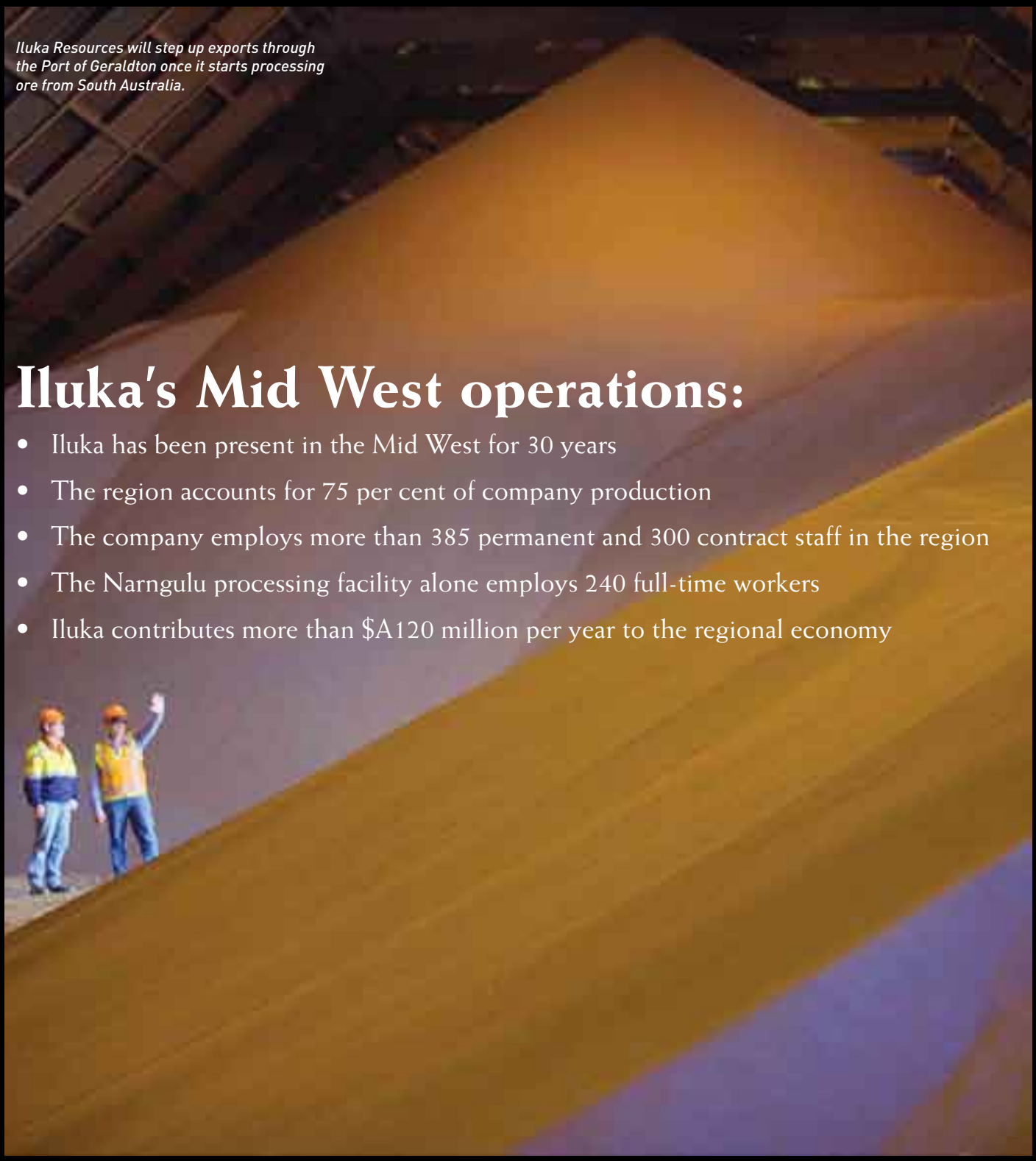
Mid West Development Commission Chief Executive Steve Douglas said Iluka had been a valued contributor to the Geraldton and Mid West community for a generation.

"Iluka has also been a good corporate citizen in terms of its contribution to community events, sporting events and so on," he said.

"From our point of view, allowing Iluka to bring in this concentrate from South Australia will allow that position to continue well into the future."

Mr Douglas said the continuation of Iluka's mineral processing operation would allow the Mid West to maintain some diversity within the mining sector at a time when there was growing interest in iron ore development.

"While there has been a lot of interest in the region from the junior iron ore miners, the interest from the major companies has not yet materialised and it's important that we maintain that diversity within sectors, as well as across sectors," he said.



Iluka Resources will step up exports through the Port of Geraldton once it starts processing ore from South Australia.

Iluka's Mid West operations:

- Iluka has been present in the Mid West for 30 years
- The region accounts for 75 per cent of company production
- The company employs more than 385 permanent and 300 contract staff in the region
- The Narngulu processing facility alone employs 240 full-time workers
- Iluka contributes more than $A120 million per year to the regional economy

"It is encouraging to note that compliance levels have improved in the Goldfields and the Mid West ..."

Environmental compliance on the up

The percentage of mining companies not complying with environmental regulations governing exploration has dropped significantly.

There has been a big jump in the Western Australian mining industry's compliance with the environmental regulations governing exploration tenements following the 2007 revelation that 82 per cent of sites failed to meet requirements.

Field inspectors from the Department of Industry and Resources (DoIR) have reported the figure has now been reduced to about 30 per cent.

Inspections of 56 exploration sites by DoIR last year revealed that 46 had environmental and regulatory breaches, some of which were in environmentally sensitive areas of the State.

Breaches included drilling or construction of exploration camps without an approved Program of Works; failure to permanently and securely plug drill holes and pick up sample bags; excessive clearing for drill pads and access tracks; and failure to comply with rehabilitation requirements.

"The breaches were widespread, and the incidence had increased markedly over previous inspections," DoIR Senior Environment Advisor Graham Cobby said.

"They appeared to result from the rapid rise in the number of exploration companies with exploration applications having risen to 2500 a year, compared with 500 per annum four years ago.

"It was also clear that small-to-medium sized companies were not well enough aware of basic legislative requirements and there was a lack of onsite management control.

"We designed a package of measures to ensure that industry was made very aware that the Government would not tolerate non-compliance, and it is very rewarding to see that these are having an effect."

The 2007 situation was so serious that the then Resources Minister Francis Logan warned he was prepared to remove tenements from offending companies, and hefty fines were imposed for significant breaches.

Golden West Resources was fined a total of A$71,500 for a number of offences at mining tenements at its Wiluna West iron ore project, including unauthorised drilling and clearing and the failure to complete rehabilitation.

And Hancock Prospecting was fined A$20,000 for the unauthorised construction of an exploration camp at Roy Hill, 120 km north of Newman.

Ten of the non-compliant sites were issued with directions to modify work practices; the operators of 26 sites were ordered to provide written explanations; and seven were issued with verbal instructions to undertake work.

With the maximum fine for breach of exploration licence or lease conditions being A$50,000, DoIR reviewed the level and range of fines in terms of their disincentive effectiveness. Amendments are proposed for a maximum of A$150,000 per tenement for corporations.

Following the review, the Government also revised the Scale of Fines, which dictates the level of fines different breaches attract, based on factors such as the size and environmental impact of ground disturbance.

DoIR arranged a series of workshops to improve general understanding of exploration regulatory requirements.

"We conducted a series of exploration compliance seminars and workshops, in Perth, Bunbury, Geraldton and Kalgoorlie." Mr Cobby said.

"We had a good response, including more than 100 exploration staff in Kalgoorlie. I was very happy with attendance, the response of attendees at the workshops and also with what we are now finding in the field."

Mr Cobby said inspectors were making more regular field inspections.

"There were 251 inspections of mining operations during 2007-08 compared with 170 inspections the previous year," he said.

