



P R O S P E C T

Mine makes hay

Turning groundwater into new, rich resource



Western Australia remains well placed to deal with the challenges created by recent volatility in world financial and commodity markets.

For a start, we live in an exciting region, and at both government and industry level have worked hard over five decades to develop our links with the economies of Asia and the Indian Ocean regions.

Undoubtedly, the biggest opportunities for Western Australia's future development are to be found in these regions, with China, Japan and South Korea, currently our three biggest trading partners and our relationships with India and Singapore are steadily strengthening.

Taking China as a gauge, in 1994, exports of Pilbara iron ore to China were 17 million tonnes a year. In 2011-12 the comparable figure was 322 million tonnes.

In 2006, China's first Liquefied Natural Gas imports were sourced from Western Australia. The State remains the biggest LNG supplier in a rapidly-growing market.

China's growth rate will be maintained by continued development, as 25 million people move from rural to urban areas each year. China will move from being a commodity buyer to a long-term investor, with a major role in sustaining Western Australia's development.

While the China relationship will dominate Western Australia's economy for the foreseeable future, we must not downplay the wealth of opportunities in the Asian and Indian Ocean regions.

Japan and South Korea are vital to Western Australia's development as a resources economy, and remain important trade and investment partners.

Singapore is growing as an international business centre for the mining industry, creating even greater opportunities for partnerships in development, both within and beyond South East Asia.

India's economic development, and its increasing demand for mineral and energy resources, petroleum, coal and uranium, has resulted in increasingly frequent visits by Indian business leaders.

Western Australia is also a major player in the development of resources in Africa, as outlined in this issue, with more than 160 WA-based mining companies now involved in mining and mining services there.

Western Australia's commitment to developing relationships in Asia and the Indian Ocean region will see us continue to lead the nation's integration with the leading economies of these regions well into the future.

Colin Barnett
PREMIER OF WESTERN AUSTRALIA & MINISTER FOR STATE DEVELOPMENT

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MINISTER FOR MINES AND PETROLEUM

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Cover photo: *Charlie Knight, Rio Tinto supervisor for the HAP project (right) and Agriculture Minister Terry Redman with the first water coming through the pivots at Marandoo.*
Photo: Rio Tinto (Christian Spragoel). Story, page 9.

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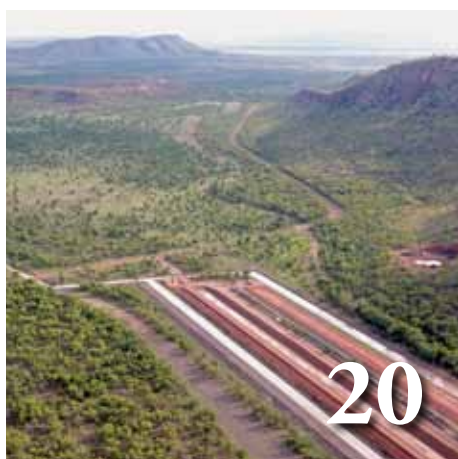
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Algae fuels successful biodiesel project



Aurora Energy's system of harvesting ponds at Karratha. Photo: Aurora Energy.

Aurora Algae has successfully completed a demonstration algae production facility in Karratha, providing a step towards using algae as a future biodiesel source in Western Australia.

The facility is supported by a \$2 million WA Government grant from the Low Emissions Energy Development (LEED) fund and has been jointly supported by four State Government departments: State Development, Environment, Energy and Regional Development.

The production system uses carbon dioxide, seawater and sunshine to produce algae, which is turned into biofuel and dietary supplements (primarily Omega 3 oil).

"The completion of the project underlines the importance of the LEED fund in supporting the development of new, low-emission technologies and renewable energy supplies to reduce the State's carbon footprint," Energy Minister Peter Collier said.

"The ultimate benefits of the LEED fund flowed from wider adoption of the technologies it supported.

"Algae farming is well suited to WA's dry, sunny climate, regional carbon dioxide (CO₂) sources and liquid fuel requirements.

"The technology provides the environmental benefits of sequestering CO₂, while producing renewable fuel."

Aurora is proposing to construct a larger-scale commercial plant in the next couple of years, with the aim of supplying the local mining industry with biodiesel.

Aurora's Managing Director in Australia, Matthew Caspari says the grant required the project to reach certain targets.

"We also wanted to integrate different pieces of the process, including production and harvesting, and the drying to create the end product," he said.

"We also succeeded in producing biofuel from the facility and running one of our vehicles on it," he said.

"We are very excited to have these successful results and the technology, and we are looking forward to the next stage, which is the commercial project."

All this has happened since 2006, when the company was formed by three American university students studying at the University of California, Berkley.

Matt Caspari explains: "One of us was studying biochemistry, another chemical engineering and I was doing an MBA, though I also have a degree in biochemistry," he said.

"I was interested in alternative energy and one of the others was looking at algae being used in hydrogen production, so one thing led to another.

"It's not as though it's anything new. The US Government had been looking at it in the 1970s. I guess what focused our attention was the shift in oil prices."

What brought the company to Karratha, 1,557km north of Perth, was a combination of four factors – all ideal for algae growth. These are abundant sunlight, constant warm temperatures, large tracts of flat land near the sea and being close to supplies of carbon dioxide.

The last factor is possibly the most important, as carbon dioxide from industry (and there's plenty of it near Karratha) is used in growing the algae.

The company's six, 4,000 square metre shallow harvesting ponds have been producing algae at Karratha for a year, resulting in a production rate of 12 tonnes of algae, which is sent to the US as a powder for processing.



While the company employs 50 people in Western Australia, at this stage it is cheaper to send the algae to America for conversion to fuel, oil and testing.

Within the scope of this commercial sector project, downstream processing will be done in WA.

“We expect that to be some time in 2015,” says Matt Caspari.

“At present we are working our way through engineering designs and permits for land for the commercial-scale project.”

The company has already patented more than 30 items necessary to protect what it sees as world-leading technology.

“We look at things such as the type of algae to different methods and types of equipment for processing it.”

One unusual discovery has been that when algae is under stress, it produces more oil. Matt Caspari says the company is looking at ways to induce stress.

“It seems like an easy thing to do, but if it was there’d be plenty of other companies doing it,” says Matt Caspari. “It’s an extremely large project and needs a lot of Research and Development, then of course, the construction.”

WA Environment Minister Bill Marmion says the development of an algae aquaculture industry in the Pilbara also

has the potential to create new jobs that complements the resources sector, with health foods, pharmaceuticals and feedstock all possible sectors to benefit.

“Algae production does not compete with food production, as some biofuel sources do, and has beneficial by-products that help offset biofuel production costs.

The Minister for Regional Development, Brendon Grylls, says commercial-scale algae projects could provide much-needed economic diversification in the region.

Meanwhile, Perth-based biofuels developer Algae.Tec has signed a major airline to fully fund a production plant and take half of its output.

The agreement with Lufthansa will result in the construction of a large-scale algae-to-aviation biofuels production facility at a location in Europe.

ASX-listed Algae.Tec has developed the McConchie-Stroud system, which it describes as a high-yield enclosed algae growth and harvesting system.

The company said it would manage the project and would receive “licence fees and profits”.

“Lufthansa has committed to a long-term off-take agreement of at least 50 per cent of the crude oil produced at an agreed price,” Algae.Tec said in a statement.

“The agreement forms the base for a long-term cooperation between Algae.Tec and Lufthansa for the industrial production of crude algae suitable for conversion into aviation kerosene and conventional diesel fuels.” ■



Aurora Energy's Matt Caspari, who is looking ahead to downstream production in 2015.

WA mine closure practice assists Laos

The importance of early and continuous mine closure planning has gained momentum in recent years, as many countries grapple with the legacy of closed and abandoned mines, which present varying degrees of risk. *Prospect* takes a look at how the Department of Mines and Petroleum's (DMP) approach to mine closure has been applied overseas through a recent project to update planning for the eventual closure of a copper-gold operation in South-East Asia.

The Phu Kham Copper-Gold Operation, in Laos, has produced copper-concentrate from an open-cut pit operation since 2008. With up to 15 years' of productive mine life remaining, the majority Australian-owned company Phu Bia Mining Limited (PBM), sought the assistance of the global engineering and environmental company Golder Associates to review and update its approach to closure planning.

In 2011 DMP and the Environmental Protection Authority (EPA) issued Guidelines for Preparing Mine Closure Plans. Golder and PBM recognised the relevance of the new framework as leading international practice for mine closure planning, and sought to apply these to closure of a significant operation in a developing country.

At PBM's request, Golder conducted a gap analysis and scoping study of the Phu Kham Operation's Mine Closure Plan (MCP) using international guidelines and Western Australian guidelines as the benchmark for leading practice.

The study, which included a site visit and discussions with local village leaders, showed PBM was already applying leading practice in its operations, and could reorientate these activities to establish a direct link to closure and closure-related environmental, social, financial and other scenarios.

The importance of early and continuous mine closure planning has gained momentum in recent years and while planning for the

rehabilitation and remediation of mine sites has been an accepted practice in Australia, the requirement for comprehensive MCPs – from exploration through to site relinquishment – is new.

Some international standards have been available through the International Finance Corporation (IFC) and the International Council on Mining and Metals (ICMM), where MCPs are broadly recognised as a key component of ensuring sustainable development and mitigation of risk for the environment and communities.

Golder's closure specialist, Dr Clint McCullough, said good closure planning happened early, while a mine was still in the exploration stages.

"These early plans are broad and conceptual in nature, but with each revision through the life of the mine, they provide more and more detail until all potential risks and issues in closing the mine are adequately mapped and addressed," he said.

"MCPs help mining companies calculate their closure liabilities in financial terms, too, avoiding situations where the cost of closing a mine can outweigh the commercial benefit of extracting the ore.

"There is also an important role for communities and other stakeholders, as the best plans will include consultation several years before closure and take into account stakeholders' ideas about how the mine should be closed and what should happen after mining."

In Laos, PBM's operations at Phu Kham have become integral to the local economy and livelihoods of nearby villages and their residents. The company has set a high standard for social planning and community development through detailed studies conducted during the Environmental and Social Impact Assessment (ESIA) phase of the project and in regular socio-economic updates since.

PBM currently employs more than 500 residents of the two neighbouring villages, Ban Nam Mo and Ban Nam Gnone. Commercial ventures such as rice and vegetable growing, fish farming and the production of bottled water have been developed through PBM programs. Local standards of living have been improved with better quality housing and better access to education, health services, sanitation and clean water.

The company has received numerous international awards for its approach to community development, which features a Community Development Fund (CDF) of US\$300,000 (\$AUD\$288,840) per annum for villages impacted by the Phu Kham Operation. Additional CDFs are applied at the company's other sites in Laos.

The parent company of PBM, the Brisbane-based ASX-listed PanAust Ltd, has invested around US\$900 million (\$AUD866.5 million) in Laos through the development, construction and operation of projects in its concession area, including the Phu Kham Operation. At a national level, PBM production accounts for around eight per cent of Laos' gross domestic product.

PBM is conscious of the finite nature of its operations and the potential dependence of local communities on an operating mine. The Phu Kham operation is in a remote area, more than 100km north of Laos' capital city Vientiane, and local communities were living a subsistence lifestyle with very little industrial activity before the mine was developed.

Alistair Maclean, PanAust General Manager of External Affairs, said the long-term viability of local communities, while supported by PBM through initiatives such as business micro-financing, was dependent on growth and development beyond PBM's projects in Laos.

"We are very aware of the need to encourage our local entrepreneurs to seek out alternative markets to our operations when developing their businesses," he said.

"For example, a bottled drinking water company which has developed at Ban Nam Mo would like to sell 100 per cent of their products to our mine. Instead, we have contracted the company to provide 50 per cent of their products and will assist it to tap new markets."

Economic impacts are just one of the issues that arise out of a comprehensive approach to mine closure planning. Local regulations in Laos require a mine closure and rehabilitation plan be developed but do not describe the structure, contents, level of detail or specific local requirements for the plan.

