

'Battle' of the Pilbara ports

A tale of two resources

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The resources sector in Western Australia continues to go from strength to strength, as highlighted by articles in this issue. Record investment growth continues unabated, with total private new capital expenditure in Western Australia growing by almost 21 per cent in 2010-11.

Major milestones since the last issue include the first delivery of gas from the Pluto LNG project and the government moving to acquire the land necessary for the Anketell Port in the Pilbara.

The State's business culture is both internationally-focused and development-orientated. Two articles in this issue highlight these aspects. Prospect looks at the potential of India and the state's capacity for developing and exporting home-grown solutions, demonstrated in the article on the Australian Maritime Complex and subsea engineering.

Internationally, we are highly regarded, judging by the feedback from recent conferences the Department of Mines and Petroleum attended in Canada, Hong Kong and the UK.

More than 20 major projects, led by the \$43 billion Gorgon LNG development, continue to be progressed and are outlined at the end of the magazine. A glance at the accompanying maps will demonstrate the breadth of development. A further 24 major projects, including the Browse LNG precinct, are in the process of being finalised.

The resources sector is certainly nothing but diverse and changing. However, with rapid development comes the resultant pressure on companies to fill thousands of vacancies. This is well documented in the media.

It's satisfying, then, to see industry embracing employment change on two fronts, with increasing employment of women and Indigenous Australians.

This has helped Western Australia create 40,000 new jobs over the past year, four times as many jobs as all other states combined. This is a direct result of the more than \$17.7 billion in contracts going to local companies since the government launched its local content framework on July 2011.

Prospect highlights some WA women who are making their marks in the resources sector, and also programs leading to positive outcomes for Aboriginals.

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Cover photo: *The Pilbara powerhouse continues to drive the nation's economy, with the Ports of Dampier and Port Hedland continuing to experience strong growth. This bulk carrier at Port Hedland helped ship more than 202 million tonnes of WA iron ore last year. Story, page 10.*

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In this issue



02 Pluto enters production

History has been made, with the Pluto LNG Project beginning production and exporting its first shipment to Japan.

04 What lies beneath

Subsea oil and gas is a highly specialised and challenging field, with WA-based companies leading the world. Two of them are located at the Australian Marine Complex, south of Perth.

08 Iron ore in focus

A 'veteran' of the iron ore industry provides an insight into the past, present and future.

12 Women in resources

The barriers are breaking down. There has been a steady rise in the number of women seeking to work in resources.

18 Spotlight on India

The world's second largest democracy is stirring industrially. Indian companies are operating here, while opportunities are opening there for Australian companies.

21 Wickam's \$336m expansion

The State Government has approved a plan to expand the Pilbara town, including more than 200 new homes.



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New LNG era as Pluto begins production

Tanker receiving commissioning cargo at the Pluto LNG onshore gas plant.

Western Australia's second Liquefied Natural Gas plant has begun production, signalling the commencement of a new era for the State's role as an energy supplier.

Woodside's Pluto LNG Project, in the State's Pilbara region, is the first greenfield LNG project undertaken in Western Australia in 23 years,

In coming years it will be joined by two others, as Western Australia's LNG export capacity almost trebles to 44.5 million tonnes per annum (Mtpa) by 2016.

Pluto will initially take gas from the Greater Pluto fields discovered in 2005, 190km offshore from Karratha, and estimated to contain 5.5 trillion cubic feet of recoverable resources.

Having secured government approvals, and the company's final investment decision, construction commenced in 2007.

The project includes an offshore platform and five subsea wells in 85 metres of water, a 180km underwater pipeline, an LNG processing train with a 4.3Mtpa capacity, two LNG tanks with a combined capacity of 240,000m³, loading

facilities, service jetties and condensate storage tanks.

Woodside estimates the project generated more than 15,000 Australian jobs and \$7.6 billion in local content during construction.

Announcing the start of production on April 30, 2012, Woodside CEO Peter Coleman said: "This is the culmination of millions of hours of work by our own people and the hundreds of businesses that worked on the construction phase of this project.

"We appreciate the support the development has received from governments, the communities in the Pilbara region where we operate, and our customers and fellow project participants, Tokyo Gas and Kansai Electric."

Woodside is a 90 per cent owner and the operator of the Pluto project in a joint venture with two Japanese utilities, Tokyo Gas Pluto Pty Ltd (5 per cent) and Kansai Electric Power Australia Pty Ltd (5 per cent).

Pluto is underpinned by 15-year sales agreements with each of the Japanese partners.

The Pluto LNG plant is located on the Burrup Peninsula near Karratha, 1,200km north of Perth.

It is close to the Woodside-operated North West Shelf LNG and Gas Plant, which has been producing natural gas for Western Australia's domestic use since 1984, and exporting LNG since 1989, with a current annual capacity of 16.3Mtpa from five LNG processing trains.

Two other LNG joint venture projects are under construction, with Chevron the operator for both.

The Gorgon LNG and Gas Project, on offshore Barrow Island 140km to the west, has an initial capacity of 15Mtpa. The Wheatstone LNG and Gas Project at Ashburton North near Onslow, 80km south west of Karratha, has a 8.9Mtpa initial capacity.

These plants are scheduled to commence production in 2014 and 2016 respectively. Both, along with Pluto, are designed to be expanded. ■

Pilbara rock art captured

Tens of thousands of Indigenous rock art treasures in WA's remote Pilbara region will be researched, catalogued and promoted under a six-year, \$1.08 million agreement between the University of Western Australia (UWA) and miner Rio Tinto.

The primary focus of the research will be one of the world's richest collections of Indigenous rock art at the National Heritage-listed Dampier Archipelago, about 1,250km north of Perth.

The rock art is known to be thousands of years old and includes pictures of thylacines (Tasmanian tigers) which became extinct on the Australian mainland about 3,500 years ago. Archaeologists will continue to develop modern technology to more accurately date its origins.

UWA and Rio Tinto have established the Rio Tinto Chair of Rock Art Studies, to be headed by Australian rock art specialist, UWA Professor Jo McDonald.

Acting UWA Vice-Chancellor Professor Bill Loudon said the Rio Tinto Chair in Rock Art Studies would significantly advance global knowledge and recognition of Pilbara rock art.

"The Indigenous rock art of the Pilbara is of world-wide interest and this collaboration with Rio Tinto will allow our university to study, catalogue and protect that priceless heritage for generations to come," Professor Loudon said.

Rio Tinto President, Pilbara Operations, Greg Lilleyman, who is also a member of UWA's Energy and Minerals Institute Board, said the company had partnered with the university over several years on projects to increase our understanding of the significant rock art of the Burrup.

"This sponsorship further develops this relationship with UWA, as well as with the traditional owners of Murajuga. Along with other projects, this will support Rio Tinto's drive to conduct leading-practice heritage management in Western Australia," he said.

Professor McDonald will also become Director of UWA's Centre for Rock Art Research and Management.

"Deepening our understanding of Indigenous knowledge is a key priority of this university and we are indeed fortunate in Western Australia to have this rich heritage on our doorstep," Professor Loudon said.

"We have made a deliberate effort to attract world-renowned researchers in the field to our university to further that knowledge."

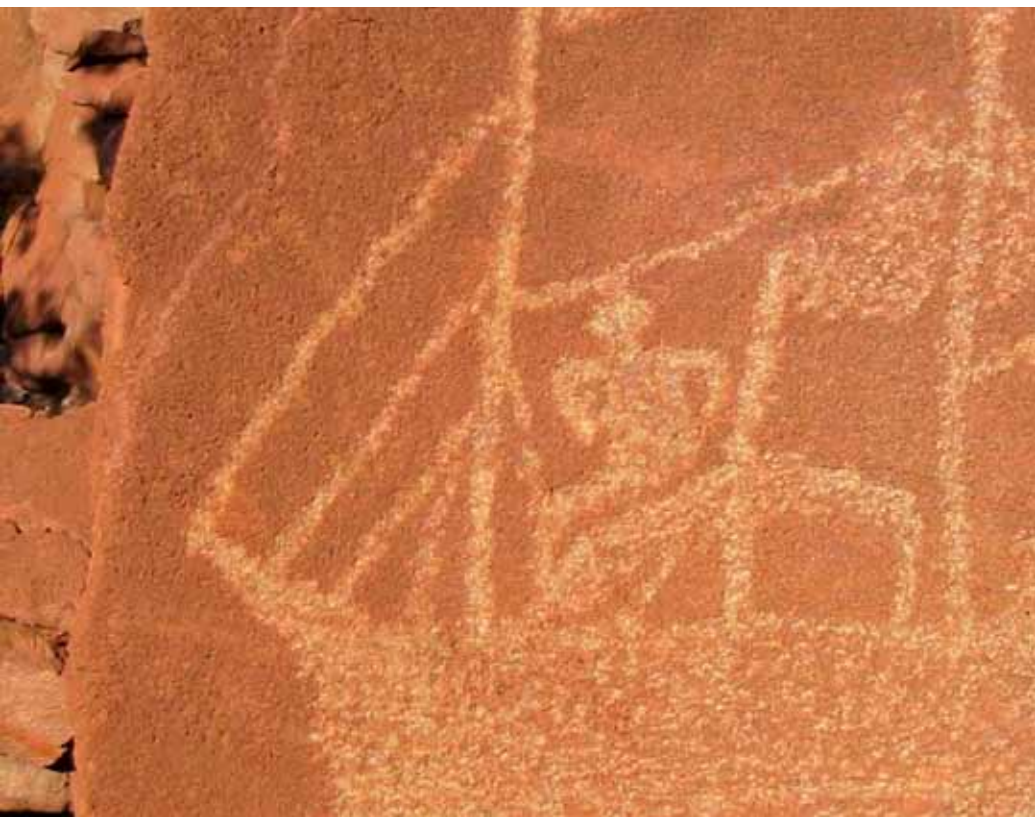
The naming of the Rio Tinto chair follows the announcement in February of the Kimberley Foundation Ian Potter Chair in Rock Art, established with a \$1.5 million gift from Melbourne-based philanthropic organisations.

The company's funding will support research into and the recording of rock art, and this work, done in collaboration with the relevant Indigenous communities, will enhance its responsible management and protection, and increase public knowledge of rock art.

UWA has a strong history of collaboration with Rio Tinto. This year is the third year of a joint rock art recording field school at Happy Valley on the Burrup Peninsula involving Rio Tinto and UWA staff and 12 undergraduate students. ■



UWA archaeologists in the field. Photos: UWA.



Marine complex leads the way



The 20,000 square metre Matrix facility at the AMC, Henderson. Photo: Matrix.

MOST people could identify an oil or gas rig. But what lies beneath? With 12 subsea fields operating in Western Australian waters, someone has to install and maintain them. Here the 'action' takes place beneath the surface and is managed by subsea engineers – a relatively small group of highly-skilled people operating across many facets of this challenging work. With the resources sector experiencing record growth in WA there are increasing opportunities in this field. A web search revealed 187 subsea engineering-related jobs in WA. *Prospect* profiles two companies operating at a world-class marine facility just south of Perth.

A specialised industrial precinct south of Perth has become the focal point of subsea engineering in WA.

The facility, located 23km from Perth at Henderson, is a world-class centre of excellence for manufacturing, fabrication, assembly, maintenance and technology servicing the marine, defence, oil and gas, and resource industries.

The Australian Marine Complex (AMC) enables industry to deliver projects on an international scale. Companies such as BHP, ENI, Shell, FMG, Woodside and Rio Tinto have completed major infrastructure projects there.

Both the WA Department of Commerce and the Government's WA land authority Landcorp, are intricately involved in developing the State's capacity to develop the engineering capacity of the resources and oil and gas sectors through its support of the complex.

The AMC was developed to enhance the opportunities created by the clustering of compatible industries and is the largest facility of its type in Australia.

It has already established international credentials for the repair, maintenance and fabrication of naval and commercial vessels, as well as infrastructure for the

fabrication and assembly of offshore oil and gas modules.

This provides the resources industry with the space and infrastructure needed to build major projects.

Apart from a fabrication complex, the facility also has five wharves – one equipped with a 300 tonne crane – and offers loadout capability.

FMC Technologies

FMC Technologies has 27 production facilities in 16 countries, with a service base in the AMC, Henderson, and a Front End Engineering and sales and marketing office in Perth city.

In WA, the company focuses on the design, supply maintenance and modification of subsea production and subsea processing systems, and surface wellheads. Subsea engineers provide the expertise to install and maintain the systems.

For the uninitiated, the wellhead is a structure that contains the drilling and production equipment. When the well is in the drilling or completion phase the wellhead also supports a blowout preventer (BOP) to maintain control of the well.

The Subsea tree is simply a series of valves which are installed on top of the wellhead in place of the BOP after the well is drilled and completed. The subsea tree switches the flow on or off and controls the pressure and flow of fluids during production. Subsea Trees may be in a vertical or horizontal configuration and provide the interface between the wellheads and the infield flowlines, typically connecting to large manifolds that act as gathering stations to feed into larger pipes and pipelines.

Commercial subsea fields may contain anything from a single tree to many subsea trees, each weighing 50-60 tonnes or more, depending on their complexity. For example, FMC will provide Shell's Prelude field with seven trees initially. The 850 metre-deep Woodside Pluto field on the North West Shelf has five trees initially, with Chevron Wheatstone commencing with 11 sets of FMC Subsea trees. There are more than 7000 individual parts in a typical Subsea tree.

Installation of trees, which is done from mobile offshore drilling units, also known as 'rigs' or vessels and assisted by Remote Operated Vehicles (ROVs), can take between five hours to two days, depending on how they are installed.

With the hire of rigs costing an average \$1 million a day, time is money.

Subsea trees are designed to produce oil or gas for the life of a field which on average is between 15-30 years. At the end of its life a well will typically be 'plugged and abandoned'.

Subsea is a highly-specialised field, and there are no formal courses for subsea engineers in Australia.

With 60 employees in Western Australia, FMC is kept extremely busy with a range of clients, (and projects) including Shell (Prelude), Chevron (Wheatstone), Woodside (Pluto) and ENI (Kitan).

FMC's Subsea Services Manager for Australia and New Zealand, Peter Walton, says Perth's current status as a world oil and gas hub is increasing exponentially.

"Currently Perth is where Aberdeen (Europe's oil capital) was 30 years ago," said Mr Walton.

The company brings in senior staff, such as Peter, from its overseas operations (in his case, Scotland) to train staff to meet its rigorous standards. FMC places such a high value on training that it has its own accredited university, offering courses across eight schools, including Finance, Project Management, HSE, Quality, Applied Technology and Engineering to name a few.

Ross Hendricks, a 15-year industry veteran and the company's Aftermarket Engineering Manager, is on 'secondment' from headquarters in the

US and is training four WA mechanical engineering graduates and one Brazilian (a controls engineer).