"It is encouraging to note that compliance levels have improved in the Goldfields and the Mid West but continued communication and engagement with industry and consultants is needed to drive the message home.

"The Government has clearly indicated that it will not tolerate non-compliance with legally binding conditions."

DoIR's 2008-09 inspection program is focused on exploration and mining activities that are considered to be higher risk, particularly in the Goldfields and Pilbara regions.

Risk factors considered include location and environmental sensitivity, nature and extent of operation, area of disturbance and potential for rehabilitation, company history of performance and a range of technical considerations.

Golden Geckos celebrate another year of sustainable development

The broad range of projects entered in the 2008 Golden Gecko Awards covered everything from sustainable accommodation and waste recovery initiatives, to technologies to reduce pollution and environmental footprints.

This year's winners of the awards, which are organised by the Department of Industry and Resources (DoIR), were announced at a ceremony at the Perth Convention and Exhibition Centre on September 10.

HIsmelt Operations, Minara Resources and Kings Park and Botanic Gardens with Rocla Quarry Products won Golden Gecko Awards while Rio Tinto Iron Ore won a Certificate of Merit.

Now in their 17th year, the Golden Geckos recognise outstanding contributions to environmental sustainability in the Western Australian resources industry.

DoIR Environment Director Kim Anderson said the awards provided an opportunity to showcase outstanding projects and communicate their progress to the public.

"By offering recognition to companies that responsibly develop Western Australia's valuable resources, the Golden Geckos help to encourage the wider industry adoption of such practices in the future," Ms Anderson said.

She said the nine submissions for the 2008 awards were of a very high quality.

"What is most encouraging is that they cover a broad range of resources development in both the mining and petroleum sectors, and employ a variety of innovative methods to achieve their important outcomes."

Last year a Golden Gecko was awarded to Alcoa World Alumina Australia for the rehabilitation of 975 hectares of land at the Jarrahdale Bauxite mine.

The assessment panel for the awards is made up of representatives of DoIR; the Departments of Environment and Conservation, Agriculture and Food, and Water; the Environmental Protection Authority; and the Conservation Council of Western Australia.

Findings based on written submissions and site visits are presented to a selection committee, which decides the projects deserving of a bronze Golden Gecko Award sculpture and any Certificate of Merit recipients.

The criteria against which the entries are judged are:

- Commitment to Environmental Excellence
- Demonstrated Excellent Environmental Outcomes
- Community Engagement
- What Makes it Special?

To find out more information about the Golden Geckos, including the 2008 winners, visit **http://www.doir.wa.gov.au/goldengecko/**

Full details of the winners will also be included in the next edition of *Prospect*.

Rio Tinto Iron Ore

The 2008 Golden

BHP Billiton

Project: Newman EcoVillage
Location: Pilbara

BHP Billiton has developed sustainable self-contained accommodation for fly-in, fly-out workers that is energy and water-efficient and aimed at townsite integration, thereby improving workforce participation in the community.

Chevron Australia

Project: Enhanced management of vegetation clearing
Location: Barrow Island

Chevron has developed a new geographic information system (GIS) software to improve the planning and implementation of native vegetation clearing, to minimise impacts and avoid priority vegetation areas. This tool also assists in auditing native vegetation clearing and ongoing reporting of cumulative impacts.

HIsmelt Operations

Project: HIsmelt technology
Location: Kwinana

HIsmelt Operations has developed a new steel-making process that creates less pollution and imposes a smaller environmental footprint than existing blast furnace technology. The company has also undertaken numerous initiatives on a local level including the Kwinana Water Reclamation Plant, identifying product synergies with neighbouring industries and implementing waste recycling programs.

BHP Billiton

Chevron Australia

Inpex Browse Ltd

Geckos nominees

Inpex Browse Ltd

Project: Minimising environmental impact of onshore drilling
Location: Maret Islands

Inpex Browse has undertaken its onshore geotechnical drilling program with minimal environmental impact on Maret Islands through the helicopter transport of equipment; restricting all onshore transportation to walking, including for pipe laying; developing an offshore desalination plant; and locating all accommodation offshore.

Kings Park and Botanic Gardens with Rocla Quarry Products

Project: Banksia woodland restoration
Location: Lexia

Rocla Quarry Products engaged Kings Park and Botanic Gardens 13 years ago, to undertake research into restoring banksia woodland to rehabilitate its sand quarries. This resulted in significant improvements in the understanding of the unique ecosystem and was applied to achieve a successful return of species diversity.

Lennard Shelf Pty Ltd

Project: Cadjebut tailings storage facility rehabilitation
Location: Kimberley

Lennard Shelf Pty Ltd has undertaken an innovative approach to tailings storage facility design, for successful rehabilitation where climatic conditions and soil types could not be addressed by standard design.

Minara Resources Ltd

Project: Framework for minesite closure
Location: Goldfields

Minara Resources Ltd has developed key performance indicators for rehabilitation success, to improve rehabilitation planning, design and adaptive management, and increase certainty and clarity in assessing rehabilitation performance.

Rio Tinto Iron Ore

Project: Lang Hancock Railway
Location: Pilbara

Rio Tinto Iron Ore has avoided and minimised environmental impacts on key Mulga woodland communities and Aboriginal heritage sites through undertaking extensive consultation to inform the design and route of the Lang Hancock Railway. Research has also been undertaken into the design and rehabilitation of borrow pits to improve rehabilitation success.

Universal Sodexho

Project: Waste recovery program
Location: Statewide

Remote site services company Universal Sodexho has overcome numerous implementation barriers to remove all recyclable materials from mine site accommodations. The amount and volume of waste deposited in local landfill has been significantly reduced and all money raised is donated to Princess Margaret Hospital. Waste canola oil is also converted into biodiesel to fuel on-site vehicles.

Minara Resources Ltd

Kings Park and Botanic Gardens with Rocla Quarry Products

Universal Sodexho

Lennard Shelf Pty Ltd

FMG on expansion track in Pilbara

FORTESCUE Metals Group (FMG) continues to pass milestones in the Pilbara as it aims to cement its position as the new force in the Western Australian iron ore sector.

The fledgling company shipped the first ore from its Cloudbreak mine to China in May this year, in keeping with its long-stated schedule.

By 18 July it had achieved "project completion", a condition of its financing arrangements whereby it mined, railed and shipped two million tonnes of ore within a four-week period. And by the end of July, 25 shipments carrying more than four million tonnes of ore had left the company's Herb Elliot port facility, bound for China.

FMG Executive Director Graeme Rowley said the company's operations had four significant phases - construction; commissioning of equipment; ramp-up to full operation; and expansion.

It has completed the first two of these and is busily working on the remaining two.

"Our initial plans are to achieve a production rate of 55 million tonnes per annum (Mt/a), before expanding to in excess of 100Mt/a," Mr Rowley said.

"The board is currently considering a range of finance options that is expected to establish a strongly funded expansion."

FMG will announce further details of these expansion plans in the near future.

It is currently investigating resources within its tenements, with exploration activity focused on the western region around the Solomon Group.

The company's tenement area increased by 17,000 km² during the three months to June 2008 and currently stands at 57,400 km².

In a project named Heng Shan, Fortescue has undertaken extensive planning to increase the production base of its Chichester Range deposits - Cloudbreak and Christmas Creek.

FMG has also entered into a joint venture with Chinese firm Baosteel to develop the Glacier Valley tenement.

Reflecting the importance of the Chinese market, it has established an advisory board to provide advice to senior management about the company's strategy and operations in the country. Mr Rowley said it was important for FMG to have such high level representation in China, which purchased the bulk of its iron ore.

"Fortescue has agreements with all top 20 steel producers in China for production up to 100 Mt/a," Mr Rowley said.

"There is huge demand worldwide demand for iron ore, and as a result we are in constant discussions with existing customers about expanding worldwide supply as well as new customers seeking iron ore from Fortescue."