In recent months, Golder has rounded out this work by completing an updated closure cost estimate for Phu Kham and drafting a corporate Closure Standard for application across all PBM projects. Phu Kham's MCP has been updated according to the Standard.

The project has shown how a leading practice approach to planning for mine closure can contribute to a mine's record of sustainability and long-term benefits. ■



For more information on mine closure management, contact Clint McCullough on (08) 9213 7600 or via email at cmccullough@golder.com.au.



After years in the making, the National Mine Safety Framework (NMSF) is expected to be finalised in 2013, introducing harmonised national mining regulations. To date, general occupational health and safety model regulations have been finalised for all workplaces as part of the NMSF, while all jurisdictions have agreed to core model regulations. *Prospect* takes a look at the latest developments towards harmonisation.

Harmonised mining regulations a step closer

The National Mine Safety Framework (NMSF) working group has met for the last time in Sydney, before the proposed new model regulations are finalised for adoption in 2013.

The NMSF Non-Core Legislative Working Group – which includes staff from the Department of Mines and Petroleum’s (DMP) Resources Safety Division (RSD) – discussed the final stages of the drafting instructions in late July.

The proposed regulations would apply to the three major mining states of Western Australia, New South Wales and Queensland.

“The independent chair will now finalise the non-core drafting instructions and set up the modis operandi for the Tri-State Competency Advisory Committee (TCAC),” said DMP State Mining Engineer and RSD Executive Director Simon Ridge.

“The outputs from this work will provide WA with the basis for developing new regulations for what will be Chapter 10 in the package.”

WorkSafe WA is also currently embarking on a regulatory impact statement (RIS) that seeks input from industry stakeholders across WA.

“It is very important for mining sector stakeholders to take part in this process,” Mr Ridge said.

“In the interests of harmonisation across all WA workplaces, the regulations developed by the RIS process will be mirrored within the mining regulations, to address mine site activities.”

Mr Ridge added it was important to remember that the mining-specific requirements within Chapter 10 of the new regulations would be subject to a separate RIS process.

“This process will be managed by DMP, following the completion of the WorkSafe WA process,” he said.

“The idea is that the mining sector stakeholders will receive the proposed general regulations, so they can evaluate the impact of the whole regulation package on their activities.

“However, it should be made clear it is unlikely any significant changes will be allowed for in the general regulations that will form chapters one to nine of the package.

“This is because they will have been finalised during the RIS process.”

Mr Ridge was quick to point out that the current regulation of the WA resources industry was already robust.

“We’re continually looking at ways to improve upon our high safety regulation standards but, I have to say, regulation is already extremely strong here in WA,” he said, noting DMP was in its third year of a five-year Reform and Development at Resources Safety strategy, known as RADARS.

The strategy allows the department’s Resources Safety Division to more effectively oversee safety and support the necessary cultural change within industry.

Under RADARS, the department has been able to recruit more safety inspectors, with 63 inspectors now working at DMP.

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



DMP's Simon Ridge.

WA's safety boss wins national award

Western Australia's head of resources safety has been named the national 2012 Occupational Health and Safety Leader of the Year.

Department of Mines and Petroleum (DMP) Resources Safety Executive Director Simon Ridge received the award at the Next Generation Mining Australia Summit in Adelaide.

Mr Ridge, who only recently started his new DMP role, was recognised for his tireless work in the State Government's ongoing resources safety reforms.

In his previous role as the department's Mines Safety Director, Mr Ridge was instrumental in the recruitment of additional safety inspectors and a new

industry-funded system under the Reform and Development at Resources Safety (RADARS) strategy.

RADARS was established in 2010 as part of the State Government's response to independent reviews and inquiries, such as the 2009 Kenner Review of the *Mines Safety and Inspection Act 1994*, and a spate of mining fatalities.

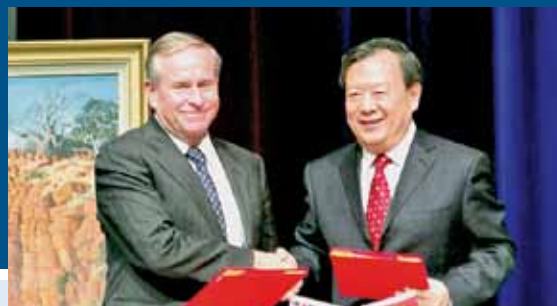
"The department now has 63 safety inspectors who assess operations on a site-by-site and sector-by-sector basis, which is a great outcome," Mr Ridge said.

"But we're obviously doing so much more in the area of safety, so it is really humbling for myself and the team to be recognised."

The accolade came at the same time the new-look Mining Industry Advisory Committee (MIAC) was announced, with Mr Ridge taking over as chairperson and the panel expanding from seven to 11 members.

The award marks the second 2012 title for Mr Ridge, who was the Australasian Institute of Mining and Metallurgy's Jim Torlach Health and Safety Award recipient in June. ■

WA and Zhejiang celebrate 25 years



WA Premier and Minister for State Development Colin Barnett and the Governor of Zhejiang, Dr Xia Baolong reaffirm their sister-state agreement.

Premier and State Development Minister Colin Barnett recently hosted a delegation from Zhejiang, China to mark the 25th anniversary of the province's sister-state relationship with Western Australia.

Mr Barnett and the Governor of Zhejiang, Dr Xia Baolong, signed a Memorandum of Understanding to renew and strengthen the sister-state agreement.

Governor Xia was making his first visit to WA, accompanied by a 300-member trade and investment delegation, to investigate opportunities for co-operation in areas such as resources, agriculture, infrastructure, health and tourism.

"Both Zhejiang and WA are leading economies in our respective countries and this has provided a strong foundation for the sister-state relationship," Mr Barnett said.

"The agreement, signed in 1987, has underpinned several productive economic partnerships between WA and Chinese businesses.

"For example: a Zhejiang bearing manufacturer is the major shareholder in WA's second largest winery, Ferngrove; The University of WA jointly operates three laboratories with Zhejiang University; and 120 Zhejiang police officers have trained at the WA Police Academy."

The next phase of the sister-state agreement would focus on extending existing business and investment partnerships, particularly those linking WA's natural resources with Zhejiang's manufacturing strength.

"The potential for this relationship to grow is enormous," Mr Barnett said.

"While WA's land mass is 25 times that of Zhejiang's, Zhejiang's population is approximately 25 times ours," he said.

"Building stronger, more diverse commercial links and a better mutual appreciation of our different cultures is also important to the relationship, so tourism is a strong focus in the agreement, as well."



Overseas delegates seek DMP expertise

Western Australia is gaining a global reputation for its best-practice legislation and policy development for the resources industry, attracting many delegations each year from developing nations.

One recent delegation involved representatives from three African nations and Iraq, who met with Department of Mines and Petroleum (DMP) officers hoping to learn from the Western Australian regulatory regime.

The delegates from Nigeria, Algeria, Guinea and Iraq, represented developing countries in the process of creating new regulatory policies for their respective resource industries.

"As regulators, these jurisdictions face similar challenges as our department but are in an earlier stage of their development," said Mineral Titles Executive Director, Dr Ivor Roberts.

"The delegates were interested in learning more about how they can ensure greater transparency and consistency within their industry which, over the past few years, has experienced rapid growth.

"As one of the world's leading mining jurisdictions, sharing experiences and providing advice within these fields is part of our global duty to encourage developing countries to adopt best practice legislation," said Dr Roberts.

Meeting the delegates coincided with the Africa Down Under Conference, which was held in Perth during September.

The conference is an annual event which attracts thousands of mining delegates from around the world, including mines ministers, business leaders and executives from the mining services industries.

"Western Australia's international standing as a destination of choice for investment in the mining industry is further strengthened by events such as Africa Down Under," said Dr Roberts.

"This year Western Australia was ranked among the top 20 mining jurisdictions in the world by the 2011/12 Fraser Institute survey results.

"Our approvals system is considered by industry as one of the best in the world, with the State Government committing \$8 million in funding during the next four years to speed up application approvals."

Delegates who visited the department included Nigerian Minister for Mines and Steel Development, Musa Mohammed Sada, Algerian Chairman of the Board of Directors at the National Agency for Mining Assets, Hocine Anane, Guinea Secretary General, Ministry of Mines and Geology, Centre for Mining Promotion and Development, Guillaume Curtis, and Iraqi Director General, Ministry of Industry and Minerals, Ali Hussien Alwan. ■



Mining delegates from three African countries and Iraq recently met with DMP representatives to seek advice on best practice legislation and policy.



(From left) Mick Green, general manager of the Marandoo mine, Rio Tinto's Allan Jackson and Agriculture Minister Terry Redman with a working pivot in the background. Photo: Rio Tinto (Christian Sprogoe).

Mining giant makes hay

As you read this, the first crop of Western Australian hay, irrigated with mine water, is either being harvested, or about to be.

After five years' of planning, water is flowing through the first of what will be 17 irrigation centre pivots at Rio Tinto's Hamersley Agricultural Project (HAP), 45km north east of Tom Price in the Pilbara region.

The project demonstrates one of several uses of surplus water from below-water-table mining at Rio Tinto's Marandoo mine. Other useful applications include operational supply, supply to Tom Price township, reinjection to the Southern Fortescue Borefield, or discharge back to the environment.

The HAP is the first project of its kind in the Pilbara, relying on 35km of mild steel pipe, 22 pumps and large scale associated pumping infrastructure. The project irrigates around 850 hectares of land, using large centre pivots, each able to cover an area of 40-50 hectares.

Rio Tinto general manager for Climate Change, Water and Environment Allan Jackson said receiving the first water (in late September) through the pivots was a significant milestone for the project.

Western Australia's Agriculture and Food Minister, Terry Redman, was on site to officially turn on the valve connecting the surplus mine water through to the pivots.

Most of the irrigated land will be used for hay production. Several hectares has been set aside to optimise native vegetation growth, with the aim of producing seed for mine-site rehabilitation.

Rhodes grass seeds were planted in October and the first hay is expected to be harvested before Christmas 2012.

When fully commissioned, the project will deliver more than 30,000 tonnes of hay per year, with some provided to Rio Tinto pastoral stations in the Pilbara and the balance available to other interested pastoralists in the area.

"We are conducting studies for a similar project in the Pilbara, also including irrigated hay production," Mr Jackson said.

Rio Tinto owns six pastoral stations in the Pilbara and manages five covering 1.5 million hectares of land in total. The five Rio Tinto-managed stations of Karratha, Hamersley, Rocklea, Juna, and Yarraloola jointly run approximately 25,000 head of cattle.

Pastoral lease and rangeland management brings a number of obligations including; the maintenance of a commercial cattle herd, management of environmental aspects including rangeland pasture cover, water and fence facilities and fire risk, and interaction with Traditional Owners.

Property management strategies for each station encompass all company policies, with emphasis on safety, local heritage values, and natural resource conservation.

The Department of State Development (DSD) helped facilitate various project approvals, including from the departments of Mines and Petroleum, Agriculture, Environment and Water.

"I'm sure we are going to see a lot more of this type of activity," said DSD's General Manager of Project Facilitation Bruce Simpson. "It just makes so much sense to use what up until now has been a largely wasted resource." ■

African 'dawn' breaks in Western Australia

The 10th Annual Africa Down Under Conference, held in Perth, was again a resounding success, highlighting what Western Australia and Africa have to offer each other.

What was once a round-table gathering of a dozen like-minded individuals, with an interest in African resources, is now the second-largest African resources forum in the world.

There were 2,700 delegates who had access to more than 70 presentations and business breakfasts, lunches and dinners for networking.

Apart from Western Australia being relatively close to Africa, the State has a tremendous presence on the continent.

WA businesses comprise 73 per cent of Australian companies operating in Africa, with Australian investment in Africa valued at \$40 billion.

As of July 2012, there were 162 WA companies involved in 866 projects across 43 countries in Africa – a 24 per cent jump in the number of companies there in 2011 and a 108 per cent increase in the number of projects.

The Australian Federal Government was represented by Defence Minister Stephen Smith, Foreign Affairs Minister Bob Carr, Resources Minister Martin Ferguson and Special Minister of State Gary Gray, along with former Prime Minister Kevin Rudd.