"There's a global shortage of subsea engineers, and there's no local courses, so we invest heavily in training," said Mr Hendricks, who is due to head back home soon after four years in WA.

"We can take a qualified engineer and transform them into a subsea engineer within six months to a year with training.

"Because we're primarily a service-orientated company in Perth, we look for a more hands-on/service driven person, rather than someone who is just technically-inclined.

"FMC's focus is safety, quality, delivery and cost in execution of providing Subsea Systems including trees, manifolds, controls and connections."

MATRIX a world leader

Directly across the road from FMC is home-grown firm Matrix Composites and Engineering.

The world leader in marine riser buoyancy systems, Matrix engineers solutions using composite syntactic foams and engineered plastics.

A riser buoyancy system provides uplift for steel risers on mobile drilling platforms. Matrix's riser buoyancy system is the lightest and most durable in the market allowing drilling in ultra-deep water, which is where the global oil and gas industry is moving.

Once a heavy engineering firm, Matrix saw the potential to diversify by using composite syntactic materials in the offshore and subsea sectors. It restructured in 1996, and by 2005 had introduced an expanded testing capability, allowing it to test to American Petroleum Institute (API) standards.

"Once that happened we became recognised as a serious global player," CEO Aaron Begley said.

The company gained further projects via European-based drilling contractors, which in turn drove the eventual development of the current manufacturing facility, opened in June 2011.

The group now manufactures and supplies drilling products, well construction products, SURF ancillary equipment, downstream cryogenic insulation systems, and offshore and site services.

Matrix manufactures a large range of subsea buoyancy products from its new facilities in Henderson which Begley believes is the largest, most technically advanced composites syntactic plant of its kind in the world.

Continued page 6.



*Artist's impression of a subsea field.
Graphic: FMC Technologies.*



*A well head tree being assembled.
Photo: FMC Technologies.*

Continued from page 5.

Covering 20,000 square metres, the new plant is highly automated and uses advanced manufacturing processes and technologies to produce industry leading products.

“We can test buoyancy to 17,500 feet in our hydrostatic pressure testing facilities which include the largest chambers in the world. We are also in the process of developing 15,000 feet riser buoyancy systems, the greatest depth ever for this type of buoyancy,” says Begley.

Matrix chose to remain in WA for a number of reasons, including the highly-skilled labour pool, the quality standards required when operating in Australia, better control over the product, political stability and strong intellectual property regulations.

Being at Henderson is a distinct advantage, as the company is part of a subsea cluster which supports the oil and gas sector. Everything is at the company’s fingertips – deepwater port, ship lift facilities, cranes, loading areas and the assembly hall.

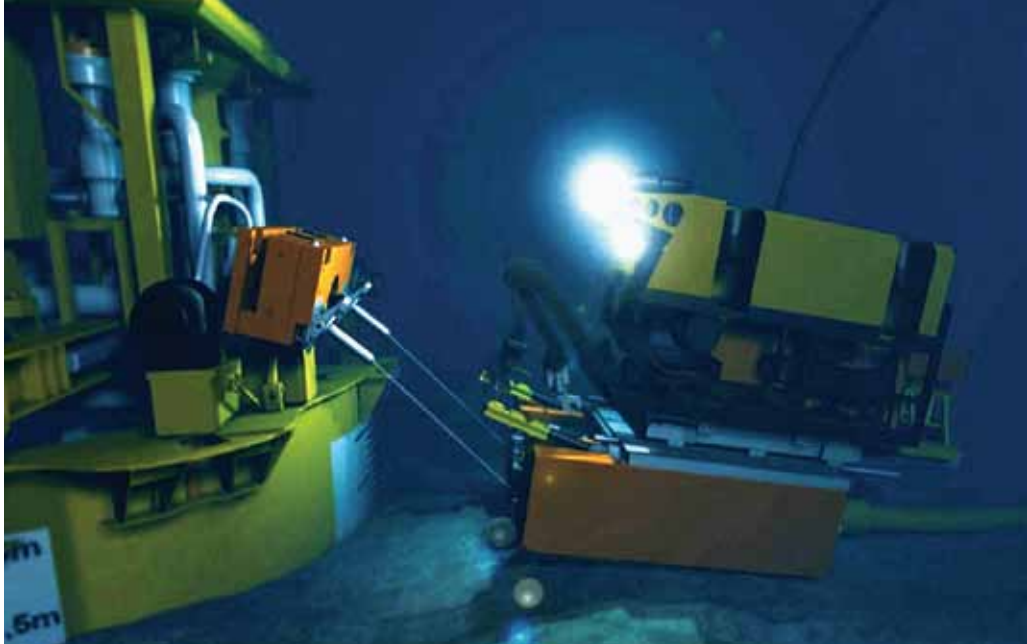
The business is truly globally-focused, with 85 per cent of its revenue derived from exports. Current industry trends indicate many overseas projects are coming back on line after the global financial crisis.

“There are a lot of planned rig upgrades and replacements,” says Begley. “There are 53,000 new wells in the US alone this year.”

Brazil is a promising area of operation, while closer to home there is increased spending in WA and in the Timor Sea. Matrix is driven to retain its place as a world leader and has a heavy focus on research and development.

“We are continually looking to advance our materials and technologies to ensure we remain ahead of industry trends and client demands. Matrix has developed more than 100 such syntactic mixes to offer varying combinations of density, mechanical and thermal properties, machinability and cost. Our new plant is 10 years ahead of the competition and positions us well for future growth,” says Begley.

“Continued strong capital expenditure in the oil and gas sector is driven by increasing oil and gas demand, which in turn encourages exploration, particularly deep sea.” ■



*A Remote Underwater Vehicle (RUV) installs a wellhead tree.
Photo: FMC Technologies.*



*Assembly of riser buoys at Matrix's Henderson facility
Photo: FMC Technologies.*

Boost for local engineering firms

The WA Government recently outlined funding measures to further develop local engineering and design industry capacity.

Minister for Commerce, Simon O'Brien said great potential existed for the local engineering and design industry to become more involved in the early phases of offshore energy developments.

“The State Government believes the capabilities of WA’s engineering and design industry is internationally competitive and has the capacity to work on major energy projects,” he said.

“The advantages of utilising local engineering and design expertise include the increased potential for other areas of the State’s economy such as manufacturing to become suppliers.

“I will be signalling to oil and gas proponents that use of the local engineering and design industry is a priority”.

He said the State Government will fund industry associations, such as Engineers Australia and the Association of Professional Engineers, Scientists and Managers Australia to identify future opportunities to supply.

“The government and industry are determined to build upon this by making WA a regional hub for development and support of energy-based resource development,” Mr O'Brien said.

Environmental reforms announced

With considerable reforms to resources safety and approvals, the Department of Mines and Petroleum (DMP) is now turning its focus to environmental reforms.

The department announced the commencement of the program, to be known as Reforming Environmental Regulation (RER).

The RER program will help deliver greater certainty, confidence and clarity surrounding the department's environmental regulatory system for all stakeholders.

Importantly, the reforms will strengthen the enforcement capacity of the department.

The RER objectives and implementation plan foreshadows the establishment of a Ministerial Advisory Panel, which will formally include RER program stakeholders.

The panel will operate from June to December 2012, with an initial objective to establish the scope and functions of working groups to progress the reforms.

The establishment of a dedicated RER Implementation Team within DMP will play an important role in developing the reforms.

Specific reform workshops will be held for detailed input and collaboration on particular projects.

This builds on the knowledge gained from consultation with industry groups and government agencies, through stakeholder workshops held by DMP in early 2012.

Ongoing stakeholder engagement will guide the development of the specific details and actions of the RER program.

It is the aim of the RER Implementation Team that procedural, policy and legislative reforms required will be identified by February 2013.



The State, industry and the community will directly benefit from these reforms through more effective application of environmental standards within the industry, and a more responsive regulatory agency.

For further information contact Dr Phil Gorey, Executive Director Environment Division on 9222 3290. To download the objectives and implementation plan visit: <http://www.dmp.wa.gov.au/15407.aspx>. ■

Mining Securities review completed



Norman Moore
MINISTER FOR MINES AND PETROLEUM

The Department of Mines and Petroleum (DMP), in close consultation with key industry associations, has completed a lengthy review into the State's environmental bonds system.

In December 2011, the department recommended to the Minister for Mines and Petroleum, Norman Moore, that the requirement for environmental bonds be largely replaced by a fund contributed to by proponents of all sites under the *Mining Act*.

The fund would be known as the 'Mining Rehabilitation Fund', with DMP having management responsibility.

It is proposed that annual fund contributions would be initially set at one per cent of each site's total rehabilitation and closure liability.

As with the current environmental bonds system, most exploration and prospecting activities will be exempt.

It is also proposed that interest earned on the fund will be available to rehabilitate or remediate high-priority, existing abandoned mines, for which there is currently no dedicated funding source.

Contributing to the fund, however will not mean that companies will no longer be liable for their environmental liabilities.

The fund will only finance closure where all reasonable compliance options have been explored and another operator cannot be found to take over the liability.

A key longer-term objective of the fund is for financial incentives (in the form of a credit or rebate scheme) to be available to industry following the achievement of successful rehabilitation and mine closure.

The next step in implementing the Mining Rehabilitation Fund will be to introduce new legislation to establish the fund under a separate Act of Parliament.

During the development of the legislation a system of stronger environmental compliance regulation and detailed transitional arrangements will be developed.

This will be done in consultation with industry and other key stakeholders to ensure the successful implementation of the new system. ■

Iron ore: past, present and future

During the 70s, 80s and 90s, although a major world seaborne trader, there was a level of stagnation in the Western Australian iron ore industry. There was little growth and prices were generally declining in real terms. How times have changed. BILL PRESTON, a senior resources advisor with the Department of State Development discusses how much has changed and suggests it will continue to do so for the foreseeable future. The article provides an insight into the evolution of Australia's greatest export-earner. Mining remains a cornerstone of the Western Australian economy, comprising nearly 33 per cent of the Gross State Product (GSP). Leading the way is iron ore exports, which increased to \$A63 billion in 2011, up \$14 billion from 2010, according to the Department of Mines and Petroleum. China continues to be the state's biggest export recipient, having taken over the mantle from Japan in 2005.

It was only as recently as 1960 that Australia lifted its embargo on the export of iron ore and 1965 when the first exports left the State. In the first quarter of this year WA surpassed its six billionth tonne of iron ore product output.

There have been a number of major changes in the industry over the last 50 years, but most notably within the last decade. Foremost among these have been:

- changes in resource cut-off grades;
- lowering in acceptable quality limits of saleable products;
- an increased number of players in the industry from a few major producers to a wide range of junior producers, explorers, and entrepreneurs;
- implications of China replacing Japan as the dominating market force;
- a seller's market after 25 years of a predominantly buyer's market;
- the abandonment of free-on-board (FOB), annual benchmark pricing system to a combination of index and spot pricing based on delivered prices to China; and
- interest in low-grade magnetites.

During these past 10 years, there have been hiccups, with prices almost halving overnight during the global financial crisis, but one thing has remained ... China's economic growth and the associated insatiable demand for iron ore.

"There's certainly been a rapid transformation since 2003, which is when I pinpoint the current emergence of China as a growing significant market," said Bill.

"But China has now surpassed Japan as WA's major export destination to the extent of making up nearly 70 per cent

of all of our exports in 2011, while Japan has dropped below 20 per cent of the total quantity."

With increasing Chinese demand came a shift in product qualities and hence to resource-base definition.

"Up to that time what was considered waste or low to sub-grade material was now being classified as ore, and effectively almost anything with iron ore units was saleable," Bill said.

Lower saleable iron grades became acceptable, while strict limitations on deleterious alumina content and phosphorus, in a Japanese-controlled market, were lifted in a dominant suppliers market with China's growing influence. Resultant re-definition of exploitable cut off grades boosted marketable resources from just over 30 billion tonnes to stand at around 40 billion tonnes under current market conditions. How long this will last, is the key question being asked.



These numbers do not include low grade magnetite deposits. The interest from China has fostered a massive growth in interest in magnetite-based projects and since 2003 an increase in resources from less than 1 billion tonnes to 30 billion tonnes (approximately 10 billion tonnes of magnetite concentrate product). Some 30 magnetite projects have been identified, most of which are supported by Chinese backers.

"Low-cost developments, based on limited resource bases were being developed so quickly that we moved from three main miners in 2001 to 15 in 2011, and production grew from just over 150Mt to more than 470Mt ... a tripling in 10 years."

In a 30-year 'quiet' time from the 1970s to the early 2000s, there were only three major producers – Hamersley Iron (Rio Tinto), Newman and Goldsworthy JVs (BHP) and Robe River. This was effectively reduced to two when a large part of Robe River JV was acquired by Rio.

"By 2004 almost anybody interested in exploration was on the lookout for, or switched their attention to, iron ore," said Bill.

"The mineral potential in banded iron formations saw a switch from targeting base metals and gold in the Yilgarn and north Pilbara, to exploring for iron ore on already-granted tenements.

"That's where we see the accompanying rise of mid-range and junior miners and explorers, the entrepreneurs and mum and dad investors in stock, which almost always resulted in an oversubscription. Money flowed freely, until the Global Financial Crisis.

"We saw the large blank areas with no tenements in the Hamersley Range rapidly become filled with applications from both existing and new iron ore explorers and aspiring developers. All prospective ground in the most lucrative Hamersley Basin was quickly snapped up. Iron ore focussed exploration increased from 'tick-over' levels of between \$10 and \$30 million a year to peak at \$280 million a quarter at the end of 2011. This is more than 52 per cent of all mineral exploration expenditure in WA."

China's economic growth fostered a massive increase in steel demand, with figures of plus-20 per cent annual growth in the early 2000s. The major world producers were at first reticent to commit to commensurate iron ore capital-growth programs, because of the question as to whether such growth could be sustained.



© BHP

Within a year or two there was the realisation that China was firm in its economic development plans and the seaborne iron ore industry got behind this growth. There was a rapid transformation into a suppliers' market, which had not been seen for decades and to unprecedented price hikes.

"Everybody interested in the mining sector, or in making quick money, wanted to get onto the 'band wagon'," Bill says.

As Bill Preston sees it, the future is all about China.

"When you look at the dominance China has gained, and being essentially the main driving force since 2003, it is difficult to see this changing," he says. However, the significance of Japan as a baseload supplier should not be ignored.

"There is not much more on the horizon. India certainly has potential in the longer term, with major companies making advances to secure any opportunities there. South Korea is seen to provide incremental, yet assured, growth.

"China could well provide 80 per cent of our market by 2020, which is remarkable considering five years ago Japan was our main customer. I think by 2020 we are looking at best that we would double exports; 900Mtpa looks achievable. We have around 1.5 billion tonnes per annum of capacity, aspiring to be in production by this time. Many will be disappointed, but such numbers still show a healthy iron ore growth in the State over this period."

