

PROSPECT

Balancing act

Special eight-page report:
2013 exciting for WA



In this first edition of *Prospect* for the year I want to thank West Australians for giving my government another four years. I am excited at the future growth that lies ahead for the Western Australian resources industry.

This issue of *Prospect* delves into our future prosperity in great detail. Two studies, produced by the Committee for Perth, University of Western Australia and WA Chamber of Minerals and Energy, outline the way our State is changing and how we can position ourselves for the future.

The resources sector will continue to drive the economy and we will be looking at ways to build on the already strong foundations in place.

The latest election also marked the retirement of long-serving Minister for Mines and Petroleum Norman Moore. Norman's contribution to the State is recorded in this magazine, but I'd like to add my personal gratitude for his outstanding performance across all portfolios, particularly mines and petroleum.

I'd also like to welcome the new Mines and Petroleum Minister, Bill Marmion, who has been a Member of Parliament since 2008. Bill has served in various Parliamentary Secretary and Ministerial positions, the most recent being as Minister for the Environment and Minister for Water.

I look forward to working with Bill to support the long-term growth of this State's prosperous resource industry, as many major projects come online.

Colin Barnett
PREMIER OF WESTERN AUSTRALIA & MINISTER FOR STATE DEVELOPMENT

Bill Marmion
MINISTER FOR MINES AND PETROLEUM

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Prospect

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Cover photo: A technician conducts maintenance on a WA oil rig. There are more than 73 overseas companies operating oil and gas fields in Western Australia, highlighting the growing attraction of WA as a resources investment destination.

Photo: Vertech
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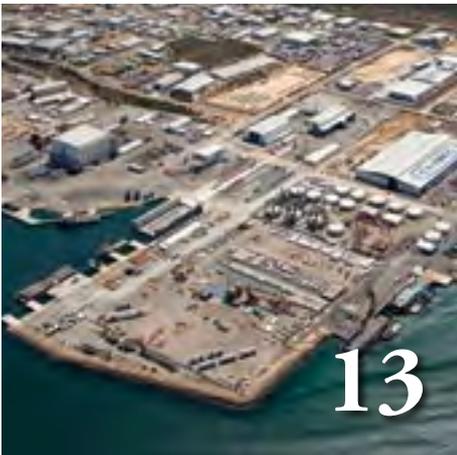
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Two Western Australian companies are providing innovative solutions to the global metalliferous mine market, in mine safety and training.



Fast resources approvals the 'norm' in WA

Recent statistics show the Department of Mines and Petroleum (DMP) continued to accelerate approval processing times for the WA resources industry in 2012.

The department finalised 82 per cent of its 7,048 mining, petroleum and geothermal applications within the targeted timeframes.

DMP Director General Richard Sellers said this was achieved on the back of stellar results during the past four years.

"We're not only celebrating the fact that 2012 was a hugely productive year, we are also pleased that the average WA mine was approved in a 28-month time period over the past four years," he said.

Mr Sellers said he was particularly pleased the department continued its stellar turnaround times in the fourth quarter of 2012.

"The department received 1,025 mineral tenure applications from October to

December last year, which was a 21 per cent increase in the number of applications received during the previous quarter," he said.

"Even so, 98 per cent of Exploration Licence applications were completed within the set target of 65 business days."

In addition, in the fourth quarter DMP processed 89 per cent of its 472 Programme of Work (PoW) applications and 96 per cent of its 78 Mining Proposals within the 30 business-day target.

"Great headway was also made in relation to stalled mining leases," Mr Sellers said.

"The department employed a specialised team in the fourth quarter, which addressed long-standing applications for mining leases stalled in the future 'right to negotiate procedure' of the Commonwealth *Native Title Act 1993*."



"As a result, 147 Mining Lease applications that were submitted before January 2009 were determined during the quarter, which is a great outcome."

The department also finalised 99 per cent of its Petroleum Environmental Plans within 30 business days during the fourth quarter of 2012.



Resources industry remains top performer

Recent figures released by the Department of Mines and Petroleum (DMP) show Western Australia's resources industry continues to set records.

The annual Mineral and Petroleum Statistics Digest, which provides an in-depth overview of the WA resources industry, shows WA returned exceptional resources sales of \$106 billion.

Mineral exploration expenditure increased to an all-time record of \$2.1 billion — a jump of 32 per cent from 2010-11 and 150 per cent from five years ago.

Iron ore remained the State's most valuable sector with \$61.1 billion in sales, while petroleum delivered \$23.8 billion and gold \$9.3 billion.

Other highlights of the 2011-12 Statistics Digest included mineral and petroleum exports accounting for 91 per cent of the State's merchandise exports earnings.

Western Australians also directly benefited from the \$5.3 billion paid in royalties to the State Government in 2011-12.

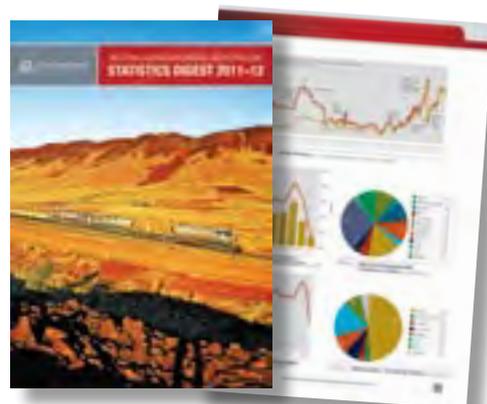
As one of the great mineral provinces of the world, WA, in 2011-12, hosted 65 operational oil and gas fields and 975 operating mines, producing more than 50 different minerals.

One of the State Government's major aims is to attract investment through initiatives such as the Exploration Incentive Scheme's (EIS) Co-Funded Drilling Program, supported by the Royalties for Regions program, which covers up to 50 per cent of successful candidates' drilling costs.

The State Government also approved the average mine in a 28-month time period in the past four years.

The 2011-12 Mineral and Petroleum Statistics Digest can be accessed at http://www.dmp.wa.gov.au/documents/Statistics_Digest_2011-12.pdf

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Channel opening boosts Ord expansion

The Western Australian Government recently opened the 31km main irrigation channel, centrepiece of the Ord expansion project at Kununurra.

The channel is part of a \$322 million State Government investment – including \$311 million through Royalties for Regions – to deliver key infrastructure for the second stage of the Ord Irrigation Scheme and servicing future expansion into the Northern Territory.

The channel will supply water to 13,400ha of land to be developed by Kimberley Agricultural Investment (KAI), the preferred proponent to lease and develop the land for farming. KAI is an Australian company wholly owned by Shanghai ZhongFu (Group) Co.

The company proposes to invest \$700 million to establish a sustainable large-scale sugar industry, including a refinery with power co-generation and a major upgrade to Wyndham Port.

The opening of the main irrigation channel is a major step towards the East Kimberley reaching its full potential.

The channel is considered to be the backbone of the Ord expansion, and vital to the success of agricultural development for the East Kimberley and northern Australia.

During the visit, the WA Premier, Northern Territory Chief Minister and Federal Minister for Regional Australia signed a memorandum of understanding on the proposed extension of the Ord irrigation area into the Northern Territory.

The visit acknowledged the significant role the Miriuwung and Gajerrong people played in the project and the future benefits they would realise under the agreement, as they become landholders in their own right.

The Federal Government also committed a \$195 million investment in the region under a national partnership agreement

with the State Government, which will deliver education, health and other community services to Kununurra, Wyndham and surrounding communities.

The State Government now has the opportunity to work with KAI, the traditional owners and local business to make the Ord-East Kimberley Expansion Project one of the Australian north's most important developments.

KAI and the State Government will soon finalise contract negotiations, with KAI to obtain approvals and funding for associated infrastructure.

The State Government will retain ownership of the irrigation channel and other infrastructure developed as part of the Ord-East Kimberley Expansion Project, including nine kilometres of secondary irrigation channels and a workers' village accommodating 252 employees. A 40km network of new roads will be transferred to the Shire of Wyndham-East Kimberley.



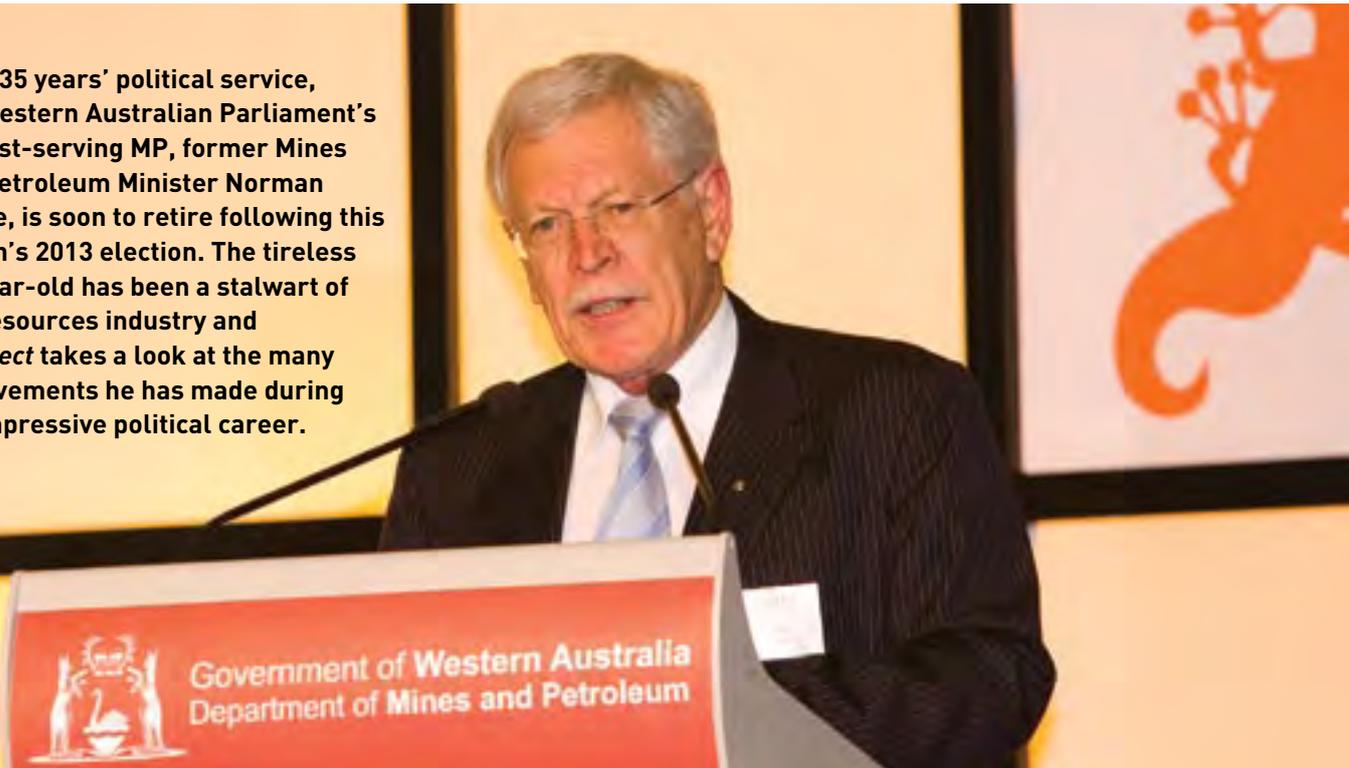
At the opening of the Ord Irrigation Channel (from left) Teddy Carlton, MG Corporation director, Premier and Minister for State Development Colin Barnett, Minister for Regional Development Brendon Grylls, and Peter Handel, General Manager Western Infrastructure Leighton Contractors.

Fact File

- Ord Stage One opened in 1972.
- New irrigation channels to supply 3,350 megalitres of fresh water – equal to 8,000 standard backyard swimming pools – from the Ord River each day.
- Ord-East Kimberley Expansion Project is a State Government initiative to deliver economic development, social and cultural prosperity to people of the East Kimberley.
- East Kimberley Development Package, signed between the Federal and State governments in Kununurra in 2009, to deliver 29 community and economic infrastructure projects in East Kimberley region.

Mines and Petroleum Minister Norman Moore calls it a day

After 35 years' political service, the Western Australian Parliament's longest-serving MP, former Mines and Petroleum Minister Norman Moore, is soon to retire following this month's 2013 election. The tireless 67-year-old has been a stalwart of the resources industry and *Prospect* takes a look at the many achievements he has made during his impressive political career.



After the 2008 State Election when an unexpected outcome resulted in a Liberal-National Government victory, it wasn't long before newly sworn Mines and Petroleum Minister Norman Moore swung into action.