The 18 July date for project completion in the Pilbara was exactly five years from when FMG came into existence at an extraordinary general meeting in Perth in 2003.

Mr Rowley said there had been significant challenges since then in getting the company's project off the ground.

"There was obviously considerable scepticism about Fortescue's lofty ambitions," Mr Rowley said.

"In addition the challenges presented by our competitors only spurred us to work smarter and harder to achieve our goals."

He said innovations, such as the use of surface miners, presented significant challenges to achieve maximum efficiencies.

"Some worked, some didn't, but the end result has been high production rates matched by low cost of production, which will sustain Fortescue for decades to come."

FMG's first shipment of ore to China was marked by a ceremony at Port Hedland attended by political, business and community leaders from across Australia.

Speaking at the ceremony, the then Western Australian Premier Alan Carpenter said the project had gone from conception to operation in record time and attributed this to the drive and determination of FMG chief executive Andrew Forrest and his team.

"For FMG's mine and the associated railway and port facilities to go from the first drill holes at Cloud Break to operation within three-and-a-half years is a momentous achievement," Mr Carpenter said.

He also praised FMG's commitment to the Pilbara community.

The company has pledged to house all of its 250 permanent port and rail workers in Port Hedland. The first of 250 homes were scheduled to be completed in mid-August and a home ownership program for FMG employees was to be implemented at the same time.

On top of this, FMG has a number of programs to improve the lives of indigenous Australians in the north of Western Australia.

FMG has targeted a production rate of 55 million tonnes of iron ore per annum, before expanding to more than 100 Mt/a.

The FMG timeline

2003 FMG formed at extraordinary general meeting in Perth and acquires tenements at Christmas Creek and Cloudbreak localities

2004 Signs first Chinese iron ore sales agreements and Infrastructure State Agreement

2005 Discovers significant iron ore mineralisation within Cloudbreak area and signs Mining State Agreement

2006 Commences earthworks at port site and construction of railway

2007 Opens China office, signs further supply deals and begins commercial mining at Cloudbreak

2008 Completes construction of Cloudbreak to Port Hedland railway and ships first ore to China

Commissioned Projects

IRON ORE

Pilbara - Hope Downs - Iron Ore Mine

HAMERSLEY WA PTY LTD

The initial mining project includes the development of mining in the East Pilbara and the construction of a rail spur line to connect to the existing Pilbara Rail network. Production will be up to 30 Mt/a after 5 years. Full operation is expected to commence in Q4 2008. Hope Downs Iron Ore assigned a 50 per cent interest in the project to Hamersley WA Pty Ltd.

Employment: Operation: 280

Pilbara - Iron Ore Mine Rail and Port Development

FORTESCUE METALS GROUP LTD

FMG operates a 45 Mt/a iron ore mine at Cloud Break in the Chichester Ranges of the eastern Pilbara. The mine is serviced by a multi-user railway and new port facilities at Port Hedland. First exports of iron ore to China commenced in May 2008.

Expenditure: $3.2b.

Employment: Construction: 2500; Operation: 870

BAUXITE

Worsley - Alumina Refinery Expansion to 4.7Mt/a

WORSLEY ALUMINA PTY LTD

BHP Billiton in May gave the go-ahead for the $2.5 billion Efficiency and Growth Expansion Project at its Worsley Alumina Refinery. The project will lift capacity of the refinery from 3.5 Mt/a to 4.7 Mt/a through expanded mining operations, additional refining capacity and upgraded port facilities. The construction phase will start immediately and first production is expected in the first half of 2011.

Expenditure: $2.5b.

Employment: Construction: 1500; Operation: 200

CHAR

Collie - Premier Mine - Char Plant (Coal)

WESFARMERS PREMIER COAL LIMITED

At its Premier Coal Mine near Collie, Wesfarmers Energy has commissioned a demonstration scale char plant, with a target production capacity at full operation of 50,000 t/a. The plant is providing sufficient volume to allow potential customers to fully assess the product. Char has applications in steelmaking, ferro alloy production, mineral sands processing, smelting and some chemical plant processes.

Expenditure: $8m.

Employment: Operation: 10

COAL

Collie - Collie Coal Mine (Ewington I)

THE GRIFFIN COAL MINING COMPANY PTY LIMITED

Griffin Coal plans to develop its Ewington I coal deposit, approximately 2 km east of Collie, which has estimated coal resources of 408 Mt. The mine will produce approximately 3.4 Mt/a of coal for private sector customers, including Griffin Energy's nearby Bluewaters 1 power station, presently under construction, and its proposed Bluewaters 2 power station. Mine start-up is scheduled for 2008-09. The Ewington I coal mine will be an extension of the Ewington II mine.

Expenditure: $20m.

Collie - Collie Coal Mine (Ewington II) - Char Plant (Coal)

THE GRIFFIN COAL MINING COMPANY PTY LIMITED

The char plant is designed to drive off most of the water and volatile compounds from Ewington II coal. The plant, located about 4.5 km east of Collie, will convert up to 800,000 t/a of coal to 400,000 t/a of char from two process units. The plant will produce high-value char suitable for steelmaking as well as generation of 24 MW of power.

DIAMONDS

Kimberley - Argyle - Argyle Diamond Mine

ARGYLE DIAMOND MINES PTY LIMITED

Development of the Argyle Diamond Mine commenced in 1982 and mining commenced in the main ore body (AK1) in 1985. The mine is operational and in order to extend the life to about 2024, the company has committed to an underground mine expansion. Commencement of underground operations is scheduled for Q4 of 2008.

Expenditure: $1.2b.

Employment: Construction: 250; Operation: 500

Committed Projects

ELECTRICITY

Collie - Collie - Bluewaters I and II, Coal-fired Power Stations

GRIFFIN ENERGY PTY LTD

Griffin Energy is constructing the first of two 208 MW coal-fired power stations at the proposed Coolangatta industrial estate, 10 km northeast of Collie. Commissioning of the Bluewaters 1 coal-fired base load power station is expected by late 2008. Griffin expects the second of the two power stations (Bluewaters II) to be commissioned in late 2009.

Expenditure: $400m.

Employment: Construction: 600; Operation: 50

GOLD

Boddington - Gold Mine (Wandoo Expansion)

BGM MANAGEMENT COMPANY PTY LTD

BGM Management Company Pty Ltd, on behalf of Newmont and AngloGold Ashanti, is developing the Wandoo project, based on mining the extensive bedrock resource that underlies the mined-out oxide resource. The mine has been in the construction phase since 2006. Production will be about 800,000 oz/a of gold and about 30,000 t/a copper in concentrates over a 17-year mine life. Initial production is expected by late 2008 or early 2009. The Wandoo project will result in significant growth in and around the rural community of Boddington, 120 km southeast of Perth.

Expenditure: $2b.

Employment: Construction: 1500; Operation: 650

HEAVY MINERAL SANDS

Narngulu - Processing Facility Expansion

ILUKA RESOURCES LIMITED

Iluka recently announced a proposed $60 million upgrade of its Narngulu processing facility to treat third-party ore from South Australia, to supplement a diminishing supply from its Eneabba mining operations. Iluka will treat up to 600,000 t/a of heavy mineral concentrate from its Jacinth-Ambrosia deposit in SA at Narngulu starting in early 2010. Up to 350,000 t/a of zircon will be produced at the plant.

Expenditure: $60m.

IRON ORE

Tom Price - Brockman 4 Iron Ore Mine

HAMERSLEY IRON PTY LIMITED

Hamersley Iron is developing the Brockman 4 iron ore deposit. Construction work has commenced and commissioning is expected in 2010. Full capacity of 22 Mt/a is expected to be reached in 2012.

Expenditure: $1.5b.

Cape Lambert - Cape Lambert Port Expansion

ROBE RIVER MINING CO PTY LTD

Robe River Mining is planning to expand the capacity of its port facilities at Cape Lambert, east of Karratha. The expansion will lift the iron ore export capacity of the facilities to 85 Mt/a. It is anticipated that the expansion will be completed Q4 2008.

