

# IT'S A GAS!

Gorgon grows & Macedon boosts WA gas

PROSPECT





As we head into the final quarter of 2013, Western Australia is well-positioned to reap the benefits of strong investment in the State's resources sector despite the recent softening in industry conditions.

The near-term prospects for natural gas in particular look bright.

This edition of *Prospect* includes a synopsis of the latest developments for the Gorgon Project – Australia's largest single-resource development and one of the world's largest natural gas projects (story page 16).

With WA's strong population growth forecast to continue and the energy needs of our Asian neighbours increasing, natural gas will continue to play a critical role in both the State's economic growth and in servicing our energy needs.

Natural gas today accounts for almost 60 per cent of the State's electricity production and the Western Australian Government is committed to expanding domestic gas supply by supporting exploration and encouraging investment in projects.

The State's latest domestic gas processing facility, the Macedon project, officially opened in September (see story page 2). The new facility will boost domestic gas supply and is a significant contribution to Western Australia's energy future.

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**MINISTER FOR MINES AND PETROLEUM**

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Cover photo: The Gorgon Project is one of the world's largest natural gas projects. It will include a 15.6Mtpa LNG plant on Barrow Island, off the north-west coast of Western Australia and a domestic gas plant. Work on the project is progressing at a rapid pace. Photo: Chevron Australia.

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# In this issue



## 02 Macedon adds to State's energy future

The US\$1.5 billion BHP Billiton operated Macedon project – Western Australia's latest domestic gas project – officially opened in September.

## 06 Major boost for petroleum sector

The Department of Mines and Petroleum's latest acreage release includes a mixture of highly prospective and greenfield areas for petroleum exploration.

## 14 Royalty rates review

The State Government invites WA's mining industry to participate in a review of its mineral royalty regime.

## 16 Gorgon grows

Work on the A\$52 billion Gorgon Project continues at a rapid pace.

## 21 Specialist safety inspectors appointed

WA reaffirms commitment to resources industry safety, with seven new specialist safety inspectors.

## 26 Capturing carbon

Recent research results support further investigation into the potential of the South West Hub project.



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# MACEDON BOOSTS WA GAS

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Western Australia's latest domestic gas project, the US\$1.5 billion BHP Billiton operated Macedon project, was officially opened in late September and is set to make a significant contribution to the State's energy future.

Opening the new plant, WA Premier and Minister for State Development Colin Barnett said the Macedon project was a major investment by the project participants, BHP Billiton and Apache Energy, that would significantly boost the State's domestic gas supply.

"New investment in domestic gas production is increasingly important for Western Australia's economic future," the Premier said.

"Natural gas is critical to the State as feedstock for industry, for household use and as the energy source for almost 60 per cent of electricity production.

"The Macedon plant has a design capacity of 200 TJ/day, to be transported

via the Dampier to Bunbury Natural Gas Pipeline into the Western Australian domestic gas market.

"By providing an additional, independent supply of gas, the Macedon plant will increase the State's domestic gas production capacity by nearly 20 per cent – making a significant contribution to our energy future."

Mr Barnett said that investment in, and the development of, projects such as the Macedon project was vital to ensuring the sufficient supply of natural gas to meet the State's growing demand.

*"The Macedon plant will increase the State's domestic gas ... making a significant contribution to our energy future."*

"With Western Australia's population growing strongly, and its mineral production processing industries expanding, demand for natural gas is continuing to increase," he said.

"The State Government is committed to expanding domestic gas supply by supporting exploration, encouraging investment such as Macedon, and requiring that gas equivalent to 15 per cent of natural gas processed onshore for export is reserved for domestic use."

The Macedon project is the State's newest domestic gas processing facility, following on from the commissioning of the Apache-operated Devil Creek Gas Plant last year.

The project is located at the Ashburton North Strategic Industrial Area (ANSIA) near Onslow in the State's Pilbara region. Planning for a multi-user port and strategic industrial area, the ANSIA was initiated by the State Government in 2008 as a hydrocarbon precinct for natural gas



*BHP Billiton's Asset President Conventional, Steve Pastor with Premier Colin Barnett at the official opening of the new Macedon plant.*



projects and associated industries, using gas reserves in the Carnarvon Basin and Exmouth Gulf.

The gas field production lease for the Macedon project is located in the Exmouth sub-basin, about 40 kilometres north of Exmouth and about 90km west of Onslow.

The project includes four offshore production wells. Associated infrastructure includes the installation of subsea 'trees', connectors, flow-lines and a manifold to feed the produced gas into a central pipeline, and umbilical lines.

A 75km subsea wet gas pipeline travels from the field to the shore, crossing near the ANSIA precinct.

In comparison to an offshore platform (dry gas) approach, the wet gas option allows for subsea operations with no surface facilities or emissions at the gas field.