One of the first things he did was to establish a dedicated department for Mines and Petroleum, by splitting the former Department of Industry and Resources and bringing Resources Safety back to the fold from the previous Department of Employment and Consumer Protection.

It was to have immediate effect and as soon as Resources Safety returned to its traditional Mines Department roots, Minister Moore was addressing the troops in an emotional display of his commitment to safety.

He declared that safety in the mining industry was the State Government's number one priority and he vowed to increase resources to meet that commitment.

A Kalgoorlie-born lad from the Goldfields, he told the audience of safety specialists of his memories as a child when there had been a mining fatality of one of his neighbours, and the lasting impact that had made on him.

It was clear he was talking from the heart and his rhetoric was real — Norman Moore is a man that is passionate about resources safety.

He walked the talk and committed his government to improving safety at a time when more and more young people were being employed in this fast growing industry.

He launched a mine safety and inspection levy which has been responsible for the employment of an additional 21 inspectors to the Mines Safety Inspectorate, increasing specialist safety staff by a third, and representing the single biggest overhaul of the resource industry's occupational health and safety regime.

The fact that there was not one work related resources fatality throughout the entire State last year, during a time of great expansion and a record \$106 billion in sales during 2011-12, is indicative of the positive changes to safety.

This was the first time, in more than 100 years of recorded history, a year has passed with zero fatalities.

In the preceding decade there were 42 fatalities, which Mr Moore points out is 42 people who never came home from work, and 42 groups of family members, co-workers and friends who have been forever impacted.

"I am proud of my contribution to mine safety. We owe it to them, and to every person killed or injured on a Western Australian mine site, to do everything we can to continually improve safety," Mr Moore said.

"I am pleased the department has continued its move to online lodgement which now includes all petroleum environmental management plans, bridging documents, written notifications, oil spill contingency plans and revisions, Mining Proposals, Radiation Management Plans and Annual Environmental reporting," Mr Moore said.

He said the introduction of the levy ensured that the Resources Safety Division of DMP had the funding to change not only the way that the industry is regulated, but also the resources available to work with and assist industry to change its safety culture.

Since his appointment to the Mines and Petroleum portfolio, as a Minister Mr Moore has barely stopped. He has overseen huge improvements to the State Government's approvals processes for mining and petroleum exploration and development, including the

introduction of online lodgement and tracking of applications, the Petroleum and Geothermal Register (PGR) and the deployment of the web-based mineral titles register eMITS.

"I am pleased the department has continued its move to online lodgement which now includes all Petroleum environmental management plans, bridging documents, written notifications, oil spill contingency plans and revisions, Mining Proposals, Radiation Management Plans and Annual Environmental reporting," Mr Moore said.

Lead agency framework

He was instrumental in the development of the Lead Agency framework to streamline the approvals process and reduce the backlog of applications, and the establishment of an Inter-agency Working Group.

Recently released statistics compiled by DMP have shown that the average new mining project in Western Australia took just over two years to reach full approval.

During his tenure as Mines and Petroleum Minister there have also been huge improvements in Environmental reform, including the new online Environmental Assessment and Regulatory System (EARS) and electronic submission of Annual Environment Reports (AER).

"The Mining Rehabilitation Fund (MRF) legislation passed through Parliament last year and minimises the State Government's unfunded liability in respect of abandoned mine sites," Mr Moore said. "It also enhances the ongoing capacity to manage and rehabilitate abandoned mines, leading to better environmental and community safety outcomes."

This has resulted in increased certainty for industry, the attraction of resource project investment and increased economic benefits for all Western Australians.

Uranium mining

The State Government also lifted the previous ban on uranium mining and work has commenced on a new regulatory framework for the sector, as well as completion of an independent review to benchmark WA uranium mining regulation against World Best Practice, along with extensive community consultation.

The State Government has also shown a commitment to inform, consult and involve community stakeholders in the regulation of the emerging unconventional gas industry in Western Australia.

"In Western Australia, research shows that there is roughly twice as much gas available onshore as there is offshore, creating an enormous potential for this emerging industry," he said.

Mr Moore said he was also pleased that the highly successful drilling program for Western Australia's first onshore Carbon Capture and Storage (CCS) project was completed last year.

He also convinced his Cabinet colleagues for \$7.5 million to establish a new Minerals Research Institute in WA (WAMRI) to bring government, researchers and industry together to improve mining techniques and new processing methods.

As an advocate of 'finding tomorrow's mines, today', Mr Moore worked hard to secure funding for the State Government's \$138 million Exploration Incentive Scheme (EIS) and its associated Co-funded Exploration Drilling Program.

The EIS is made up of a number of programs that are delivering support to explorers in WA through improvements in tenement management and by supporting exploration drilling including unconventional gas. The EIS also supports major geological data capture, and collaborative research projects that have already led to a number of new discoveries.

The internationally recognised Fraser Institute Survey of Mining Companies now ranks WA as the first preferred mining



Norman Moore during his tenure as Minister for Mines and Petroleum.

destination in Australia, and equal 15th in the world.

Additionally DMP's petroleum geology database, which features information on titles, wells, geophysical surveys and petroleum data, was judged third best in the world by the Fraser Institute Petroleum Survey.

"The development of the resources industry over the past 35 years has been extraordinary," Mr Moore said.

He said there was a time that he knew the name of every mining operation in the State, and possibly the name of every mine manager, which was no longer the case.

Downstream processing

One of the things he laments is the lack of development of downstream processing in the resources industry.

"We just haven't been able to turn our raw materials into value added products," he said.

"Fundamentally, our cost structures have adversely affected our capacity to be competitive on the international scene."

He said apart from the massive growth, the biggest change has been the introduction and expansion of fly-in fly-out (FIFO).

"Traditionally the mining industry built towns and communities, and I lived in a number of them in my younger days, but now industry relies very heavily on fly-in fly-out," Mr Moore said.

He said serious industrial relations issues in the 1970s and 1980s, and the introduction of 12 hour and continuous shifts, had contributed to this occurring, which was regrettable in his view, although he understood the reason for it.

Future challenges

In terms of the future Mr Moore said the resources industry faced a number of challenges during the next five years, including Federal Government taxes – the MRRT, the PRRT and the Carbon Tax – which he believes will reduce WA's competitiveness in the international marketplace.

He also regarded 'green' activism, where virtually every mining or petroleum activity is rigorously opposed, would place significant pressure on the industry.

"There is a real need for the industry to promote itself in the metropolitan areas of the nation," he said.

Besides his commitment to the resources industry Mr Moore, who was also Mines Minister from 1997 to 2001, has also had stints during his acclaimed political career as Member for Mining and Pastoral Region (in 2001 he was awarded



Norman Moore ... a proud supporter of Western Australia's resources industry as Minister for Mines and Petroleum.

Mr Moore has barely stopped and has overseen huge improvements to the State Government approvals processes for mining and petroleum exploration and development, including online lodgement and tracking of applications.

a Centenary Medal for 'service to Australian society through Parliament') as a Minister for Fisheries, Education, Tourism, Sport and Recreation, and Electoral Affairs.

He is also the Leader of the State Government in the Legislative Council, and fondly referred to as the 'Father of the House'.

As the Minister for Fisheries, he has taken the tough decisions necessary to protect Western Australia's important commercial and recreational fishing stocks, including a quota system to protect Australia's single most valuable fishery, the commercial Western Rock Lobster industry.

In accordance with the State Government's strategy to improve the WA electoral system, Mr Moore also used his authority as Minister for Electoral Affairs to introduce legislation that has seen WA move to fixed term elections every four years.

Proud Western Australian

He is also a fiercely proud Western Australian and has suggested over the years that WA should secede from the Federation. Considering the fact that the State is the engine room of the national economy, many others have also shared that view over the years.

Prior to politics Mr Moore spent 10 years teaching, including the position of high school principal, an area he says he would have stayed in if he hadn't had such a successful political career.

In his retirement, besides spending time with his family, wife Lee and his three adult children, Kathryn, Georgia and Daniel, Mr Moore will also enjoy travel, golf and developing his property.

He will officially retire on May 21, 2013 when his current Legislative Council term concludes.

Prospect wishes him all the best in his retirement and acknowledges his distinguished political career.



What lies beneath

WA not just a dig-it-up, ship-it-out economy

Change is happening quickly in Western Australia. A recently-released report from the Committee for Perth 'think-tank' points to the State shifting from a reliance on traditional resource extraction, to a key player in corporate leadership, knowledge generation, finance and services. At the same time, the Chamber of Minerals and Energy (CME) has released its outlook for growth in WA for 2013, following reports in 2009 and 2011. Perth also continues to prove itself as a destination of choice for European companies, boosting Western Australia's ambition of becoming a key financial hub in the Asia Pacific region. This article summarises the reports, which also consider the changes and challenges, particularly within the State's capital, Perth. *[Note: These are independent reports and do not represent the State Government's position].*

It is stating the obvious, but it sets the scene. The Western Australian resources sector drives Australia's economy.

According to the Department of Mines and Petroleum (DMP), as of 2010-11, more than 50 different mineral resources were mined as part of 545 commercial mineral projects operating in 966 mine sites. In the same period, there were also 73 operating oil and gas fields in the State.

The pace of expansion is increasing. The Australian Bureau of Statistics (ABS) says the WA economy more than doubled in size between 1990-91 and 2010-11. Western Australia's Gross State Product in chain volume measures increased from \$76.9 billion in 1990-91 to \$187.1 billion in 2010-11, a rise of more than 140 per cent.

Western Australia maintained its status as the nation's leading exporter in 2011-12, contributing a record 45.6 per cent towards Australia's merchandise export earnings of \$264.3 billion.

Liveability factors

However, as the Committee for Perth study points out economic growth not only brings increased wealth but also associated changes in society, including population increases, pressure on infrastructure and government services, cultural changes and shifts in power. These criteria contribute to a city's 'liveability' ranking.

The committee's research team compared Perth to Calgary, Houston, Rio De Janeiro and Brisbane — all cities inexorably linked to the resources sector.

As the report found, Perth already rates well on various livability indices. On the Economist Intelligence Unit (EIU) rankings of livable cities, Perth is consistently in the top 10 in the world. In 2012, of the world's largest resource

The Committee for Perth, established in 2006, is a member-based organisation driven by Perth's business and community leaders, which aims to promote and enable change that improves the cultural diversity, economic prosperity, sustainability and world-class amenity of Perth. More information, including the complete report, can be found at: www.committeeforperth.com.au. The Chamber of Minerals and Energy is the peak resource sector body in Western Australia, with its member companies generating 95 per cent of all mineral and energy production by value and employing more than 80 per cent of the resources sector workforce in the State. Its report can be found at www.cmewa.com

cities, only Calgary surpassed it when it comes to liveability. However, while Perth performs well, it is not without challenges and lags behind some other Australian cities.

According to the CME, “population increases will place increasing demands on social and community infrastructure in Perth and regional towns, requiring advanced planning and investment.” In some areas, notably the Pilbara, a mismatch between demand and supply of land has resulted in property prices and rents far exceeding Perth prices.

The CME report says that, in order to attract and retain skilled and highly-mobile resource sector workers, it is important the liveability and vibrancy of Perth and key regional centres is continually improved.

Corporate power shift

Perth’s position as a place of emerging corporate power is one of the more telling signs of how the State is being remoulded. Perth is already headquarters of some of the world’s largest minerals and energy operations such as Rio Tinto, BHP Billiton, Chevron Australia and Shell Australia.

As the committee’s report notes: “Corporate headquarters play a pivotal role in the socioeconomic and cultural development of cities by adding prestige, generating investment and specialist employment opportunities in areas such as accounting, legal services and information technology.

“Analysis of the market capitalisation trends in the Australian stock market is evidence of a shifting geography of corporate power that points to the increased competitiveness and growth potential of Perth as an emerging corporate centre for the resources sector. As of September 2011, total market capitalisation on the Australian Stock Exchange reached \$1,374.8 billion, 12 per cent of which is accounted for by Perth companies. Sydney and Melbourne accounted for 43 per cent and 34 per cent of total market capitalisation, respectively.

“However, of the total companies listed Australia-wide, Perth ranked highest as the preferred location, with 34 per cent, or 830 companies headquartered in Perth as of September 2011. Sydney and Melbourne, on the other hand, accounted for 23 per cent and 14 per cent, respectively.”

The committee’s report analysed the top 300 companies in Australia and found the increasing status of Perth as a preferred location of corporate power, “with the number of companies headquartered in the city increasing by 31 per cent, from 42 companies in 2005 to 55 companies in 2011.”