Expenditure: $1.1b.

Employment: Construction: 450; Operation: 70

Dampier - Dampier Port Expansion

HAMERSLEY IRON PTY LIMITED

Hamersley Iron is well advanced in its construction work to expand the capacity of its port facilities at Dampier Port from 120 Mt/a to 145 Mt/a. This work included installation of a new car dumper, screen house and related facilities. Final approvals to operate the new facilities at 145 Mt/a are expected in Q3 2008.

Expenditure: $920m.

Employment: Construction: 800; Operation: 200

Mid West Region - Extension Hill Hematite Mine

MT GIBSON IRON LTD

Mount Gibson Iron has environmental approval for a 2 Mt/a hematite mining operation at Extension Hill, 330 km southeast of Geraldton. The ore will be trucked to a railhead near Perenjori then railed to the port of Geraldton for export. The Mount Gibson board has approved commencement of construction of the project. Subject to secondary Government approvals, Mount Gibson expects to start shipments in Q2 2009.

Expenditure: $73m.

Employment: Construction: 150; Operation: 100

Mid West Region - Koolanooka/Blue Hills Hematite Iron Ore Mine

MIDWEST CORPORATION LIMITED

Midwest Corporation commenced transporting iron ore fines from stockpiles at Koolanooka, about 160 km southeast of Geraldton, in January 2006, with the first exports shipped in February 2006. Midwest proposes to re-open the Koolanooka and Blue Hills hematite iron ore mines at a rate of 1-2 Mt/a, with timing dependent on the timing of government approvals. The re-opening of the mines is being environmentally assessed at a Public Environmental Review level.

Expenditure: $26m.

Employment: Construction: 40; Operation: 60

IRON ORE PROCESSING

Kwinana - HIsmelt Commercial Iron Making Plant

HISMELT CORPORATION PTY LTD

HIsmelt Corporation, in a joint venture with Nucor (25%), Mitsubishi (10%) and Shougang (5%), has developed a commercial-scale HIsmelt process plant at Kwinana, near Perth. The first stage of the plant is designed to produce 800,000 t/a of pig iron from iron ore fines, coal and fluxes. First hot metal production commenced in mid-2005, with commissioning continuing towards full production capacity over three years.

Expenditure: $800m.

Employment: Construction: 320; Operation: 65

OIL & GAS DEVELOPMENTS

Carnarvon Offshore Basin – Angel – Gas and Condensate Field

WOODSIDE ENERGY

The Angel gas and condensate field, operated by Woodside as part of the North West Shelf Venture (NWSV), includes the NWSV's third fixed production platform, which will be remotely operated; three subsea production wells; and a 50 km subsea pipeline, which will link the new platform to the existing North Rankin production facility. Angel is expected to start up in Q4 2008. The platform will be capable of processing 800 million standard cubic feet of gas a day and 50,000 bbl/d of condensate.

Expenditure: $1.6b.

Carnarvon Offshore Basin - Pluto LNG

WOODSIDE ENERGY

Woodside approved the Pluto LNG project in Q3 2007. Construction has commenced on Sites A and B on the Burrup Industrial Estate for export of LNG in Q4 2010.

Expenditure: $11.2b.

Employment: Construction: 3000; Operation: 200

North West Shelf - Project Expansion - 5th LNG Train

WOODSIDE ENERGY

Commissioning is due in Q4 2008 and first LNG export cargoes are also planned for Q4 2008.The fifth train will boost the North West Shelf project's total LNG production capacity to 16.3 Mt/a.

Expenditure: $2.4b.

Employment: Construction: 1500; Operation: 20

Carnarvon Offshore Basin - Pyrenees – Oil Fields

BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

In July 2007, BHPB Petroleum announced approval of the Pyrenees oil development, located 45 km north of Exmouth. The development comprises the Crosby, Ravensworth and Stickle oil fields, which have estimated recoverable oil reserves in the range of 80-120 million barrels. The project involves

This section is intended as an overview and does not constitute an exhaustive list of projects within the Western Australian resources industry.

the development of 13 subsea wells connected via flowlines to a floating production, storage and offloading (FPSO) vessel, which will be capable of producing about 96,000 bbl/d of oil. First production is expected during the first half of 2010 and the estimated economic field life is 25 years.

Expenditure: $2b.

Carnarvon Offshore Basin - Van Gogh – Oil Field

APACHE ENERGY LIMITED

The Van Gogh oil development, located about 50 km northwest of Exmouth, will utilise a FPSO vessel with a processing capacity of 63,000 bbl/d of oil and storage capacity of 620,000 barrels. It will be linked to two subsea drill centres with 10 production wells. Drilling commenced in January 2008 and will continue until September 2008. Subject to obtaining all the necessary government approvals, the field installation of Van Gogh is expected to start in late 2008 and be in production by early-to-mid-2009. The expected life of the development is 12-15 years.

Expenditure: $600m.

Carnarvon Offshore Basin – Vincent Development – Oil Field

WOODSIDE ENERGY

Approval of the first phase of the Vincent oil development was given in March 2006. The field is located approximately 50 km northwest of Exmouth in a water depth of about 350 metres. Oil will be produced through an eight well subsea development and processed and stored in a FPSO vessel. First oil is planned for Q4 2008, with initial production at about 100,000 bbl/d.

Expenditure: $1b.

RARE EARTHS

Mt Weld - Rare Earths Mine

LYNAS CORPORATION LTD

The Mt Weld deposit, located about 35 km south of Laverton, contains an estimated resource of 12.2 Mt at 9.7% grade for 1.18 Mt rare earth oxides (REO). The development involves an open pit mine and concentration plant at Mt Weld. The concentrate will be containerised on site then trucked to Leonora and railed to a container port for export. The first mining campaign was completed in May 2008. The ore will be shipped to a $220 million processing plant in Malaysia, which will have an initial production capacity of 10,500 t/a of REO in late 2009, and is then expected to be expanded to 21,000 t/a in 2011.

Expenditure: $90m.

Employment: Construction: 12; Operation: 40

TITANIUM DIOXIDE PIGMENT

Kwinana - Titanium Dioxide Pigment Plant Expansion

TIWEST JOINT VENTURE

Tiwest, through its joint venture partners Tronox Incorporated and Exxaro Resources, has approved an expansion at its Titanium Dioxide Pigment Plant in Kwinana that will see a 36 per cent ramp-up in production from the plant's current capacity of 110,000 t/a to around 150,000 t/a, in a bid to take advantage of the strong demand for titanium oxide in the Asia-Pacific region. Construction is expected to start in late 2008, subject to Government approvals, with additional capacity to come online in early 2010.

Expenditure: $100m.

Employment: Construction: 108; Operation: 12

VANADIUM

Windimurra - Vanadium Pentoxide mine and processing plant

WINDIMURRA VANADIUM LIMITED

The project involves construction of a processing plant and planned commencement of operations in late 2008. Once operational, the mine will produce approximately 5,600 t/a of contained vanadium. The process plant will produce both ferro-vanadium (an alloy of vanadium, aluminium and iron) and high purity vanadium pentoxide.

Expenditure: $296m.

Employment: Construction: 400; Operation: 120

AMMONIA/UREA

Burrup Peninsula - Ammonia Plant

DYNO NOBEL ASIA PACIFIC LIMITED

Dyno Nobel purchased the interests of Plenty River (Plentex) and Thiess in a large scale ammonia-urea project to be located on the Burrup Peninsula. The company is also conducting a feasibility study into developing a 230,000 t/a ammonium nitrate production facility, which could be located on the Burrup Peninsula. The alternative of building a small scale ammonia plant to supply the ammonium nitrate plant is being investigated as part of the feasibility study.

Expenditure: $900m.