International delegates were led by the Honourable Susan Shabungu, Minister of Mineral Resources from the Republic of South Africa, as well as 16 other ministers from various African countries, including Gabon, Nigeria, Namibia, Kenya, Zimbabwe, Madagascar, South Sudan, Congo, Tanzania, Zambia, Malawi and Burkina Faso.

Opening the conference, Senator Carr said it was time to look to Africa, which has 30 per cent of the world's mineral resources.

"It's the dawn of the African century," said Senator Carr.

"Based on International Monetary Fund data, by 2015 African countries will be among the world's fastest-growing economies," he said.



Australian Foreign Affairs Minister Bob Carr and South Africa's Minister of Mineral Resources Susan Shabungu.

"Of course, China will top the list for highest average annual GDP growth, but Ethiopia, Mozambique, Tanzania, Congo, Ghana, Zambia and Nigeria will be close behind, with growth rates between 8.1 and 6.8 per cent respectively, for that period.

"Data from the African Development Bank (ADB) shows direct foreign investment in Africa rose from \$9 billion in 2000 to \$80 billion last year."

Senator Carr outlined the Federal Government's increasing engagement and presence in Africa, with new diplomatic missions in Ethiopia and Senegal, and membership of the African Development Bank.

Coffey Mining's General Manager – Africa, Mr Chris Fredericks, said the 'dawn of the African century' was an apt tagline.

"The investment upside in Africa is increasing levels of available risk capital, new reserves, new ore replacement efforts, new discoveries, changing exploration costs, more attractive mining laws and investment incentives, and availability of dependable geological information," he said.

"In addition to the well understood need for improved mining infrastructure, there are a number of new requirements to secure Australian investment in African mining and these include providing a corruption-free investment climate."

Mr Fredericks said from a technical aspect, Australian mining companies had barely scratched the surface in Africa.

It was important, however, that Australian miners partnered the development of Africa's mining future with a legacy of training, safety and social and community responsibility.

From being a niche event for a handful of visionary miners, this conference is now as much about government-to-government and industry-to-government relations.

The Department of State Development and Department of Mines and Petroleum co-sponsored the conference.

Staff were highly sought out for information and engagement with African nations and companies, especially in forging relationships that lead to business-matching and joint venture opportunities for WA-based companies. ■



Delegates on one of two floors of information booths at the Africa Down Under Conference.



Australian geologists abroad. Nigeria, Ghana and the Congo are regional hotspots. In many places the geology is similar to Australia.

Local companies trek further afield

Nigeria, better known as Africa's top exporter of oil and gas, has become a focus for foreign companies after its government made changes to the country's mining code to attract investment into its minerals sector.

WA-based explorer Australian Mines identified the Nigerian opportunity and acquired a first-mover advantage on gold properties in the country more than 12 months ago.

Originally a nickel explorer in the Goldfields, managing director Ben Bell told *Prospect* Australian Mines shifted its focus to Africa following a downturn in nickel prices.

"We saw we could be a first-mover in Nigeria, where, unlike other West African countries, there has been little mineral exploration in the past 20 years," Mr Bell said.

"The geology is similar to other West African countries, so there is no reason to believe it won't have the same potential."

The company recently started its first drilling program at sites within Nigeria's north-west goldfields.

Australian Mines remains a rare company exploring in Nigeria, but Mr Bell believes it may only be a matter of time before others follow.

"Because there has been no evidence of gold exploration in the country, a lot of people are likely holding back to see how we go," he said. "If we perform well I'd imagine that would attract other foreign companies."

A challenge for companies such as Australian Mines has been securing suppliers to carry out its exploration activities.

To assist with these requirements, a growing number of mining services groups have built a presence in the region, including Perth geological consultancy International Geosciences.

In the past 12 months International Geosciences's team of geoscientists has provided specialist geological and geophysical consulting and project management services to companies operating in Africa.

The consultancy identified there was an opportunity for a company with its expertise and has secured work in countries like Nigeria and Ghana.

Through the Africa Down Under Conference, International Geosciences principal geophysicist Greg Street said the company had established a network of contacts and potential clients.

"We have a certain expertise in West African geology which we saw would be useful for companies there," Mr Street told *Prospect*.

"Our primary expertise is structural geological interpretation of airborne geophysical data, using other information to assist us in that interpretation."

While there are many foreign businesses operating in the African industry, companies such as Tiger Resources have proved investments can be successful.

Tiger has been involved in mineral exploration in the Democratic Republic of Congo (DRC) since 2005 and is now producing copper from its Kipoi mine.

Managing director Brad Marwood said the DRC government was keen to facilitate investment.

"The DRC realises the importance of mining to the local economy and welcomes foreign investment," Mr Marwood said.

Tiger is working towards moving the next stage of the Kipoi operation into production to allow it to produce up to 100,000tpa. ■

Africa considers WA model

African countries are looking to WA's State Agreements regime as a model for fostering big resource-sector developments.

Department of State Development Deputy Director General, Resources and Industry Development, Giles Nunis made the statement at a public Senate hearing in Perth on the Indian Ocean region and Australia's foreign, trade and defence policy.

"Some of WA's State Agreements, mostly in iron ore, went for 50 years, so they gave the proponent considerable certainty," he said.

State Agreements are contracts between the State Government and proponents of major resources projects. The agreements outline the proponent's rights and obligations, terms and conditions for a project, and also provide the basis for relations between the company and the State Government.

Strengthening regulations and community engagement a focus for unconventional gas



Participants discuss unconventional gas industry concerns and aspirations in groups during the Port Denison community workshop in October.

The Department of Mines and Petroleum (DMP) is continuing to strengthen its regulatory framework around the emerging unconventional gas industry in Western Australia.

With the industry in the early stages of exploration, the opportunity exists to further refine and adapt State petroleum regulations before any production activities are considered.

Following the introduction of new petroleum environment regulations in August, the department will make new petroleum resource management and administration regulations available for public comment in early 2013.

The new regulations are the second reform area implemented following a 2011 independent review of the State's regulations by petroleum law expert, Dr Tina Hunter.

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

"The regulations will be objective-based to enable operators to identify and address the site-specific requirements of operating in a particular geographical location. It will also enable assessors to review applications with full knowledge of the specifics," DMP Petroleum Executive Director Bill Tinapple said.

"Focusing on subsurface operations, the regulations will further strengthen well integrity requirements. Regulations are designed to provide aquifer protection achieved through multiple layers of pressure tested casing separating the well from groundwater."

In conjunction with the new regulations, DMP will also be developing guidelines and checklists for operators.

The regulations will replace the Schedule of Onshore Petroleum Exploration and Production Requirements 1991.

In recent times, the public has received highly-contrasting opinions and factually -inaccurate information from some sources regarding the unconventional gas industry.

To address information gaps and concerns, the department recently hosted a community engagement workshop in the Mid West in partnership with the Australian Petroleum Production Exploration Association (APPEA) and facilitated by the CSIRO.

More than 50 people participated from a variety of community groups, including land owners, farmers, industry operators, environmental groups, Aboriginal interest groups and local government.

Presenters during the workshop included representatives Ray Hortin from Protect Our Water and Environment (POWER), Yamitji Marlpa Aboriginal Corporation (YMAC), Shire of Irwin, DMP, APPEA and local politician Phil Gardiner.

"Workshop participants were able to voice their opinions, raise concerns and offer recommendations about future community engagement methods," DMP Deputy Director General Strategic Policy, Michelle Andrews said.

The feedback and information gathered from the workshop will be released in a report by workshop facilitator CSIRO in December 2012.

"Recommendations from the report will assist the department to gain a greater understanding of the community's needs and priorities," Ms Andrews said.

Following the Mid West workshop, a similar workshop is planned for the North West in early 2013.

2012 hydraulic fracture stimulation activity summary

Three approved small scale petroleum exploration wells in the northern Perth Basin have undergone hydraulic fracture stimulation (fracking) in 2012.

- Arrowsmith 2, located 45 kilometres south of Dongara, was fraced in July at depths of 2,639m to 3,300m.
- Woodada Deep 1, located 12 kilometres west of Eneabba, was fraced in August at depths of 2,283m to 2,425m.
- Senecio 2, located 15 kilometres east of Dongara, was fraced in August at depths of 2,643m to 2,685m.

The three activities were the most inspected petroleum activities in recent department history, with site visits by specialist DMP inspectors. Compliance auditing was conducted against the companies' approved management plans to ensure environment, drilling and safety standards were met.

All three activities complied with the regulatory standards, with some minor housekeeping issues identified and immediately resolved. ■



Hydraulic fracture stimulation activities at the Senecio 2 well site 15km east of Dongara.

Want to keep updated about the regulation of the unconventional gas industry in Western Australia?

Subscribe to our free Unconventional Gas RSS feed at:

www.dmp.wa.gov.au/onshoregas.

Updates include department media releases, community engagement activities and information materials such as fact sheets.

Western Australia remains a resources hotspot

Despite global economic uncertainty, Western Australia is well positioned to maintain strong growth, says the State's leading resources bureaucrat.

Department of Mines and Petroleum (DMP) Director General Richard Sellers said he believed WA was uniquely placed to continue to attract investment.

"We are in close proximity to Asia, have strong regulations in place, world-class infrastructure and an abundance of natural resources – so we are well placed to ride out any volatility," said Mr Sellers, adding that Western Australia continued to be the economic engine room for the rest of the nation, due to a record \$107 billion of resource sales in 2011.

He noted the recent shift in sentiment against resources industry investment in recent months seemed excessive.

"With an estimated \$167 billion worth of resource investment either committed or under construction, the long term outlook for the State's resources industry still remains positive," he said.

Mr Sellers said he believed that the recent media speculation regarding the 'end of the resources boom' was unfounded.

"Economists will tell you a boom is defined by a sharp rise and fall and this did not happen in the first place – so to say the boom has ended isn't really true," he said.



Department of Mines and Petroleum Director General Richard Sellers.

"In my eyes, the growth of the WA resources industry is now levelling, which I understand is providing the government with some space to tackle skilled workforce needs head on."

Mr Sellers said DMP would continue to work hard to sustain the long-term growth of the WA resources industry.

"The department will remain fair, robust and consistent in all of its dealings across the industry," he said.

"But most importantly, we will continue to support industry through initiatives like drilling subsidies, faster online approvals, minerals research and transparent regulation." ■



Premier Colin Barnett.

Domestic gas supply secured

Last year, the US Energy Information Administration estimated the Canning Basin unconventional gas resources at about 229 trillion cubic feet, which is about one and a half times WA's currently-identified offshore resources.

"This agreement will facilitate the growth of Western Australia's energy supplies for the future," the Premier said.

"It ensures gas discoveries are rapidly brought into production, and that gas is delivered to the State's domestic gas network, before any is exported."

Mr Barnett said natural gas provided about 50 per cent of the State's domestic electricity generation, and contributed to the production of key resource exports including iron ore, alumina, base metals and gold.

"Future development of energy-intensive magnetite production in the Pilbara and the Mid-West and other value-adding and advanced manufacturing opportunities in the State, will benefit considerably from an expansion of WA's domestic gas supply sources," he said.

"Natural gas is also an ideal partner for the State's growing renewable energy production as a back-up in times of adverse weather conditions and peak demand."

The Premier said the agreement provided additional security of tenure for 17,000sqkm (1.7 million hectares) covered by five exploration permits held by the joint venture. These permits anchor the joint venture's Canning Basin Domestic Gas Project, with the agreement facilitating further targeted gas exploration in these permits and the development of a pipeline to transport gas south to existing industrial areas.

The agreement also provides for potential future gas supply for gas export once the domestic gas project is under development.

"If commercially viable gas resources are discovered, by mid-2016 the partners will be required to submit a plan for construction of the domestic gas project, including a pipeline connecting to the existing State gas network in the Pilbara," Mr Barnett said.

The Premier said that under the agreement, the partners were still required to obtain relevant State and Commonwealth environmental, safety, indigenous heritage and Native Title approvals for their exploration, development and infrastructure proposals. ■

Premier and State Development Minister Colin Barnett has announced the Natural Gas (Canning Basin Joint Venture) Agreement had been signed by the State Government with joint venture partners, Buru Energy Limited and Mitsubishi Corporation.