A 67km gas pipeline connects to the existing Dampier to Bunbury Natural Gas Pipeline to export gas into the State's domestic gas market.

The project has delivered significant benefits to the town of Onslow, with BHP Billiton signing a State Development Agreement with the State Government in 2012, committing to local social infrastructure developments.

The agreement includes A\$5m invested in community infrastructure, including support for basketball and netball courts and a skate park in the Onslow sport and recreation precinct and other potential projects in the community, such as improvements to a coastal boardwalk. BHP Billiton also made a commitment to work with the local Thalanyji Native Title partners.

BHP Billiton estimated the construction workforce for Macedon peaked at about 700 employees and, together with several construction contracts awarded to local companies, the company has committed to ongoing relationships with local businesses for its operations and employee accommodation. The company has estimated Australian content for Macedon at more than 57 per cent of project expenditure.

Mr Barnett commended all parties involved in the finalisation of the Macedon project as it moved into the operational phase.

"We look forward to the safe operation of the Macedon project, and the positive impact it will have on the Western Australian gas market and the future development of the ANSIA, as well as the project's social contribution to Onslow," he said. •



*BHP Billiton's Macedon gas plant.*

## Macedon Timeline

<b>1992</b>	Macedon gas field discovered
<b>1993-94</b>	Field appraisal
<b>1995-2005</b>	Proponents determine development plan
<b>Nov 2008</b>	BHP Billiton undertakes approvals process applications
<b>Dec 2008</b>	WA Government announces Ashburton North Strategic Industrial Area (ANSIA) to be developed
<b>2009</b>	<i>Gas Supply Act WA (2009)</i> passed, broadening gas specifications for the State's main pipeline. State Government announces support for the establishment of the ANSIA.
<b>2010</b>	BHP Billiton announces final investment decision. WA Environmental Protection Authority gives conditional approval. Front-end engineering and design work completed.
<b>2011-13</b>	Two-year construction phase commences
<b>2012</b>	State Development Agreement (25 years) announced
<b>2013</b>	Production commences

A photograph of an industrial facility, likely a liquefied natural gas (LNG) export plant. The image shows a large, multi-story structure with a prominent cylindrical tank at the top. The structure is composed of various metal components, including pipes, walkways, and structural beams. The sky is clear and blue. The text "WA DOMESTIC GAS POLICY" is overlaid on the top right of the image.

# WA DOMESTIC GAS POLICY

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## LINKING IN WITH LNG

The effect of new liquefied natural gas (LNG) export projects on domestic gas markets has been a topic of much debate over the past year, both in Australia and other countries.



In eastern Australia, the main focus has been on LNG export projects located at Gladstone in Queensland, three of which are under construction and scheduled to commence exporting over the next two years. Coal seam gas has added significantly to domestic gas supply, but domestic consumers say they are struggling to secure long-term gas contracts because producers are prioritising LNG exports.

In the United States of America, new technologies allowing the extraction of shale gas have added greatly to domestic gas supply and driven down gas prices. Gas producers hope to export some of this resource as LNG. This has been controversial, as major gas consumers fear that significant exports will divert supply from the domestic US market and raise prices. So far, the US Government has approved export licences for three proposed LNG processing facilities.

As the possible conflict between domestic and export gas markets has come under scrutiny, Western Australia's long-established domestic gas policy has attracted renewed attention.

Not all commentary on the policy has been accurate. This article, produced by the Department of State Development, provides some background on Western Australia's policy, and summarises the main elements of the policy and its application to LNG producers.

Successive Western Australian Governments have maintained a domestic gas policy position since the 1970s, when the then State Government negotiated domestic gas supply arrangements in the State Agreement to support the North West Shelf Joint Venture.

The State Government introduced a formal policy in 2006 – the *WA Government Policy on Securing Domestic Gas Supplies*. This aimed “to secure domestic gas commitments up to the equivalent of 15 per cent of LNG production from each export gas project.”

In 2012, the current State Government released clarified arrangements for the policy in the *Strategic Energy Initiative: Energy2031* document.

As a condition of LNG project approval, the policy requires LNG producers to commit to make available domestic gas equivalent to 15 per cent of LNG production from each LNG export project by:

- Reserving domestic gas equivalent to 15 per cent of LNG production from each LNG export project.

- Developing, or obtaining access to, the necessary infrastructure (including a domgas plant, associated facilities and offshore pipelines) to meet their domestic gas commitments as part of the approvals process.
- Showing diligence and good faith in marketing gas into the domestic market.

The policy requires LNG producers to make available domestic gas by undertaking these actions. The requirements of the policy create an incentive for producers to supply domestic consumers. However, if after genuinely fulfilling these requirements, a producer cannot find genuine customers, then it would not be forced to sell gas to the domestic market. This in built flexibility of the policy mitigates the risk of over-supplying the domestic gas market.