Employment: Construction: 1000; Operation: 130

BAUXITE

Wagerup/Willowdale - Alumina Refinery Train 3 Expansion

ALCOA WORLD ALUMINA - AUSTRALIA

Alcoa is investigating the feasibility of a third production train expansion at its Wagerup Alumina Refinery to increase capacity up to 4.7 Mt/a. On 14 September 2006, the Minister for the Environment approved the expansion proposal. A decision on the project go-ahead is dependent on market factors.

Expenditure: $1.5b.

Employment: Construction: 1500; Operation: 260

COAL

Collie - Bluewaters III and IV – Coal-fired Power Stations

THE GRIFFIN COAL MINING COMPANY PTY LIMITED

Griffin Energy Pty Limited is planning to expand the Bluewaters Power Station Project with two additional 208 MW coal-fired power stations to be located on the Coolongatta Industrial Estate, 4.5km north-east of Collie. Commissioning of the Bluewaters III base-load power station in expected by late 2012 and commissioning of Bluewaters IV by late 2014.

Expenditure: $800m.

Employment: Construction: 600; Operation: 30

COPPER

Pilbara - Panorama Copper-Zinc Mine

CBH RESOURCES LTD

The Panorama Project is located about 110 km southeast of Port Hedland. It involves the construction and operation of an open-pit mine and associated infrastructure, with a mine life of about 8 years. Approximately 75,000 t/a of copper concentrate and 85,000 t/a of zinc concentrate are planned to be produced for shipment via Port Hedland. The project currently is undergoing environmental assessment through a Public Environmental Review.

Expenditure: $250m.

Employment: Construction: 176; Operation: 150

ELECTRICITY

Mid West Region - Centauri 1 Power Project

ENEABBA GAS LIMITED

Eneabba Gas Limited (EGL) has received all necessary approvals for the start-up of its 168MW Centauri 1 gas-fired power station project, located on company-owned land 8 km east of Dongara. Planning approvals have been received from the Shire of Irwin, Environmental Protection Authority and Department of Industry and Resources (DoIR). EGL is the only holder of an Economic Regulation Authority generation licence in the Mid West. A Memorandum of Understanding has been signed with Verve Energy to swap gas for operation flexibility. The project will be capable of supplying power into the South West Inter-connected System (SWIS) but will be focused on supplying additional volumes of energy for the developing Mid West iron ore industries. EGL has an agreement to acquire four GE LM 6000 gas-fired turbines, which will allow construction to commence on-site immediately and for the plant to be operational in approximately 14 months, as soon as take or pay contracts for Mid West iron ore customers are confirmed. Generation capacity can be easily increased to 365MW. Besides sourcing gas from the Dampier to Bunbury Natural Gas Pipeline, EGL has 10, 100 per cent-owned exploration tenements containing coal deposits. A preliminary drilling program has returned positive results for a low-cost alternative energy source which would minimise Greenhouse effects. EGL is awaiting DoIR approval for an expanded drilling program to prove up the capacity for coal gasification of the resource.

Expenditure: $200m.

Employment: Construction: 100; Operation: 4

Mid West Region - Central West Coal & Coolimba Power Projects

AVIVA CORPORATION LTD

Aviva Corporation Ltd is progressing the development of the Coolimba Power Project, a 2 x 200 MW base-load coal-fired power station and associated coal mine located 20 km south of Eneabba. Coolimba will be the first power station in WA to deploy leading edge emissions technology for carbon capture. Upon commissioning, the power station will constitute 8 per cent of the installed capacity in the SWIS and have an operating life of 30 years. Subject to Government approvals, construction is expected to commence in mid 2009 and will extend over three years for completion in 2011-12.

Expenditure: $1b.

Employment: Construction: 600; Operation: 100

Neerabup - Perth - Bioenergy

SpiritWest Bioenergy Pty Ltd

SpiritWest is developing a 46 MW base-load power station at Neerabup, 33 km north of Perth. The power station will use timber waste from pine plantations nearby, and other wood residues. Environmental approval was received in 2006, and a final investment decision is expected by Q4 2008, with construction commencing shortly thereafter. Commercial operation is scheduled for 2010-11.

Expenditure: $100m.

Employment: Construction: 250; Operation: 45

GOLD

Kalgoorlie - Super Pit - Golden Pike Cutback

KALGOORLIE CONSOLIDATED GOLD MINES KCGM

KCGM is planning to extend the life of its Fimiston open cut mine by five years to 2017, with the Golden Pike Cutback. This will entail additional tailings storage facilities and waste rock dumps. KCGM is also required to develop a detailed closure plan prior to commencing the expansion. The Minister for Environment endorsed the proposed project in June 2008 subject to additional conditions being imposed that will limit the project's impact on the environment and surrounding residents.

Employment: Operation: 1043

HEAVY MINERAL SANDS

Happy Valley - Heavy Mineral Sands Mine

BEMAX CABLE SANDS (WA) PTY LTD

Located adjacent to Bemax's Gwindinup deposits, the project will involve the mining of mineral sands from two deposits (Happy Valley North and South) located on private land and in State forest. The level of assessment for the project has been set at Environmental Review and Management Program. Environmental impact studies for the proposed mine development have been completed. Assessment of the project by the EPA will commence in Q3 2008. Happy Valley contains a reserve of around 6 Mt of ore at a heavy mineral grade of 11.3 per cent.

Expenditure: $35m.

Employment: Construction: 100; Operation: 30

Jangardup South - Heavy Mineral Sands Mine

BEMAX - CABLE SANDS (WA) PTY LTD

The Jangardup South minerals deposit is situated 54 km south of the Nannup township and adjacent to the D'Entrecasteaux National Park. Cable Sands estimates that the deposit would provide 2 Mt of minerals. Feasibility and environmental studies are well advanced. An environmental impact statement for the project is being prepared.

Expenditure: $60m.

Employment: Construction: 100; Operation: 50

Keysbrook - Heavy Mineral Sands Mine

OLYMPIA RESOURCES LTD

Olympia proposes to develop a mineral sands mine located near the township of Keysbrook, approximately 70 km south of Perth. Olympia has identified proven and probable reserves of 41 Mt of ore containing 1.2 Mt of zircon, ilmenite and leucoxene. The concentrate will be processed at Cable Sands' plant at Bunbury over the mine's eight-year life. In late October 2007, the EPA recommended approval of the project subject to Olympia meeting a number of conditions in the development and operation of the mine. All required information is now with the Appeals Convenor, which will be considered before a recommendation is made to the Minister for Environment.

Expenditure: $18m.

Employment: Construction: 35; Operation: 30

Shark Bay - Coburn - Heavy Mineral Sands Mine

GUNSON RESOURCES LIMITED

Gunson proposes to develop the Coburn mineral sands project, located south of Shark Bay, which contains total ore reserves of 306 Mt at an average grade of 1.2 per cent heavy minerals. All of these reserves lie within the portion of the project area that has received Government environmental approvals for mining. At the proposed mining rate of 17.5 Mt/a, the Coburn mine life is estimated to be 17.5 years. In October 2007, Gunson signed a second MOU with CTIEC of China providing for CTIEC's parent, CNBM, and an electric power supply company in the Chinese city of Bengbu, to take a combined 40 per cent share in the project. A formal agreement between the parties is currently being negotiated. It is planned that zircon-rich non-magnetic concentrate from the Coburn mine will be shipped to a mineral separation plant in China for further processing. The magnetic fraction is to be sold in Geraldton as a final ilmenite product containing 62 per cent TiO2.

Expenditure: $100m.

Employment: Construction: 170; Operation: 110

Tutunup South - Heavy Mineral Sands Mine

ILUKA RESOURCES LIMITED

Iluka proposes to develop the Tutunup South mineral sands mine, located approximately 15 km south east of Busselton. The project will include the construction of mine pits, solar drying dams, ore concentrator and associated mine infrastructure. The mine is expected to produce over 1.2 Mt of heavy mineral concentrate over its five-to-six year life, which will be transported to Capel for further processing. Tutunup South is scheduled to commence operation in early 2009, subject to obtaining necessary government approvals, and will replace Iluka's Wagerup mine site. The project is currently in the Environmental Impact Assessment phase and is being assessed at the level of Public Environmental Review.