Department of State Development (DSD) figures released in November 2012 showed that in the previous two years (2011-12) 85 overseas businesses opened new offices in WA, with most involved in the resources sector. European companies feature strongly (see story page 12).

Of those, 48 per cent are involved in oil and gas projects and eight per cent in mining and mining services. Other businesses came from the legal, financial and construction sectors.

Changing demographic

It is within the corporate cluster that the demographic is changing from being dominated by extraction-based companies to knowledge-based, supportive industries “that include mining software development, exploration, engineering and processing.” Examples of these companies include subsea engineering, mine safety systems, geospatial mapping and computer programming, to name but a few.

The committee’s report considered the importance of financial, legal and consulting firms, whose services play a critical role in articulating the flows of

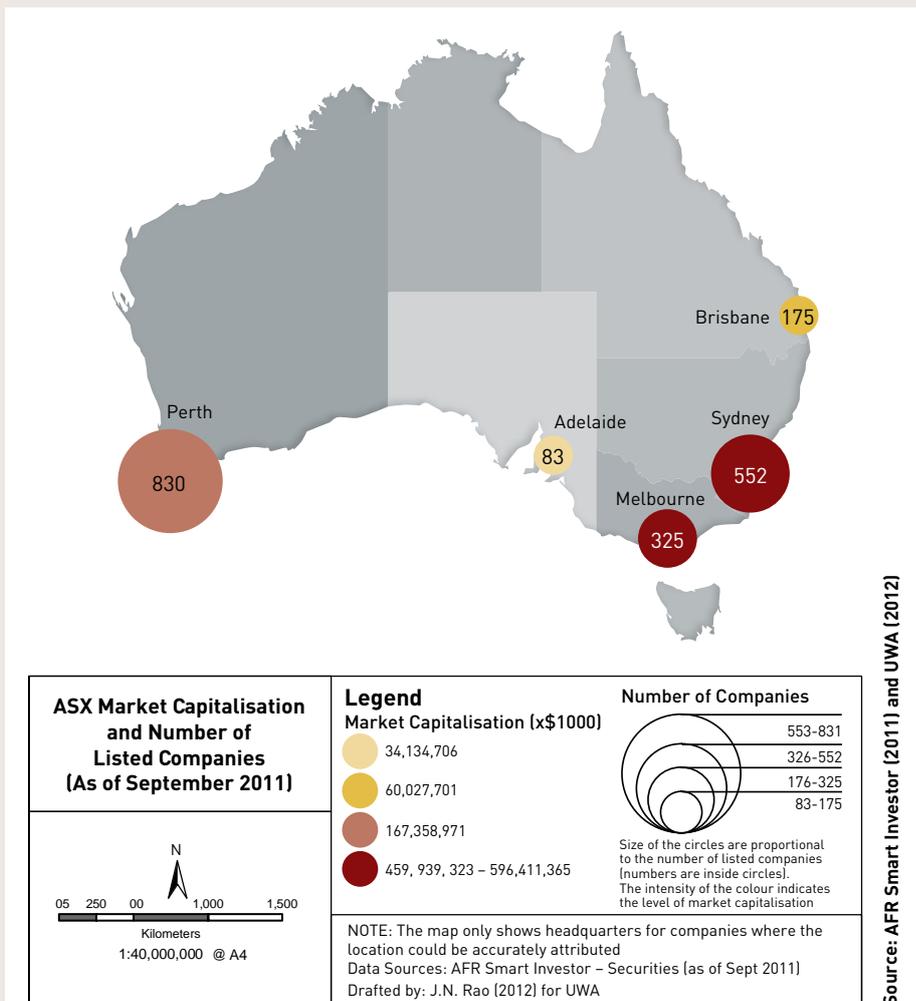
finance, knowledge and influence within the global economy. Major cities, such as New York, Tokyo and London are typically seen as ‘command centres’ in this regard.

“The presence of these firms within cities has become an increasingly important reflection of how well a city is ‘hooked in’ to the global economy,” the reports states. This not only enhances the city’s strategic economic position, but helps to inject talent and diversity into the local community.

DSD has collected information on the establishment of new firms in these sectors, and has found that more than 20 have opened offices in Perth in the past two to three years. These include firms from Europe, Asia and North America, and point to Perth’s growing integration with the world city network.

State breaks the mould

The committee’s report describes Western Australia as generating its wealth “primarily from growing agricultural products or digging holes in the ground and extracting minerals and petroleum products”.



Source: AFR Smart Investor (2011) and UWA (2012)

Shifting balance of power. The number of Australian Stock Exchange-listed companies in Perth is greater than either Sydney or Melbourne.

On the surface it doesn't appear the State fits the notion of an advanced-knowledge economy.

However, research by Felicity Wray, reported in FACTBase Bulletin, argues against the notion that primary industries and a globalised, knowledge-based economy do not fit together.

Wray's research highlights the existence of four important hallmarks of innovative, knowledge-based economies that exist in Western Australia:

- Agglomeration economies, as a result of the clustering of a considerable number of nickel exploration firms in West Perth.
- Technological change brought about by the booming mining-related software development sector in Perth.
- Global pipelines and local buzz that provide an indication of the myriad valuable global economic connections and interactions.
- The central role of universities in the development and expansion of the Western Australian nickel industry.

Mining leads employment growth

Figures from the Australian Bureau of Statistics (ABS) show employment in WA has grown 40 per cent since 2000, with the mining sector accounting for an increased share of total employment from 3.5 per cent in 2000 to 9.0 per cent in 2012, or 115,777 people. Allied industries, such as construction; transport, postal and warehousing; and professional, scientific and technical services also recorded increases in their overall share of total employment.

Employment data collected by the Department of Mines and Petroleum (DMP) from operating mines and companies indicate the same trend. For 2010-11, 92,564 people were directly employed in the industry — an increase of 16.8 per cent, compared to 2009-10 employment levels. The bulk of this

employment (65 per cent) was accounted for by iron ore, gold and bauxite alumina operations, as demand for these resources from Asia continued to post strong growth.

The CME report looked at long-term growth. It says the sector is projected to peak at 125,000 people in 2014, around 9,000 above current levels. After 2014 it will slowly reduce, as construction activity gives way to operations. This means the operating workforce will increase strongly to 2018, with an additional 19,000 operational staff required.

The high-growth regions will be the Mid-West and the Kimberley. The Mid-West will require an additional 4,800 workers by 2014, of which 3,600 will be new construction workers. The workforce in the Kimberley is forecast to increase from 3,400 workers in 2012 to 6,200 in 2015.

A talent hothouse

While mining heavily influences the WA economy, much of the activity in WA is 'smart', meaning that companies are not just producing ore, they are leading the way in mining technology. The Centre for international Economics says mining in WA is more research and development-intensive.

There is compelling evidence to suggest that the resource-based Western Australian economy is transitioning to a highly globally connected knowledge economy — and the city-region of Perth is the central hub in the network. One example of this global success story is the clustering of exploration firms in industries such as nickel, copper and gold in the suburb of West Perth.

It is clear that the profitability and quality of mineral extractions is increasingly dictated by the skill and expertise of supporting industries, such as information technology. For example, 60 per cent of global mining software is now produced in Perth.

The increasing emergence of WA and Perth as a knowledge hub within the global resources sector is reflected in the relative number of graduates within selected knowledge economy disciplines, such as physics and astronomy, earth sciences, engineering and related technologies, process and resources engineering, civil engineering and law. While Western Australia's national population share accounted for only around 10 per cent, data from 2009 shows WA's five universities produce 14.6 per cent of the nation's domestic graduates in these disciplines, and an even higher proportion (18.9%) of international graduates.

The transformation of Perth into a knowledge-rich economy is also demonstrated by its increased global connectivity. Perth is "increasingly recognised as a global solutions centre" in oil and gas. This development is mirrored in the choice of Perth as one of the 11 global locations of KPMG's Oil and Gas Centres of Excellence.

Industry research centres

There are a number of industry research centres, including:

- The Energy and Minerals Institute
- The Cooperative Research Centre for Mining
- The International Mining for Development Centre
- The Western Australian Energy Research Alliance
- The Centre for Exploration Targeting
- The Centre of Excellence for 3D Mineral Mapping
- The Centre for Energy
- The Centre for Mining, Energy and Natural Resources Law
- The Centre for Offshore Foundation Systems
- The Centre for Petroleum Geoscience and CO2 Sequestration





Diversity a byproduct

The complex production and supply chains associated with mineral and resources extraction mean that there is a wide range of firms that provide facilities, equipment and services that ultimately make up the entire resources industry. These facilities, equipment and services include: asset management, exploration, engineering (e.g. civil, mechanical, electrical, chemical and environmental), extraction and processing, construction, geology, geophysics, occupational health and safety, transport, research and development, project management, legal services, urban planning, and even anthropology.

The growth and diversity of Perth's resources sector places it at the hub of the global network of knowledge exchange, with an increasing number of high profile events held in the city each year. In the five years 2005-2012, there were at least 109 mining and resources-related conferences held within Perth/WA, attended by 66,500 people.

Austmine's National Conference will be held in Perth from 20-23 May and is expected to attract 300 industry delegates. In April 2016 Perth will host LNG 18, a triennial conference, organised by the International Gas Union (IGU), Gas Technology Institute (GTI) and International Institute of Refrigeration (IIR). This event is expected to attract 5000 delegates from across Australia and internationally.

Energy a key to developing industry

Increasing energy needs are an obvious and pivotal factor in the State's development. The CME report predicts "the estimated State electricity growth rate over the period to 2023 is 5.6 per cent per annum; substantially higher than the 1.9 per cent long-term electricity growth (to 2035) forecast from the Bureau of Resources and Energy Economics (BREE).

"Electricity consumption in Western Australia could increase approximately 52 per cent by 2018, driven by projects in the resources sector ... with most new electricity generation required by the sector in 2018 being for projects in the Pilbara (70%) and Mid-West (15%).

"Natural gas demand for Western Australia is (also) expected to increase, from an estimated 430 PJ in 2012 to 700 PJ in 2023, with resource-sector demand expected to increase by 81 PJ/a by 2018 — a 47 per cent increase on 2012.

"Total water abstraction in Western Australia is forecast to increase at an annual growth rate of three per cent — from 1,900 GL in 2012 to 2,640 GL in 2023. Resources sector water use is projected to reach 400 GL above 2012 levels by 2018, totalling 980 GL.

"Most new resource sector water use in the State will be located in the Pilbara, with water use more than doubling from 205 GL in 2012 to 420 GL in 2018."

Infrastructure needs increasing

Supporting the continuing growth is the proliferation of a wide range of infrastructure, including aviation, ports, rail, road and social projects.

Aviation appears to be the most stark reminder of the ongoing transformation. Western Australia's airports have experienced significant growth in demand over the last decade.

According to the CME, "passenger volumes at Perth Airport grew from 4.9 million in 2001 to 11.3 million in 2011 – a growth rate of nine per cent annually. Port Hedland, Newman, Karratha and Paraburdoo have averaged growth over 16 per cent – meaning passenger volumes have more than quadrupled since 2001".

On the waterfront, bulk mineral export facilities are operating at capacity. "Total trade volume through Port Authority Ports more than doubled (over nine years), from 200Mt in 2002 to 428Mt in 2011," says the CME. "This growth was driven almost entirely by exports."

Into the future

The committee's report says recent developments in Western Australia indicate the State remains an attractive place to locate for innovating organisations and companies.

However, according to the CME, while growth remains strong, "changing market conditions, increasing difficulty in gaining access to finance, increases in the costs of doing business, and challenges in recruiting a skilled workforce all need to be addressed to maintain this growth.



Photo: Vertech

European companies settle on Perth

A rigger from Vertech, now a division of Scottish firm GEG, check a flange connection on flare tower.

With the attraction of \$167 billion worth of investment in Western Australian resources projects, more and more European companies are calling Perth home.

Figures released by the Department of State Development (DSD) in November 2012 showed that in the previous two years 85 overseas businesses opened new offices in WA, with most involved in the resources sector.

Of those, 48 per cent are involved in oil and gas projects and eight per cent in mining and mining services. Other businesses came from the legal, financial and construction sectors.

DSD figures show 43 European companies opening offices in WA since 2010. This includes 14 from the United Kingdom, 11 from Norway, four from Belgium and two each from France, Germany, the Netherlands and Switzerland.

Companies like French oil and gas specialists, Technip have expanded their WA operations and recently opened new premises.

The Paris-based company has operated in WA since 1995 and employs approximately 750 staff in Australia, of whom 700 are in WA.