The State Government will also legislate to facilitate the continued exploration for natural gas in the remote Canning Basin, the development of a gas pipeline to the Pilbara and ensure WA consumers have first use of any gas discovered.

Mr Barnett said there was enormous potential for natural gas in the arid, 530,000sqkm Canning Basin, which stretched from the coast between Port Hedland and Broome, to the State's eastern border.



(From left) John Bowler MLA, Training and Workforce Development Minister Murray Cowper, Nationals MP Tony Crook, Wendy Duncan MLC, Goldfields Institute of Technology former MD Mellisa Teede, Regional Development Minister Brendon Grylls and Kalgoorlie-Boulder Chamber of Commerce and Industry president David Nicholson at the CEMT launch in July 2012.

Ground-breaking WA training course up-skills Goldfields miners

The Mining Engineering Para Professional Program, to be rolled out by the Goldfields Institute of Technology and supported by the Western Australian School of Mines (WASM), will provide a range of mining engineering, technical and professional qualifications to men and women without formal degrees who are already working in the industry. *Prospect* investigates how this ground-breaking new training program aims to fill vital professional skills gaps in the Western Australian Goldfields region's mining sector – from within its own ranks.

The program is the culmination of a year-long collaboration between the Goldfields Institute, Curtin University's WASM and the Chamber of Minerals and Energy of Western Australia (CMEWA), and is designed to up-skill participants to take on site management roles.

In a win-win for industry and the individual, companies will be able to increase their advantage in attracting and retaining experienced staff in a highly competitive climate, while course participants can significantly broaden their qualifications and career opportunities.

The Mining Engineering Para Professional Program has been widely welcomed by the WA Goldfields mining industry, where engineers are in high demand.

CMEWA Chief Executive Reg Howard-Smith said it was vital for industry to work closely with training providers to ensure the projected demands of the sector were met.

“The development of courses which are responsive to industry needs is critical to the future growth of the resources sector,”
Mr Howard-Smith said.

“It is important people are in the training pipeline to meet future demands. Ensuring all training has a focus on developing practical skills will ensure access to personnel with the right capabilities.”

WASM Director Professor Steve Hall said long-term benefits for the mining industry also included improved economic, safety and environmental performance, as well as small improvements in recovery, reduced dilution and fewer lost time incidents.

“These all add up to millions of dollars each year onto the bottom line,” Prof Hall said.

Candidates, who are expected to have five or six years in mining or related industries, are nominated by their employers.

The Mining Engineering Para Professional Program comprises a limited number of residential classes in the Goldfields mining and training hub of Kalgoorlie-Boulder, with most of the course material delivered online and on the job over 18 months.



CME welcomes Mine Rehabilitation Fund

The WA Chamber of Minerals and Energy (CME) has welcomed the establishment of a Mine Rehabilitation Fund by the State Government as a new mining securities tool.

The CME, on behalf of industry, has been engaged with the State Government to work on details of the fund.

“The benefit for industry is that this model will free up significant capital at the beginning of project development, while the government benefits from having a fund that covers the full closure costs for

mine rehabilitation,” CME Director Nicole Roocke said.

“While there are still some administrative matters that require further discussion, particularly around calculation of liability and fund contribution, the CME is happy with this announcement and will progress the finer details through dedicated working groups between industry and the Department of Mines and Petroleum (DMP).

“Industry is committed to the highest level of environmental management and it is

a requirement of any new project to have a comprehensive mine closure plan for when the resource is exhausted.

“Interest generated from the fund will provide a welcome revenue source for addressing legacy sites, and industry is keen to work with the State Government to identify a priority site list.” ■

Participants without engineering, mathematics and science qualifications undertake bridging units, with prior learning considered.

The course will be delivered by the Goldfields Institute’s Centre for Engineering and Mining Training (CEMT), which is affiliated with WASM and the CMEWA and works closely with senior regional industry representatives.

Residential classes will be held at the CEMT, which is based at the Australian Prospectors and Miners Hall of Fame in Kalgoorlie-Boulder.

Last year, the CMEWA forecast an additional 44,000 workers would be needed this year to meet the WA resource sector’s demand for skills.

Goldfields Institute former MD Mellisa Teede said this represented a significant challenge given that unemployment in Western Australia was at an all-time low.

“Re-skilling and up-skilling the existing workforce is therefore an important strategy in meeting labour demand,” Mrs Teede said.

Prof Hall said the course was expected to trim industry reliance on skilled migration.

“It will reduce the need for, and cost of, skilled migration, however I suspect we will also see a further demand for these programs from international students, governments and industry – continuing to keep the Goldfields as a centre of mining education excellence,” he said.

Mr Howard-Smith said industry’s first preference would always be training and employing local people first.

“However, targeted skilled migration has an important part to play. With the number of projects in the construction phase, the demand for skilled labour is incredibly competitive.”

The program is also expected to boost the Goldfields training sector through increased student numbers at the Goldfields Institute.

“As the program develops we plan to share training resources such as equipment, facilities and people,” Prof Hall said.

“With WASM growing, and expanding para professional programs, further jobs should be created.”

For more information on the Mining Engineering Para Professional Program please contact Goldfields Institute’s Centre for Engineering and Mining Training Director Vikki Brown on 1800 465 334 or vikki.brown@cemt.wa.edu.au ■



Minister Moore, strong supporter of WASIM, and research.



Dr Kellie Pendoley shares a joke with Mines and Petroleum Minister as she accepts the 2012 Golden Gecko Award for Environmental Excellence.



Pendoley Environmental tagging a turtle as part of its sea turtle monitoring program.

Tracking turtles to close the knowledge gap

When it comes to sea turtles in Western Australia, environmental scientist Kellie Pendoley wrote the book. Well a PhD actually.

What started “out of necessity” while working on Barrow Island for Western Australian Petroleum Pty Ltd (WAPET) in the early 1990s, turned into an epic search for answers for Dr Pendoley. In September, that search for answers culminated in her company, Pendoley Environmental, receiving the 2012 Golden Gecko Award for Environmental Excellence.

The journey began when Dr Pendoley was working for WAPET. In 1992, she began researching WA’s sea turtle population.

“There was a huge gap in the knowledge we had about marine turtles in Western Australia,” she said.

At the time, Dr Pendoley had no idea where the research was going to take her.

“In many ways you were following your nose with these things,” she said.

“However, we did know that there was a lot of information we were going to need to address the rapidly expanding resources sector in WA to provide support for long-term management of sea turtle populations in the State.”

After taking a voluntary redundancy from WAPET, Dr Pendoley decided to focus her attention on her sea turtle research.

“I took all the questions I had about sea turtles that I couldn’t get answered and started my PhD – that was how I could answer the questions I still had,” she said.

Dr Pendoley received help from Chevron and Apache to conduct her research in the Barrow and Montebello Island area.

“They knew we were going to need all that information for Gorgon. That was in the back of my mind as well. To try to get what I could, because at some point the information would be needed.”

She was able to balance her studies by also working as a consultant.

“I would consult during winter and research my PhD in the summer,” Dr Pendoley said.

The research didn’t stop once she had completed her PhD. It was not long after, her company Pendoley Environmental was started.

The ultimate goal of her research was to build an understanding of the sea turtle population in Western Australia.

“Western Australia has some of the biggest and healthiest marine turtle populations in the world,” Dr Pendoley said.

“As a whole, we know very little about them. It is staggering, but you don’t know, unless you look.”

To help understand the scale of WA’s sea turtle population, Dr Pendoley relays a story from a recent conference she attended.

“A researcher from the Middle East was talking excitedly about all this great data he had from the satellite transmitters they had on the local turtle population,” Dr Pendoley said.

“They had nine turtles and were spending \$10,000 to \$20,000 per turtle to study them.

“There are thousands here in Western Australia. For them to understand the kind of numbers we are dealing with over here is almost unfathomable.”

Dr Pendoley estimates there may be more than 20,000 green turtles nesting on the west coast of Barrow Island each year.

“There could be even more. We just don’t know,” she said.

“Our Barrow Island flatback turtle tagging program is amongst the top four or five turtle tagging programs in the world.

“There are only a couple that are more important and that is because they have been going longer.”

Flatback turtles nest on the east coast of Barrow Island.

Dr Pendoley said there were 8000 flatback turtles tagged to date as a part of the company’s research program.

“Nowhere else in the world, apart from one program in Brazil, has that many tagged turtles, and this has been achieved in seven years,” she said.

This has been largely due to the resource and support that Chevron has been able to provide to the company.

Dr Pendoley said Chevron’s investment means the Barrow Island program is a world-class program.

“We had five years of baseline data from Barrow,” she said.

“I don’t think you could find any other major project anywhere in the world that has five years of baseline data. ■

Golden Gecko Winners

Pendoley Environmental and Argyle were announced as recipients in the final Golden Geckos for Minister Moore.

Retiring from politics in 2013, Mines and Petroleum Minister Norman Moore presented the prestigious 2012 Golden Gecko Award to Pendoley Environmental.

"During the last decade, this small team of dedicated individuals have significantly increased the scientific knowledge of WA's sea turtle population," Mr Moore said.

"Through their work, a broad range of marine turtle research and monitoring tools, and monitoring programs, have been developed to support the State's rapidly-growing resources sector.

"This provides environmental practitioners, regulatory authorities and developers with innovative and practical solutions which protect and conserve these precious species," he said.

The Minister also awarded a Certificate of Merit to Argyle Diamonds Limited for its work in rehabilitating a contaminated site.

The company committed to remediating contaminated groundwater at their Belmont Training Centre.

"Argyle was not aware of the contamination when they purchased the site, but have spent considerable time and money in addressing the legacy they inherited," the Minister said.

Mr Moore congratulated all entrants for their leadership in developing new and innovative environmental solutions and said WA's resources industry is the envy of its competitors.

"To ensure the State continues to be an attractive destination for resources investment, government and industry must work together towards responsible resource development," he said.

"The State Government has undertaken a range of environmental reforms to help deliver greater certainty, confidence and clarity surrounding the environmental regulatory system," Mr Moore said.

The Department of Mines and Petroleum's Golden Gecko Awards showcase companies that have raised the bar for environmental standards in WA and are working beyond regulatory compliance to set new industry standards for environmental protection and resources sector management.

'Soft' infrastructure builds strong foundations

While not responsible for the provision of traditional infrastructure such as roads, rail and ports, DMP plays an important role in the provision of 'soft' infrastructure to support the resources industry.

As the lead agency responsible for attracting private investment for the resources sector, the department provides a single point of entry for proponents – managing all approval and licensing processes, and consulting with relevant agencies.

The provision of 'soft' infrastructure, including technical services and specialised databases, plays a huge role in the continued development of the resources industry.

Mineral Titles and the Geological Survey of Western Australia (GSWA) are examples of service divisions within DMP that acquire and disseminate geoscientific and mining tenement-related information.

This is achieved through specialised databases and DMP's online systems including TENGRAPH (Tenement Graphs), MTO (Mineral Titles Online), and GeoVIEW.WA (Interactive Geological Map). The department provides access to this 'soft' infrastructure free of charge to the wider community.

The department also operates the Geothermal Information Management System, which contains exploration and production information such as titles, wells and geophysical surveys.

The system – which consolidated 50 years' of exploration information into a powerful industry tool – was rated the best in the world by the Fraser Institute's 2011 Global Petroleum Survey.

Importantly, the agency provides statistical information about the State's commodities and resources operations and is responsible for releasing new areas of Western Australia for exploration and granting titles for projects.

DMP provides pre-competitive geoscience information, which encourages the search for resources in underexplored regions of the State. The information is also used by government in decision-making processes, particularly on economic and land use issues.

By the delivery of 'soft' infrastructure the department improves Western Australia's status as a favourable investment destination, which is essential for guaranteeing the sustainability of the resources sector and the State's future prosperity.

During the past 12 months the department has made a number of achievements in the delivery of 'soft' infrastructure.