Expenditure: $25m.

Employment: Construction: 150; Operation: 40

IRON ORE

Great Southern Region - Southdown Magnetite Mine

GRANGE RESOURCES LTD

Grange is finalising a bankable feasibility study on the Southdown magnetite project, 90 km northeast of Albany. The company plans to produce an initial 3.3 Mt/a magnetite concentrate from 2012 stepping up to 6.6 Mt/a. The concentrate will be transported via a slurry pipeline to the Port of Albany for export and pelletising in Malaysia. The project is currently being environmentally assessed at a Public Environmental Review level. Subject to environmental approvals, construction is anticipated to commence in 2009, with commissioning Q4 2012.

Expenditure: $839m.

Employment: Construction: 700; Operation: 250

Mid West Region - Extension Hill Magnetite Mine

ASIA IRON

Asia Iron has primary environmental approval to produce up to 5 Mt/a of magnetite concentrate, which will be transported by slurry pipeline to the port of Geraldton for export. The company is currently seeking secondary approvals.

Expenditure: $715m.

Employment: Construction: 1000; Operation: 280

Mid West Region - Jack Hills Hematite Mine Stage 2

CROSSLANDS RESOURCES

Murchison Metals commenced trucking 1.5 Mt/a hematite from its Jack Hills operations to the port of Geraldton in December 2006. The company expects to increase production to 2 Mt/a in 2008 before proceeding to Stage 2, which would involve a further increase to 10-25 Mt/a of hematite and beneficiation ore. The ore would be transported by a new railway to a new deepwater port at Oakajee. A definitive feasibility study and exploration drilling program on its Jack Hills Stage 2 project is progressing.

Expenditure: $750m.

Employment: Construction: 450; Operation: 350

Mid West Region - Mt Karara Magnetite Mine

GINDALBIE METALS LTD

Gindalbie Metals plans to develop a 12 Mt/a magnetite concentrate project at Mt Karara, which has a resource life of about 50 years. Transport options for the ore are currently under investigation. The project is currently undergoing environmental assessment at a Public Environmental Review level. The company anticipates that first shipment will occur in Q1 2010, subject to government approvals.

Expenditure: $1b.

Employment: Construction: 400; Operation: 240

Mid West Region - Mungada Hematite Mine

GINDALBIE METALS LTD

Gindalbie Metals is proposing to develop a direct shipping hematite ore project of up to 3 Mt/a at Mungada, 85 km east of Morawa. The project is currently undergoing environmental assessment at a Public Environmental Review level.

Expenditure: $75m.

Employment: Construction: 200; Operation: 170

Mid West Region - Weld Range Iron Ore Mine

MIDWEST CORPORATION LIMITED

Midwest Corporation proposes to develop a 15-20 Mt/a iron ore mine at Weld Range, 65 km southwest of Meekatharra, producing a mix of hematite lump and fines. The project is expected to utilise a new rail line and a new deepwater port facility at Oakajee. The company commenced an extensive drilling program in June 2006 and is currently completing a pre-feasibility study.

Expenditure: $800m.

Employment: Construction: 900; Operation: 220

Pilbara - Atlas Iron Pardoo Hematite DSO Mine

ATLAS IRON LTD

In December 2008, Atlas Iron Ltd is due to commence shipping 1 Mt/a of hematite iron ore from its Pardoo deposit, 75 km east of Port Hedland (subject to final Government approvals). It plans to increase production to 3 Mt/a by 2010.

Employment: Operation: 70

Pilbara - Balla Balla

AUROX RESOURCES LIMITED

Aurox has recently signed contracts for the design, engineering and manufacture of all major components required to commission both the mine and port aspects of the Balla Balla magnetite iron ore project located mid-way between Karratha and Port Hedland. Aurox has also signed two 15-year 3 Mt/a magnetite sales agreements with major Chinese steel companies. First export of magnetite is expected in 2011.

Pilbara - Iron Ore Mine - Roy Hill

HANCOCK PROSPECTING PTY LTD

Hancock Prospecting Pty Ltd is undertaking a pre-feasibility assessment of the development of the Roy Hill iron ore deposit, possibly Australia's largest undeveloped Marra Mamba iron ore deposit. The deposit is located about 80 km north of Newman. In 2007, the company invested $38 million on a major drilling program to more closely define the iron ore resource. Further infill drilling is continuing. The development program is to move to a bankable feasibility study by Q3 2008 for a decision on the project by late 2009. The project includes the development of mines, a new railway or third party use of an existing railway, and export port facilities at Port Hedland.

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 20-30 Mt/a of direct shipping iron ore from a group of three mine sites located approximately 50 km southwest of Pannawonica. The ore will be exported via a new railway and port facility located on the Pilbara coast. Subject to the successful completion of feasibility and environmental studies (in process), and receipt of Government regulatory approvals, the company anticipates that the first shipment will occur in early 2012.

Expenditure: $3b.

Employment: Construction: 1300; Operation: 700

Pilbara Region - Rapid Growth Project 5

BHP BILLITON IRON ORE PTY LTD

BHPB is currently expanding the production capacity of its Western Australian iron ore operations to 155 Mt/a by 2012, to supply international growth in iron ore demand, particularly from China. It is also in the process of seeking approvals for a parallel expansion that would extend this to 205 Mt/a within the same period. The increased production involves mine expansions, railway duplication and additional berths at Port Hedland. BHPB is also investigating further expansion to 300 Mt/a by 2015.

Expenditure: $9b.

IRON ORE PROCESSING

Pilbara - Cape Preston - Iron Ore Processing

CITIC PACIFIC

CITIC Pacific, a Chinese company, received Ministerial approval on 2 May 2008 for the development of a magnetite iron ore mine and pellet plant with a capacity of 6 Mt/a. Construction is due to begin this year. A concentrator, pellet plant, slurry pipeline, port facilities, 240 MW power station and desalination plant will be built at Cape Preston, as well as accommodation facilities. The company plans to export the first high-grade pellets to China in 2010.

Expenditure: $3.5b.

Employment: Construction: 2500; Operation: 500

Pilbara - Cape Preston - Mine and Pellet Plant

MINERALOGY PTY LTD

The Iron Ore Processing (Mineralogy Pty Ltd) Agreement is based on the development of Mineralogy Pty Ltd's Fortescue magnetite deposits, located near Cape Preston, 70 km southwest of Dampier. Mineralogy has sold subsidiary companies with right-to-mine agreements to two purchasing companies, CITIC Pacific Ltd and Australasian Resources, which are planning the development of separate projects under the Mineralogy State Agreement. Australasian Resources Ltd has announced an agreement with Shougang Corporation, which will fund a feasibility study on a combined concentrate/pellet and DRI project. If viable, Shougang will fund the project development, with Australasian keeping a 50 per cent interest.

Expenditure: $5b.

Employment: Construction: 2500; Operation: 800

This section is intended as an overview and does not constitute an exhaustive list of projects within the Western Australian resources industry.

MOLYBDENUM

Pilbara - Spinifex Ridge Molybdenum-Copper Mine

MOLY MINES LIMITED

The Spinifex Ridge Project is located 50 km northeast of Marble Bar in the Pilbara region of Western Australia. It is based on a resource of 469 Mt at 0.06 per cent molybdenum and 0.09 per cent copper. Moly Mines has completed a definitive feasibility study which has forecast 240 Mlbs of molybdenum concentrate and 270 Mlbs of copper concentrate to be produced in the first 10 years of the operation. The project's processing plant design capacity is at 20 Mt/a. The project is undergoing environmental assessment.

Expenditure: $1.084b.