However, ongoing growth to these levels cannot rely purely on China's continuing, but slowing, economic growth forecasts. Western Australia's iron ore growth also depends on a significant replacement of a lot of high-cost Chinese production and an increased market penetration into China from the 43-44 per cent at present.

"So there are a number of dependencies in achieving the 900Mtpa figure," says Bill.

"It will require a strong mutual relationship with Chinese steelmakers and government, as well as continuing support from Japan, South Korea and Taiwan, as to where the remainder of our exports are destined."

Crystal-ball gazing is not part of the process. The selection of which projects will develop, and those that will not, is not a question that can be answered, says Bill Preston.

"There are inevitably opportunities for small, short-term, low-capital, direct shipping ore developments, but many of the long-term sustainable projects, with investments of \$4-5 billion are becoming common," he says.

"Since the GFC, the new players have depended more on overseas investment to advance their projects. Finance has become harder to obtain, and projects with consumer-type investors are at a distinct advantage. Either the cost of, or access to, rail and port infrastructure is a key factor in the development and also timing of projects. This becomes more crucial in the consideration of an increasingly competitive market."

The changes created by iron ore in WA are being reflected in many ways, particularly in our lifestyles (and increased traffic).

While many see this continuing at an unabated pace, Bill is cautious.

"The way the future develops very much depends on China's continuing growth, which will be slower than the past decade, increased market penetration levels and whether India develops sufficiently during the next 10 years or so to kick in and pick up the China slowdown," he says.

"WA's iron ore growth will be significant but not to the scale of many aspirations. As the market becomes balanced, as everybody predicts, and prices come down, it will have both positive and negative effects for WA. It obviously lowers the revenue stream per unit of output, makes some potential developments marginal, but on the reverse will shut down a significant part of competing production, especially from many domestic producers in China.

"Given China's domestic output being around 450Mt of import equivalent grade per annum at present, this could be very significant. The critical factor is the price-demand equation remaining sufficiently balanced to advantage WA's growth.



Iron ore producers could be moving into uncharted markets with the pricing mechanism. Bill Preston has experienced the changes in this regard.

"In a balanced market, the annually-negotiated benchmark price was the cushion and the spot market disappeared almost entirely. There is no longer this cushion and how the index/spot pricing mechanism evolves in this situation could significantly influence the capital borrowing capacity of the aspiring developers."

Looking back at the early days of development in WA, the 'be-all-and-end-all' of investment underwriting of iron ore projects was by the long-term contract and benchmark annual pricing with Japanese steel mills. The benchmark has all but disappeared since 2009.

As the middle of the decade approaches, WA will be entering interesting times and could be an indicator of the long-term future growth profile of the industry and determine how many new aspiring developers have a place in this profile. ■

Ports 'battle' for supremacy



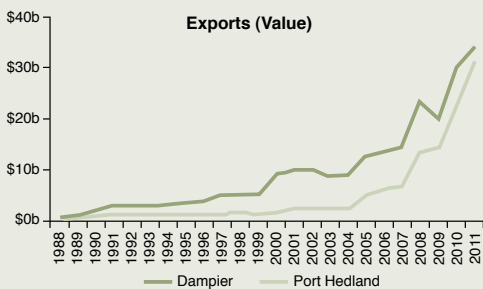
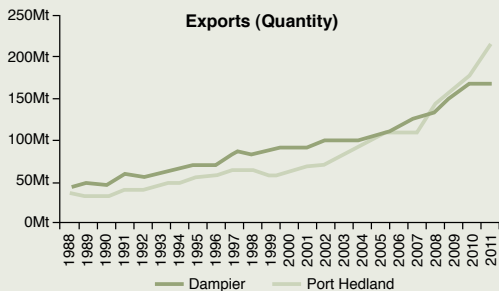
Dampier Port, which will become part of the Kimberley Ports Authority. Photo: Dampier Port Authority.



Tankers at Port Hedland. Photo: Port Hedland Port Authority.



WA's largest iron ore port, Port Hedland shipped \$202 million tonnes last year. Photo: Port Hedland Port Authority.



Graphs showing the growth of Port Hedland and Dampier.

There's no official prize at stake, but a heavyweight battle on Western Australia's docks has been going on since 1988.

Dampier and Port Hedland have been "slugging it out" to see which is the State's leading export port.

And the winner is . . .

Well, it's not so simple. Dampier wins when it comes to the value of exports, but Port Hedland leads in terms of tonnage.

Figures from the Australian Bureau of Statistics show:

- Dampier exported \$34 billion (28 per cent) of WA's merchandise exports in 2011, closely followed by Port Hedland, with \$32 billion (26 per cent). The value of merchandise exports from Dampier has exceeded Port Hedland's in each year since 1988.
- Port Hedland exported 218 million tonnes (41%) of merchandise exports in 2011 compared with 168 million tonnes (32%) from Dampier. Port Hedland overtook Dampier as the

State's largest exports tonnage port in 2008.

- Port Hedland is Western Australia's largest iron ore port with \$30 billion, or 202 million tonnes of iron ore exported in 2011.
- Dampier is Western Australia's second largest iron ore port with \$21 billion or 132 million tonnes of iron ore exported in 2011. Dampier did, however, have almost \$9 billion of LNG exports and more than \$4 billion (6 gegalitres) of crude oil and condensate exports in 2011.

The growth of both ports is expected to increase in line with growing world demand for WA's resources.

At the end of last year the Fortescue Metals Group (FMG)-loaded vessel, the *Wugang Innovation*, broke the record for the largest iron ore shipment to leave Port Hedland.

The *Wugang Innovation* was loaded with 247,906 tons of iron ore, breaking the previous record by 48 tons set in June 2011 by the *Cape Infinity*, a BHP Billiton-loaded ship. ■

Scholarships boost resources research

Seven Western Australian post-graduate students will share in \$65,000 worth of scholarships to undertake research projects in the mineral and energy industries.

Mines and Petroleum Minister Norman Moore officially presented the students with their 2012 Minerals and Energy Research Institute of Western Australia (MERIWA) scholarships.

Minister Moore said the scholarship program was crucial in attracting and retaining future generations of researchers, to support the growth of the mineral and energy industries.

"During the past 30 years, 284 research projects have been completed, and reports published in the public domain by MERIWA," Mr Moore said.

"We believe these research projects have helped to stimulate growth in this State's minerals and extractive energy industries, which is a plus for all."

Six recipients have each received \$10,000, with \$5000 for stipend and \$5000 for project maintenance, while another recipient will receive \$5000 for stipend.

Mr Moore said the State Government was committed to the scholarships.

"Since 1981, the WA Government has invested more than \$20 million into MERIWA-endorsed research," he said.

"This will be further boosted by more than \$2 million dollars in State funding during the next two years.

"Ultimately, this will allow MERIWA to provide further cutting-edge research for the mineral and energy industries, through universities and other government and private laboratories."

This year's MERIWA scholarship recipients are:

- Zoja Vukmanovic (University of Western Australia) is researching the processes involved in the remobilisation of nickel sulphides.
- Margaux le Vaillant (University of Western Australia) is researching the nature, geometry and size of hydrothermal remobilisation of base metals, platinum group elements and gold around magmatic nickel sulphide deposits.
- Amir Mokaramin (Curtin University of Technology) is focusing on introducing the technology of coiled tube drilling from existing applications in the petroleum industry, for deep mineral exploration drilling.

- Bryn Funnekotter (Curtin University of Technology) is researching effective cryo-preservation protocols.
- Vida Minaeian (Curtin University of Technology) is investigating the physical and mechanical characteristics of shale gas.
- Maryam Jozegholami Barmi (Murdoch University) has a goal to produce efficient, large scale cobalt composite electrodes for base metal electro-winning systems.
- Kerryn Chia (University of Western Australia) is studying methods to reduce dormancy loss and promote germination in snottygobble seeds. ■

Fact File

- MERIWA has completed 284 research projects in the past 30 years.
- A Minerals Research Institute promoting mineral research in Western Australia will be established with \$7.5million in funding in the State Governments 2012-13 Budget.
- The new institute will continue the work of the existing MERIWA scholarship program, building on its achievements.



From left Kerryn Chia, Maryam Jozegholami Barmi, Minister Norman Moore, Vida Minaeian, Prof. Ricardo Mancera represented Bryn Funnekotter, Amir Mokaramian, Margaux Le Vaillant, Zoja Vukmanovic.

More women joining WA resources

Although not traditionally an employment choice for women, the resources sector in Western Australia is experiencing a gradual increase in the number of females.

The average employment level of women in resources in WA is 22 per cent which, although below the National average of 45 per cent, is expected to increase as demand for labour increases. In WA there has been a three per cent increase in the past five years.

The resource sector can provide women with initiatives, diverse career (traditional and non-traditional), and employment opportunities, from land-based or off-shore fly-in, fly-out; drive-in, drive-out; remote residential and metropolitan living.

Resources-related industries will require a skilled workforce to deliver the significant number of projects currently in planning and development. The Chamber of Minerals and Energy believes that by 2013, labour demands will result in an estimated 38,000 additional employees being required by the minerals and energy sector, with

shortages expected to impact business sustainability.

Earlier this year, in tandem with International Women's Day, the Australian Women in Resources Alliance (AWRA) launched their Way Forward paper to raise awareness of the benefits of a gender-diverse workforce.

AWRA spokeswoman Minna Knight said the paper was important to the entire sector.

"This paper is a call to action and outlines how we can facilitate the appropriate cultural change, and promote best-practice workplace policies. The aim is to strengthen and unite the various women's networks and employers across Australia towards the goal of attracting and retaining more women in our workforce," she said.

Established in November last year, AWRA is coordinated by the Australian Mines and Metal Association (AMMA) and involves key stakeholders in the resources sector.

The AWRA was formed after it was identified that a key strategy to filling the skills shortage was increasing the attraction and retention of women in the resources sector.

AWRA's goal is to increase representation of women in the WA resources sector to 25 per cent by 2020.

Woodside Energy Australia business executive vice-president Lucio Della Martina said women were an essential part of having a highly-engaged, skilled and motivated workforce.

"Women are an essential part of a highly engaged, skilled and motivated workforce," Mr Della Martina said.

"To harness this talent our industry must continue to develop flexible work practices, increase awareness about opportunities and promote successful women in our industry as role models for others." ■

Mine's innovative use of time

Newmont Asia Pacific is one company that has been innovative in the way it is increasing the number of women in its workforce.

The company retains and attracts women through its Driving Force initiative, implemented at Newmont Boddington Gold, in the south west of the State.

Newmont identified short comings when full time equipment operators on 12-hour shifts took morning tea and lunch breaks, costing the company thousands of tonnes in lost production.

To solve this problem, Boddington management proposed to employ local women who were looking for work between 9am and 2pm.

The women involved were able to drop off their kids and collect them up from school, while being trained for operator roles and developing their skills in the mining industry.

The innovative new shift, which won a CME Women in Resources award for the company, covered production downtime during the breaks of the full-time staff and an estimated 120-160 hours of equipment operational time was gained.

Employing locals has had many benefits in the Boddington community creating a niche job market for working mums who can boost their qualifications while contributing to the mine's production.

Further information from <http://www.amma.org.au>

Isolation conquered

Feeling isolated within the mining industry, Norseman-born Sabina Shugg did something about it by establishing Women In Mining and Resources WA (WIMWA).

Formed in 2003, the organisation aims to foster mining as a career for women. It was borne out of a feeling of isolation Sabina felt early in her career as a mining engineer during the 1990s.

She started work as a 'fieldy' in exploration in 1987, before becoming an assay clerk at the then new Jubilee mine south of Kalgoorlie, where she worked for the next seven years.

That was the start of a 14-year career with Normandy Mining, for whom she worked as a survey assistant and mine clerk, before being promoted to mine surveyor.

Sabina then filled in as pit supervisor, which she continued to do when she started full-time study in mining engineering at the Western Australian School of Mines in Kalgoorlie (WASM).

After graduating, she moved to Cue in WA's Murchison region where she worked at the Golden Crown underground mine honing her skills as a 'skippy' as well as in timbering, bogging and airlegging.

She then transferred to a FIFO role at Golden Grove, also in the Murchison, undertaking a number of roles over the next four years, culminating as alternate underground manager.

During that time Sabina completed a shift boss ticket, followed by an underground manager's ticket – the first woman to receive and use these tickets.

"At various times in my career I felt quite isolated and it wasn't because I was a woman," said Ms Shugg, who also holds an MBA from the University of Western Australia.

She says she still felt isolated, even after moving to Perth to work in project management for a gold mining operation.



Minna Knight.



Sabina Shugg.



Jenness Gardner.



Women from Boddington Mine's casual haul truck shift. Photo: Newmont.

WIMWA holds eight networking events every year, with participation fully booked at 200 for each activity. Since 2009 an annual one-day seminar has been added to the calendar with some 500 attendees in 2011.

Sabina currently works for management consultancy Momentum Partners across a range of industries leveraging her mining and management skills, while working with support industries as well as mining companies.

The skills shortage is a pressing issue for Western Australia's mining industry, and one Ms Shugg believes opens up opportunities to those forging a career in the sector.

"If you are prepared to go out there and have a go, you end up being the right person at the right time," said Ms Shugg, a recipient of the Chamber of Minerals and Energy (CME) inaugural Women in Resource Champion award in 2010.

"I think you can use the skills shortage to your advantage. You might not be in the exact job you want but if you are in a decent company and something comes up, you put your hand up for; it might be the start of something good for you."

For more information, see <http://www.womeninmining.com>

Awards encourage women

With the prediction of skills shortages during the next year and beyond, the WA Chamber of Minerals and Energy has recognised the need to encourage more women to explore the mining and energy sectors as a career.

The CME sponsors the Women in Resources Awards, which recognise individuals and organisations working to build a world-class industry which provides attractive career opportunities and enhances the recognition and participation of women in the sector.

The 2012 Awards were presented recently, on International Women's Day.

Award winners were:

Joanne Farrell - 2012 Women in Resources Champion

Margaret Watroba - 2012 Outstanding Woman in Resources (Professional/Specialist)

Natasha Cann - 2012 Outstanding Woman in Resources (Trade/Operator/Technician)

Katrina Bukauskus - 2012 Outstanding Woman in Resources (Young Professional/Specialist)

Newmont Boddington Gold - Driving Force (Outstanding Company Initiative)

Director receives scholarship

The Department of State Development's (DSD) Policy Director, Jenness Gardner, pictured, has received one of two Chief Executive Women (CEW) scholarships offered nationally.

Jenness attended an executive short course in negotiation skills at the INSEAD Business School in Singapore in early May.