The policy allows producers to offset their domestic gas commitment by supplying gas or other energy from an alternative source, rather than supplying gas from the same source as their LNG projects. This added flexibility may become more important as the Western Australian domestic gas market matures with more buyers and sellers.

It is common for LNG exporting countries to have a policy that provides a benefit to domestic consumers, whether through direct Government ownership, profit

sharing, taxes or reservation of gas for the domestic market.

The type of policy adopted depends on a number of factors including the historical development of gas production in the country, the relative size of the domestic market to export markets and the country's governance structures.

An important feature of any domestic gas policy design is its impact on investment and production decisions within that sector. Because of this, and because of this State's isolation from other energy grids, direct comparisons of Western Australia's policy against that of other, often more interventionist jurisdictions and policy frameworks, is difficult and not very meaningful. Projects in this State continue to reach final investment decisions for their LNG projects with a negotiated domestic gas commitment. The most recent commitment has been negotiated with Buru Energy for domestic gas supply from its lease areas in the onshore Canning Basin.

Equally significant has been the investment in and development of the State's dedicated domestic gas supply sector with projects such as Apache Energy's Devil Creek and BHPB's Macedon which have also come into production in parallel with the development and expansion of its larger LNG counterparts. •



***The Apache-operated Devil Creek Gas Plant in Western Australia's northwest is one of the State's domestic natural gas processing hubs.***

# PETROLEUM EXPLORATION:

## NEW AREAS RELEASED

Western Australia's petroleum sector has been given a major boost, with the Department of Mines and Petroleum (DMP) opening six different areas across the Midwest, Pilbara and Goldfields regions for exploration.

DMP former Petroleum Executive Director Bill Tinapple said the department's latest acreage release included a mixture of highly prospective and greenfield areas.

"One release area is located east of Geraldton in the Perth Basin – which is known for oil and gas production and excellent infrastructure," Mr Tinapple said.

An additional two areas are situated off the Pilbara coast within the highly prospective Northern Carnarvon Basin – which produces more petroleum than any other Australian basin.

**"One release area is located east of Geraldton in the Perth Basin – which is known for oil and gas production and excellent infrastructure."**

"We're also offering an under-explored area south of Exmouth in the Southern Carnarvon Basin, as well as two larger release areas in the Officer Basin, located in the central eastern part of the State," Mr Tinapple said.

He said he believed the latest acreage release would further enhance the State's reputation as Australia's premier destination for petroleum exploration.

"In 2012, the Western Australian petroleum sector was valued at a record A\$24.4 billion, so this is an exciting opportunity to expand on such growth," he said.

Work program bids for the release areas close at 4pm on Thursday, 14 November 2013.

"The last petroleum acreage release in September 2012 attracted a number of highly competitive bids," Mr Tinapple said. •

For more information contact  
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## WA GEOLOGIST RECEIVES TOP PEER AWARD



*APPEA's David Byers presenting the award for Best Peer Reviewed Paper published in the 2013 APPEA Journal to DMP's Dr Ameer Ghori.*

A senior geologist from the Department of Mines and Petroleum's (DMP) Geological Survey of Western Australia has been recognised nationally for his shale gas research.



# 100<sup>TH</sup> PETROLEUM PIPELINE LICENCE FOR WA

The Department of Mines and Petroleum (DMP) has reached a milestone by processing its 100<sup>th</sup> onshore petroleum pipeline licence in Western Australia.

The licence involves an upgrade to an existing pipeline located on the Dampier to Bunbury Natural Gas Pipeline, operated by DBP Transmission.

Since 1970, a total of 115 onshore and offshore pipeline licences have been granted covering about 7,227 kilometres of pipeline in WA's State waters and onshore.

The Bunbury to Dampier pipeline is the longest at 1600km, making it longer than the US State of California.

On average, it transports 50 terajoules of gas every day – one terajoule is enough gas to supply an average home with energy for about 50 years.

DMP former Petroleum Executive Director Bill Tinapple said the 100<sup>th</sup> onshore pipeline licence showed Western Australia

was further strengthening its future energy security.

"With a number of new gas projects in the works, the outlook for the State's energy resources is very promising," he said.

"As the gas industry continues to develop, natural gas will become available to a wider range of industries."

There are a number of new gas supplies in Western Australia. Chevron's Gorgon Joint Venture project and Wheatstone projects are currently under construction and are two of the world's largest liquefied natural gas (LNG) projects. These developments are scheduled to have gas to market by 2015.

In addition, Empire Oil and Gas' Red Gully project near Gingin, north of Perth, is the first new gas facility to come out of the Perth Basin for many years. Construction is complete and the facility is now online.