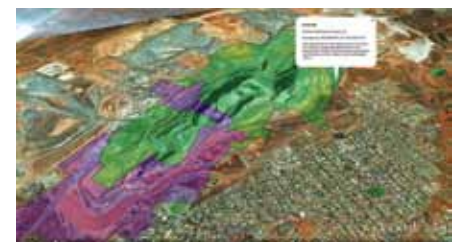
It has continued to streamline its approvals process and since the staged introduction of online lodgement of mineral exploration applications throughout 2010/11. Most exploration and mining companies now lodge applications online.

Online tracking of applications has also been implemented and is being expanded, along with a three-year ICT implementation strategy (to 2015).

Additionally, petroleum environmental applications can now be lodged online following a successful pilot program earlier in 2012. ■



Mineral Titles Online (MTOL) – Online lodgement of Tenement Applications using spatial selection.



Tenograph® – Google Earth overlay of the Kalgoorlie Superpit.



MTOL – Google Earth overlay within Tenement Register detailing the location of the queried tenement



State's gas network set for growth

The Western Australian Government has selected a preferred corridor and operational model for a natural gas pipeline from Bunbury, 200kms south of Perth, to Albany on the State's southern coast.

In late October, Premier and State Development Minister Colin Barnett and Regional Development Minister Brendon Grylls announced details of the proposed 350km Bunbury to Albany Gas Pipeline.

Mr Barnett said the pipeline would deliver secure, reliable and safe energy to support future economic and population growth in the South-West and Great Southern regions.

"As well as making reticulated natural gas schemes possible for householders along the pipeline route, it will create new opportunities for existing industries and attract new investment," he said.

The Premier said the pipeline would be designed, built and operated by a private sector proponent, with the State Government, through Verve Energy, retaining an interest in the project.

He said the government would co-fund the project through a mix of upfront capital and an ongoing subsidy.

In mid-November, the State Government invited companies such as gas pipeline owners/operators; infrastructure investors and providers, and major banks and energy businesses to register to participate in a market sounding process.

The market sounding will identify private sector interest in developing the project in a joint venture with Verve Energy.

It will also gather information related to project structure, financing, delivery and management of the new pipeline, and the development of a procurement process to appoint a preferred proponent.

The State Government is considering options including a Build, Own and Operate (BOO) model or financial investor and an Engineer Procure Construct (EPC) plus Operate and Maintain (O&M) model.

After the market sounding, an open competitive procurement process will commence to select a preferred owner/operator by mid-2013.

The proposed Bunbury to Albany gas pipeline will service approximately 100,000 South-West and Great Southern residents living in Albany, Manjimup and towns along the corridor, including Donnybrook, Bridgetown and Mount Barker.

Mr Grylls said the pipeline would be built with capacity for further expansion to accommodate future gas requirements, including lateral pipelines to other regional centres such as Katanning.

"Access to internationally competitive gas prices will drive investment in value-adding and export production, including in viticulture, agriculture, mineral processing and timber industries," he said. ■

WA outlines new energy future



A new blueprint for the long-term development of the energy sector in Western Australia has been released by the State Government.

The Strategic Energy Initiative, *Energy2031* outlines a vision and strategic direction for WA's energy sector that would enable affordable, secure, reliable and cleaner energy for future generations.

"*Energy2031* aims to provide industry and the community with clarity about the sector's direction and the future framework for State Government policy," Energy Minister Peter Collier said.

"The Western Australian economy, including the energy sector, will continue to operate in an evolving and more globally connected environment, and the ability to adapt to these changing circumstances is paramount."

"This, coupled with the unique characteristics of our State's energy sector, drives the need for a more strategic approach in energy policy setting."

Mr Collier said five pathways had been identified to achieve the *Energy2031* vision: diverse and secure energy supply; pro-active energy planning; effective and efficient energy delivery; informed and responsible energy use; and capacity-building.

"The pathways will help decision-makers address the challenges that the State energy sector faces and make the most of the opportunities available through the development of a series of strategies and actions," he said.

"*Energy2031* has been developed through extensive consultation with industry, government and community stakeholders."

The key issues and challenges identified by stakeholders include growing demand for energy for mineral processing and as an export commodity, with steadily increasing domestic demand for electricity.

The Strategic Energy Initiative, *Energy2031* Final Paper can be accessed at <http://www.finance.wa.gov.au>

CME endorsement

WA Chamber of Minerals and Energy (CME) Chief Executive Reg Howard-Smith said the initiative was welcomed by the resources sector, and outlined the government's approach to the ongoing development of the State's energy markets.

"CME broadly supports the vision and is pleased to see the formation of an industry roundtable," Mr Howard-Smith said.

"A competitive energy market is essential for a strong Western Australian economy and a key theme for the future growth of the resources sector along with people and water."

CME has forecast electricity demand to grow by 70 per cent in the next five years through the strength of the resources sector.

"Energy is key microeconomic reform issue and should be considered along with key issues such as labour mobility, migration and a skilled workforce; reducing State and Federal duplication; and investment in key economic infrastructure like ports and rail to further promote productivity," Mr Howard-Smith said. ■



Kimberley towns transformed

A massive makeover has taken place in the Kimberley towns of Kununurra and Wyndham.

The East Kimberley Development Package (EKDP), managed by a team from the Department of State Development and jointly funded by the Federal Government and the State through Royalties for Regions, has seen the towns positively transformed.

The \$195 million EKDP was launched in July 2009 following a joint assessment by the Federal and State Governments into the most effective infrastructure projects to meet the ongoing social and economic needs of the East Kimberley.

The package, in conjunction with the Ord River Irrigation Expansion Project (see separate story), has seen the towns transformed into more attractive, sustainable and enjoyable places to live.

Already the package has delivered 17 of the 24 projects identified to meet priority community needs in health, education, housing and accommodation, transport

and community infrastructure in these remote Kimberley towns. The remaining projects are scheduled to be completed by June 2013.

The department has responsibility for the financial management of 17 of the 24 EKDP projects worth almost \$178 million. Other EKDP projects are managed through the Shire of Wyndham East Kimberley and private organisations including the Waringarri Arts Aboriginal Corporation, Warmun Community Incorporated and the Catholic Education Office of Western Australia.

Projects overseen by the department include:

- The Wyndham early-learning activity centre.
- Health service provider housing at Kununurra.
- Upgrades of Technical and Further Education colleges (Wyndham and Kununurra).

- Wyndham port upgrade.
- Social and transitional housing.
- New facilities for Indigenous groups in Wyndham.
- Expansion of Kununurra Hospital.
- Wyndham education precinct.

"It was certainly one of the most diverse undertakings we have helped to deliver," said Gail McGowan, the department's Deputy Director General (State Initiatives).

"It's also a departure from what we are mostly involved in, which is major resource projects. Nonetheless, it shows how adaptable we are and how the State and Federal Governments can work together to achieve positive outcomes for people.

"In essence, it's a comprehensive package of social infrastructure projects that provide a wide range of services that will enhance the quality of life for people in the region." ■

Ord project drives development



An aerial view of irrigated fields near Kununurra.

The State Government, through Royalties for Regions, has invested \$322 million for the Ord River Irrigation Expansion Project in Kununurra, a joint initiative between the State and Federal Governments.

The Ord River Irrigation Expansion Project will see the size of the Ord irrigation area increased to about 28,000 hectares of agricultural land. Already

approximately 14,000 hectares of irrigated farmland has been developed with future expansion expected to double the irrigated land area.

Phase 2 works are underway and are expected to be completed in 2013. These works include the construction of a secondary irrigation channel, roads, flood protection levees and drains to

service farm lots and utilisation of water for irrigation.

One of the key drivers of the project is to facilitate employment opportunities for Indigenous firms and individuals in the East Kimberley region. Indigenous employees comprise approximately 37 per cent of the project's 240 person workforce.

An advisory panel established for the project has been liaising with proponents interested in developing available land, with a decision on the selection of proponents expected to be finalised later this year.

The Ord River Irrigation Expansion project sits alongside the EKDP as part of the broader Ord East Kimberley Expansion Project to create a vibrant, major regional centre.

The project is also a collaborative partnership between the Western Australian and Commonwealth Governments and is a vital project to ensure the successful development of Australia's north. ■

New housing assists communities

One of the most ambitious and innovative projects delivered through the East Kimberley Development Package was the construction of 108 social and transitional houses in Wyndham and Kununurra, a project managed by the Western Australian Department of Housing.

The housing project was the second-largest undertaking of the EKDP, valued at \$46 million.

The delivery of new transitional housing will help provide accommodation for Aboriginal workers who have taken up employment in the East Kimberley.

The provision of social housing will assist the government in delivering a number of subsidised rental properties for people with low incomes through a

public housing body or a not-for-profit organisation.

In Wyndham, 25 social housing dwellings were constructed, with eight of the new dwellings built as part of the Oombulgurri Relocation Social Housing Project. In the Kununurra region, a further 83 dwellings were constructed, of which 40 are to be used as transitional houses.

The remote communities of Wangkatjungka and Warmun in the Kununurra region have also benefitted from the project, with seven and six new dwellings constructed, respectively.

The aim of the Social and Transitional Housing Project was to provide stable,



Some of the social and transitional housing.

affordable housing options to Aboriginal people seeking employment or training in Kununurra.

The project was established to encourage Aboriginal people to develop independence and offer opportunities to create personal wealth and achieve home ownership. ■

Education for everyone

Forget the notion of school being for students. In Kununurra the new school library is for the entire town.

Within the grounds of Kununurra District High School, four separate projects, delivered under the East Kimberley Development Package (EKDP) and worth \$48.5 million, have transformed the 1960s-style institution into a vibrant education precinct.

At the heart of Kununurra's education district is the new \$5 million community library. Once located in the middle of the school grounds the new library is now situated on the corner of two of the town's main streets and has been increased in size from 200 to 600 square metres.

The new and expanded community library has provided a much-needed upgrade to existing facilities and, along with other infrastructure projects at the school, has helped create a revitalised education precinct in the town.

"By the end of the entire project, about 65 to 70 per cent of the school will have been remodeled and/or replaced," said Sue Swenson, who heads facilities management for the WA Department of Education.

"It's certainly the largest-ever building program the department has undertaken in the Kimberley."

Completed in three stages, the project has meant a constant reshuffle of the school's 900 students, from



Part of the newly-constructed Kununurra District High School.

kindergarten to Year 10. However, the students have handled the upheavals well, with a view to the final product, which includes a new secondary block with the latest food technology, textiles and multi-media areas.

"I think what they're most looking forward to is the new multi-purpose sports hall, which will allow them to do a range of sport all year, which is always a problem due to the climate in the Kimberley," said Ms Swenson.

In the training (TAFE) sector, the Kununurra and Wyndham Campuses of the Kimberley Training Institute have benefited from a combined \$10 million upgrade.

Designed with the intention of becoming a community-friendly institute, to help boost attendance rates, the Kununurra complex has undergone extensive upgrades, including an expansion of trade training areas and the horticultural facilities.

The construction of purpose-built classrooms with state-of-the-art IT and audio visual equipment will help the institute deliver a diverse and wide range of training options.

The Wyndham campus has also been upgraded with new classrooms that will enable it to deliver a range of trade, community and business-oriented training programs in comfortable, modern facilities.

"By making the two campuses more community-friendly, we hope to improve engagement with our students and improve attendance rates," said Lindsay Gassman, the Kimberley Training Institute's Director of Corporate Services.

He said the investment in these two facilities focused on the future, with the demand for training expected to increase in the East Kimberley as the Stage II Ord Expansion project progresses and other demands become apparent, including community needs and developments in the resource sector. ■

Health care transformed from 'chookhouse'

Health care in the Kimberley was identified as an area of focus for the East Kimberley Development Package (EKDP), with 10 separate projects worth \$54 million being undertaken across the East Kimberley region.

The standout is the new Ochre Health Centre in Kununurra, which is set to revitalise health care in the region.

Located on the grounds of the Kununurra Hospital, the \$20.5 million purpose-built primary health care facility incorporates a range of community and allied health services.

The new building is two-thirds the size of the existing hospital and caters primarily for walk-in, walk-out clients.

Nurses working for Community Health are certainly pleased by the development of the new centre, which provides a marked improvement from the government office space, affectionately known as the 'chookhouse', where they had been working for the past 25 years.