She was also involved in negotiations to achieve domestic gas agreements as part of the Wheatstone project last year.

"The course developed my understanding of international negotiating styles and will be of benefit in future agreement discussions," she said.

CEW is a member-based organisation, comprising more than 200 of Australia's leading business women, and has a shared goal to facilitate greater representation of women at senior levels of Australian business, government and the not-for-profit sectors.

Go to <http://www.cew.org.au/> for more information.

International conferences put state in spotlight



DMP Manager of Mineral Promotion Gaomai Trench (second from left) and DMP Executive Director of Geological Survey Rick Rogerson (third from left) with representatives from Geosciences Australia and State and Territory Geological Survey teams.

Senior staff from the Department of Mines and Petroleum recently travelled to Canada for a leading global exploration conference.

Deputy Director General Strategic Policy Michelle Andrews attended the Prospectors and Developers Association of Canada (PDAC) event in Toronto, along with Executive Director of Geological Survey Rick Rogerson and Manager of Mineral Promotion Gaomai Trench.

The conference, which attracted more than 30,000 attendees from 120 countries, allowed the department to promote and attract investment to the WA resources industry, particularly greenfields exploration in a time of rapidly changing exploration technology.

The department's staff members attended various presentations and technical sessions throughout the four-day event.

They offered policy and technical advice and answers to attendees at the West Australian desk in the Australian booth at the Trade Show, and observed a significant increase in enquiries from service industries keen to access the WA market.

The department also co-hosted a half day seminar with the WA Chamber of Minerals and Energy and the Association of Mining and Exploration Companies - focusing on WA's mineral industry and exploration opportunities.

Recognising the challenges ahead for the resources sector was the focus of many conference and workshop presentations. These included social licence to operate, transparency, community engagement by industry and environmental approvals.

Ms Andrews said the conference proved extremely valuable to the department.

"By attending the presentations, trade and investor booths, and meetings with investors, industry and government representatives - we have returned with a better understanding of the international drivers, trends and forecasts for the resources industry," she said.

"And that in turn helps the department prepare better for the future, improving the way we regulate and, therefore, the performance of the WA sector."

Ms Andrews said she was pleased DMP's regulation of the West Australian resources sector compared favourably with Canadian jurisdictions.

"Similar to WA, Canadian national and provincial governments have been focussed on approvals reforms for the past several years - improving timelines, removing red tape and strengthening accountability," she said.

"And my dealings with Canadian explorers and government officials at this conference gave me the confidence that Western Australia's regulatory reforms are in step and sometimes ahead of these jurisdictions.

Asian focus

Deputy Director General Dr Tim Griffin and Manager of Mineral Promotion Dr Gaomai Trench attended the Hong Kong Mines and Money conference and exhibition.

The four-day event, which attracted almost 3,000 attendees from 50 countries, allowed the department to promote the WA resources industry to potential investors.

"Delegates were interested in the department's geoscience data system, which was rated the best in the world by the Fraser Institute's 2011 Global Petroleum Survey, against 135 other destinations," Dr Griffin said

They were also equally impressed when they found out the department allows all operators to lodge mining and exploration applications online - accelerating our assessment times.

"It was interesting to hear from several Chinese-based investors who said they couldn't access the department's website, because it is barred in China."

There was also major interest in the Commonwealth's recently announced Mineral Resource Rent Tax (MRRT).

"It is clearly causing investors to reassess investing in Australia and therefore, WA," Dr Griffin said.

"As a result, we will definitely need clear information on the application of MRRT when it swings into action.

"The Federal Government's pending Carbon Tax was also of interest, with many delegates asking when and how it would be applied."

Dr Griffin and Dr Trench attend various presentations, providing them with a deeper insight into how Asian economies continue to grow and require resources.

They also gained key information on the issues confronting mining project developments outside Australia - including approvals, access to finance and lack of critical infrastructure.

The conference gave the department a better understanding of the international trends and forecasts for the resources industry.

"The information we gathered is really helpful to the department, so we can continue to plan for the future," he said.

"The meetings had a lot of energy and we are clearly continuing to attract potential investors from China and, in general, Asia." ■



Safety at top of department's agenda

The Department of Mines and Petroleum (DMP) is undertaking one of its largest recruitment campaigns in recent history, as part of a State-wide reform of safety regulation in the resources sector.

The goal is to ensure the department has the capacity to regulate the rapidly-expanding resources industry well into the future.

In its latest campaign to recruit petroleum safety assessors, the department experienced a positive response, receiving 226 applications for nine Perth-based positions.

The safety assessors, who signed their contracts in April, will be responsible for regulating occupational safety and health laws under WA petroleum legislation for onshore areas.

The assessors will support Petroleum Safety's new team-based approach, for

which three new team leaders were hired in December last year.

Another recruitment drive for petroleum safety and risk analyst positions is set to commence later this year.

DMP Director General Richard Sellers said the recruitment drives were vital to maintaining high safety standards in the industry, which is experiencing rapid growth.

"The department is committed to supporting the industry as it grows and this is just one way in which we are doing this," he said.

"It's all part of our approach to implement best-practice regulation and permanently change the safety culture of industry members.

"It shows we are working hard to remain a robust regulator, but we need to remember that safety is the responsibility of the operator – all companies must provide safe workplaces in good repair."

The ongoing petroleum safety recruitment drive follows activity by the department's Resources Safety Division (RSD), which recruited an additional 25 mines safety inspectors during 2010-2011.

It also follows the introduction of the department's mine safety levy and the recent petroleum safety levy, which enables industry cost recovery for ongoing and future mines and petroleum safety programs. ■

Korea cements WA relationship

The Republic Of Korea's Ambassador to Australia His Excellency Mr Taeyong Cho, made his first official visit to Western Australia recently, attending a briefing at the Department of State Development (DSD) to learn more about the State economy, trade and major projects.

Ambassador Cho said he was extremely interested in the State's different industry sectors and was keen to encourage Korean businesses operating in WA to work together to boost their community profile and improve their understanding of how to approach government.

The inaugural visit by the Korean Ambassador follows a move by Korean steel giant POSCO to increase its equity in Roy Hill Holdings, the holding company of the Roy Hill Iron Ore Project, from 3.75 per cent to 15 per cent, along with STX Corporation which has increased its equity to 2.5 per cent, and Marubeni which will hold 12.5 per cent.

Funding for the equity is \$3.5 billion, with POSCO's investment in the Roy Hill project the single largest investment ever made in Australia by any Korean company.

Following closely Ambassador Taeyong, His Excellency Mr Shigekazu Sato, the Ambassador of Japan, met with Director General Steve Wood. ■



Korean Ambassador Taeyong Cho.

South Korea fact file

- South Korea is Western Australia's third largest trading partner, with total trade in 2011 valued at \$11.2 billion.*
- In 2011 (calendar year), Western Australia contributed 44.7 per cent of total Australian exports to South Korea, with crude petroleum and minerals such as iron ore, non-monetary gold and copper among the top exports to Korea. It is the State's third largest market for crude petroleum exports with a 14 per cent share (\$1.4 billion) and third for iron ore exports with 11 per cent (\$6.8 billion). South Korea is also the State's fourth largest market for agricultural exports, with an 8 per cent (\$401 million) share.*
- In 2010/2011, 14% (A\$2.6 billion) of Western Australia's petroleum (incl. crude oil, condensate, LPG, LNG and natural gas) exports went to South Korea.**
- Several large Korean companies, including POSCO and KOGAS, have entered Western Australia's resources sector in the last few years contributing to the growth of some of Western Australia's largest projects.
- KOGAS has purchase agreements with various LNG projects including North West Shelf and Prelude. *Source: TradeStats

** Source: WA Mineral & Petroleum Digest (DMP biannual publication), ABS – as at August 2011.



Simulated mine cuts through training time

The CUT, or Central Underground Training Facility.

IT'S hidden under Perth's CBD, but the word is spreading about a unique mining training centre.

The CUT, or Central Underground Training, a once dingy corridor which housed furniture, has been transformed into a simulated underground mine and is attracting interest from overseas.

Built in 2010, Central Institute of Technology's (CIT) \$100,000 facility has hosted resource sector managers from Chile, China, India and Africa.

Closer to home, Western Australian-based underground mining specialist Swick Mining Services runs inductees through the underground simulation and CIT's drilling compound at a Boral quarry in Orange Grove.

"It's a great way to conduct this type of training," Swick safety and training adviser Jamie Dallas said.

Swick trains groups of between three to 10 inductees every Friday. The one-day induction at the institute is the equivalent of about two to three weeks training onsite.

Mr Dallas said the CUT provides a realistic feel of what it is like to be underground. That was evident when *Prospect* and six female resources employment consultants took a tour. The darkness, particularly in the refuge chamber, was overpowering.

"It's a great idea for putting new people through just to give them that feeling of what it's like to go underground, and how an underground mine works," Mr Dallas said.

"It not only helps familiarise people as to what to expect, but also assists in training, allowing new employees to work confidently and safely from their first day on the job."

It is also a money-saver. There is a significant cost of putting someone through interviews, medicals, inductions, and appropriate clearances and getting them to site.

With The CUT potential workers can experience the mining environment straight away, rather than discovering on the job that mining may not be suitable.

"If people decide it's not for them from the beginning, then it's a cost saving to us and to them, too," Mr Dallas said.

Central Institute of Technology principal lecturer Charles Dornan, who set up the facility in 2010, agrees.

"We always taught theory, so we sent out students who liked theory and the concept of working underground but when they got out on the mine site and went underground they'd say, 'I don't like this, it's not for me'.

"By that stage, the mining company has already spent \$4,000 to \$5,000 inducting them. The mining company was losing out and our students were losing out, because they had gone down the wrong pathway."

Mr Dornan first thought of the idea in 2009.

"I had some pretty good students pull out when they went on site, so I contacted some geologists I knew at Barrack and Newmont and it wasn't long before we had several companies involved.



© CIT



© CIT

Premier Colin Barnett visiting the CUT.

“It was important to have industry come in to make sure it would be accepted, and Swick was part of that,” Mr Dornan said.

Apart from the induction process for drillers’ offsideers and geotechnical students, the CUT Mine also allows Central to offer new areas of training including short courses in mine safety (such as elevated work practices) the Certificate III and IV in Occupational Health and Safety, and Certificate II and III in Underground Metalliferous Mining.

The CUT’s secondary ventilation system, the noise, darkness, and interactive aspects, are designed to test and teach different competencies, including safety, emergency procedures and warnings, drilling, geology and exploration in a realistic environment.

“People think they go down and just come back up, but there obviously are inherent dangers which we make them aware of,” Mr Dornan said.

Realistic quartz seams were created by a professional set designer, based on actual mine seams.

Students are taught to map the mine face and when they finish their calculations they walk through a door in semi-darkness to see how the seam continues.

Nothing is left to chance, with students required to wear full safety equipment and clothing to enter the shaft and tag in and out, as they would at a real mining site.

“To simulate the heat we make the students wear clothes under their overalls, so they get hot,” Mr Dornan said.

Recorded sounds normally heard underground, including fans, machinery and equipment, are played loudly to add a final touch of realism.

Like all mines, The CUT is a work in progress and the institute will add to it as the need arises. They recently installed a surround-sound system and a diamond rig, and water dropdowns, donated by Xstrata Nickel, will soon add to the realism.

“The surround sound really makes it interesting when students hear a boggler coming towards them,” Mr Dorner said.

“The water will be a nice touch, even if they just learn how to handle soggy paperwork.”

One of the outcomes of the course is that students’ suitability for underground mining can be established prior to them entering the industry.

This works in everyone’s favour: the students know if they are suited to the industry or not, the companies save money and a more highly-trained student graduates. ■



The Indian experience

While major domestic resources projects form the backbone of the Department of State Development's core business, the Western Australian Government assists local businesses and investors to capitalise on other opportunities through its International Trade and Investment division (ITI). With offices located in 10 of the State's key trading regions, ITI aims to drive economic growth by facilitating exports, investments, relationships and promoting the State internationally. This issue we look at one of our main trading partners, India. The WA office was established in Mumbai in 1996. With support of a representative in Chennai, it assists Western Australian businesses access export opportunities in India and Indian companies to identify investment opportunities in WA.

Birla Nifty Mine, Great Sandy Desert.

For the moment, in India, most of what glitters for WA companies is gold. The precious metal forms the bulk of our exports ... for now.

As our fourth-largest export partner, and sixth largest in total, India accepts \$5.4 billion of our exports. Of that, \$4.9 billion comes from the resources sector, with 80 per cent (\$4 billion) in gold and diamonds to cater for the insatiable Indian jewelry industry.

However, with a population of 1.2 billion (2011 Census) the world's largest democracy's burgeoning economy continues to gain momentum, due to its liberalisation, market reform and the dismantling of tariff barriers.

Historically, from 2006 until 2011, India's average annual GDP Growth was approximately eight per cent and is still a growing market with untapped opportunities which can be explored by Western Australian companies.

India imports nearly 70 per cent of its petroleum requirements. The country's growing energy needs, for both industrial development and domestic supplies, presents huge opportunities for Western Australia as a reliable energy supplier.

In August 2009, ExxonMobil signed a deal with Indian company Petronet LNG to supply 1.5 Mtpa of LNG over 20 years

from the Gorgon project in Western Australia's North West.

That watershed agreement, signals what is likely to be a long and rewarding relationship with India's resources sector.

Perhaps it's apt that ITI has dubbed 2012/13 the 'Year of India'. Three major industry events are taking place: Petrotech (New Delhi, October 2012), the International Mining and Machinery Exhibition (Kolkata, December 2012) and Australasian Oil and Gas Conference (Perth, February 2013).

Peter Forby, ITI's Regional Director South Asia, who is based on Mumbai, is positive about the future of WA's relationship with India.

"We have been approached by a number of Indian companies looking for investment opportunities in the mining sector in WA and Indian companies looking to purchase gas," he says.

"Sri Lankan companies are also seeking partners in the development of their mineral sands resources.

"We are very interested in talking to companies interested in being part of an investment mission to India later this year to meet potential investors and gain an insight into developments taking place."

There are numerous opportunities for WA companies in India, with demand for resources including gas, copper, coal, gold and rare earth minerals.

"As the Indian resource sector develops there are also opportunities to provide technology and services and the potential for joint ventures and partnerships in areas such as contract mining and mine rehabilitation, and also in oil and gas for companies to supply equipment, design services, software and in project management," says Mr Forby.

Several WA companies are positioned for expansion in India.

Mine refuge chamber manufacturer MinARC Systems recently appointed an agent in India to gain a foothold.

The Welshpool-based company lists 37 of the world's leading mining companies as customers and has offices in the US, China, South America and South Africa.



Indian Goldsmith.