Employment: Construction: 400; Operation: 375

NICKEL

Goongarrie - Kalgoorlie Nickel Project - Mine (laterite ore) and Hydrometallurgical Processing Plant

HERON RESOURCES LTD

This project will involve a mine and hydrometallurgical processing plant at Goongarrie, about 85 km north of Kalgoorlie, producing up to 50,000 t/a of nickel from laterite resources of 903 Mt grading 0.74 per cent nickel and 0.05 per cent cobalt. Heron and Vale Inco are undertaking a pre-feasibility study which is due for completion in January 2009. Further ore reserve estimation, mine planning and metallurgical testing will be undertaken. The main focus will be on development of three flowsheet applications, leading to preliminary plant design, final flowsheeet selection and new capital and operating cost estimates.

Expenditure: $1.4b.

Employment: Construction: 1000; Operation: 300

North Eastern Goldfields - Yakabindie Nickel Mine

BHP BILLITON NICKEL WEST PTY LTD

The Yakabindie project is based on a large nickel deposit situated near BHP Billiton's existing Mt Keith nickel project and is estimated to contain a resource of 289 Mt at 0.58% nickel. BHPB is considering developing Yakabindie as an integrated part of the Mt Keith project, and is conducting a pre-feasibility study, including infill drilling of the ore body and metallurgical testing.

Expenditure: $20m.

Pilbara - Nickel Mine

SHERLOCK BAY NICKEL COMPANY

Sherlock Bay Nickel Corporation owns the Sherlock Bay nickel project, 120 km east of Karratha. The project is comprised of the Symonds and Discovery deposits. The ore body extends over a length of approximately 1.6 km and varies in width between 5 m and 35 m. The deposits contain a combined proven resource of 25.4 Mt at 0.4 per cent nickel, 0.09 per cent copper and 0.02 per cent cobalt. This resource is expected to give a project life of 12 years. Processing of the ore will use the BioHeap bulk heap leach process, which will produce metal with an expected recovery of 88 per cent.

Expenditure: $30m.

OIL & GAS DEVELOPMENTS

Carnarvon Offshore Basin - Barrow Island - Gorgon LNG

CHEVRON AUSTRALIA PTY LTD

In December 2007, the Gorgon Joint Venture (GJV) announced its intention to upgrade the project specifications from a 10Mt/a (2 train) to a 15Mt/a (3 train) development on Barrow Island. The project is based on gas from both the Gorgon and Jansz fields. The GJV is also considering a domestic gas development on Barrow Island. The GJV obtained environmental approval for the 10Mt/a development in late 2007. Once the GJV has obtained environmental approvals for the additional train and completed front-end engineering and design work for the project, it will consider a final investment decision on the project.

Expenditure: $11b.

Employment: Construction: 3000; Operation: 600

Browse Basin – Ichthys

INPEX

The Ichthys gas and condensate field was discovered in 1980 and is located in 250 metres of water, approximately 440 km north of Broome and 250 km from the mainland. Six discovery and appraisal wells were drilled during 2000-2004. The P50 estimated recoverable resource in place is approximately 12.8 Tcf of gas and 527 mbbl of condensate and LPG. The permit is owned by Inpex Browse Ltd (76 per cent) and Total (24 per cent). Development of the field is planned to include offshore semi-submersible facilities and a subsea pipeline to an offshore location, where approximately 8 Mt/a of LNG will be produced for export to the Asia-Pacific market, with the first shipment scheduled for 2012. The company is also looking at new technologies associated with gas-to-liquids and dimethyl ether, as well as possibilities for domestic supply.

Expenditure: $10b.

Employment: Construction: 2000; Operation: 500

Carnarvon Offshore Basin - Macedon - Gas Field

BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

The Macedon gas field, located about 50 km north of Exmouth, was discovered in 1992 by the West Muiron-3 well, with a follow-up appraisal campaign in 1994. BHP Billiton is continuing to investigate domestic market opportunities for Macedon, which is estimated to contain a gas resource of up to 1.2 Tcf. Gas recovered to date is dry, containing no condensate or LPG.

Pilbara - Devil Creek Development Project

APACHE ENERGY LIMITED

Apache Energy Ltd and Santos Ltd are investigating the development of the Devil Creek Development Project (DCDP), a greenfield gas project comprised of an unmanned offshore gas production platform over the Reindeer gas field, about 80 km northwest of Dampier; offshore and onshore gas pipelines; an onshore gas processing plant near Devil Creek, 65km southwest of Karratha; and a sales gas export pipeline connected to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The DCDP is designed to provide up to 300 TJ per day of dry natural gas and between 160 kl to 800 kl per day of gas condensate. All gas from the DCDP will service the domestic gas market in Western Australia. Construction is scheduled to start by end 2008, with first gas delivered into the DBNGP by mid 2010, subject to receiving all the required statutory approvals.

Expenditure: $600m.

Employment: Construction: 200; Operation: 20

Pilbara - LNG Plant

BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

BHP Billiton Petroleum and Exxon Mobil are working together to identify the optimal development plan for the commercial development of the Scarborough gas field located offshore in about 900 metres of water and about 280 km northwest of Onslow. The project is examining a number of concepts including the development of an associated 6 Mt/a LNG plant at a site approximately 4.5 km southwest of Onslow. The LNG produced may be sold to the American west coast and Asian energy markets.

Expenditure: $5b.

Employment: Construction: 2400; Operation: 125

Browse Basin - Scott Reef/Brecknock - Gas Fields

WOODSIDE ENERGY

Woodside discovered gas and condensate at Torosa (Scott Reef) in 1971, Brecknock in 1979 and Calliance (Brecknock South) in 2000. The fields are located in water depths of up to 800 metres, about 425 km northwest of Broome and 250 km from the mainland. The reserves in these fields are currently held as a contingent resource and are estimated to be in excess of 20 Tcf of gas and 300 Mbbls of condensate. During 2007 and 2008 Woodside (Operator and 50 per cent interest holder) is planning to continue with field appraisal activities and concept evaluation studies to select a preferred development concept in the latter half of 2008. Woodside is targeting an LNG production facility capable of supporting up to 15 Mt/a of LNG. Start-up of LNG production is expected in the period 2013 to 2015.

Bonaparte Offshore Basin - Tern/Petrel - Gas Fields

SANTOS LIMITED

The offshore Petrel gas field, discovered in 1969, is located about 250 km west of Darwin on the WA-NT seabed border in the Bonaparte Basin. The offshore Tern gas field, discovered in 1971, is located about 300 km west of Darwin in WA waters in the Bonaparte Basin. Field development options include installation of unmanned offshore production platforms with a pipeline to a gas treatment plant south of Darwin. The development possibilities for these fields has been enhanced by recent significant discoveries by other parties nearby, which may provide tie-in potential for Petrel and Tern to service domestic gas customers. A conceptual plan involves initial development of Petrel with a pipeline to an onshore gas plant and a subsequent phase that completes Petrel and develops Tern.

Expenditure: $1b.

PLATINUM GROUP METALS

Halls Creek - Panton Sill-Platinum Project

PLATINUM AUSTRALIA LIMITED

The Panton platinum-palladium deposit is located 60 km north of Halls Creek in the Kimberley region of Western Australia, and contains the highest grade known in Australia. A bankable feasibility study (BFS) has found that, while the project is technically sound, it is not commercially viable. The company is considering updating the BFS during the first half of 2009 to assess the impact of current higher prices for platinum, palladium and by-product nickel.

Pilbara - Platinum Deposit

HELIX RESOURCES NL

Helix Resources NL has established an indicated resource of 9.2 Mt at 2.9 g/t combined platinum, palladium, rhodium, and gold, 0.2 per cent nickel, and 0.3 per cent copper at its project site near Karratha. Preliminary mining studies suggested a mining rate of combined open cut and underground production of 1.5 Mt/a. Further activity was postponed in early 2003, as a result of poor exploration results and a decreased palladium price. The project is under review.