The company has worked on several major onshore gas projects in Australia including BHP Macedon and Woodside Otway. They are now involved with a number of major offshore LNG operations, including Chevron's Wheatstone and Gorgon projects, BHP Billiton's Macedon as well as the subsea installation on Apache's Balnaves field.

Germany chemicals firm, BASF opened a new laboratory, office and research centre last year in Perth. This follows the company signing a long-term agreement with the Commonwealth Scientific and Industry Research Organisation (CSIRO) to lease the premises in exchange for sponsoring collaborative research with the Parker Centre, a hydrometallurgy research and development organisation.

The collaborative research will focus on breakthrough technologies and processing for alumina, base metals, gold and uranium.

BASF consisting of 474 staff across Australia and 69 in WA, has a diverse portfolio. The company's research team at Bentley is looking at ways to improve the thickening process for valuables and tailings using advanced rheology modifiers.

At its Kwinana plant, BASF is producing solution and powder-grade flocculants for the mining industry and its salt lake operation at the Hutt Lagoon is producing commercial grade algae and beta-carotene for dietary supplements and natural food colouring.

Scottish-based Global Energy Group (GEG) recently joined the WA market. The company opened its Australian headquarters in West Perth, following its acquisition of Australian company, Global Resources Network, GRN Australasian Pty Ltd.

GEG specialises in construction and maintenance of energy industry assets. Its entire Australian staff are based in WA across three premises in Perth. The West Perth, Malaga and North Beach operations employ around 60 office-based staff, with 250 more engineering staff in the field.

In October 2012, the company announced its third Australian acquisition, taking a controlling interest in specialist services company Vertech Pty Ltd.

GEG is working on a number of major Western Australian projects, including Woodside Karratha Gas and Enasco's offshore drilling platforms 104 and 109.

Resources industry continues to support local jobs

Resource projects in Western Australia continue to develop, benefiting the economy with new businesses opening and additional jobs. More than 75,000 jobs have been created and \$30 billion in contracts have been awarded to WA-based suppliers since July 2011.

One of the prime examples of the expansion of the WA economy is the CB & I Kentz Joint Venture at the Australian Marine Complex (AMC), which recently engaged its 1,000th employee on the Chevron-operated Gorgon Project contract.

The contract, valued at \$2.2 billion, is for mechanical, electrical, instrumental and commissioning support for the Gorgon LNG trains.

The contract, one of many high-value, sophisticated work packages being undertaken across the State, would ultimately create more than 1,650 local jobs.

The joint venture partners also launched a recruitment drive to source a further 600 employees for jobs both

at the AMC at Henderson and Barrow Island. The partners also recently launched an apprenticeship and traineeship program that would offer up to 100 places.

The State Government has invested almost \$400 million in infrastructure at the AMC to help Western Australian industry win work associated with major projects.

The contracts are listed in the Department of Commerce's November 2012 Local Content Report.

The government reports began in May 2011 and provide Parliament and the people of WA with important information regarding achievements and trends in local industry participation in our mineral and energy projects.

One of the prime examples of the expansion of the WA economy is the CB & I Kentz Joint Venture at the Australian Marine Complex (AMC).

The November 2012 report contains a number of highlights, including strong growth in local contract awards; positive reporting by major project proponents; increasing entry into the State's economy by specialist, globally-based companies; and a further set of policy initiatives developed in consultation with stakeholders.



The Australian Marine Complex.



Photo: Chevron

An aerial view of the foundation structures for the LNG jetty and the materials offloading facility on Barrow Island looking back towards the plant site.

Maritime facility helps keeps content local

Since the State Government opened the Common User Facility (CUF) at the Australian Marine Complex (AMC) in 2003, it has not only provided local companies with an improved ability to compete for major tenders but also kept jobs in Western Australia that might have gone to overseas facilities.

Since 2003, the CUF has created \$1.4 billion in economic activity in WA — a sum that would have gone elsewhere had the facility not been developed.

The infrastructure hall allowed for local companies to win important contracts within the oil and gas, mining, marine and defence sectors.

The facility has been a great success and is an important source of employment for Perth's southern region.

The facility has 50ha of sealed and serviced laydown and assembly area and five load-out wharves — one of which is fitted with a 300 tonne crane — and there is also a big fabrication hall.

It has the world's most technically-advanced floating dock and a 512-wheeled self-propelled Modular Transporter that can transfer up to 4,500 tonnes.

The range of infrastructure gives industry the ability to expand and diversify operations and compete for big-scale projects without having to expand their own physical boundaries. This represents a significant cost saving, which can be reflected in more competitive pricing.

Currently the major CB & I Kentz Joint Venture services the Gorgon project. The Saipem Leighton Gorgon Consortium is also building 55

Since 2003, the CUF has created \$1.4 billion in economic activity in WA — a sum that would have gone elsewhere had the facility not been developed.

concrete caissons for the export jetty at Barrow Island, using the CUF to cast and assemble the whole units for transporting north.

While businesses catering to the energy industry account for 60 per cent of users, the CUF also provides capacity for suppliers to a variety of mining, marine and defence projects including the maintenance and repair of naval frigates and submarines.

\$30b of benefits

Local businesses are seizing their share of resource projects in Western Australia, having claimed contracts worth \$30 billion.

The November 2012 Local Content Report revealed more than 75,000 jobs had been created as a result of \$30 billion in contracts awarded to WA-based suppliers since July 2011.

The contracts are across a wide range of businesses in the manufacturing and service sector, including construction, project management and equipment supply.

Despite increased volatility in some commodity prices, the outlook for the resources sector, and therefore the WA economy, remains strong. Construction activity will remain buoyant and there are \$167 billion of projects under construction, or in the pipeline.

In terms of project reporting, Gorgon achieved a result of 64 per cent local content, a significant increase on 44 per cent from the previous year.

The November report shows these projects incurred \$15 billion in operational expenditure, of which WA's share was 75 per cent; while construction-based outlays were \$9.3 billion, where WA claimed 69 per cent.

This year, 120 local small and medium-sized businesses were allocated \$2.5 million to assist in areas including capital equipment upgrades; risk management and quality assurance; training; and business systems improvement.

There has already been 30 positive outcomes from the program that have led to contracts being awarded and increased employment.

These include:

- Software company Scope Australia awarded \$9.5 million in contracts
- Perth Surveying Services won \$3.97 million in contracts
- Dwyer Engineering and Construction picked up \$13.8 million in contracts.

The November 2012 Report has details of a further 10 government initiatives designed to ensure competitive local companies have every opportunity to do business with our resource projects. This adds greater impetus to the momentum built up since the introduction of the Local Industry Participation Framework in July 2011.



85 businesses move to WA

At a time when the outlook for some commodity prices appear uncertain, confidence in the Western Australian economy remains strong.

The November 2012 Local Content Report highlighted that offshore companies continued to be positive about the State's resources sector.

In the past two years, 85 global companies which specialise in supporting resource project activity have either established themselves in WA or significantly expanded their presence here.

Companies from the United Kingdom and the USA each have 16 additional

businesses in WA, while Norway has 11 and China has eight.

The arrival of more international companies brings a number of benefits to the State, including knowledge transfer; research and development activities; and new technologies, while opening pathways for future global expansion through trade and network development.

Of the 85 companies, nearly half are from the oil and gas industry, which consists mainly of project operators, equipment suppliers, service providers, consultants' services and exploration enterprises. Legal and financial services represented the second biggest sector, while mining

and associated services such as project operators and engineering providers were the third biggest group.

The State Government identified the 85 organisations and found that the most compelling reason for these companies to make such a big investment was in response to the current and predicted growth of the WA economy.

The report found companies also regarded the State as a rapidly-emerging global oil and gas hub, with the added attraction of joint venture partnerships and alliances with local companies. Also, businesses said the strong focus on research and development in this State made a move desirable.

\$10m seawater pipeline to support Pilbara expansion



Photo: Aurora Energy

Aurora Energy's algae harvesting ponds at Karratha.

The State Government is providing \$10 million in funding from Royalties for Regions to construct a Common User Seawater Pipeline to support the expansion of an algae industry at Karratha.

The pipeline would initially support Aurora Algae, a US-based technology company which is investing \$86 million towards a Stage 1 production facility at Karratha.

Aurora's proposed production facility is estimated to bring 170 jobs to the region.

The company's pilot facility close to Karratha airport has proved the technology to produce biodiesel; Omega-3 used in health supplements and nutraceuticals used by the pharmaceutical industry; and protein-

rich biomass for aquaculture and animal feed.

The common-user infrastructure will deliver benefits beyond encouraging the investment of Aurora Algae, with the seawater resource capable of supporting further investment by other industrial users.

The development is another example of how science and scientific innovation are maximising opportunities in Western Australia.

An expanded algae industry in the Pilbara would also play an important role to provide much-needed economic diversification in the region.

The Pilbara is ideally suited to the development of the algae industry, due to the abundant sunshine and

The development is another example of how science and scientific innovation are maximising opportunities in Western Australia.

close proximity to sea water – the two key ingredients for the efficient production of algae – and the ready supply of carbon dioxide that is a by-product of the resources sector.

As well as bringing jobs and economic diversification to the region, Aurora's production facility will create new exports, helping reduce the resources industry's CO₂ emissions and support the local provision of diesel.



Mines and Petroleum Minister Norman Moore presents Dr Kellie Pendoley with a Golden Gecko.

Golden Gecko awards showcase environmental excellence

Nominations for this year's prestigious Golden Gecko Awards for Environmental Excellence are open.

The awards, launched in 1992, recognise excellence and leadership, and acknowledge the outstanding contribution recipients have made to the responsible development of WA's resources.

Department of Mines and Petroleum Environment Division Executive Director Dr Phil Gorey said the awards offered an opportunity for industry to be recognised for leading-practice and innovation in environmental management.

"The Golden Geckos allow companies to share their experiences with government, industry and the community," Dr Gorey said.

"Receiving a Golden Gecko Award also helps to build the reputation of being a good corporate citizen with a responsible attitude to the environment."

Dr Gorey said assessment is merit-based, so there is no competition between entries.

"An assessment panel from various government agencies assess each of the eligible entries by attending site visits and presentations," he said.

In 2012, Pendoley Environmental Pty Ltd received a Golden Gecko Award for Environmental Excellence for research into WA's sea turtle population.

Entries for this year's Golden Gecko Awards are now open and close on 12 April 2013.

For more information, including links to the entry form go to: www.dmp.wa.gov.au/goldengecko, or contact Golden Gecko co-ordinator Richard Smetana on (08) 9222 3639 or by email at richard.smetana@dmp.wa.gov.au

State well positioned

With business investment remaining the key driver of growth in the near term, underpinning above-average population growth and strong labour demand, the Western Australian economy is well positioned heading into 2013, according to the latest figures compiled by Treasury and the Department of State Development (DSD).

Western Australia's seasonally adjusted unemployment rate fell from 4.3 per cent in December 2012 to four per cent in January 2013, while the national rate remained unchanged at 5.4 per cent.

The State continues to provide the bulk of Australia's export earnings, with WA contributing 46 per cent (\$114 billion) of the nation's merchandise exports in 2012, higher than the share of New South Wales, Victoria and Queensland combined (43 per cent).

Iron ore continues to be the main driver of export volume growth, with the volume of exports rising 12 per cent to 510 million tonnes in 2012. However, the total value

of WA exports fell five per cent to \$114 billion, mainly caused by the sharp drop in the spot price for iron ore, from \$US150 a tonne in May 2012 to around \$US90 a tonne in October 2012. In February 2013 the spot price was once again trading around \$US150 a tonne.

Liquid Natural Gas (LNG) became Western Australia's third largest export commodity in 2012, with the value of LNG exports rising 24 per cent to \$10.7 billion, overtaking the value of crude oil and condensate exports, which decreased by eight per cent to \$10.3 billion.

Looking forward, the State's economic growth over the next few years is expected to remain close to trend as a number of major projects currently under construction begin production and the driver of growth rebalances away from business investment and into strong growth in exports.

Growth in business investment in 2011-12 was 38.2 per cent, the highest level since 2005-06.

"The big resource projects responsible for the high growth in business investment and underpinning the State's growth require a significant amount of plant and equipment that tend to be sourced from overseas," says DSD's Director of State Development Policy, Amy Lomas.

"This can be seen in merchandise imports, which grew at the rate of 27.6 per cent in 2011-12.

"However, Treasury expects the growth in imports to fall sharply over the new few years in line with the moderation in business investment and the rise in exports."

"That's not bad news for the WA economy, because it simply signals a shift to the next phase, where production kicks into action, and export growth is projected to grow at rates six per cent and above for the next few years."

"The figures show strong year-on-year economic growth in WA, at levels above four per cent per year for the next four years."