Run by the State Government's Northern and Remote Country Health Service, the new centre is now home to a diverse range of primary health care agencies, which had been operating at the Kununurra District Hospital and other locations.



The Ochre Health Centre in Kununurra. Photo: Department of Health.

Organisations offering child health services, physiotherapy, occupational and speech therapy, drug and mental health counselling services have already moved into the centre.

Kimberley Population Health allied health manager Kato Matthews said the centre would provide a facility for consultations and appointments, which was separate from acute and emergency care.

"It's kind of like de-hospitalising health and making it less hospital-based and more community-based," she said.

Another project which will have a large impact on health services is the provision of seven houses for health care providers in Kununurra.

A total of \$6.8m was allocated for the construction of seven and purchase of two houses in the suburb of Lakeside. Two houses have been provided to the

Kimberley Aboriginal Medical Services Council for housing staff from the renal service. The remaining five houses are now occupied by WA Country Health Service staff. New staff accommodation has also been provided in Kalumburu (\$1m) and Wyndham (\$3.4m).

Other completed EKDP health projects include the final stage of the Wyndham Residential Rehabilitation Facility (\$3.2m), environmental health services across the East Kimberley region (\$3.9m) and the refurbishment of the Kununurra and Wyndham sobering-up centres (\$0.6m).

By the end of 2012, the EKDP will also deliver short-stay patient accommodation in Kununurra (\$5.1m), a Community Care facility in Kalumburu (\$5m), and ground works for a new remote clinic in Warmun (\$4.5m). ■

Port makeover assists expansion

The transformation of the Port of Wyndham has been ongoing since 2010, using \$10 million of funding provided by the Commonwealth Government under the East Kimberley Development Package.

Operated by the Department of Transport, the port is being expanded to maintain, or increase, its current trade in livestock, nickel concentrate, fuel, ammonium nitrate and general cargo, while meeting the future needs of the expanding Ord River Irrigation System.

Works on the port's revitalisation were completed in mid-2012, with key features including:

- Jetty fender system replacement.
- Refurbished jetty steel piles protective coatings.
- Reconstruction of container hardstand.
- New worker amenities and ablutions.

One of the most impressive features is the new steel cathodic protection system, which provides protection to jetty steel structure below mean sea level.

The new system involves installation of state-of-the-art anode skid assemblies on the sea bed surrounding the jetty structure.

It replaces an impressed anode system (installed onto the piles) which has been susceptible to damage from debris brought in by fast-flowing water into Cambridge Gulf. ■



Sturdy stuff . . . after-shots of the Port of Wyndham's jetty piles.



Daniel Endacott, DMP Senior Environmental Officer.

The Ranger open pit Uranium mine.

Meeting the uranium challenge

In November 2008 the State Government made a decision to reverse the ban on uranium mining in Western Australia.

Since the decision, uranium exploration in Western Australia has risen dramatically. So too has the amount of known reserves. At last estimate, the State contained approximately 211,000 tonnes of uranium oxide across more than 30 deposits.

In the last four years there has been a considerable amount of work behind the scenes to ensure Western Australia is well prepared for the challenges presented by uranium mining.

In February 2009, the Department of Mines and Petroleum (DMP) established an Inter-agency Working Group to review the adequacy of the current framework to regulate the development of uranium mines and associated uranium transport issues.

The review found the framework that was already regulating radiation safety associated with heavy mineral sand mining was suitable for the development of uranium mining in the State.

The following year, DMP commissioned the Uranium Advisory Group (UAG) to prepare an independent review of uranium mining regulation in Western Australia. In April 2012 the UAG report recommendations and DMP's response were published.

In responding to the recommendations, the department said it recognised that moving towards a best practice model was a journey of continuous improvement, and that practices must align with national and international trends to adopt a risk-based approach.

Another important part of the journey has been the knowledge DMP staff have gained through participating in industry workshops with experienced regulators, industry representatives and consultants, and in particular those working in South Australia and Northern Territory.

To extend this interaction to a global level key DMP staff attended a workshop hosted by the International Atomic Energy Agency (IAEA) in Darwin earlier this year.

The IAEA is an international agency that works with member States and partners worldwide to promote safe, secure and peaceful nuclear technologies.

The five-day workshop focussed on the effective regulation and environmental management of uranium production globally.

Rachel Maiden, the DMP uranium liaison officer, Ivan Fetwadjieff, DMP Inspector of Mines and Daniel Endacott, DMP Senior Environmental Officer, attended the workshop.

"The workshop gave us the opportunity to come together and share the knowledge and experiences of a broad range of experts," Mr Endacott said.

"It involved not just regulators but also industry representatives and consultants that work in the uranium mining industry."

The workshop was broken into three days of presentations and talks from industry groups, local and international regulatory agencies, the IAEA and other radiological and environmental experts.

Two field trips were organised as a part of the workshop. One was to the Ranger uranium mine, with the other to Rum Jungle – a former uranium mine.

"The site visit to the Ranger uranium mine illustrated how environmental and safety management practices are implemented on the ground," Mr Endacott said.

Rum Jungle was closed in the 1970s, and since its closure there have been a number of legacy issues associated with the site, particularly surrounding environmental management.

"We looked at some of the issues that have arisen post-closure and the lessons we can take from that site to ensure mistakes are not repeated," Mr Endacott said.

"This applies not just to uranium mining, but all mining."

Mr Endacott said there was a strong focus on the safe and environmentally responsible closure of uranium mine sites.

"This needs to be done progressively and across the life of the mine," he said.

"It also needs to involve all key stakeholders, including local indigenous groups, land holders and the local community.

This will ensure the companies and regulators involved have put all the steps in place to make sure that the closure objectives are met."

Rachel Maiden also stressed the real value in these experiences for Western Australia is to learn from other jurisdictions.

"We were able to meet with some highly skilled uranium professionals and having the opportunity to talk to them about their regulatory experience was incredibly valuable," she said.

Ms Maiden said the workshop also highlighted Western Australia's position in the lead-up to the State's first operating uranium mine.

"We do have the systems and legislation in place to properly regulate the industry, and comparison with other jurisdictions confirms that we are in good stead," she said.

"We have a long history of dealing with mining in Western Australia and we have a long history of dealing with the mining and export of radioactive materials.

"We are aware that there will be new pressures that come with opening up an industry such as uranium mining, however the WA Government is in a very strong position to ensure it is regulated and managed appropriately." ■



*On completion of pump repair, students test the pump efficiency rate. Here a student puts the pump through its paces.
Photo: Polytechnic West.*

Institute expands world-class hydraulics training

Western Australia is again proving it offers cutting-edge training to the resources sector. In this instance it's in the field of fluid power – the ability to change fluid energy into mechanical energy and vice-versa. Critical in mining and engineering, it increases force and improves systems of movement using hydraulics (oil) and pneumatics (air) as the mediums. It is the backbone of the equipment that digs holes, transports materials, loads ships, crushes ore and operates bulldozers. Almost any piece of equipment used in producing or handling iron ore will use fluid power.

Since its official relaunch in September, Polytechnic West's Fluid Power Institute has worked towards bridging the skills shortage gap by offering specialised education and training courses to mechanical apprentices, qualified tradespeople and defence force personnel across Western Australia.

The relaunch took place following a two-year, \$1.5 million makeover, spurred by increasing demand from a growing client base, during which the institute relocated from its small home at Polytechnic's Thornlie campus to larger premises 24km away at the Midland campus.

Formerly an old aviation workshop, the newly-converted 900 square metre facility

has two state-of-the-art pneumatic labs, a fully-equipped workshop, new classrooms and a suite of hydraulic and pneumatic training simulators utilising current fluid power technology, all built by Polytechnic's machinery and fabrication staff.

The simulators have been specifically designed with portability in mind: to service the institute's growing base of mining and engineering companies in WA's remote northwest, such as BHP Billiton and Rio Tinto.

As the largest facility of its kind in WA, the Fluid Power Institute will offer world-class training in hydraulics and pneumatics to students, and provide them with access to more than \$1 million worth of specialised fixed and mobile equipment.

Polytechnic West Portfolio Manager (Fitting, Machining & Fabrication) Gary Cover said the revamped facility has been well-received since opening earlier this year, with current enrolment numbers for the Certificate IV and Diploma courses exceeding historical figures.

"The original push for the revamp came from an increased demand from Rio Tinto for more skilled workers," he said.

"We had been running a number of night classes for their Perth-based workers and as they started putting more team members through, we found ourselves running out of equipment and floor space to house them.

"The upgrade was inevitable. We were fortunate in securing the funding required to physically grow and also to expand our course line-up. We have also increased staff numbers from two to five, which means we can offer more classes for more students."

Cover said students must have current trade qualifications to be eligible for Fluid Power Institute courses, with tuition designed to 'top up' their knowledge and skills base.

"What we offer is the opportunity to have a career path that goes beyond being a tradesperson, into supervisory and management roles," he said.

"From a productivity perspective, our training can help mining employees, for example, learn to better manage and maintain their own equipment rather than relying on third party contractors.

"Time is money on a mine site. Any equipment breakdown can equate to large dollars and costly downtime, so it makes tremendous financial sense to have staff with the latest qualifications in hydraulic and pneumatic fluid power systems.

"And in an age where third-party skilled workers can be hard to come by, it makes economic sense as well to equip your people with extra qualifications and keep that expertise in-house.

"We currently have 84 individuals going through the Certificate IV course and 12 of those are doing their Diploma of Engineering – Advanced Trade (Fluid Power).



Two students working in the automation centre, using a Programmable Logic Controller to manage processes. Photo: Polytechnic West.

"We are starting to do a lot of customised training packages with mining and engineering operations based outside of Perth. For instance, we have trained 150 staff for Rio since 2011 and have just delivered 10 weeks' of solid training with BHP staff in the Pilbara, which the company wants us to conduct again in 2013.

"We have also just finished a 10-week contract with the defence forces, training their staff on site.

"We are unique to WA and are focused on creating an esteemed profile for ourselves through the delivery of exceptionally high standards of education and training in fluid power," he said.

"We could not have asked for better results from our recent refurbishment and we believe we are now well-placed to offer solutions to the ongoing skills shortage crisis." ■

TradeStart paves way to international business

Businesses in Western Australia have a unique advantage when it comes to entering the international market.

TradeStart is a free service which helps Western Australian companies find the best export market, meet the right people and receive assistance.

If you're an exporter, TradeStart can help reduce the time it takes to meet the right contacts and reduce the risks in doing business internationally.

TradeStart, an international business initiative of the Australian Government delivered in partnership with the Department of State Development, also assists with bringing events to WA and attracting investment to WA.

Among its range of services, companies can get access to market research, industry specialists and in-market consultants, Government Grants Export Market Development and Enterprise Connect and WA and AusTrade offices.

TradeStart's WA advisor, Gordon Hay, operates within the Department of State Development and can be contacted on 9222 3542, or gordon.hay@dsd.wa.gov.au ■



Reform Project Director
Simon Skevington.

Environmental reforms gather pace



Minister Moore supports industry engagement in environmental reform.

When it comes to introducing reforms at the Department of Mines and Petroleum (DMP), one man knows better than most the kind of work this involves – Reform Project Director Simon Skevington. After spending the past two years focussing on the department’s safety reforms and the transition to the new Commonwealth offshore petroleum regulator, *Prospect* looks at how he has shifted his attention to DMP’s environmental reform program.

The Reforming Environmental Regulation (RER) program kicked off in May this year, and despite the obvious differences between environmental and safety regulation, Mr Skevington can see plenty of common ground.

“There are a lot of similarities,” he said.

“Both have featured Ministerial Advisory Panels to get input from our stakeholders and have required important changes to legislation.”

However, Mr Skevington says there will be additional challenges associated with the environmental reforms.

“The big difference was that in safety all our stakeholders were committed to getting a better safety outcome for the industry and its workers,” he said.

“It was clear what was safe and what was not. I feel these reforms will be a little harder, as there appears to be a degree of tension between industry and environmental groups about outcomes.

“Ensuring we have effective discussions and agreed outcomes is going to be very challenging.”