SALT

Exmouth Gulf - Yannarie Solar Salt Project

STRAITS SALT PTY LTD

Straits Salt is proposing to develop the Yannarie Solar Salt, a 4 Mt/a salt operation in the east coast of Exmouth Gulf. It has exploration licences over the area and has applied for a mining lease. The proposal was assessed at the Environmental Review and Management Program level by the EPA. A statement released on 23 July 2008, EPA Report 1295, recommended against approval for the Yannarie Solar Salt proposal.

Expenditure: $200m.

Employment: Construction: 100; Operation: 75

TIMBER

Mirambeena Timber Processing Precinct - Engineered Strand Lumber

LIGNOR LTD

Lignor Ltd is proposing the development of an engineered strand lumber plant located at Mirambeena, near Albany. The plant will source most of its timber from the extensive eucalypt plantations growing in the Albany region and will use technology developed by the German engineering company, Siempelkamp. The company has completed its feasibility study. Further project development has been put on hold pending more favourable global market conditions.

Expenditure: $350m.

Employment: Construction: 400; Operation: 140

Changes in store for Indian mining

A Western Australian trade and investment delegation visited India in July this year.

India has a wealth of natural resources but its mining sector remains relatively underdeveloped. As explained by Simon Johnson, the India Regional Director of the Western Australian Global Network, this could all be about to change.

Though their mining sectors are vastly different in terms of development and economic potential, India and Western Australia both have vast endowments of natural resources.

The eastern Indian states of Orissa, Chhattisgarh, Jharkhand and West Bengal in particular, are home to world-class reserves of iron ore, bauxite, chromite and manganese. Coal too is common and is treated as a separate industry sector to other mining, with its own relevant ministry.

Despite the country's natural wealth, mining at present contributes just 2 per cent to India's gross domestic product and mining operations are small-to-medium in size and often run by government operations.

This is vastly different to the situation in Western Australia, where multinational firms regularly announce new multi-billion-dollar mining projects, and the combined mining and petroleum sectors contribute 30 per cent to gross state product.

India's inability until now to capitalise on its resources wealth has been attributed to a variety of factors, including the steel and power industries protecting their interests through lobbying for a highly regulated sector.

Many officials in both central and state governments have also supported the status quo, while issues concerning land rights and the environment have contributed.

However in the past few years real progress has been made in efforts to change this situation and create a more transparent and welcoming investment framework for foreign mining companies.

Western Australia has an important interest in this process because of the potential for new opportunities for trade and collaboration. India is already Western Australia's fourth largest export market and contributed A$5 billion value to the State in 2007.

Western Australia has two Indian trade offices, at Chennai and Mumbai, that facilitate trade between the two regions. The growing importance of India to Western Australia was reflected in a State trade and investment mission to the country in July.

Western Australia also has a Memorandum of Understanding (MoU) with India for the exchange of environmental and mining management technologies, and another relating to petroleum is being considered.

The process of reforming India's mining sector began in the 1990s, when the approach to foreign direct investment (FDI) in mining became more welcoming.

In 1993 a new national mining policy was introduced and by 2006, FDI of 100 per cent was permitted for exploration and mining of gold, silver and minerals other than those for metallurgy and processing, and by approval for diamonds and precious stones.

While allowing for foreign investment in theory, these initial reforms proved insufficient at attracting any real interest and to date there has not been a single mining production lease issued to any foreign company in India.

In the iron ore sector, no new greenfield projects have opened in the past two decades despite a plethora of MoUs being signed between companies and state governments.

To address these concerns, a review of the national mining policy was established, proposing legislative changes that would finally encourage meaningful investment in mining and exploration. A high level committee chaired by Anwarul Hoda was established in 2005 by the Indian National Planning Commission.

The main findings of what became known as the Hoda Report included the allowance for stand-alone mining, rationalisation of royalty regimes to encourage market-based pricing, streamlining of conversion of mining leases, and reduction of the discretionary use of government powers in granting leases.

The report also allowed for the continued provision, in certain circumstances, of captive mining, whereby end users such as power companies will undertake mining for their own purposes.

States were likewise permitted to continue giving preference to miners that committed to investing in value-added industries, where it was an option.

After much deliberation, the Hoda Report received cabinet approval following some amendments.

The Indian Ministry of Mines has since published new rules and regulations governing the national mining policy which accepted most of the recommendations.

The new rules and regulations were expected to be presented to parliament in August 2008 and it is hoped they will soon pass into legislation.

There is a chance for further delays as a result of an upcoming election and continued contention, but there are real hopes for a period of new prosperity in the Indian mining sector.

With Western Australia poised to become an Asia-Pacific mining services sector leader, this could provide immense opportunities for years to come.

Significant resource projects in Western Australia

Western Australia continues to lead the way as Australia's premier resources investment destination. Despite several significant projects moving to the operational stage since the last edition of Prospect, there are still more than A$90 billion worth of projects either committed or under consideration during the next few years. These will create more than 34,000 construction and more than 8900 full-time jobs.

	Project Value (estimated A$m)	Employment	
		Construction	Permanent
Alumina			
Alcoa - Wagerup/Willowdale Refinery Train 3 Expansion	1500	1500	260
Worsley Alumina - Refinery Expansion	2500	1500	200
Sub Total	**4000**	**3000**	**460**
Iron and Steel			
Asia Iron - Extension Hill Magnetite Mine	715	1000	280
Australian Premium Iron Joint Venture - Iron Ore Mine	3000	1300	700
BHP Billiton Iron Ore - Rapid Growth Projects	9000	-	-
Hamersley Iron - Brockman 4 and Dampier Port Expansion	2420	800	200
Fortescue Metals Group - Mine, Rail and Port Project	3200	2500	870
Gindalbie Metals - Karara Magnetite Mine	1000	400	240
Grange Resources - Southdown Magnetite Mine	839	700	250
HIsmelt - Commercial Iron Making Plant	800	320	65
Hope Downs Limited - Iron Ore Mine	-	-	280
Midwest Corporation - Weld Range Hematite Mine	800	900	220
Mineralogy and CITIC Pacific - Cape Preston Mine and Processing Projects	8500	5000	1300
Murchison Metals - Jack Hills Stage 2 Hematite Mine	750	450	350
Robe River - Cape Lambert Port Expansion	1100	450	70
Sub Total	**32124**	**13820**	**4825**
Nickel/Cobalt			
Heron Resources - Goongarrie Mine and Plant	1400	1000	300
Sub Total	**1400**	**1000**	**300**
Oil, Gas and Condensate			
Apache - Devil Creek Project	600	200	20
Apache - Van Gogh Oil Field	600	-	-
BHP Billiton - Onslow LNG Plant	5000	2400	125
BHP Billiton - Pyrenees Oil Project	2000	-	-
Gorgon Joint Venture LNG Project	11000	3000	600
Inpex - Ichthys LNG Project	10000	2000	500
North West Shelf Venture - LNG Phase V Expansion	2425	1500	20
Santos - Tern Petrel Gasfield Project	1000	-	-
Woodside - Angel Gas/Condensate Project	1600	-	-
Woodside - Pluto LNG Plant	11200	3000	200
Woodside - Vincent Oil Project	1000	-	-
Sub Total	**46425**	**12100**	**1465**
Other			
Argyle Diamonds - Underground Mine (Stage 1)	1200	250	500
Aviva Corporation - Mid West Power	1000	600	100
BGM - Boddington Wandoo Gold Mine Expansion	2000	1500	650
Dyno Nobel - Burrup Ammonia Plant	900	1000	130
Griffin Coal - Blueswater III & IV	800	600	30
Griffin Energy - Bluewaters 1 and 2 Coal Fired Power Stations	400	600	50
Moly Mines - Spinifex Molybdenum/Copper Mine	1084	400	375
Straits Resources - Yannarie Salt Project	200	100	75
Sub Total	**7584**	**5050**	**1910**
TOTAL	**91533**	**34970**	**8960**

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September 2008

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