Canning Basin makes a 'comeback'

Roughly the size of France, the Canning Basin covers more than 500,000 square kilometres of Western Australia's southwest Kimberley region and has geological similarities to some of the world's most productive Palaeozoic-aged basins. After a couple of decades of low level exploration, *Prospect* discovers the region is finding its way back into the spotlight, thanks to a new oil discovery and its untouched shale and tight oil and gas resources.

The Canning Basin once enjoyed a healthy level of petroleum exploration before interest in the area slowed to a halt in the mid-1980s, following the discovery of major petroleum resources off-shore on the North West Shelf.

The North West Shelf has been the main source of domestic gas in WA for the past 25 years.

However, Department of Mines and Petroleum Executive Director for Petroleum Bill Tinapple said reserves in the North West Shelf could not supply the State's energy needs forever.

"It is estimated Western Australia's domestic conventional gas supply could fall below demand by as early as 2016," Tinapple said.

"The worldwide competition for new sources of gas supported by this predicted change in the State's energy supply has led to a renewed interest by industry in onshore gas and the vast amount of untouched shale and tight gas resources estimated to be in the Canning Basin."

The US Energy Information Agency estimates the Canning Basin to hold the largest onshore gas potential of any Australian basin.

"The Canning Basin is very large in area and, although it has had about 250 wells drilled in its history, it is still a highly underexplored area," Tinapple said.

"An estimated 229 trillion cubic feet (Tcf) of shale and tight gas could be recoverable from the basin's Goldwyer shale formation.



"That really is a staggering amount when you consider the amount of conventional gas discovered to date in onshore and offshore WA is only around 142 trillion cubic feet.

"A 229 trillion cubic feet resource is enough for around 450 years of domestic gas supply at WA's current rate of consumption."

WA is currently in the exploration / proof of concept phase for onshore gas, estimated to be approximately five to 10 years behind the United States industry — in terms of time needed to reach the production phase.

With industry commentators predicting onshore gas will account for 30 per cent of global production by 2040, the State Government is focused on strengthening the regulatory framework to responsibly support this emerging industry.

"By setting the standards now, the department is providing operators with a clear understanding of what is required to undertake petroleum operations in WA," Tinapple said, adding the department

was committed to ensuring its petroleum regulations reflected best practice for hydraulic fracture stimulation activities.

"In August 2012, we introduced new Petroleum and Geothermal Energy Resources (Environment) regulations — which are among the strongest in the world and require full public disclosure of chemicals used to provide greater transparency to operators and the community.

"The department is committed to engaging in community consultation to understand the issues of concern to communities, demystify the process of fracking, and differentiate WA from other jurisdictions.

"Working with communities is crucial for both government and industry to ensure social licence to operate issues are recognised and addressed from the outset."

For more information on onshore gas, please visit: www.dmp.wa.gov.au/onshoregas and sign up to our RSS feed.

DMP continues community engagement program



A CSIRO report is guiding the Department of Mines and Petroleum's (DMP) unconventional gas community engagement program.

The December 2012 report is based on information gathered during a community workshop held in the Mid West in October 2012.

The report analyses community interests and concerns regarding onshore unconventional gas and provides suggestions on how to address issues.

"This report has become a key document for the department in developing our community engagement strategies for the unconventional gas sector," Deputy Director General for Strategic Policy, Michelle Andrews said.

"As a regulator, it is important to continue to work with the community to ensure issues are being addressed and information gaps are filled.

"This is an integral part in the department's commitment to inform, consult and involve community stakeholders in the regulation of the emerging unconventional gas industry in Western Australia.

"The contribution of those who participated in the Mid West workshop will assist the department to gain an understanding of issues relating to the sector."

Other activities are being planned for the North West this year.

To view the report, please visit www.dmp.wa.gov.au/onshoregas and select 'helpful links and documents'.



Photo: Buru Energy

Buru's Steve Broome and Paul Scott check an oil sample at Ungani EPT.

Buru blazes exploration trail

One company that needs little incentive to progress its work in the Canning Basin is Perth-based explorer Buru Energy, which has been steadily building a portfolio of exploration and production tenements in the region since 2007 and has accelerated its activity since its Ungani conventional oil discovery last year.

Against a backdrop of sustained high oil prices and increased demand for domestic gas in WA, it is not difficult to understand the explorer's excitement at being one of the first players to stake a claim in the State's largest sedimentary basin.

With the backing of partner Mitsubishi Corporation, Buru recently topped up its large asset base with the multi-million dollar purchase of two new parcels of acreage, boosting its holdings in the region to 69,000km².

While Buru has started test production of oil at Ungani and is continuing its production at the Blina and Sundown oilfields, the company's other focus is on the wealth of resources believed to lie within the basin's tight unconventional oil and gas reserves.

It is the only company with material exposure to both of the largest and most prospective unconventional plays in the region — the Laurel Formation, with its massive, independently-verified tight

gas resources; and the highly-promising Goldwyer Shale.

If all goes to plan, Buru executive director Eric Streitberg says the company will begin supplying gas from the Basin to WA's domestic gas customers via a pipeline to Port Hedland by late 2015, reaching full production by 2017.

"We have a lot of work ahead of us and we have a long way to go to prove our reserves up to commercial level but the promise we see so far is very large," he said.

Streitberg said every element of Buru's success helps promote the Canning's profile.

"We are the only company doing any long-term exploration in the basin at this point, so every hole we drill adds to the knowledge base significantly," he said.

"We have spent a great deal of time and effort over the past few years making sure we integrate our geological data into the overall understanding of the basin and its prospectivity.

"We have a huge amount of the basin under title and we are actively and systematically exploring across some fairly wide areas — every element of success we have validates our geological theories and means another huge step forward in the industry's understanding of the region."



Photo: Buru Energy

Ungani EPT.

New executive to drive WA minerals research



Newly appointed WAMRI CEO Mark Woffenden.

A 35-year resources industry expert has taken the helm at the State Government's new \$7.5 million Western Australian Minerals Research Institute (WAMRI).

Mark Woffenden, the outgoing head of Curtin University's Resources and Chemistry Precinct, has been appointed to the new CEO role at WAMRI.

"Mr Woffenden was the ideal candidate, as not only does he have strong strategic and technical knowledge when it comes to the various challenges and opportunities of the contemporary WA mineral industry, he has also held positions with major resources' players Rio Tinto, Hamersley Iron, Comalco Aluminium and KPMG Consulting," said outgoing Mines Minister Norman Moore.

"I am confident the institute will flourish under his stewardship, promoting the long-term international competitiveness of WA's minerals industry."

WAMRI will develop new mineral discovery, extraction and recovery technologies,

helping previously uneconomic deposits become attractive to industry.

"We must all remember that the long-term sustainability of this industry is dependent upon the discovery of new resources and the development of new technologies," Mr Moore said.

Mr Woffenden's appointment was endorsed by the institute's board of directors, which includes BHP Billiton senior research and development manager, Peter Lilly; Australian Petroleum Production and Exploration Association chief operating officer for Western Region, Stedman Ellis; Rio Tinto Innovation general manager Andrew Shook; Resource Capital Funds managing partner James McClements and Phil Lockyer, director of Phil Lockyer and Associates.

University of WA (UWA) Vice-Chancellor Professor Paul Johnson welcomed the announcement of the new institute and said the university looked forward to

working closely with the new institute on expanding the tertiary institution's contribution to world-class mineral research.

"It will directly benefit Western Australia and the nation through the advancement of knowledge and education in an area vital to the Australian economy and the nation's future," Professor Johnson said.

UWA Energy and Minerals Institute Director Tim Shanahan said WAMRI would foster improved exploration techniques and promote new processing methods for WA's minerals industry.

"We greatly appreciate Minister Moore's support for bringing government, researchers and industry together for minerals research and the benefit of Western Australia," Mr Shanahan said at the launch.

"This announcement will enhance EMI research capabilities and outcomes in the minerals sector through greater industry participation."

Indonesian Ministry signs resources training deal

A new program to deliver education, training and capacity-building for Indonesia's mining, oil, gas and technology sectors was recently signed in a Memorandum of Understanding (MoU) at the University of Western Australia (UWA).

The signatories were delegates from Indonesia's Ministry of Energy and Mineral Resources Training Agency and representatives from the International Mining For Development Centre (IM4DC) — a partnership between UWA and the University of Queensland (UQ).

IM4DC Director Ian Satchwell said the Indonesian Ministry had independently identified UWA as its preferred partner for capacity-building in oil and gas administration.

The visit included discussions with key UWA staff about building capacity

to provide services in extractives administration.

Indonesian delegates also visited the Accelerated Learning Laboratories in UWA's School of Psychology, and the Faculty of Engineering, Computing and Mathematics.

Mr Satchwell said the Indonesian Training Agency first approached the centre last December to build Ministry capacity through cooperation and assistance.

He said IM4DC was already delivering a project through UQ to cooperatively develop new competency standards and training for about 1,000 Indonesian inspectors to administer new mining laws in that country.

"In addition to short courses and other capacity-building, the MoU provides for the centre to provide advice and

assistance to Ministry staff for scholarships, advanced studies and to attend relevant courses at partner universities and other institutions," Mr Satchwell said.

"The MoU will also broaden and deepen existing collaborations in mining and energy research and education between the two leading universities in that sector — UWA and UQ."

The IM4DC partnership was formed last year between UWA's Energy and Minerals Institute, UQ and AusAID to support governance, sustainability and expertise in developing nations.

IM4DC's program includes scholarships for students from developing nations to study advanced mine sciences at research-intensive universities in Australia's two main resource-rich states.



Photo: Rio Tinto

Approval of an extension to the Yandicoogina Mine demonstrates the strength of the WA economy.

Mines' expansion gets green light

The State Government has approved proposals by Rio Tinto Iron Ore to expand two of its iron ore operations and build a major new power station in the Pilbara, clearing the way for a \$3 billion investment.

The expansion of Rio Tinto's Nammuldi and Yandicoogina mines and construction of a 130MW power station at Cape Lambert will help to sustain Western Australia's strong economic performance.

The investment at Nammuldi will create almost 1,500 construction jobs and secure ongoing employment for more than 700 people, while the \$1.8 billion Yandicoogina extension will provide continued employment for about 1,000 people.

The Nammuldi mine, 60km north-west of Tom Price, includes a major investment in mine infrastructure, which will see iron ore mined below the water table and increase the mine's production limit from eight to 23 million tonnes a year.

Production of ore from below the water table is expected to begin in the third quarter of 2014.

Among other uses, surplus water extracted from the mine will be used for hay production, which will provide additional stock feed for local pastoralists.

At Cape Lambert, Rio Tinto will build a state-of-the-art, fuel efficient 130MW power station to feed into its integrated power network. This additional power source will help meet the port's power needs as annual capacity grows from 85 million tonnes to 235 million tonnes by 2015.

Both investments were announced by Rio Tinto last year subject to government approvals.

Approvals for the Nammuldi project were granted under *the Iron Ore (Hamersley Range) Agreement Act 1963* and for the Cape Lambert Power station, *the Iron Ore (Robe River) Agreement Act 1964*. Both State Agreements are managed by the Department of State Development (DSD). Rio Tinto has received environmental approval for both projects.

The Yandi Sustaining Project includes upgrades of major infrastructure, additional workforce accommodation

The investment at Nammuldi will create almost 1,500 construction jobs and secure ongoing employment for more than 700 people, while the \$1.8 billion Yandicoogina extension will provide continued employment for about 1,000 people.

and development of the Junction South West deposit as a new mining operation.

It will also see production expand from 55 to 60 million tonnes per annum (Mtpa), adding to the State's royalty income.

The project was approved under *the Iron Ore (Yandicoogina) Agreement Act 1996*. The proposed works also have environmental approval.

Long-haul LNG vehicle trial a success

WA company Orbital has produced impressive results from a trial of its LNG-diesel fuel substitution system.

A year ago *Prospect* featured the company and its LNG-powered heavy vehicles, which have been on the road since November 2010.

Toll Mining Services (TMS) has been testing the system, with its B-Double and road train prime movers hauling up to three trailers, with a total weight approaching 150 tonnes.

Working around the clock, on some of WA's longest and loneliest roads, they've clocked up the kilometres fast.

Toll says that with LNG substituting diesel fuel at rates of up to 80 per cent

(by energy), the Orbital system has significantly reduced fuel costs. The cost difference in the fuels is considerable, with LNG 30 to 40 per cent cheaper than diesel and also more environmentally friendly.

The dual fuel capability is a must in Western Australia. It can be a long way to the next LNG refuelling point, and means the trucks can revert to diesel operation if gas runs out.