The scale of the RER program will also be a considerable challenge for Mr Skevington and the department.

“Timing is an issue, particularly as we have an election coming up and the imminent retirement of our minister. He has been a very big supporter of this work.”

Despite the challenges ahead, the reforms are a vital part of improving environmental regulation in Western Australia.

“There will be a number of benefits from these reforms,” Mr Skevington said.

“Firstly, there will be clearer approvals processes. This means industry and the regulator both know what is expected, and the community has greater confidence in our capacity to regulate.”

“Compliance reform will provide better tools and processes for us to ensure industry is doing the right thing. These will be clear, consistent and used regularly to ensure we establish a good culture within industry.

“Funding through the Mining Rehabilitation Fund will allow us to actually get out and clean up the priority sites where the State is liable.”

Mr Skevington is particularly excited about the potential scope of these reforms.

“I think we are only looking at the tip of the iceberg with this fund,” he said. “It has the capacity to be much more and potentially change the way we do business.”

The reforms clearly point to an exciting period of change for the department.

However, Mr Skevington is realistic with the length of time it takes to initiate such a dramatic change.

“Reform does not happen overnight,” he said.

“It is a dynamic cultural change that needs to evolve through changing direction, where appropriate, to achieve a process of continuous improvement.”

Whatever challenges are ahead, Mr Skevington’s experience with the department’s safety reforms has prepared him for the reform road ahead.

“I did not come from a safety background, so I spent a lot of time asking questions,” he said.

“From a positive point, it helped me in my discussions with stakeholders because I could ask them questions without having any preconceived ideas.”

He said the experience gave him a lot of satisfaction.

“From a personal and professional sense it took me out of my comfort zone, as it was so different from what I had done before,” he said.

“It was good to work on something that will change safety in the industry for the better.” ■

Premier opens resource-focused logistics centre



WA Premier and State Development Minister Colin Barnett (second from right) gets the lowdown on Linfox's new resources logistics centre from the company's CEO of Logistics, Michael Byrne, accompanied by FMG's Andrew Forrest (third from left) and Linfox's Peter Fox (far left).

Western Australian Premier and State Development Minister Colin Barnett officially opened Linfox's new Perth super site designed to support the state's resources industry.

The Premier toured the site's high-tech facilities at Hazelmere and joined Lindsay Fox and Peter Fox, Linfox's Chairman, to unveil a plaque to commemorate the opening of the \$70 million site.

"Linfox's investment brings a new level of sophistication that adds value for WA's resources industry and the State's economy generally," Peter Fox said.

"Key mining projects will benefit from our commitment to cutting-edge technology and skilled employment.

"We are committed to investing in leading assets, IT and training for our people."

Hazelmere has high-tech systems that guarantee accurate management of a vast range of essential needs for remote resource projects – from heavy equipment to paper clips.

Mr Fox said the centre's master control room allowed the company to monitor and manage their resources warehouse and transport operations throughout Western Australia.

"Linfox has added more than 150 new road trains to its WA fleet and 300 new employees in the past 18 months," he said.

"We bring more than a decade of experience in supporting major resource projects, so Western Australia is a natural area of growth for Linfox."

"We're also investing heavily in Asia's growth economies, where there is strong demand for our supply-chain expertise."

More than 130 Linfox staff work at the new facility. The 80,000m² facility includes a state-of-the-art master control centre that monitors their resource operations across WA in real-time.

The site's specialised warehousing receives and manages a wide range of goods for Linfox customers and it has ideal access to major road networks for the Linfox fleet. ■

Juniors to benefit from port review

The Port Hedland Port Authority (PHPA) has completed a whole-of-port review of its productivity and capacity utilisation.

The review identified under-utilised capacity available at the port and a number of development opportunities to access that capacity.

WA Transport Minister Tony Buswell and the PHPA have approved the following, subject to the State Agreement processes:

- Fortescue Metals Group is able to develop the AP5 berth for iron ore export, with one ship loader servicing both AP4 and AP5.

- BHP Billiton Iron Ore is able to develop two additional berths within the company's existing State Agreement tenure at Burgess Point.

The review arrangements do not involve an increase or decrease in the export capacity allocations for any port user.

Mr Buswell said the State Government and PHPA worked together to deliver a sound outcome for Western Australia.

"These developments will see the PHPA optimising its export capacity within the inner harbour and are a significant step towards the port realising its target throughput capacity of 495Mtpa," he said.

"These initiatives represent an advance for both the junior miners and the major iron ore companies at Port Hedland." ■

AGRICULTURE

East Kimberley – Ord – Ord/East Kimberley Expansion Project WA STATE GOVERNMENT

The State Government (through Royalties for Regions) has committed \$322 million to increase the existing amount of irrigated land in the Kununurra region by releasing an additional 15,000ha of 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. The Government has been in discussions with potential proponents for the Ord farm lands and will soon announce the preferred proponent/s. The Commonwealth Government has committed \$195 million of funding for social and common use infrastructure in the East Kimberley region through the East Kimberley Development Package (EKDP) National Partnership Agreement (NPA). Construction is well underway and some of the infrastructure projects are now complete such as the Wyndham Early Learning Activity Centre which was opened by Prime Minister Julia Gillard on 18 July 2012. The Package will be fully implemented by June 2013. 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: \$506m.

Employment: Construction: 761

BAUXITE

Worsley/Boddington – Alumina Refinery – E & G Project Expansion – 3.5 to 4.6Mtpa BHP BILLITON WORSLEY ALUMINA PTY LTD

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

Expenditure: \$3.2b.

Employment: Construction: 1500; Operation: 200

GOLD

Boddington – Gold Mine

NEWMONT BODDINGTON GOLD PTY LTD

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

Employment: Operation: 650

INFRASTRUCTURE

South West Region – Kemerton (HUILS – Heavy Use Industrial Land Strategy) WA STATE GOVERNMENT

Kemerton Industrial Park, located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, only 90 minutes away by road. The estate comprises 7,543ha of land, including 2,019ha of industrial core, 293ha support industry area and 5,231ha buffer areas. It is accessible to the Port of Bunbury by road and 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 – Extension Hill Hematite Mine MOUNT GIBSON IRON LIMITED

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

Expenditure: \$73m.

Employment: Construction: 150; Operation: 100

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

FORTESCUE METALS GROUP LTD

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

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 number of projects in Western Australia with exports commencing in December 2008 from its Pardoo Project, east of Port Hedland. In 2012 exports will increase to 6Mtpa with production from the Wodgina Direct Shipping Ore Project, south of Port Hedland. All exports of iron ore are from the Utah Point multi-user berth in Port Hedland with ore transported via concessional loaded truck. The company is targeting exports of 12Mtpa by December 2013 as it brings three new mines – Abydos, Mt Dove and Mt Webber – into production. With the addition of McPhee Creek and its south east Pilbara assets, Atlas plans to progressively expand its exports, targeting 15Mtpa by 2015 and 46Mtpa during the 2017 calendar year.

Expenditure: \$500m.

Employment: Operation: 570

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 the expansion will be completed in the first half of 2014.

Expenditure: \$550m.

Employment: Construction: 300; Operation: 10

Pilbara – Burrup Industrial Estate Site D – Burrup Nitrates

YARRA INTERNATIONAL ASA

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 mining is scheduled to start Q3 2012. The project is on track for first gold production in 2013.

Expenditure: \$700m.

Employment: Construction: 700; Operation: 400

HEAVY MINERAL SANDS

Keysbrook – Heavy Mineral Sands Mine MATILDA ZIRCON LIMITED

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 to up to 11 years. Keysbrook has a mineral resource of 49.1Mt at 2.6% heavy minerals and an ore reserve of 670,000t of total heavy minerals, which underpins the first 5.5 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 early 2013, with first production expected in Q4 2013. The project is expected to produce 62,200tpa of leucocoxene 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

Mid West Region – Karara Iron Ore KARARA MINING LTD (GINDALBIE METALS LTD / ANSTEEL JOINT VENTURE)

The Karara Iron Ore Project is Karara Mining's cornerstone production project in the Mid West region. Construction commenced in November 2009. Karara will deliver some 10Mtpa of iron products by Q4, 2012, comprising 8Mtpa of high grade magnetite concentrate and blast furnace quality pellets and 2Mtpa of Direct Shipping Ore hematite. The Project is underpinned by a JORC compliant resource base comprising a 977Mt magnetite reserve, a 2.518Bt magnetite resource, a 10.9Mt hematite reserve and a 16.2Mt hematite resource.

Expenditure: \$1.975b.

Employment: Construction: 1500; Operation: 500

Pilbara – BHPB – Inner Harbour Expansion – Port Hedland

BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.9 billion (BHP Billiton's share) to increase total inner harbour installed capacity to 220Mtpa with debottlenecking opportunities to 240Mtpa. The project is currently on schedule (overall project is 69% complete) and on budget.

Expenditure: \$1.344b.

Pilbara - BHPB - Port Blending and Rail Yard Facilities

BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.4 billion (BHP Billiton's share) to optimise resource and enhance efficiency across the BHP Billiton WA iron ore operation supply chain. The project is currently on schedule (overall project is 32% complete) and on budget.

Expenditure: \$1.344b.

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

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

Expenditure: \$1.6b.

Employment: Construction: 2100; Operation: 720

Pilbara – Jimblebar Iron Ore Mine Expansion BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$3.3 billion (BHP Billiton's share) to increase installed mining and processing capacity at Jimblebar mine to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The project is currently on schedule (overall project is 52% complete) and on budget.

Expenditure: \$3.168b.

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. Construction of supporting infrastructure, which includes the new 60Mtpa iron ore mine at Solomon and a 137km railway spur to Fortescue's existing Christmas Creek to Port Hedland rail line has commenced. The Solomon Hub is planned to initially involve at least two mining areas and two processing plants. First production from Solomon is anticipated by late 2012. FMG has recently announced deferral of commissioning of its fourth berth, its third train unloader and part of its Solomon development. This will reduce its expected export capacity to 115Mtpa. FMG advises that this deferral will be reviewed before the end of 2012.

Expenditure: \$9b.

Employment: Construction: 7000; Operation: 6000

IRON ORE PROCESSING

Pilbara – Cape Preston – Sino Iron

CITIC PACIFIC

CITIC Pacific Mining is constructing the Sino Iron project at Cape Preston, 100km south west of Karratha. The 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 a final investment decision on the \$43 billion Gorgon Project on 14 September 2009. The GJV's foundation project on Barrow Island includes a three train LNG development capable of exporting 15Mtpa and a domestic gas project capable of delivering at least 300TJ/d of gas to the mainland. The development on Barrow Island also includes potentially the largest commercial geosequestration project in the world. The project obtained State and Commonwealth environmental approval in August 2009. The project is based on gas from both the offshore Gorgon and Jansz/lo gas fields. On-island activity commenced in late 2009 and the major construction work for the processing plant commenced in 2011.

Expenditure: \$43b.

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

Expenditure: \$5b.

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

RARE EARTHS

Mt Weld – Rare Earths Mine

LYNAS CORPORATION LTD

The Mt Weld deposit is located about 35km south of Laverton and contains an estimated resource of 23.9Mt at an average grade of 7.9% for 1.9Mt rare earth oxides (REO). The development includes an open pit mine and a concentration plant, located 1.5km from the open pit mine. The first feed of ore into the 33,000tpa concentration plant occurred in May 2011 and the plant was officially opened in August 2011. The concentrate will be bagged and containerised on site, and trucked to the Port of

Fremantle for export. It will be shipped to a \$500 million processing plant in Malaysia, which will have an initial production capacity of 11,000tpa REO scheduled to commence in Q4 2012 subject to Malaysian regulatory approvals. 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 Q2 2013 and will meet the Malaysian processing plant's planned expanded production of 22,000tpa REO.

Expenditure: \$135m.