© Roy del Vecchio, www.roydelvecchio.com



Lina Ashar.

“It’s early days for us in India, and things are changing so quickly there,” said the company’s general manager, Mike Lincoln.

“There’s tremendous potential for us, because the sector is growing and because India’s mine safety is probably about five years behind us.”

“However, because doing business in India is different, and most mines are government-owned, things take time. We obviously hope to have a full office with our own people there one day.”

Another WA company leading the world in its field is Immersive Technologies, which supplies surface and underground mining equipment simulators. With more than 190 customers globally, the Perth-headquartered company has already started its push into India.

It has had a representative in Kolkata for a few years and has sold two systems, to a zinc mine and an iron ore mine, with a third to a coal mine now in the final stages of negotiation.

“There is certainly tremendous scope for investment for us in India,” says the company’s Brisbane-based Asia-Pacific manager, Mike Eaton-Reid.

“I’m working on a business plan for establishing an office there. It certainly helps to have a dedicated presence, as we’ve just done in Jakarta.

“There are unique challenges and it’s unusual to be dealing with State-owned mining businesses when you’re used to dealing with private companies. That’s just a reflection of India’s lack of access to capital, so the government gets involved in a range of industries, including companies that supply the mobile plant.”

Australian Lina Ashar runs Kangaroo Kids, a group of 59 pre-school learning centres, toddlers’ clubs and 13 Billabong High Schools across India.

Indian-born Ms Ashar was educated in Australia, where she taught in secondary schools. She returned to India in 1993 with a dream to make a much-needed difference in education. As a teacher in Mumbai, she soon realised her limitations in providing individual attention to each of the 60 or so students cramped in a classroom. This led her to start her first preschool in Bandra (Mumbai), India.

Kangaroo Kids turns India’s century-old textbook learning system to a more hands-on and student-centric experience, more suited to the Indian culture than the British system on which was based.

On the other side of the equation, there are Indian companies investing and operating in Australia. These include Perdaman, NMDC, Lanco and Aditya Birla.

The Birla Nifty Copper mine is located in WA’s Great Sandy Desert, about 1,250km north of Perth and 350km east of Port Hedland. Commissioned in 2004, it is one of the established world’s largest underground copper mines to be in this decade and has a capacity of 2.3 mtpa.

Dr Sunil Kulwal, the CEO of Aditya Birla Minerals Limited, who has been here since 2003, says there are challenges associated with operating in Australia, but these are almost always at the start of a project.

“Apart from the cultural challenges of adapting to a new life, Indians have to get used to the different price structures,” Dr Kulwal said.

“Indian prices are 50 to 70 per cent lower. But it’s not just Indian companies operating here that need to adjust. It works the other way, too.”

Dr Kulwal says while the regulations in Australia were stringent, once they were met, his mine was operating quickly, thanks to the assistance he received from Department of Mines and Petroleum staff.

“They were willing to understand the issues we faced and were very approachable and understanding,” he said.

“Once the boxes are ticked, everything runs smoothly, but you need to get it right the first time.”

The experience was obviously positive, as Dr Kulwal’s company is now looking to invest further in Western Australia, with other opportunities in copper, and perhaps coal, on the horizon. ■

Reconciliation plan to assist Indigenous Australians

The Department of Mines and Petroleum (DMP) has made a commitment to develop a Reconciliation Action Plan (RAP) by the end of June.

The newly-developed plan, in partnership with Reconciliation Australia, aims to assist Indigenous Australians to increase personal and collective prosperity.

The department's vision for reconciliation will be achieved by fostering positive relationships with the Indigenous community and local Indigenous organisations.

This will include providing employment and training opportunities for Indigenous Australians and increased Indigenous representation at DMP.

DMP RAP coordinator Bec Blurton said the program will build employee understanding and knowledge of Indigenous culture and history, and encourage workplace involvement in Indigenous cultural events.

"The department is working towards creating better support, including the development of mentor/buddy programs within the agency," Ms Blurton said.

"We will be working closely with the local communities we operate with to practise fair and respectful business activities at all times," she said.

One of the objectives is to have a visible Indigenous presence in the department and to provide acknowledgment of traditional land owners.

"We want to provide opportunities for Indigenous people to fill existing vacant positions within DMP, including areas specific to Indigenous development," Ms Blurton said.

"In order to maintain Indigenous employment levels, retention initiatives will support recruitment activity, as well as tracking the progress of Indigenous employees to ensure desired outcomes are met."

Since October last year, the department has filled eight positions with Indigenous staff, with another four jobs to be offered in the next financial year.

The department is currently reviewing its human resources policies and procedures to ensure it provides for Indigenous cultural responsibilities, and will also introduce cultural-awareness training.

"DMP also wants to implement specific employment strategies to increase the number of Indigenous employees," Ms Blurton said.

A DMP-Reconciliation Action Plan (RAP) Committee, consisting of Indigenous and non-Indigenous staff members and external stakeholders, has been created and will meet regularly to develop the plan.

"The plan formalises the department's contribution towards reconciliation through building positive relationships between Indigenous and non-Indigenous Australians," Ms Blurton said.

DMP was also involved in the recent Reconciliation Week (May 27-June 3, 2012) Street Banner Project in Perth, which invited Western Australians to embrace and celebrate the culture of the first Australians. ■

Anketell port closer

The State Government has moved to assemble the land required for the Pilbara's next major deepwater port and industrial precinct.

Premier and State Development Minister Colin Barnett said Anketell Port, 30km east of Karratha and 10km from Cape Lambert, would be developed in stages as a multi-user facility, with an ultimate annual export capacity of more than 350 million tonnes.

The development includes a related industrial precinct to accommodate mineral processing and other heavy industry.

"Anketell will generate new business and development in the Pilbara, with existing towns, especially nearby Karratha and Roebourne, providing services and homes for the operational workforce," Mr Barnett said.

"This project will further strengthen these communities and help realise the Liberal-National Government's Pilbara Cities vision."

The Premier said that the Government had issued notices under the *Land Administration Act 1997 (WA)* and the *Native Title Act 1993 (Commonwealth)*, identifying 4,300ha required to enable the development of the Anketell Port and Strategic Industrial Area.

"The government will ensure all landholders affected by the notices are informed and that their rights are recognised and, where required, they will be appropriately compensated," he said.

"Currently, this land is covered by various forms of tenure, including native title, pastoral leasehold, private land and mining tenements."

The Ngarluma people are the traditional owners and native title holders over a large area of the land proposed for the Anketell project.

"The government is already working with the Ngarluma Aboriginal Corporation, the representative body, to negotiate native title matters," Mr Barnett said.

"Together, we will ensure Aboriginal heritage is protected and the Ngarluma people are compensated properly."

The Premier said the government was considering a range of options for how the staged development of the port would proceed. ■



Premier and Minister for State Development Colin Barnett with Wickham Wolves players Tyler Ridley (left) and Daniel Cross. The Premier visited Wickham to announce the town's expansion. Picture: Aaron Bunch.



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An aerial view of Wickham and an artist's impression of the new Central Facilities Building.

Wickham set to expand

The State Government has approved a \$336 million plan to expand the Pilbara town of Wickham, 60 kilometres east of Karratha.

Western Australian Premier and Minister for State Development, Colin Barnett, welcomed the Rio Tinto project which he said was an important investment by a major iron ore company in the future of the Pilbara and Western Australia.

"Rio Tinto's investment will see Wickham's population increase from about 2000 to more than 2,600," Mr Barnett said.

"Wickham will house the workforce necessary for Rio Tinto to reach its goal of increasing annual iron ore export capacity through Cape Lambert Port from the current 80 million tonnes to a possible 183 million tonnes in 2015."

The Premier said the Wickham Town Expansion Phase 2 project, which will create a new Wickham South subdivision, included:

- Building 212 new dwellings for company use, on 174 lots.
- Providing 25 residential lots for use by government agencies, other businesses and Indigenous organisations and 35 additional lots for future use.
- Installation of 198 new high-quality, motel-style Fly-in-Fly-Out (FIFO) workforce accommodation units.

- Construction of a new 1600m² town administration and training centre for company and community use.
- Development of a two new public recreational parks, one in the new subdivision and a new central park located near Wickham's sporting precinct.

"Rio Tinto's commitment to Wickham will complement the State Government's billion dollar Pilbara Cities initiative and help strengthen the region as a place to bring up families, with access to high standard services and facilities," Mr Barnett said.

"Last year the government approved a \$43 million phase 1 project, which included upgrades to the town's waste water and electricity infrastructure.

"There has also been redevelopment of Wickham Lodge, providing accommodation and a high quality modern cafeteria for residents and FIFO employees, as well as a FIFO transit lounge, gymnasium and other facilities.

"Rio Tinto is in the final stages of completing a new \$22 million sport and recreation precinct, with high standard sporting and leisure facilities, available for Wickham residents and teams from surrounding communities, and is also revamping many of its existing houses.

"Construction activity and the increased population will generate new opportunities for non-mining businesses and services not only in Wickham, but in other communities in the Shire of Roebourne." ■

Fact File:

- The Wickham Town Expansion Phase 2 project was approved under the *Iron Ore (Robe River) Agreement Act 1964* (Robe Agreement), which is managed by the Department of State Development.
- Rio Tinto and the Shire of Roebourne jointly administer Wickham, which was established in 1970 to accommodate the Cape Lambert workforce.
- Rio Tinto is spending up to \$18 billion expanding its annual iron ore export capacity in the Pilbara from 220 million tonnes to a planned 353 million tonnes.
- Last year iron ore producers contributed more than \$3 billion in royalty payments to the Western Australian Government.

In the news

Government welcomes MMI involvement in Browse

Premier and State Development Minister Colin Barnett has welcomed Woodside's announcement that it has accepted an offer from Japan Australia LNG (MIMI Browse) Pty Ltd (MIMI) to acquire a 14.7 per cent interest in the Browse LNG Precinct. "This strong commitment by Japanese industry, which also includes an off-take agreement to purchase about 1.5 million tonnes of LNG a year, is a major boost for the Browse project," Mr Barnett said. Woodside now has a 31 per cent share of the project. "This enables Woodside to remain operator of the development with a more manageable share for the Australian company to be able to finance," he said.

Study into new Pilbara rail line

Atlas Iron and QR National have agreed to jointly fund a feasibility study into the Pilbara's fourth rail line. The study, for a 600km multi-user railway, at a cost of up to \$3.5 billion, is expected to be completed by the end of this year. The companies had been working informally on the proposal, now named Pilbara Independent Rail Project, since 2011. Although Atlas would be the railway's foundation customer, QR will be seeking other miners. – *The Australian* and *The West Australian*, 26 April.

Cape Lambert contract awarded

Perth-based resource services' provider NRW Holdings has secured a series of contracts from Rio Tinto's Hamersley Iron, worth a combined \$125 million. The company said it had been awarded contracts for work at Cape Lambert, the Boolgeeda Aerodrome and the Western Turner Syncline project. The Cape Lambert Port B expansion work will involve excavating 480,000 cubic metres of earth in preparation for the construction of rail car dumpers. The works are expected to last six months with a peak workforce of 85. It is being undertaken as a joint venture with Ngarluma and Yindjibarndi Foundation Limited. – *PerthNow*, 19 April.



Refinery celebrates 40 years

When the Alcoa Pinjarra refinery turned 40 on May 3, its lifetime production had reached about 114.8 million tonnes of alumina, the equivalent of 60.8 million tonnes of aluminium, or enough aluminium for about 920,000 Boeing Jumbo 747-400s. The Pinjarra refinery was officially opened by then Premier John Tonkin on May 3, 1972 to take advantage of the growing global alumina demand and the larger-than-expected bauxite deposits in WA. "It has grown from an initial production capacity of 250,000 tonnes of alumina per annum to today's annual output of around 4.3 million tonnes, around 25 per cent of Alcoa's alumina production globally", said refinery manager Simon Pascoe. – *Mandurah Coastal Times*, 18 April.



Steel funding initiative announced

The State Government will provide more than \$82,000 in State Government funding to the Australian Steel Institute (ASI) to assist the Western Australian steel fabrication industry win local resource project contracts. Minister for Finance, Commerce and Small Business Simon O'Brien said the funding will enable ASI to engage expert assistance to consider how the industry could present "value-for-money solutions" to project proponents. Strategies will include the possible formation of alliances and joint ventures, both within WA and with external partners. – Ministerial release, 19 April.

Mining unaffected by downturn

In its latest economic round-up, Treasury says recruitment in mining remains at record levels, with the recent global downturn having no material impact on the sector. "An excess of demand for skilled employees has also seen firms in the mining and related construction sectors becoming less selective in recruitment but spending more on training," it said in its quarterly round-up. – *PerthNow*, 1 May.

More workers wanted

Mining giant Rio Tinto has launched one of the single biggest recruitment drives in Australian history. The miner wants tradespeople, engineers, planners, project professionals, geologists and operators to fill vacancies at projects worth \$22 billion that are either under way or about to start at sites across the country. Rio hopes to fill about 6000 vacancies during the four-month campaign, with about two-thirds at its 14 WA sites. – *The West Australian*, 27 April.

Please explain

Mining companies will have to explain to the Federal Government every six months what efforts they have made to use Australian products in large investment projects, or lose access to tariff reductions for using imported materials. Manufacturing Minister Greg Combet said new transparency and compliance provisions would apply from July 1. These will apply to any project which receives \$20 million or more of government funding, while the six-monthly reporting requirement, which will include having to justify why Australian goods are not used, will apply to projects worth more than \$2 billion. – *The West Australian*, 12 April.

Wave power support swells

Carnegie Wave Energy has finalised investment for its first revenue-creating project. The Fremantle-based company secured \$31 million in cash through a government grants and institutional investment for the Perth Wave Energy Project. Located at Garden Island, the project uses wave technology to produce electricity. Assisting the project was \$10 million cash from the Federal Government's Emerging Renewables Program and \$5.5 million from the WA Government.



Buoyant Actuator during Installation.

© Carnegie

Broome ships sand

Congestion caused by mining infrastructure works and activity in the Pilbara has generated a new freight industry for Broome Port – sand. Mined near Port Hedland, the sand is being used by Chevron in the construction of its \$43 billion Gorgon project on Barrow Island. The sand is trucked 600km north to Broome, loaded onto barges and then shipped back down to Barrow, south of Port Hedland. Broome was considered the most suitable port, due to the current level of activity in North West ports.

Initial arrangements were for a year and would, during the next 12 months, result in direct employment of about 16 people and other indirect work and services in Broome. Local contractors include Toll Mermaid Logistics, Agility Project Logistics Oilfield Transport Services, Offshore Marine Services Alliance and Broome Pest Control. – *North West Telegraph*, 21 March.



© Purple Communications

Broome Port.