The prime movers have now accumulated more than two million kilometres, with the trial successful for TMS and Orbital.

TMS has been able to reduce fuel costs, while Orbital has gained invaluable

learning and the opportunity to prove the reliability of the gas system.

Paul Thorp, the WA Fleet and Logistics Manager for TMS, said Orbital's system helped mitigate rising fuel costs.

"With rigs this size, fuel is a significant part of operating costs," Thorp said. "The LNG system gives us reduced fuel costs, while helping us maintain performance and driveability standards."

Orbital is a true Western Australian operation, with the technology developed and supplied by a local company to a key transport company servicing Australia using a domestically-sourced fuel.



Orbital engineers work on a long-haul LNG-powered vehicle at the company's Balcatta headquarters.

Report shows cultural diversity important to WA economy



A new report which outlines the economic and social contribution of migrants to Western Australia has been released by the Office of Multicultural Interests.

The report titled *The Economic and Social Contribution of Migrants to Western Australia* was commissioned by the State Government to increase community awareness of the benefits that migrants bring to WA.

The office released the report along with the State Government's Cultural Diversity Statement, which supports and promotes cultural diversity as one of the State's greatest assets late last year.

The Cultural Diversity Statement adds to the awareness and value of WA as a State enriched by our multicultural population and the latent opportunities this diversity provides.

WA is seen nationally and internationally as a place of opportunity for all people, providing a harmonious environment that respects differing points of views and cultural differences.

Among its findings, the report identified:

- The international education sector alone contributed \$795 million to the WA economy.
- Migrants provided a net fiscal contribution of \$355 million to WA's economy annually.
- About 40 per cent of WA small businesses are owned and operated by migrants.

In addition, the report found that the economic returns from migration and cultural diversity included the injection of skilled labour to WA's workforce, job generation, increased

productivity through innovation and business formation, enhanced trade links and international markets and supported regional development and repopulation.

The Department of State Development, the Department of Training and Workforce Development, the Department of Education Services and Tourism WA contributed to the report.

Copies of *The Economic and Social Contribution of Migrants to Western Australia* full report and the summary report are available from the Office of Multicultural Interests website www.omi.wa.gov.au



Government of **Western Australia**
Department of Local Government
Office of Multicultural Interests

Exporting great ideas to the world



Simulated training in a mine refuge chamber.

Australians have never been shy of taking their innovation to the world, so it should come as little surprise that two local manufacturing businesses are dominating their respective corners of the global metalliferous mine market. *Prospect* takes a look at how two Perth-based companies are making a global impression.

Since the 1990s, Perth companies MineARC Systems and Immersive Technologies have each been exporting a unique range of home-grown products designed to improve a mine's safety performance and profitability, growing to become world leaders in their fields.

Mine safety equipment specialist MineARC has been supplying industry-leading emergency refuge chambers to major mine operators around the globe, since the company was first established in 1999.

MineARC was a leading pioneer of the modern-day refuge chamber industry, developing new refuge chamber technologies that would vastly improve future safe working practices

and influence industry legislation, domestically and overseas.

Before the company's inception, most underground refuge chambers were rudimentary steel shipping containers connected to the mine air supply, with no back-up life support systems should the air supply fail, and no cooling inside the chambers, despite high ambient mine temperatures.

MineARC's first major innovation was the development of its patented CO/CO₂ electrical scrubbing system, designed to remove the build-up of potentially-fatal carbon dioxide and carbon monoxide gases from the air inside a refuge chamber. The gases are caused primarily by the occupants as

they exhaust oxygen and expire carbon dioxide and carbon monoxide.

Ingress of these harmful gases can also occur as people enter and leave the chamber and without a scrubbing system in place, the atmosphere inside an occupied refuge can become fatal in a matter of minutes.

MineARC recently developed a stand-alone carbon monoxide scrubbing unit for easy installation into generic chambers that lack the vital life support feature, thereby bringing the units in line with the official guidelines set out by the WA Department of Mines and Petroleum (DMP).

In 2008, the company signalled its arrival onto the US coal scene with the first

major sales of its patented CoalSAFE refuge chambers to major mine operators in Alabama.

To this day, CoalSAFE remains the only refuge chamber model engineered to US Mine Safety and Health Administration regulations, which require all refuge chambers to have internal cooling systems.

“Refuge chambers in their current form have been around for about 15 years and we have been there from the beginning,” said MineARC’s Australian Business Manager Paul Medcraft, who manages the company’s sales in the Australasian region.

MineARC has regional offices throughout the world with a second major fabrication facility in Dallas, Texas.

“We have a number of worldwide offices, and a presence now in most corners of the globe,” Mr Medcraft said.

“We liaise closely with the appropriate mining authorities in each country so that modifications and upgrades can remain at the cutting edge of the market.”

With models ranging from an ultra-portable four-person chamber through to a 32-person portable, as well as permanent chambers capable of accommodating more than 200 people, MineARC can customise a safety solution to suit most mining applications.

Aside from underground mining, the business’ major growth areas include the tunnelling and chemical processing industries, both of which have inherent safety concerns similar to mining.

In 2010 and 2012, the company received the WA Exporter of the Year award from the Department of Commerce, for its sustained export growth.

A few kilometres from MineARC’s offices, the world’s largest proven and tested supplier of innovative simulator training solutions to the mining industry is going strong, almost 20 years after its first model was released.

Immersive Technologies achieved its unique position in the market by focusing on a mission to make every mining and earthmoving operator in the world safer – and their employers more profitable – through the use of its patented Advanced Equipment Simulators.

The units are helping hundreds of mining companies throughout the world to increase the safety of their operators and their sites through effective simulation training.

Immersive’s unique approach to safety is made possible through a series of licensing alliances with some of the world’s leading original equipment manufacturers, allowing it to access the raft of proprietary technical information required to correctly simulate any given piece of equipment.

Currently, eight of the world’s top 10 mining companies, including Rio Tinto, Vale and BHP Billiton, use Immersive’s simulators as a key tool in recruiting, training and optimising their workforce.

“The global mining footprint of our deployed Advanced Equipment

Simulators has reached more than 310, utilising over 710 simulator training modules over approximately 230 global mining customers,” said an Immersive Technologies spokesman.

“In 2012 we had a 30 per cent growth in revenue, following an accelerated investment in research, product development, technical support and global locations.

“We expect this year will follow suit, as we continue to provide solutions in crucial areas such as quantifying operator competencies and linking them to, and driving, operational performance.”

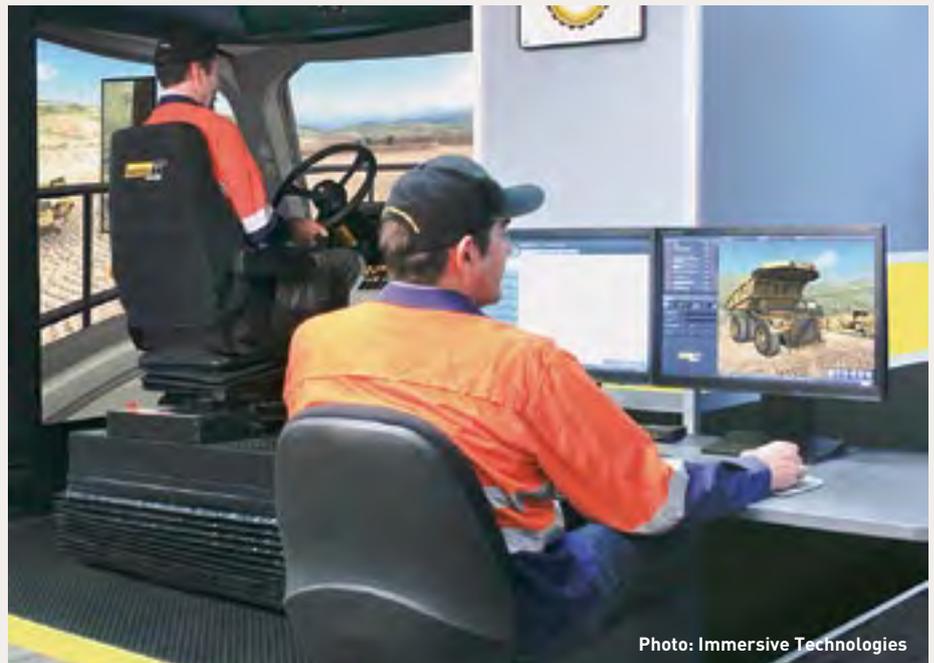


Photo: Immersive Technologies

Immersive Technologies’ PRO3-B has been specifically designed for surface mining.



Photo: MineARC Systems

MineARC’s Paul Medcraft. The company’s chamber is the only one engineered to US Mine Safety and Health Administration regulations.



New iron ore facility for Esperance

The current port at Esperance.

The go-ahead for the next stage of developing a new iron ore export facility at the Port of Esperance has been given by the State Government.

The WA Government has accepted an Esperance Port Authority board recommendation to start a procurement process to identify a private sector consortium to design, finance, construct and operate a multi-user iron ore facility (MUIOF).

Potential proponents are invited to apply for pre-qualification to participate in a Request for Proposal (RFP) process.

Following this initial step, potential proponents will be shortlisted and invited to participate in a RFP process. It is expected the preferred proponent will be identified later this year.

All project funding and associated costs will be the responsibility of the private

sector proponent ultimately selected through the RFP process.

Last year the State Government indicated its preference for Esperance Port as the site for additional port infrastructure to cater for demand from iron ore producers in the Yilgarn region.

The proposed facility will lead to an expansion of Esperance Port's iron ore export capacity. The size of the new facility will be determined by the proponent building the new infrastructure after entering into contracts with miners.

Recent market sounding conducted for the Esperance Port Authority indicated that initially it may be commercially viable to develop a facility for an additional 10 to 12 million tonnes per year.

Currently the port has an operating licence to handle 11.5 million tonnes a year.

It is expected that the decision will facilitate growth of the Yilgarn region's iron ore sector.

Investors interviewed during the market-sounding considered the Yilgarn region to have reasonable prospects of generating additional financially viable iron ore projects which are required to support investment in the new MUIOF.

The market-sounding exercise also confirmed previous industry studies that iron ore production in the Yilgarn Region could significantly grow in the next 10-15 years.

The MUIOF would be designed in such a way so as not to preclude the development of additional iron facilities in stages as justified by demand.

Registrations of interest closed on 1 March.

Multi-government services at new registrar building

A new Mining Registrar office has been opened in Mount Magnet, as part of the State Government's commitment to maintain accessible services to regional communities.

The new 115m² facility, officially opened by retired Mines and Petroleum Minister Norman Moore, will provide vital government services in the State's Mid-West and Gascoyne regions, which

produced \$2.5 billion in commodities in 2011-12.

"The facility accommodates the administration of mining activities within the Black Range and Mount Magnet districts and the Yalgoo mineral field," Mr Moore said.

"Other government services are also being carried out from the new facility, such as administration activities for the

Department of the Attorney General; licensing functions for the Department of Transport; and various services for the Western Australian Electoral Commission and the Department for Racing, Gaming and Liquor."

Funding for the new facility was announced as part of the State Budget 2012-13, with the State Government committing \$1.33 million to build the multi-purpose government office.

The facility replaces the previous Mining Registrar's office, built in 1955.

In 2010-11, the Department of Mines and Petroleum (DMP) processed 133 Miner's Rights for hobby prospectors, and 414 tenement applications in the Mount Magnet area.

Western Australia has 10 Mining Registrar regional offices at Collie, Coolgardie, Kalgoorlie-Boulder, Karratha, Leonora, Marble Bar, Meekatharra, Mount Magnet, Norseman and Southern Cross.





Photo: UWA

Professor Peter Veth inspects aerial shots of Barrow Island.

Barrow Island time capsule to unlock Australian history

An international research team led by the University of Western Australia (UWA) is about to unlock an unprecedented 45,000-year history from the unique archaeological time capsule that is Barrow Island, one of the largest islands lying off Australia's north-west coast and home to the Gorgon gas project.

Rising sea levels flooded mainland access to the island about 7,000 years ago, with the island appearing to have been uninhabited until American whalers and pearlmen arrived in the early to mid-1800s.

The biggest Australian Research Council Discovery grant awarded this year will enable Professor Peter Veth of UWA's Centre for Rock Art Research and Management (CRARM) to lead the \$1.17 million project over the next three years.

"As the most arid island continent in the world to have been colonised by humans and now faced with never-before-seen states of climate change and threats to cultural and natural heritage, it seems

absolutely timely that the Barrow Island Archaeology Project can be realised," Professor Veth said.