Employment: Construction: 145; Operation: 95

SILICON METAL

Kemerton – Silicon Metal Plant Expansion

SIMCOA OPERATIONS PTY LTD

Simcoa announced in October 2009 its decision to expand the company's 32,000tpa capacity silicon metal plant at Kemerton. The first stage expansion, involving installation of a third furnace, will increase the plant capacity to 48,000tpa and 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

AMMONIA/UREA

Shotts Industrial Park - Collie Coal to Urea

PERDAMAN CHEMICALS AND FERTILISERS PTY LTD

Perdaman Chemical and Fertilisers Pty Ltd is developing a \$3.5 billion coal to urea plant at the new Shotts Industrial Park, near Collie. The plant will use proven coal gasification and fertiliser production technologies. Around 2.7Mtpa of coal will be used to produce approximately 2Mtpa of urea, primarily for export. The urea will be transported to Bunbury Port by rail. A 20-year off take agreement has been signed with Incitec Pivot. The coal supply contract is yet to be finalised. The company has received all its environmental and all other approvals from both the Western Australian and Commonwealth governments. Construction is expected to commence in late 2012 or early 2013, with the first shipment of urea planned for 2016.

Expenditure: \$3.5b.

Employment: Construction: 2000; Operation: 200

HEAVY MINERAL SANDS

Happy Valley – Heavy Mineral Sands Mine

CRISTAL MINING AUSTRALIA LIMITED

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

Expenditure: \$35m.

Employment: Construction: 100; Operation: 30

Shark Bay – Coburn Zircon Project

GUNSON RESOURCES LIMITED

Gunson proposes to develop the Coburn zircon project, located south of Shark Bay and approximately 250km north of Geraldton. It contains total ore reserves of 308Mt at an average grade of 1.2% 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-leucoxene 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% interest in the project. A joint venture agreement is expected to be completed in December 2012. 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 includes establishment of a multi-user, multi-commodity deepwater port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha. The port and corridor development will be a proponent-funded State owned Port managed under the Port Authorities Act 1999. The industrial land will fall under the jurisdiction of the Western Australian Land Authority. Three companies have expressed interest in developing facilities at Anketell: API Management Pty Ltd for its 30-40Mtpa West Pilbara Iron project, MCC Australia Sanjin Mining Pty Ltd for its 15Mtpa Cape Lambert Iron Ore project, and Fortescue Metals Group (FMG) for its 100Mtpa Central Pilbara project. Numerous other companies have expressed an interest in using the port facilities for bulk export.

IRON ORE

Great Southern Region – Southdown Magnetite Mine

GRANGE RESOURCES LTD/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. The project's joint venture owners are undertaking finance raising prior to making a Final Investment Decision. Production from Southdown is targeted to commence in 2015. Southdown has a resource of more than 1.2Bt, potentially supporting a mine life of 40 years producing 10Mtpa of magnetite.

Expenditure: \$2.88b.

Employment: Construction: 2000; Operation: 600

Mid West Region – Extension Hill Magnetite Mine ASIA IRON

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

Expenditure: \$2b.

Employment: Construction: 1000; Operation: 350

MID WEST REGION – JACK HILLS EXPANSION CROSSLANDS RESOURCES

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

Expenditure: \$2b.

Employment: Construction: 450; Operation: 350

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

MCC Australia Sanjin Mining Pty Ltd is developing a 15Mtpa magnetite iron ore mine in the Pilbara and aims to ship its first ore in 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 will commence later in 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 2014/2015. Environmental approval for the mine and rail elements of the project was received in December 2011. The EPA is expected to finalise its assessment of the Anketell Port proposal in Q4 2012.

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, Poseidon is forecast to commence construction in Q4 2012 with operations to commence by Q4 2013.

Expenditure: \$250m.

Employment: Construction: 80; Operation: 180

OIL & GAS DEVELOPMENTS

Carnarvon Basin – Pluto Project Expansion WOODSIDE ENERGY

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

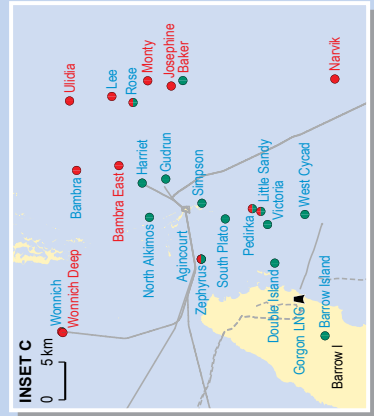
Prospect Magazine is also available to view online.

Visit www.dsd.wa.gov.au/Prospect

Major Resource Projects — December 2012

Northwest Shelf / Pilbara Region

INSET B



MINERAL SYMBOLS

- Precious metal (Au (or as shown))
- Steel alloy metal (Ni (or as shown))
- Specialty metal (Ti-Zr (or as shown))
- Base metal (Fe, Ni, Cu, Zn, Pb, Al, Mn, Mg, Si, V, Cr, Co, Ni, Mo, W, Sn, Sb, Bi, Te, Se, As, S, Br, I, Pt, Pd, Ag, Au, Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr)
- Iron
- Uranium
- Industrial mineral

PETROLEUM SYMBOLS

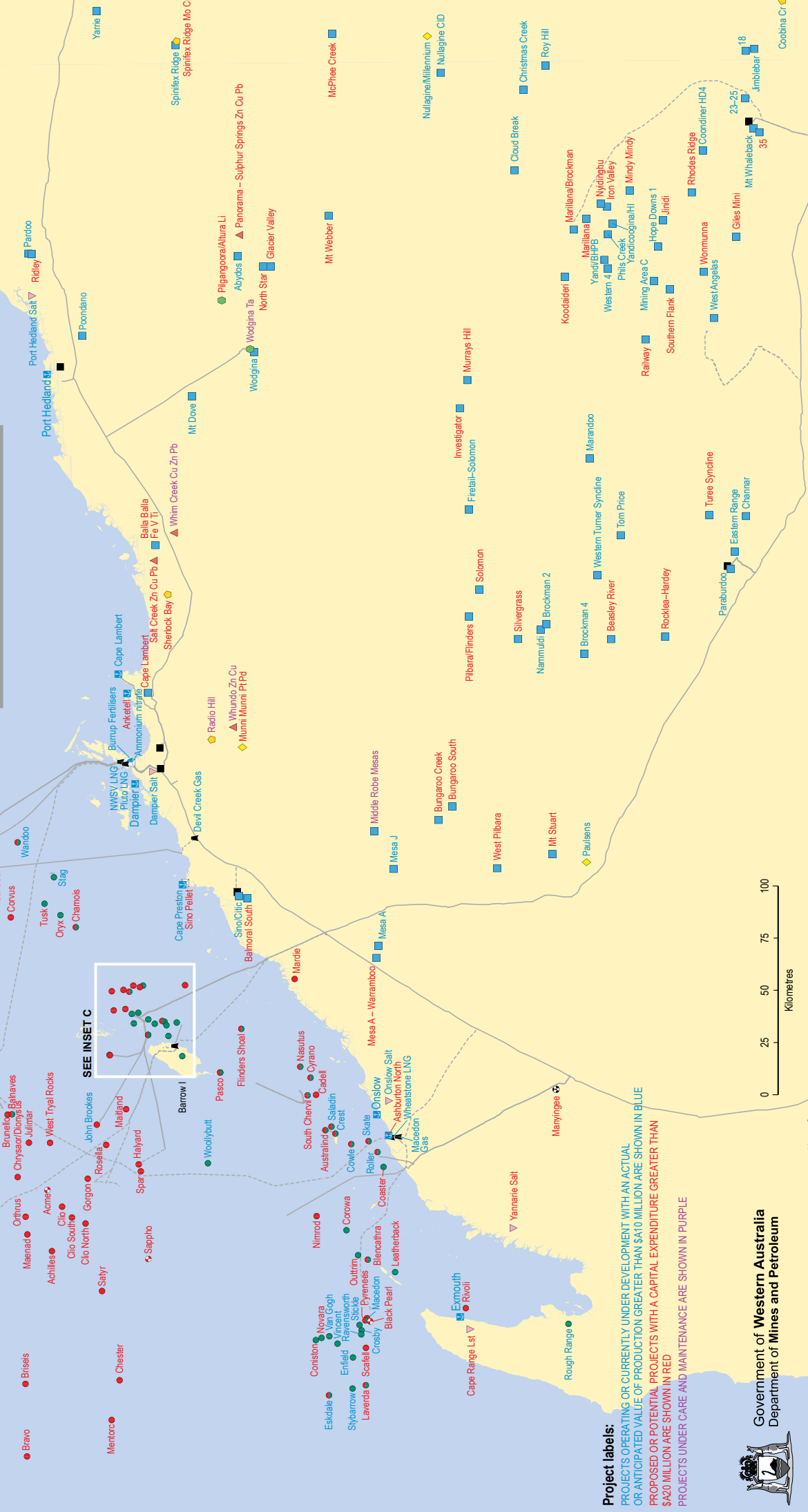
- Gas field
- Oil field
- Oil and gas field
- Significant gas discovery
- Processing plant
- Oil / gas pipeline, operating
- Oil / gas pipeline, proposed

INFRASTRUCTURE

- Power plant
- Processing plant
- Irrigation / water / desalination
- Port

COMMODITIES

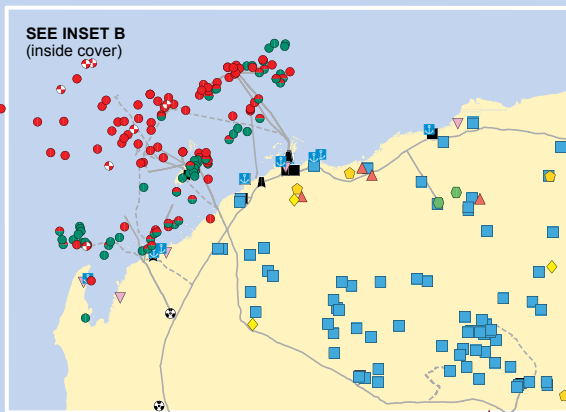
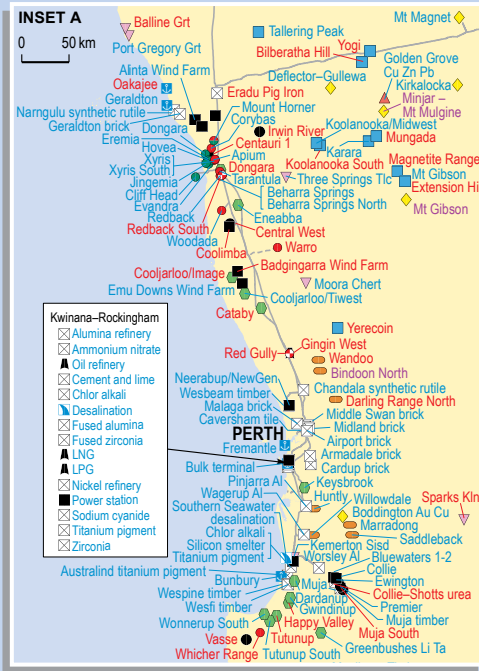
- Au: Gold
- Cr: Chromium
- Cu: Copper
- LNG: Liquefied natural gas
- Mo: Molybdenum
- Ni: Nickel
- Pb: Lead
- Pd: Palladium
- Pt: Platinum
- Ta: Tantalum
- Ti: Titanium
- U: Uranium
- V: Vanadium
- Zn: Zinc
- Zr: Zirconium



SEE INSET C

Project labels:
 PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$A10 MILLION ARE SHOWN IN BLUE
 PROPOSED OR POTENTIAL PROJECTS WITH A CAPITAL EXPENDITURE GREATER THAN \$A20 MILLION ARE SHOWN IN RED
 PROJECTS UNDER CARE AND MAINTENANCE ARE SHOWN IN PURPLE

Major Resource Projects — December 2012



- MINERAL SYMBOLS**
- ☆ Precious mineral Dmd
 - ◆ Precious metal Au (or as shown)
 - Steel alloy metal Ni (or as shown)
 - Speciality metal Ti-Zr (or as shown)
 - ▲ Base metal
 - Iron
 - Alumina Bx (or as shown)
 - 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
 - Kin..... 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
 - Ta..... Tantalum
 - Ti..... Titanium
 - V..... Vanadium
 - W..... Tungsten
 - Zn..... Zinc
 - Zr..... Zirconium