Wheatstone gas deal sealed

Chevron signed a new-customer agreement for the Wheatstone LNG project with Japan's Chubu Electric Power. Under the terms of the non-binding agreement, Chevron and partners Apache and Kuwait's state-owned Kufpec will ship one million tonnes of LNG annually to Chubu for 20 years. – *The Australian*, 18 April . ■



Mining and petroleum investment opportunities abound

The increasing need for resources in the rapidly growing economies of Asia has placed Western Australia in the middle of a major investment cycle, led by the ongoing development of large mining and petroleum projects.

The current surge in investment is evident from recent Australian Bureau of Statistics (ABS) figures showing private new capital expenditure by the State's mining industry reached \$28.3 billion in 2010-11 – an increase of 29 per cent, or \$6.3 billion compared to 2009-10.

Western Australia attracted most of the mining capital expenditure in Australia, accounting for a 60 per cent share in 2010-11. During the same period, mining investment contributed 77 per cent of all business investment in Western Australia, which totalled \$36.9 billion.

Underpinned by the rapidly-expanding resources sector, total private new capital expenditure in Western Australia grew by almost 21 per cent in 2010-11.

This impressive record of investment growth is being driven by the need to develop mine sites and infrastructure to service increasing global demand for natural resources, particularly from China. The State is well placed to meet this demand, due to its resource endowment and proximity to Asia.

The State's medium to long-term outlook remains strong and in order to supply resources to Asian markets, Western Australia needs to undertake

large investment projects, particularly in the mining and construction industries.

Western Australia has a distinguished track record in the development of large, technically-advanced mineral and petroleum processing projects. Investment capital from all over the world has been drawn to the State, renowned for its world-class engineering, construction and project management capability (see story on pages 4-6).

Furthermore, the State Government actively encourages major private sector investment in resource projects and supporting infrastructure.

Western Australia's industrial growth is the result of an outwardly-focused business culture. Through a long history of exporting, Western Australian businesses know how to compete with the world's best, especially in the large, neighbouring Asian markets (See story on India, page 18-19).

Resource Projects

In September 2011, Western Australia had \$108 billion worth of resource projects under construction or in the committed stage of development. A further \$194 billion has been identified for planned or possible projects in coming years.

Projects under construction are led by the \$43 billion Gorgon LNG project and iron ore developments in the Pilbara and the Mid West. Major iron ore projects

include Hancock Prospecting's Roy Hill mine (\$6.7 billion), the Sino Iron Project (\$6.2 billion), BHP Billiton's Rapid Growth Project 5 (\$4.9 billion), Rio Tinto's Pilbara expansion (\$3.4 billion), Gindalbie Metals Karara Magnetite Project (\$2.6 billion) and Fortescue Metals Group's Solomon Hub Stage 1 Project (\$2.5 billion).

Other significant mineral projects under construction include Worsley Alumina's Refinery expansion (\$3 billion), Rio Tinto's Argyle Diamond Underground Development (\$1.6 billion) and Lynas Corporation's Mt Weld rare earths mine (\$570 million).

Projects in the committed category comprise the Tropicana Gold Joint Venture (\$740 million), and the Carbon Capture and Storage Project located in the south west (\$300 million).

The largest planned project is the \$30 billion Browse LNG Precinct. Woodside is the operator of the Browse Joint Venture which also includes BHP Billiton, BP, Chevron and Shell. The joint venture participants are expected to make a final investment decision in early to mid-2013.

The State's resources industry performed extremely well in 2010-11, recording a record \$101.2 billion – an increase of 39 per cent on the previous year's figure and the first time resources sales exceeded \$100 billion. ■

Success for Harvey drilling program

A highly successful drilling program for Western Australia's first on-shore carbon capture and storage (CCS) project has finished and the results are now being analysed.

The Harvey 1 well set a record as the deepest hole ever drilled by the Geological Survey of Western Australia (GSWA), reaching 2945 metres.

The drilling was part of the South West Hub CCS project.

Department of Mines and Petroleum (DMP) Coordinator Carbon Strategy Dominique Van Gent said preliminary results indicated more than 95 per cent of the objectives of drilling the hole were reached.

"More than 300 metres of core was collected and will undergo a comprehensive testing program," Mr Van Gent said.

"A number of continuous measurements were also obtained down the hole to gather information on the properties of the sedimentary rocks, such as density and their potential to store CO²."

Further testing, including a 3D seismic survey, will be carried out later this year.

Mr Van Gent said the drill rig had left the site, the well had been plugged and rehabilitation work was being conducted.

"The data will be analysed over a six-month period by a team of specialist scientists and engineers," he said.

Expert analysis of the data will be carried out by GSWA, Commonwealth Scientific and Industrial Research Organisation (CSIRO), University of Western Australia, Curtin University and private sector companies.

"The coring and wireline logging program was one of the most sophisticated ever run in the State and will provide much-needed data for the South West Hub CCS project, as well as a better understanding of the geology of the southern Perth Basin," Mr Van Gent said.

The Harvey 1 well was funded by the State and Federal Governments, and the Royalties for Regions Program. ■



The Century Rig 7 at Harvey 1 Well.



Drilling at the site in Harvey set a record for the deepest hole ever drilled by GSWA.

Western Australian Industry and Export Awards



2012

- Western Australian Distinction
- National Recognition
- International Success

The Western Australian Industry and Export Awards are the State's most prestigious business awards – acknowledging the efforts of small and large businesses. Nominations for the Awards are now open.

The Awards are open to a wide range of organisations; from small developing firms to large established corporations; from manufacturing and engineering companies through to consultancies and service providers in a wide range of industries; from exporters to firms with solely local markets in 14 Award categories comprising:

Industry Awards

- C.Y.O'Connor Award for Excellence in Engineering and Technology
- Marketing and Design Excellence Award
- Innovation Excellence Award

Export Awards

- Emerging Exporter Award
- Small Business Export Award
- Small to Medium Manufacturer Export Award
- Large Advanced Manufacturer Export Award
- Agribusiness Export Award
- Information and Communication Technology Export Award
- Minerals and Energy Export Award
- Service Export Award
- Education and Training Export Award
- Arts and Entertainment Export Award
- Regional Exporter Award

Closing date for nominations is Friday 20 July 2012

For more information contact June Phillips at the Department of Commerce on **9263 8278** or email industryexportawards@commerce.wa.gov.au. To download an application kit visit www.commerce.wa.gov.au/industryexportawards.



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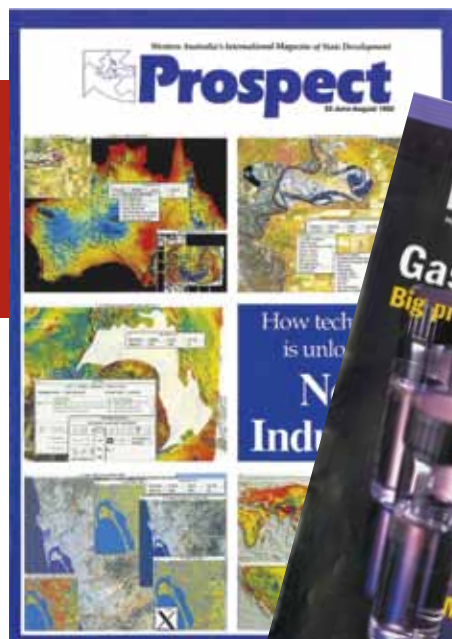
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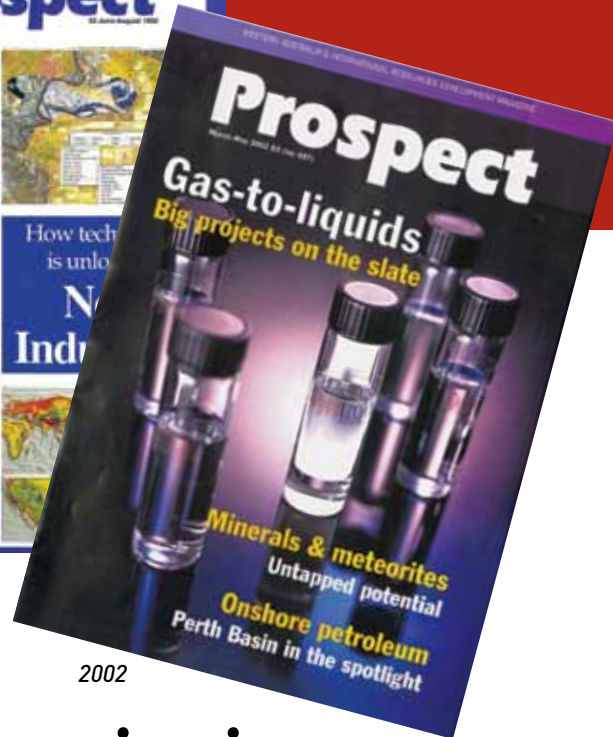
**The West
Australian**



Flashback



1992



2002

1982: Power the main issue

The more things change, the more they stay the same.

That could have been the theme for the second *Prospect* for 1982, as the then Minister for Resources Development, Peter Jones, wrote about the major issues facing Western Australia in the 1980s: "...the increasing availability of domestic sources of power".

Energy needs were addressed in detail, with a rundown of major projects across Western Australia.

The State Government was undertaking a major promotion to expand and diversify WA's manufacturing section, with presentations held in Sydney and Melbourne early that year.

Our proximity to Asia was one of the main advantages, said the Minister at the time.

Hammersley Iron introduced a home ownership program for its employees in Dampier, Karratha, Tom Price and Paraburdoo, with an initial release of 400 houses to anyone over 18.

It was part of what was called a 'normalisation process'.

The Federal Government announced changes to the guidelines covering overseas investment, with the then treasurer John Howard.

Western Australia's mineral production reached a 'record level' of \$2.69 billion for 1981, despite an 'uncertain' market. The

magazine concluded that there were 'handsome rewards' on offer from exploration.

1992: A mixed bag

Urban renewal was taking shape in the transformation of a 40km stretch of land at Coogee. The Coogee Special Industrial Area, once a collection of century-old animal processing companies, was set to become the Coogee Biotechnology Park.

Innovation was all around, with construction of a \$5.6 million laboratory being built to position Perth as the national centre for remote sensing.

The WA Remote Sensing Industry Development and Education Centre was the first of its kind in Australia and drew together experts on satellite imagery and aerial scanning.

Research was also being undertaken into airborne magnetic survey methods and into extraction of metals from ores using solutions. Curtin University's Technology Park was in the proposal stages.

Prospect reported: "The death of Lang Hancock will not end the family's quest for even greater success for the Pilbara iron ore industry." Back then the focus on iron ore sales was to Europe.

Across the Atlantic, the US (then WA's second largest export market) was entering a 'recovery phase', with the State expecting an upturn in US investment.

WA's exports reached \$13.7 billion. Our foreign trade surplus was \$10.3 billion and gave us, on a per capita basis, a higher rank than Japan or Taiwan. And it was in Asia where the Minister for State Development, Ian Taylor, said our future lay.

2002: It's a gas

Developments in the Northwest highlighted how gas was starting to shape the future, with the region's 'enormous potential', particularly in gas-to-liquids, other petrochemicals and LNG production near the Burrup Peninsula and Karratha being featured.

Australia's first gas-to-liquids conference was to be held in Perth. The forum brought together more than 100 delegates from around the world, with the theme being 'assessing viability, economics and strategy' for GT developments.

The Federal Government had also set up at GTL taskforce to provide advice on a policy framework to better enable the nation to compete for international investment in major gas-processing projects.

Australia LNG was in the final stages of being named as the first supplier of Liquid Natural Gas to China, with Indonesia and Qatar also on the shortlist. ■

AGRICULTURE

East Kimberley - Ord - Ord/East Kimberley Expansion Project

WA STATE GOVERNMENT

The State Government has committed \$301 million to increase the existing amount of irrigated land in the Kununurra region by adding 15,200 hectares in the Weaber Plains. This funding will provide the construction of irrigation channels, roads and off-farm infrastructure to service the future needs of the region's growing population and sustain economic growth. The Commonwealth Government has committed \$195 million of funding for social and common-use infrastructure in the East Kimberley region. Construction is well underway and some of the infrastructure projects are now complete. The package will be fully implemented by June 2013.

Expenditure: \$506m.

Employment: Construction: 761

BAUXITE

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

BHP BILLITON WORSLEY ALUMINA PTY LTD

BHP Billiton announced in May 2008 the go-ahead for the Efficiency and Growth expansion project at its Worsley alumina refinery. The expansion project will lift capacity of the refinery from 3.5 to 4.6Mtpa through expanded mining operations, additional refining capacity and upgraded port facilities. First production for the expansion project at the refinery was achieved in Q1 2012. The \$US3.4 billion project is 98 per cent complete and the ramp up phase is now underway.

Expenditure: \$3.4b.

Employment: Construction: 1500; Operation: 200

INFRASTRUCTURE

South West Region - 17 kilometres north east of Bunbury - Kemerton (HUILS - Heavy Use Industrial Land Strategy)

WA STATE GOVERNMENT

Kemerton Industrial Park, located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, 90 minutes away by road. The estate comprises 7,543 ha of land, including 2,019 ha of industrial core, 293 ha support industry area and 5,231 ha a buffer areas. It is accessible to the Port of Bunbury by road and planned rail link and is serviced by major road links to the metropolitan area. Under the Heavy Use Industrial Land Strategy, the government is progressing Kemerton towards project ready status by undertaking environmental, heritage and planning approvals for the estate. Work towards progressing approvals commenced in 2009 and is anticipated to be completed in 2012/13, by which time the structure plan and zoning adjustments will also have been completed.

IRON ORE

Mid West Region - Extension Hill Hematite Mine MOUNT GIBSON IRON LIMITED

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

Expenditure: \$73m.

Employment: Construction: 150; Operation: 100

Pilbara - FMG Chichester - Iron Ore Mine, Rail and Port Development

FORTESCUE METALS GROUP LTD

Fortescue Metals Group (FMG) operates iron ore mines at Cloudbreak and Christmas Creek in the Chichester Ranges of the eastern Pilbara, serviced by a multi-user railway and port facilities at Port Hedland. FMG reports a 2 billion tonne iron ore resource estimate for its Nyidinghu deposit, which it proposes to include in its Chichester operations. FMG is currently increasing production to 95Mtpa from the Chichester Ranges, with an additional 60 Mtpa from its Solomon project, to a proposed export capacity of 155 Mtpa from its Port Hedland port facilities by June 2013. FMG export capacity is currently approved at 120Mtpa.

Expenditure: \$8.4b.