The project will examine 'deep-time' maritime societies in northern Australia, modelled to date back to earlier than 45,000 years ago.

Important climate and ecological records will be reconstructed from the contents of caves. The more recent labour history of Indigenous people and pearling will also be profiled.

"This project has the capacity to provide entirely new understandings of human behavioural ecology, island biogeography, climate change and historic-era exploitation of this maritime arid zone, which will be unquestionably of national and international significance and impact," Professor Veth said.

Professor Veth's research will be conducted alongside an ARC Linkage Project on the *in situ* preservation of colonial-era wrecks, and the long-term work on the rock art and archaeology of the Western Desert and Pilbara regions.

Publication to assist gemstone enthusiasts

Earlier this year outgoing Mines and Petroleum Minister Norman Moore launched a new comprehensive publication about Western Australian gemstones and decorative stones.

Gemstones of Western Australia is the first substantial and systematic work on Western Australian gemstones by the Department of Mines and Petroleum's Geological Survey of WA (GSWA) and was produced in collaboration with the Gemmological Association of Australia (WA Division).

Mr Moore said the colourful publication was written for experienced fossickers and amateur rockhounds, as much as it was for the professional geologist and gemmologist.

"This is a comprehensive resource on gemstones and decorative stones used in jewellery and ornamental sculpture in WA," Mr Moore said. "It outlines geographic locations of known deposits, which will assist fossickers searching for gemstones throughout the State.

"The book combines geology and gemmology to provide factual information and each chapter has detailed mineralogical information, as well as their geological setting and location.

"This publication is a much-expanded update of a series of booklets entitled *Gemstones in Western Australia*, produced by GSWA between 1975 and 1994, and includes abundant references to earlier work."

Mr Moore said while Western Australia had a growing international reputation as a major source for rare fancy pink and other coloured diamonds, far less was known about occurrences of gems such as beryl, topaz, tourmaline, gem-quality quartz and associated siliceous minerals.

He said the publication also focused on materials peculiar to orbicular granite and mookaite, along with pearls, fossil wood and precious metals.



The publication is available as a free download from www.dmp.wa.gov.au/GSWApublications or order a hard copy from www.dmp.wa.gov.au/ebookshop for \$50 (inc GST).

AGRICULTURE

East Kimberley – Ord – Ord/East Kimberley Expansion Project

WA STATE GOVERNMENT

The State Government has committed \$322m to increase the existing amount of irrigated land in the Kununurra region by releasing approximately 15,000ha of additional Ord farm lands. 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.

On 20 November 2012 the State Government announced Kimberley Agricultural Investment (KAI) as the preferred proponent to lease and develop 13,400ha of irrigation land in the Goomig and Knox Plain areas. KAI, a subsidiary of China's Shanghai Zhongfu Group, proposes to invest up to \$700m to establish a sugar industry in the Kununurra region. To achieve a diverse agricultural mix for the region and to support local enterprise an additional 1,700ha of newly developed land in the Ord West Bank will be available for the development of up to 25 new farms. The Commonwealth Government has committed \$195m of funding for social and common use infrastructure in the East Kimberley region through the East Kimberley Development Package (EKDP) National Partnership Agreement (NPA). Construction is well underway and some of the infrastructure projects were officially opened in November 2012 by Federal Minister, the Hon Simon Crean MP, and the Hon Brendon Grylls MLA including the Kimberley Training Institute Kununurra campus, Wyndham Port Facilities Upgrade, Ochre Health Centre and the MG Corporation/Gelganyem Trust Shared Office Facility. The Package will be fully implemented by June 2013. The Ord East Kimberley Expansion Project is a tremendous example of the Commonwealth and State Government working closely together to deliver economic and Indigenous participation opportunities and much-needed infrastructure to a regional community of Western Australia.

Expenditure: \$517m

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 \$3.25b construction project is complete and the ramp up phase is underway.

Expenditure: \$3.25b

Employment: Construction: 1500; Operation: 200

GOLD

Boddington – Gold Mine

NEWMONT BODDINGTON GOLD PTY LTD

Newmont Boddington Gold (NBG), a major gold and copper mine in the south east of Western Australia, 120km from Perth, commenced operations in 2009 after a \$3b expansion of the original Boddington Gold Mine, a joint venture which had been in care and maintenance for several years. NBG is now 100 per cent owned and operated by United States global miner Newmont Mining Services. First gold was poured in September 2009 and 18 months later the operation achieved its first one-million-ounce milestone. An estimated 750,000 ounces of gold per annum is expected to be produced for the life of the mine. The current mine plan has a mine life of approximately 24 years, but proposals to further extend the operation indicate a mine life to 2050 and beyond. Boddington Gold also produced 69Mlbs of copper in 2011, increased this to over 70Mlbs in 2012 and expects similar copper production in 2013.

Employment: Operation: 650

INFRASTRUCTURE

South West Region – Kemerton

(HUILS – Heavy Use Industrial Land Strategy)

WA STATE GOVERNMENT

Kemerton Industrial Park, located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, only 90 minutes away by road. The estate comprises 7,543ha of land, including 2,019ha of industrial core, 293ha support industry area and 5,231ha buffer areas. It is accessible to the Port of Bunbury by road and a rail link is being planned. The estate is serviced by major road links to the metropolitan area. Under the Heavy Use Industrial Land Strategy, the Government is progressing Kemerton towards project ready status by undertaking environmental, heritage and planning approvals for the estate. Work towards progressing approvals commenced in 2009 and is anticipated to be completed in 2013/14, by which time the structure plan and zoning adjustments will also have been completed.

IRON ORE

Mid West Region – 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 is exporting through Geraldton port, 10Mtpa of iron products, comprising 8Mtpa of high grade magnetite concentrate and blast furnace quality pellets and 2Mtpa of Direct Shipping Ore hematite. The Project is underpinned by a JORC compliant resource base, comprising a 977Mt magnetite reserve, a 2.518Bt magnetite resource, a 10.9Mt hematite reserve and a 16.2Mt hematite resource.

Expenditure: \$1.975b

Employment: Construction: 1500; Operation: 500

Pilbara – FMG Chichester – Iron Ore Mine,

Rail and Port Development

FORTESCUE METALS GROUP LTD

Fortescue Metals Group (FMG) operates iron ore mines at Cloudbreak and Christmas Creek in the Chichester Ranges of the eastern Pilbara, serviced by a multi-user railway and port facilities at Port Hedland with a current capacity of 120Mtpa.

Expenditure: \$4b.

Employment: Operation: 3200

Pilbara – Port Hedland – Atlas Iron

ATLAS IRON LTD

Atlas Iron Ltd is an iron ore explorer and miner focused on a developing a number of projects in the Pilbara region of Western Australia with exports commencing in December 2008 from its Pardoo Project, east of Port Hedland. Atlas' second mine, Wodgina, commenced operations in 2010. Production has recently commenced at its third mine, Mt Dove, located 65km south of Port Hedland. The company plans to bring five mines into production in five years, with the addition of Abydos Mine in June 2013, and the first phase of the Mt Webber Mine in December 2013. Atlas aims to export between 7.2Mt and 7.7Mt in the 2013 financial year. Atlas plans to progressively expand its exports, targeting 15Mtpa by 2015 and 46Mtpa during the 2017 calendar year.

Expenditure: \$500m

Employment: Operation: 570

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 is bagged and containerised on site, and trucked to the Port of Fremantle for export. The first feed of concentrate from Mt Weld to Lynas' processing plant in Malaysia occurred in late 2012. Ramp up of production at the Malaysian plant is currently underway, with initial production capacity of 11,000tpa REO expected to be reached in the first half of 2013. Phase 2, which involves the expansion of the Mt Weld concentration plant to produce around 66,000tpa of concentrate, is scheduled to be commissioned in the second quarter of 2013 and is scheduled to meet the Malaysian processing plant's planned expanded production capacity of 22,000tpa REO in late 2013.

Expenditure: \$135m

Employment: Construction: 120; Operation: 110

Committed Projects

AMMONIUM NITRATE

Kwinana – Ammonium Nitrate Facility Expansion CSBP LIMITED

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

Expenditure: \$550m.

Employment: Construction: 300; Operation: 10

Pilbara – Burrup Industrial Estate Site D – Yara Pilbara Nitrates YARRA INTERNATIONAL ASA

Yara, Orica and Apache have formed a joint venture — Burrup Nitrates Pty Ltd (BNPL). BNPL has executed an Engineering, Procurement and Construction (EPC) contract for the construction of a circa 350,000tpa Technical Ammonium Nitrate (TAN) plant to be located on the Burrup Peninsula. Ammonia feedstock will be supplied from Yara Pilbara Fertilisers Pty Ltd (YPFPL), which operates its facility directly adjacent to the proposed location for the new TAN plant. Yara Pilbara will be the operator of the TAN plant and Orica will manage the product sales and distribution. Yara and Orica 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. Work on the project has commenced and it is expected that the new plant will be commissioned during the first quarter of 2015.

Expenditure: \$600m

Employment: Construction: 600; Operation: 65

GOLD

Kalgoorlie – Tropicana Gold ANGLOGOLD ASHANTI/INDEPENDENCE GROUP JOINT VENTURE

AngloGold Ashanti, as Joint Venture Manager, has continued to progress development of the Tropicana Joint Venture gold mining project proposal 330km north east of Kalgoorlie. Following State and Commonwealth Environmental approvals in the second half of 2010, key State and local government approvals required for construction of a 225km road, bore field, pipelines, airstrip, accommodation village, power station and mine plant are either in place or in the final stages. Road construction is complete and a sealed 2.1km airstrip is operational. Plant construction has commenced and the project is on track for first gold production in Q4 2013.

Expenditure: \$700m

Employment: Construction: 700; Operation: 400

HEAVY MINERAL SANDS

Keysbrook – Heavy Mineral Sands Mine MZI RESOURCES LTD

MZI is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. The project has received environmental approval from the Minister for Environment, as well as development approvals and extractive industry licences from the Shires of Murray and Serpentine-Jarrahdale. The Feasibility Study was completed in October 2012 which indicated a mine life of 7.2 years with potential to extend for up to 11 years. Keysbrook has a mineral resource of 49.1Mt at 2.6 per cent heavy minerals and an ore reserve of 670,000t of total heavy minerals, which underpins the first five and a half years of operations. The ore will be processed at Doral's mineral separation plant in Picton, near Bunbury, under toll treating arrangements. MZI plans to start site construction in March 2013, with first production expected in Q4 2013. The project is expected to produce 62,200tpa of leucoxene products and 28,700tpa of zircon concentrate.

Expenditure: \$64m.

Employment: Construction: 35; Operation: 30

INFRASTRUCTURE

Pilbara – Ashburton North Strategic Industrial Area WA STATE GOVERNMENT

The State Government is developing the Ashburton North Strategic Industrial Area (ANSIA) as a hydrocarbon precinct in the Shire of Ashburton, 11km south west of Onslow, to enable the development of natural gas projects and associated industries to exploit the gas reserves in the Carnarvon Basin and Exmouth Gulf. In addition to the industrial area with proponent sites and general areas, the ANSIA includes a port with common-user facilities to be managed by the Dampier Port Authority, and common user access and 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 on the Wheatstone project in September of 2011 and early construction works commenced in late 2011. First LNG exports are scheduled for 2016. In Q3 2011, BHP Billiton commenced construction of the Macedon domestic gas project, with gas production to commence in early 2013. ExxonMobil are still evaluating several development options for the production and export of LNG from the Scarborough project.

IRON ORE

Pilbara – BHPB – Inner Harbour Expansion – Port Hedland BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4b (BHP Billiton's share US\$6.6b) 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\$1.9b (BHP Billiton's share) to increase total inner harbour installed capacity to 220Mtpa. First production was achieved in Q4 2012. The overall project is 80 per cent complete. Further debottlenecking opportunities are being evaluated.

Expenditure: \$2b

Pilbara – BHPB – Port Blending and Rail Yard Facilities BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4b (BHP Billiton's share US\$6.6b) 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\$1.4b (BHP Billiton's share) to optimise resource and enhance efficiency across the BHP Billiton WA iron ore operation supply chain. The project is currently on schedule (overall project is 55 per cent complete) and on budget.

Expenditure: \$1.5b

Pilbara – Hope Downs 4 Iron Ore Mine RIO TINTO IRON ORE

Rio Tinto and Hope Downs Iron Ore Pty Ltd, as equal Joint Venture participants, are currently developing the Hope Downs 4 iron ore mine at an estimated capital cost of \$1.15b. 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 \$406m railway and power project is funded, constructed and operated by Rio Tinto. Construction is underway, with first production expected in Q2 2013.