Employment: Construction: 1400; Operation: 6800

LITHIUM

Great Southern Region - Mount Cattlin Lithium Project, Ravensthorpe

GALAXY RESOURCES LIMITED

Galaxy Resources Limited commenced commissioning of the Mt Cattlin lithium concentrate processing plant in September 2010. The mine and processing plant is now at full capacity and will produce approx. 137,000tpa of spodumene concentrate for export to China. Preparation of a mining proposal for the Stage 2 mining area including a community consultation programme has commenced. Galaxy started exporting its product to China in the first quarter of 2011. In China, Galaxy will produce 17,000tpa of battery grade lithium carbonate at its Jiangsu chemicals plant. A large proportion of this will make its way into the growing markets of China and Japan.

Expenditure: \$75m.

Employment: Construction: 100; Operation: 100

NICKEL

Ravensthorpe - Ravensthorpe Nickel Operation

FIRST QUANTUM MINERALS AUSTRALIA NICKEL PTY LTD

FQM Australia Nickel (FQMAN) acquired the Ravensthorpe Nickel Operation (RNO) from BHP Billiton in February 2010. After 18 months of modifications and re-commissioning, FQMAN achieved commercial production in December 2011. RNO is an open cut mine and hydrometallurgical process plant that produces a mixed nickel cobalt hydroxide intermediate product. FQMAN aims to produce 39,000tpa nickel metal for the first five years after recommencement and 28,000tpa nickel metal over the current anticipated mine life of 32 years.

Expenditure: \$300m.

Employment: Construction: 200; Operation: 480

AMMONIUM NITRATE

Kwinana - Ammonium Nitrate Facility Expansion CSBP LIMITED

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

is underway, with current project timelines indicating that the expansion will be completed in the first half of 2014.

Expenditure: \$550m.

Employment: Construction: 300; Operation: 10

HEAVY MINERAL SANDS

Keysbrook - Heavy Mineral Sands Mine

MATILDA ZIRCON LIMITED

Matilda Zircon is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. It has ore reserves of 41Mt, containing 1.2Mt of heavy mineral concentrate. The project is expected to produce 80,000tpa of leucoxene products and 12,000tpa of zircon over its eight year mine life. In October 2009, the Keysbrook project received environmental approval from the Minister for Environment. In October 2011, Matilda Zircon announced that the Shires of Murray and Serpentine-Jarrahdale approved the project subject to conditions, most of which had already been mutually agreed with the company. The Shire approvals now allow Matilda Zircon to complete detailed planning and engineering to enable construction to start in 2012, with first production planned for early 2013.

Expenditure: \$50m.

Employment: Construction: 35; Operation: 30

INFRASTRUCTURE

Pilbara - Ashburton North Strategic Industrial Area

WA STATE GOVERNMENT

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

IRON ORE

Mid West Region - Karara Iron Ore

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

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

Expenditure: \$1.975b.

Employment: Construction: 1500; Operation: 500

Pilbara - BHPB - Inner Harbour Expansion - Port Hedland

BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220 million tonnes per annum. The investment includes US\$1.9 billion (BHP Billiton's share) to increase total inner harbour installed capacity to 220Mtpa with debottlenecking opportunities to 240Mtpa. The project is currently on schedule (overall project is 49 per cent complete) and on budget.

Expenditure: \$2.3b.

Pilbara - BHPB - Port Blending and Rail Yard Facilities

BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.7 billion (BHP Billiton's share US\$1.4 billion) to optimise resource and enhance efficiency across the BHP Billiton WA iron ore operation supply chain. The project is currently on schedule (overall project is 16 per cent complete) and on budget.

Expenditure: \$1.7b.

Pilbara - Hope Downs 4 Iron Ore Mine

RIO TINTO IRON ORE

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

Expenditure: \$1.6b.

Employment: Construction: 2100; Operation: 720

Pilbara - Jimblebar Iron Ore Mine Expansion

BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220 million tonnes per annum. The investment includes US\$3.4 billion (BHP Billiton's share US\$3.3 billion) to increase installed mining and processing capacity at Jimblebar mine to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The project is currently on schedule (overall project is 27 per cent complete) and on budget.

Expenditure: \$3.4b.

Pilbara - Solomon - Pilbara - Solomon Hub Stage 1

FORTESCUE METALS GROUP LTD

Fortescue is progressing with construction of its proposed 60Mtpa iron ore mine at Solomon and supporting infrastructure. The Solomon Hub is planned to initially involve at least two mining

areas, two processing plants and a 137 kilometre rail link to Fortescue's existing Christmas Creek to Port Hedland rail line. First production is anticipated by early 2013.

Expenditure: \$4b.

Employment: Construction: 2000; Operation: 1200

Yilgarn - Koolyanobbing Iron Ore Upgrade

CLIFFS ASIA PACIFIC IRON ORE PTY LTD

In September 2010, Cliffs approved an upgrade of its Koolyanobbing iron ore operations from 8.5Mtpa to around 11Mtpa. Koolyanobbing is located 50km north east of Southern Cross and also includes the Mt Jackson and Windarling mines. The improvements consist of enhancements to the existing Kalgoorlie-Esperance rail infrastructure, an increase in rolling stock and upgrades to various other existing operational constraints. These improvements are well underway and are expected to be fully implemented in the second half of 2012. The development of the Mt Jackson J1 deposit, which contains 30Mt of iron ore reserves, was completed in Q1 2012 and will contribute to the increased production at Koolyanobbing.

Expenditure: \$320m.

IRON ORE PROCESSING

Pilbara - Cape Preston - Sino Iron

CITIC PACIFIC

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

Expenditure: \$5.2b.

Employment: Construction: 4000; Operation: 500

OIL & GAS DEVELOPMENTS

Carnarvon Basin - Pluto LNG Project

WOODSIDE ENERGY

Approved for development in July 2007, the project will process gas from the Pluto and Xena gas fields, located about 190km north-west of Karratha in Western Australia, into LNG and condensate. The Pluto and Xena gas fields are estimated to contain 5 trillion cubic feet (Tcf) of dry gas reserves and an additional 0.2 Tcf of contingent resources. The initial phase of the project comprises five subsea wells on the Pluto gas field connected to an offshore processing platform in 85m of water. Gas will be piped about 180km to the onshore plant via a 36-inch pipeline. Onshore facilities at the Pluto LNG Park include a single LNG processing train with forecast production capacity of 4.3Mtpa, in addition to storage facilities and an export jetty. Pluto produced its first LNG delivery during Q2 2012.

Expenditure: \$14.9b.

Employment: Construction: 5000; Operation: 300

Carnarvon Offshore Basin - Barrow Island - Gorgon Project

GORGON JOINT VENTURE

The Gorgon Joint Venture (GJV) made a final investment decision on the \$43 billion Gorgon Project on 14 September 2009. The GJV's foundation project on Barrow Island includes a three train LNG development capable of exporting 15Mtpa and a domestic gas project capable of delivering at least 300 terajoules per day of gas to the mainland. The development on Barrow Island also includes potentially the largest commercial geosequestration project in the world. The project obtained State and Commonwealth environmental approval in August 2009.

The project is based on gas from both the offshore Gorgon and Jansz/lo gas fields. On-island activity commenced in late 2009 and the major construction work for the processing plant commenced in 2011.

Expenditure: \$43b.

Employment: Construction: 5500; Operation: 300

Carnarvon Offshore Basin - North Rankin - North Rankin Redevelopment

WOODSIDE ENERGY

In March 2008 the North West Shelf Project approved funding for the North Rankin Redevelopment Project which will access additional recoverable reserves by recovering remaining low pressure gas from the North Rankin and Perseus gas fields, and extend the field life to around 2040. The project involves the installation of a second platform North Rankin B which will be connected by two 100 metre bridges to the existing North Rankin A platform. North Rankin B is scheduled for start-up in 2013 and on completion both platforms will be operated as a single integrated facility known as the North Rankin hub. The redevelopment scope also includes the necessary tie-ins and refurbishment of the North Rankin A platform.

Expenditure: \$5b.

Pilbara - Macedon Domestic Gas Project

BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

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

Expenditure: \$1.5b.

Employment: Construction: 330; Operation: 8

Pilbara - Wheatstone LNG Development

CHEVRON AUSTRALIA PTY LTD

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

Expenditure: \$29b.

Employment: Construction: 5500; Operation: 400

RARE EARTHS

Mt Weld - Rare Earths Mine
LYNAS CORPORATION LTD

The Mt Weld deposit is located about 35km south of Laverton and contains an estimated resource of 23.9Mt at an average grade of 7.9 per cent for 1.9Mt rare earth oxides (REO). The development includes an open pit mine and a concentration plant, located 1.5km from the open pit mine. The first feed of ore into the 33,000tpa concentration plant occurred in May 2011 and the plant was officially opened in August 2011. The concentrate will be bagged and containerised on site, and trucked to the Port of Fremantle for export. It will be shipped to a \$500 million processing plant in Malaysia, which will have an initial production capacity of 11,000tpa REO scheduled to commence in Q2 2012 subject to Malaysian government approvals. Phase 2, which involves the expansion of the Mt Weld concentration plant to produce around 66,000tpa of concentrate, is underway and will meet the Malaysian processing plant's planned expanded production of 22,000tpa REO. Lynas expects all construction works associated with the Phase 2 production expansion in both Western Australia and Malaysia to be largely completed in 2012 and production output to ramp up to the targeted 22,000tpa of REO in 2013.

Expenditure: \$135m.

Employment: Construction: 145; Operation: 95

SILICON METAL

Kemerton - Silicon Metal Plant Expansion
SIMCOA OPERATIONS PTY LTD

Simcoa announced in October 2009 its decision to expand the company's 32,000tpa capacity silicon metal plant at Kemerton. The first stage expansion, involving installation of a third furnace, will increase the plant capacity to 48,000tpa and is expected to come online in Q2 2012. Providing world demand for silicon continues to increase strongly, a second stage expansion, involving installation of a fourth furnace could take place by late 2013 and increase plant capacity to 64,000tpa.

Expenditure: \$100m.

Employment: Construction: 120; Operation: 40

AMMONIA/UREA

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

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

Expenditure: \$3.8b.

Employment: Construction: 2000; Operation: 200

AMMONIUM NITRATE

Pilbara - Burrup Industrial Estate Site D - Burrup Nitrates
YARRA INTERNATIONAL ASA

A heads of agreement has been signed between Yara, Orica and Apache to form a joint venture - Burrup Nitrates Pty Ltd (BNPL). BNPL has conducted a feasibility study into the construction of a 350,000tpa Technical Ammonium Nitrate (TAN) plant to be located on the Burrup Peninsula. Ammonia feedstock will be supplied from Yara Pilbara Fertilisers Pty Ltd (YFPFL), which operates its facility directly adjacent to the proposed location for the new TAN plant. Yara

Pilbara will be the operator of the TAN plant and Orica will manage the product sales and distribution. Final agreement between the joint venture partners is subject to concluding negotiations on the contract for the engineering, procurement and construction of the new plant and Board approvals. Yara and Orica will each have a 45 per cent interest in the joint venture and Apache the remaining 10 per cent. It is expected that all manufactured product will be sold into the Pilbara region. Regulatory approvals have been finalised and the company is aiming for operations to commence by Q4 2014.

Expenditure: \$600m.

Employment: Construction: 600; Operation: 65

GOLD

Kalgoortie (330kms North East) - Tropicana Gold
ANGLOGOLD ASHANTI/INDEPENDENCE GROUP JOINT VENTURE

AngloGold Ashanti, as Joint Venture Manager, has undertaken an intensive exploration and resource development program approximately 330kms north east of Kalgoortie. Plans for the project are to develop an open-cut gold mine and nearby processing plant. So far, a resource estimate of 5million oz of gold has been identified with a mine life of at least 10 years. The feasibility study commenced in July 2009 and is ongoing. Environmental approvals were finalised in September 2010. Commonwealth environmental approval was received on 13 December 2010. The first phase of construction, 220km of road, an all-weather airstrip and the accommodation village is now complete. The second phase involving plant construction will begin in early 2012. Gold production is planned for 2013.

Expenditure: \$700m.

Employment: Construction: 700; Operation: 400

HEAVY MINERAL SANDS

Happy Valley - Heavy Mineral Sands Mine
BEMAX RESOURCES LTD

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

Expenditure: \$35m.

Employment: Construction: 100; Operation: 30

Shark Bay - Coburn Zircon Project
GUNSON RESOURCES LIMITED

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

Expenditure: \$180m.

Employment: Construction: 170; Operation: 110

INFRASTRUCTURE

Dampier Peninsula - Browse LNG Precinct
WA STATE GOVERNMENT

The State Government is developing the Browse Liquefied Natural Gas (LNG) Precinct approximately 60km north of Broome. By focussing development at a suitable location the Precinct will minimise the environmental footprint of gas processing and any social impacts in the region, while maximising opportunities for the local community to benefit from the development of the Browse Basin gas fields. On 30 June 2011, agreements were reached with the Goolarabooloo Jabirr Jabirr native title claimant group to secure land for the Precinct. These agreements, valued at more than \$1.5 billion over 30 years, contribute a range of benefits for Indigenous communities throughout the Kimberley region, while providing a strong governance role for the Traditional Owners of the land upon which the Precinct will be established. Benefits will be further expanded when additional LNG proponents commit to development in the Precinct. The Precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. Woodside Energy Limited, as the operator of the Browse Joint Venture, has committed to the Precinct as a potential foundation proponent. Browse Joint Venture participants are expected to make a final investment decision by mid-2013.

Expenditure: \$30b.

Employment: Construction: 6000; Operation: 400

Oakajee - Oakajee Midwest Development
WA STATE GOVERNMENT

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

Expenditure: \$4b.

Employment: Construction: 2000; Operation: 300

Pilbara - Anketell - Anketell Port and SIA (Strategic Industrial Area)
WA STATE GOVERNMENT

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

IRON ORE

Great Southern Region - Southdown Magnetite Mine GRANGE RESOURCES LTD

The Southdown Magnetite deposit is situated 90km north east of Albany, near Wellstead. Southdown is an advanced development project. Work completed includes engineering feasibility studies, an extensive drilling program, land acquisition and most major approvals. Results of the Definitive Feasibility Study will be announced in Q2 2012. The Final Investment Decision, pending favourable market conditions, is expected in the second half of 2012. Production from Southdown is targeted to commence in 2015. Southdown has a resource of more than 1.2 billion tonnes, potentially supporting a mine life of 40 years producing 10Mtpa of magnetite.

Expenditure: \$2.57b.

Employment: Construction: 2000; Operation: 600

Mid West Region - Extension Hill Magnetite Mine ASIA IRON

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

Expenditure: \$2b.

Employment: Construction: 1000; Operation: 350

MID WEST REGION - JACK HILLS EXPANSION CROSSLANDS RESOURCES

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

Expenditure: \$2b.