Expenditure: \$1.155b

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\$7.4b (BHP Billiton's share US\$6.6b) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$3.3b (BHP Billiton's share) to increase installed mining and processing capacity at Jimblebar mine to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The project is currently on schedule (overall project is 66 per cent complete) and on budget.

Expenditure: \$3.5b

Pilbara – Solomon – Chichester expansion and Solomon Mine Project

FORTESCUE METALS GROUP LTD

Fortescue has recently completed the expansion of its existing mines at Cloudbreak and Christmas Creek to 95Mtpa (including 5Mtpa from BC Iron). The existing rail and port facilities have been expanded by the duplication of 120km of railway south of Port Hedland, installation of two new train unloaders, construction of two additional berths and associated infrastructure resulting in a rail and port capacity of 120Mtpa. Construction of infrastructure in support of the Solomon Hub, which includes the new 20Mtpa Firetail iron ore mine at Solomon and the 127km railway spur to Fortescue's existing Christmas Creek to Port Hedland rail line, has been recently completed. The Solomon Hub is planned to involve at least two mining areas and two processing plants. First production from the Firetail deposit at Solomon was achieved in November 2012. FMG recently announced that it is resuming construction of its 40Mtpa Kings mine at Solomon with first production expected late 2013.

Expenditure: \$9b

Employment: Construction: 7000; Operation: 6000

IRON ORE PROCESSING**Pilbara – Cape Preston – Sino Iron**
CITIC PACIFIC

CITIC Pacific Mining is constructing the Sino Iron project at Cape Preston, 100km south west of Karratha. The 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 27.6Mt of magnetite concentrate and high grade pellets will be exported each year. Ore production from the first and second, of a planned six production lines, is expected to commence in 2013.

Expenditure: \$5.2b

Employment: Construction: 4000; Operation: 500

OIL & GAS DEVELOPMENTS**Carnarvon Offshore Basin – Barrow Island – Gorgon Project**

GORGON JOINT VENTURE

The Gorgon Joint Venture (GJV) made its final investment decision on the Gorgon Project in mid September 2009. The GJV's foundation project on Barrow Island includes a three train LNG development capable of exporting 15.6Mtpa and a domestic gas project capable of delivering at least 300TJ/d of gas to the mainland. Cost estimates for the foundation were increased from \$43b to \$52b following a cost and schedule review conducted by Chevron in December 2012. The development on Barrow Island 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: \$52b

Employment: Construction: 5554; Operation: 300

Carnarvon Offshore Basin – North Rankin – North Rankin Redevelopment

WOODSIDE ENERGY

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

Expenditure: \$5b

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 constructing a domestic gas plant for Western Australia at the Ashburton North Strategic Industrial Area near Onslow. The development involves 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/d. Plant construction started in Q3 2011, with gas production to commence in Q2 2013.

Expenditure: \$1.5b

Employment: Construction: 700; Operation: 14

Pilbara – Wheatstone LNG Development

CHEVRON AUSTRALIA PTY LTD

Chevron has received necessary approvals and commenced early construction works for a 25Mtpa LNG project based on its Wheatstone and Iago gas fields, to be located at Ashburton North, near Onslow. The project will also process gas from 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 250Mcf per day domestic gas plant.

Expenditure: \$29b.

Employment: Construction: 5500; Operation: 400

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, increased the plant capacity to 48,000tpa and came online in Q3 2012. Providing world demand for silicon continues to increase strongly, a second stage expansion, involving installation of a fourth furnace is under consideration and could take place by 2014 and increase plant capacity to 64,000tpa.

Expenditure: \$100m

Employment: Construction: 120; Operation: 40

HEAVY MINERAL SANDS**Happy Valley – Heavy Mineral Sands Mine**
CRISTAL MINING AUSTRALIA LIMITED

Located adjacent to Cristal's Gwindinup deposits south of Bunbury, the company proposes to mine the Happy Valley North and South mineral sands deposits situated on private land and in State Forest. The two deposits contain more than 750,000t of recoverable heavy mineral concentrate, with average production expected to be around 150,000tpa over a combined mine life of eight years. The concentrate will then be trucked to Cristal's Bunbury Mineral Separation Plant for final processing. The company is awaiting the outcome of its environmental approvals process.

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 41,000tpa of zircon, 89,000tpa of chloride ilmenite and 19,000tpa of a mixed rutile-leucocene HiTi90 product. At the proposed mining rate of 17.5Mtpa, the mine life is estimated to be 17.5 years. In August 2012, the Board of Korean company POSCO conditionally approved an investment in the Coburn project. POSCO, along with a Korean resources investment fund will form a special purpose investment vehicle, the POSCO SPV, to take a minority 40 per cent interest in the project. A joint venture agreement is expected to be completed in February 2013. Subject to receiving financing in early 2013, first production is forecast to commence in Q3 2014.

Expenditure: \$192m

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 development of the Browse Basin gas fields. The Precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. Woodside Energy Limited, as the operator of the Browse Joint Venture, has committed to the Precinct as a potential foundation proponent. Browse Joint Venture participants are expected to make a final investment decision by mid-2013.

Expenditure: \$30b

Employment: Construction: 6000; Operation: 400

Oakajee – Oakajee Midwest Development WA STATE GOVERNMENT

The Oakajee Port proposal includes 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 proposal also includes 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 is planned to 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 is proposed to be operated by Oakajee Port and Rail though an open access regime.

Expenditure: \$4b

Employment: Construction: 2000; Operation: 300

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

The Anketell project involves the establishment of a multi-user, multi-commodity deep water port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha on the Pilbara coast. The port and associated infrastructure will be a proponent-funded but State owned Port which will be managed and operated under the Port Authorities Act 1999. The strategic industrial land will fall under the jurisdiction of the Western Australian Land Authority (LandCorp). During its initial phase, it is expected that Anketell will be an iron ore export facility and that, at its peak capacity, at least 350Mtpa will be exported to customers in Asia. A number of iron ore producers with mining assets in the Pilbara have expressed interest in using the planned facilities at Anketell. It is likely that the Port will be developed in stages to accord with the development of the various mining operations which are spread throughout the Pilbara.

IRON ORE

Great Southern Region – Southdown Magnetite Mine GRANGE RESOURCES LTD/SRT AUSTRALIA JOINT VENTURE

The Southdown Magnetite deposit is situated 90km north east of Albany, near Wellstead. Southdown is an advanced development project. Work completed includes engineering feasibility studies, an extensive drilling program, land acquisition and most major approvals. Results of the Definitive Feasibility Study were announced in Q2 2012. Grange Resources (70 per cent) recently announced a significant reduction in 2013 project expenditure as it continues to seek a new equity investor for the project.

Expenditure: \$2.88b

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 and undertaking an implementation study for the project.

Expenditure: \$2b

Employment: Construction: 1000; Operation: 350

Mid West Region – Jack Hills Expansion CROSSLANDS RESOURCES

The Jack Hills Expansion Project will involve the development of a 20Mtpa magnetite mine. The magnetite concentrate is proposed to be transported by a new railway to a new deepwater port at Oakajee.

Expenditure: \$2b

Employment: Construction: 450; Operation: 350

Mid West Region – Weld Range Iron Ore Mine SINOSTEEL MIDWEST CORPORATION LIMITED

Sinosteel Midwest Corporation proposes to develop a 15Mtpa iron ore mine at Weld Range 65km southwest of Meekatharra, producing a mix of hematite lump and fines. The project is expected to utilise a proposed new rail line and deepwater port facility at Oakajee. The company finalised a bankable feasibility study in July 2010.

Expenditure: \$1b

Employment: Construction: 1000; Operation: 500

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 2016 via the proposed multi-user 350Mtpa plus 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 an agreement was reached in June 2011. The environmental scoping document was approved by the EPA in August 2011.

Expenditure: \$3.7b

Employment: Construction: 3000; Operation: 1000

Pilbara – Roy Hill Iron Ore Mine & Infrastructure ROY HILL HOLDINGS PTY LTD

Roy Hill Holdings is a private company which is majority-owned by Hancock Prospecting Pty Ltd, and has key international investment partners with strategic steel-making interests. They are developing the Roy Hill iron ore project located 115km north of Newman. This project is expected to come into production in 2015 and will produce 55Mtpa of iron ore for 20 years following ramp-up. The project includes mine development, mine processing infrastructure, a new heavy-haul 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 344km railway from its mine in the eastern Pilbara to Port Hedland. All key approvals have been secured and major project works commenced in late 2012. Dredging of the new berth areas at South West Creek was finished ahead of schedule, the airstrip and internal mine roads are underway, and development is proceeding for the construction of mine, rail and port accommodation villages.

Expenditure: \$9.5b

Employment: Construction: 3600; Operation: 2000

Pilbara – West Pilbara Iron Ore Project API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 30Mtpa of direct shipping iron ore from its Red Hill and Mt Stuart mine sites located 35-80km 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 2015. Environmental approval for the mine and rail elements of the project was received in December 2011.

Expenditure: \$6b

Employment: Construction: 3500; Operation: 1000

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

Cliffs proposes to expand its Koolyanobbing Operation to include an additional iron ore mining area at the Deception Deposit, located approximately 150km north of Southern Cross. The Deception Deposit contains an estimated 7.1Mt of iron ore and is expected to have a mine life of around five years. The Deception Deposit received environmental approval in June 2012 and first production is expected in first half of 2015.

Expenditure: \$35m

NICKEL

Mt Windarra – Windarra Nickel POSEIDON NICKEL NL

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

Expenditure: \$250m

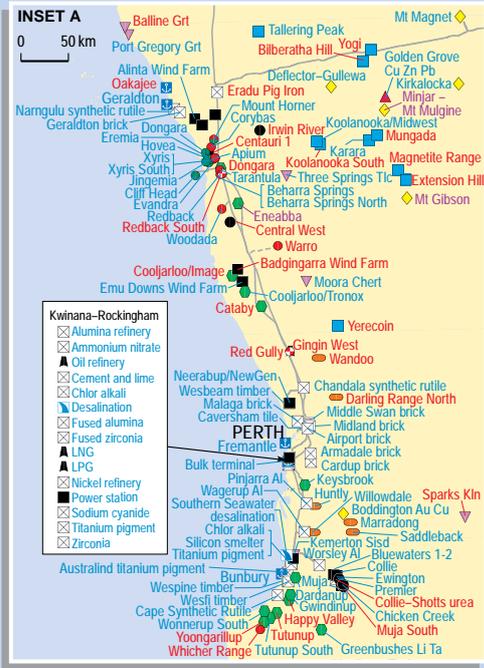
Employment: Construction: 80; Operation: 180

OIL & GAS DEVELOPMENTS

Carnarvon Basin – Pluto Project Expansion WOODSIDE ENERGY

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

Major Resource Projects — March 2013



Project labels:

- PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$10 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

- MINERAL SYMBOLS**
- Precious mineral
 - Precious metal
 - Steel alloy metal
 - Speciality metal
 - Base metal
 - Iron
 - Alumina
 - Coal and lignite
 - Uranium
 - Industrial mineral
 - Processing plant
- PETROLEUM SYMBOLS**
- Gas field
 - Oil field
 - Oil and gas field
 - Significant gas discovery
 - Significant oil discovery
 - Significant oil and gas discovery
 - Processing plant
 - Oil / gas pipeline, operating
 - Oil / gas pipeline, proposed
- INFRASTRUCTURE**
- Power plant
 - Radio astronomy
 - Irrigation / water / desalination
 - Port
- COMMODITIES**
- Ag..... Silver
 - Al..... Alumina
 - Au..... Gold
 - Bx..... Bauxite
 - Co..... Cobalt
 - Cu..... Copper
 - Dmd..... Diamond
 - Fe..... Iron
 - Fl..... Fluorite
 - Gp..... Gypsum
 - Grt..... Garnet
 - K..... Potassium
 - Kln..... Kaolin
 - Li..... Lithium
 - LNG..... Liquefied natural gas
 - LPG..... Liquefied petroleum gas
 - MgCO₃..... Magnesite
 - Mn..... Manganese
 - Ni..... Nickel
 - Nb..... Niobium
 - Pb..... Lead
 - Pd..... Palladium
 - Phos..... Phosphate
 - Pt..... Platinum
 - REE..... Rare earth elements
 - Sisd..... Silica sand
 - Ta..... Tantalum
 - Ti..... Titanium
 - Tlc..... Talc
 - V..... Vanadium
 - W..... Tungsten
 - Zn..... Zinc
 - Zr..... Zirconium