Employment: Construction: 450; Operation: 350

Pilbara - Cape Lambert Iron Ore Project MCC AUSTRALIA SANJIN MINING PTY LTD

MCC Australia Sanjin Mining Pty Ltd is developing a 15Mtpa magnetite iron ore mine in the Pilbara and aims to ship its first ore in 2015 via the proposed multi-user 350Mtpa port at Anketell. The Project comprises a proven JORC compliant 1.9bt iron ore resource, a beneficiation plant, power plant, desalination plant, port facilities for exporting concentrate and other related infrastructure. MCC has completed feasibility studies for the port, power supply, water supply, accommodation and general site infrastructure. The mine and processing studies are progressing. The company commenced native title negotiations with the Ngarluma Aboriginal Corporation in March 2010 and a preliminary native title agreement was signed on 17 May 2011. An environmental scoping document was approved by the EPA in August 2011.

Expenditure: \$3.7b.

Employment: Construction: 3000; Operation: 1000

Pilbara - FMG Central Pilbara Project (Solomon Stage 2 and Western Hub) FORTESCUE METALS GROUP LTD

FMG's Central Pilbara project is located in the Solomon Stage 2 area (about 70km north of Tom Price) and the Western Hub (west of Solomon) in the Pilbara. FMG reports that to date, Solomon Stage 2 has identified resources of 1.1 billion tonnes, with a target of 2 billion tonnes, comprising channel iron, bedded Brockman and detritals iron deposits.

Expenditure: \$7b.

Employment: Construction: 4800; Operation: 2650

Pilbara - Outer Harbour Development, Port Hedland

BHP BILLITON IRON ORE PTY LTD

The proposed Outer Harbour Development, an iron ore export facility at Port Hedland, will include a four-kilometre jetty, eight-berth wharf, stockyards, rail loop and associated facilities. BHP Billiton Iron Ore's investment in the proposed Outer Harbour Development remains subject to market conditions, the receipt of all required government approvals and BHP Billiton Board approval.

Pilbara - Roy Hill Iron Ore Mine & Infrastructure HANCOCK PROSPECTING PTY LTD

Hancock Prospecting and key strategic investment partners are developing the Roy Hill iron ore project located 105km north east of Newman.

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

Expenditure: \$7b.

Employment: Construction: 3600; Operation: 2000

Pilbara - West Pilbara Iron Ore Project API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 30Mtpa of direct shipping iron ore from its Red Hill and Mt Stuart mine sites located 35-80km south west of Pannawonica. The ore will be transported by a new heavy haul railway for export via the proposed multi-user 350Mtpa port at Anketell. Subject to the successful completion of feasibility and environmental studies, and receipt of government regulatory approvals, the company anticipates that the first shipment of ore will occur in 2014/2015. Environmental approval for the mine and rail elements of the project were received in December 2011. The EPA is expected to finalise its assessment of the Anketell Port proposal in Q2 2012.

Expenditure: \$6b.

Employment: Construction: 3500; Operation: 1000

Pilbara - 120km northwest of Newman - Mining Area C - Iron Ore Mine BHP BILLITON IRON ORE PTY LTD

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

Yilgarn - Deception Iron Ore Deposit CLIFFS ASIA PACIFIC IRON ORE PTY LTD

Cliffs is proposing to develop an open-cut iron ore mine at the Deception Deposit, located approximately 150km north of Southern Cross. The new mine will be integrated into Cliffs existing iron ore operations at Koolyanobbing. The Deception Deposit contains an estimated 9Mt of iron ore and is expected to have a mine life of around eight years.

Expenditure: \$35m.

OIL & GAS DEVELOPMENTS

Carnarvon Basin - Pluto Project Expansion WOODSIDE ENERGY

The Pluto LNG Park provides the opportunity to consider both equity gas development and third party gas supply at the site. The foundation project investment in support infrastructure enables a significantly lower cost and de-risked expansion opportunity. As a brownfield development Pluto expansion will require a much smaller construction workforce compared to a greenfield development. Discussions continue with third parties regarding the potential to process Carnarvon Basin gas through additional trains at Pluto.

TIMBER

Mirambeena Timber Processing Precinct - Engineered Strand Lumber LIGNOR LTD

Lignor proposes to develop an Engineered Strand Lumber ESL®/ Engineered Strand Board ESB® plant located at Mirambeena, about 15km north west of Albany. The first stage Commercial Plant will be smaller than the second stage Commercial Plant in order to produce a range of products for certification to the Australian Building Code and overseas equivalents. The plants will source most of the timber from the extensive eucalypt plantations in the Albany region. Lignor is finalising its design of the first stage plant and anticipates construction to commence by Q4 2012, with product coming into the market by Q1 2014. Following successful results from the first stage commercial plant, construction of the second stage commercial plant is expected to commence by mid-2016.

Expenditure: \$273m.

Employment: Construction: 380; Operation: 125

URANIUM

Northern Goldfields - Yeelirrie - Yeelirrie Uranium

BHP BILLITON YEELIRRIE DEVELOPMENT COMPANY PTY LTD

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

Employment: Construction: 700; Operation: 300

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Significant resource projects in Western Australia

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

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

	Project Value	Employment	
	(estimated A\$m)	Construction	Permanent
Alumina			
BHP Billiton Worsley Alumina – Refinery Expansion	3400	1500	200
Sub Total	3400	1500	200
Iron and Steel			
Asia Iron – Extension Hill Magnetite Mine	2000	1000	350
Australian Premium Iron Joint Venture – Iron Ore Mine	6000	3500	1000
BHP Billiton Iron Ore – Inner Harbour Expansion	2300	n/a	n/a
BHP Billiton Iron Ore – Jimblebar Mine Expansion	3400	n/a	n/a
BHP Billiton Iron Ore – Outer Harbour Development, Port Hedland	n/a	n/a	n/a
BHP Billiton Iron Ore – Port Blending and Rail Yard Facilities	1700	n/a	n/a
CITIC Pacific – Cape Preston Mine & Processing Projects	5200	4000	500
Cliffs Asia Pacific Iron Ore – Koolyanobbing Iron Ore Upgrade	320	n/a	n/a
Crosslands Resources – Jack Hills Stage 2 Hematite Mine	2000	450	350
Fortescue Metals Group – Central Pilbara Project (Solomon Stage 2 and Western Hub)	7000	4800	2650
Fortescue Metals Group – Mine, Rail and Port Project	8400	3300	6800
Fortescue Metals Group – Solomon Project	4000	3000	1200
Grange Resources – Southdown Magnetite Mine	2570	2000	600
Hancock Prospecting – Iron Ore Mine – Roy Hill	7000	3600	2000
Karara Iron Ore Project	1975	1500	500
MCC – Cape Lambert Iron Ore Project	3700	3000	1000
Rio Tinto Iron Ore – Hope Downs 4 Iron Ore Mine	1600	2100	720
Sub Total	59165	32250	17670
Lithium			
	75	100	100
Sub Total	75	100	100
Nickel/Cobalt			
Ravensthorpe Nickel Operation	300	200	480
Sub Total	300	200	480
Oil, Gas and Condensate			
BHP Billiton – Macedon	1500	330	8
Browse LNG Precinct	30000	6000	400
Chevron – Wheatstone LNG	29000	5500	400
Gorgon Joint Venture Gas Processing Project	43000	5500	300
North Rankin Redevelopment	5000	n/a	n/a
Woodside – Pluto LNG Plant	14900	5000	300
Sub Total	123400	22330	1408
Other			
AngloGold Ashanti/Independence Group – Tropicana Gold Project	700	700	400
Ashburton North Strategic Industrial Area	n/a	n/a	n/a
BHP Billiton – Yeelirrie Uranium	n/a	700	300
Burrup Nitrates	600	600	65
CSBP – Kwinana Ammonium Nitrate Facility Expansion	550	300	10
Lignor Ltd – Mirambeena – Engineered Strand Lumber	273	380	125
Oakajee Port, Rail and Industrial Estate	4000	2000	300
Ord East Kimberley Expansion Project	506	761	n/a
Perdaman Chemicals & Fertilisers – Coal-to-Urea Plant	3800	2000	200
Sub Total	10429	7441	1400
TOTAL	196769	63821	21258

Major Resource Projects — June 2012

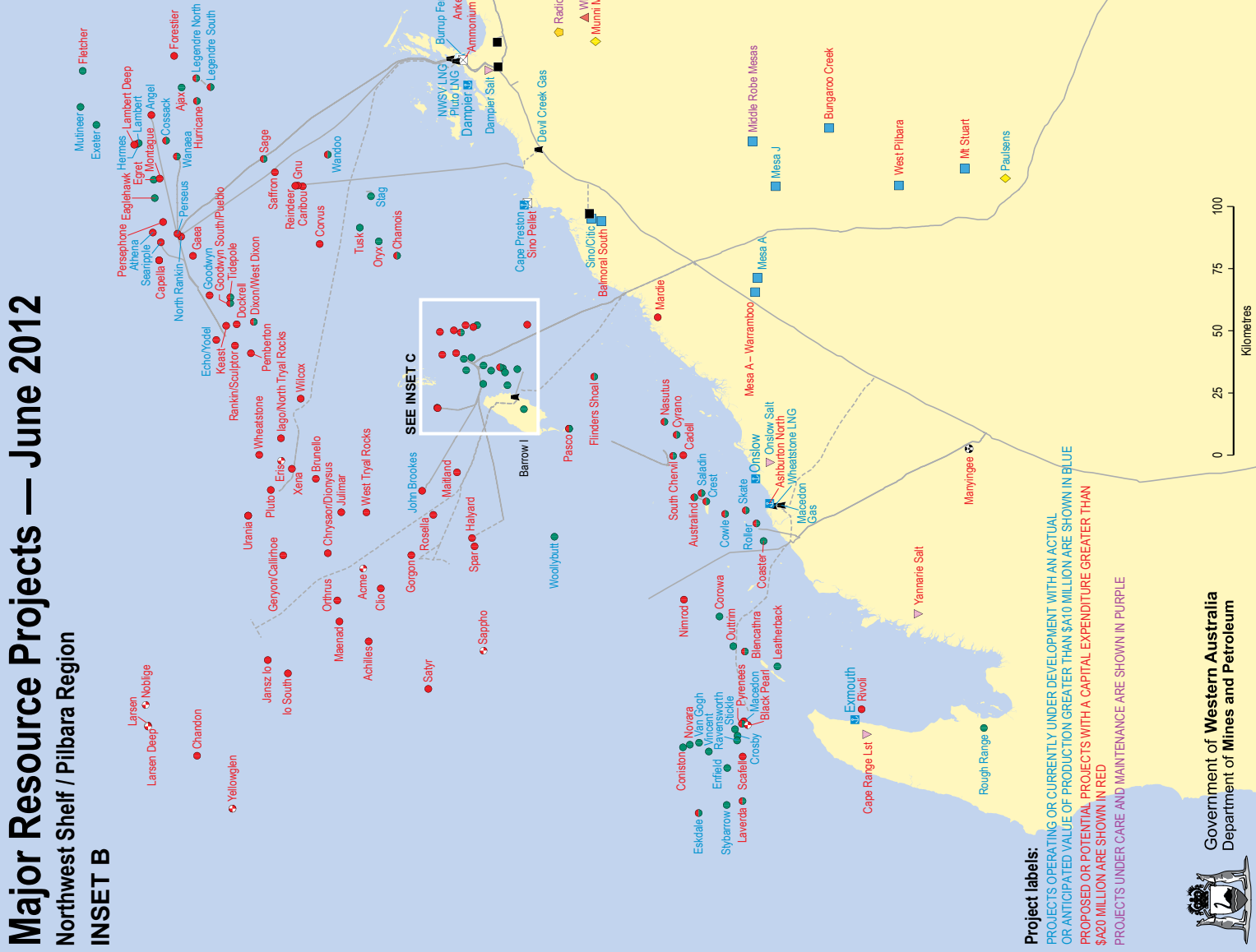
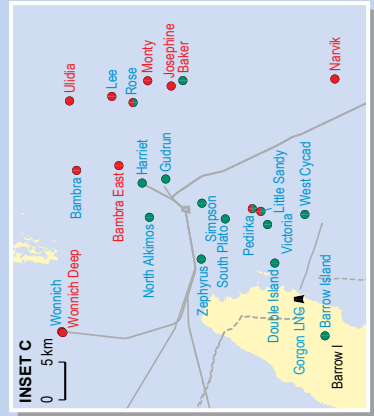
Northwest Shelf / Pilbara Region

INSET B

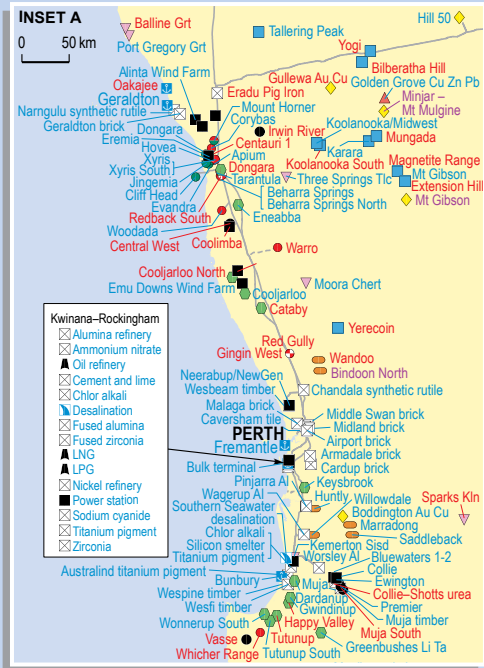
- COMMODITIES**
- Au..... Gold
 - Cr..... Chromium
 - Cu..... Copper
 - Fe..... Iron
 - LNG..... Liquefied natural gas
 - Lst..... Limestone
 - Mo..... Molybdenum
 - Ni..... Nickel
 - Pb..... Lead
 - Pd..... Palladium
 - Pl..... Platinum
 - Ta..... Tantalum
 - Ti..... Titanium
 - V..... Vanadium
 - Zn..... Zinc
 - Zr..... Zirconium

- PETROLEUM SYMBOLS**
- Gas field
 - Oil field
 - Oil and gas field
 - Significant gas discovery
 - Processing plant
 - Oil / gas pipeline, operating
 - Oil / gas pipeline, proposed
- INFRASTRUCTURE**
- Power plant
 - Processing plant
 - Irrigation / water / desalination
 - Port

- MINERAL SYMBOLS**
- Precious metal
 - Al (or as shown)
 - Steel alloy metal
 - Ni (or as shown)
 - Specialty metal
 - Ti-Zr (or as shown)
 - Base metal
 - Iron
 - Uranium
 - Industrial mineral



Major Resource Projects — June 2012



Project labels:

PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$A10 MILLION ARE SHOWN IN BLUE

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

PROJECTS UNDER CARE AND MAINTENANCE ARE SHOWN IN PURPLE