BHP Billiton's Macedon Gas Project, located off the coast of Onslow, includes

four offshore production wells supplying gas to an onshore treatment plant, connected to the Dampier to Bunbury Natural Gas Pipeline to supply gas to the domestic market.

Apache's Devil Creek Gas Plant is WA's third natural gas processing hub and processes gas from the Reindeer field off the coast of Dampier. It came online 18 months ago.

These new projects will complement the existing LNG projects including the North West Shelf joint venture project, providing power and gas to around 90 million people in Japan and 40 per cent of WA's domestic gas supply.

Within Western Australia, all the major gas transmission lines are regulated under the *Petroleum Pipeline Act 1969*. This allows the regulation of the construction, operation and maintenance of these important pieces of State infrastructure, and ensures the safety of the public and workers, and integrity of the pipelines. •

Department of Mines and Petroleum's Senior Geologist Dr Ameer Ghori was acknowledged for his research at the leading Australian Petroleum Production and Exploration (APPEA) Conference and Exhibition 2013.

Mr Ghori's paper on '*Emerging unconventional shale plays in Western Australia*' was recognised as the 'Best Peer Reviewed Paper published in the 2013 APPEA Journal'.

"The paper provides information about how production from shale plays has, since 2005, changed the position of the US, from gas importer to potential gas exporter in a very short time," Dr Ghori said.

He said the initial estimates for potential shale plays in Western Australia were very high.

"Shale resources have the potential to provide significant gas supplies from onshore basins, especially from the Canning Basin in the State's north," he said.

Dr Ghori said that exploration for shale gas in WA would benefit from new drilling and production techniques developed during the past 15 years in the US.

"The State is vastly under-explored and emerging self-sourcing shale plays have revived onshore exploration in the Canning, Carnarvon and Perth Basins," he said.

The three-day 2013 APPEA Conference was the largest oil and gas industry event ever held in Australia, with 3600 delegates from 30 countries representing 850 companies and 200 exhibitors.

Presentations at the conference covered topics related to the oil and gas industry including geoscience, engineering, environment and business.

"I am pleased to receive this award, which is not only a great honour for me, but also recognises the quality of geoscientific studies undertaken by the Department of Mines and Petroleum's Geological Survey of Western Australia," Dr Ghori said. •

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# APPROVAL BACKLOG SLASHED IN RESOURCES SECTOR

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The State Government has reaffirmed its commitment to streamlining approval processes, slashing Western Australia's mineral title applications backlog to its lowest level in almost two decades.

Mines and Petroleum Minister Bill Marmion said the State Government had committed A\$5.5million during the past six and a half years to assist the Department of Mines and Petroleum (DMP) to address stalled mining and exploration applications.

The total number of applications waiting for approvals now sits at about 5,000, almost a 75 per cent decrease from the February 2007 figure of nearly 19,000.

"We've granted applications over nearly 17,000 square kilometres of land in previously stalled mining and exploration

applications during the past year – that's just over half the size of Belgium," Mr Marmion said.

"This includes some significant and highly prospective areas across the State."

The outcome was helped by a specialist DMP taskforce that has worked throughout the past year to reduce applications from 6,400 to 5,050.

"Through the taskforce's proactive engagement in the native title negotiations, my department was able to help reduce the backlog of applications, and aims to reduce WA's stalled applications to 4,000 by June 2014," the Minister said.

"We want to prevent mining companies from so-called 'application parking' or 'land banking' – where access to land for

"We've granted applications over nearly 17,000 square kilometres of land in previously stalled mining and exploration applications during the past year – that's just over half the size of Belgium," Mr Marmion said.

mineral exploration is purposely stalled in the *Native Title Act* proceedings, to maintain priority over areas and prevent other companies from developing it.

"This is part of a bigger picture of streamlining government operations and improving approvals processes." •

## MANAGING WATER DEMANDS

The Western Australian Government has introduced new State-wide guidelines for water in mining operations. The guidelines are helping to remove barriers to third party use of surplus mine waste water.

Minister for Water Terry Redman recently announced improved regulatory support for sustainable water use by the mining industry.

"Mining is one of the largest water using sectors in the State requiring water for activities such as extraction, processing, dust suppression, construction and camp consumption," Mr Redman said.

"Ongoing liaison with the mining industry showed that helping this group comply with regulatory requirements around

increasingly complex water use should be a priority focus.

"In response, the State Government has delivered a number of improvements to assist the industry with its water licensing, regulation and compliance requirements."

The Minister said the new *Western Australian Water in Mining Guideline* was a 'one-stop shop' for navigating regulatory requirements for managing water over the life of a mining operation.

The State Government has also created a new policy to manage requests for the third party use of surplus water produced by mine dewatering.

"The industry and communities in which they operate wanted guidance on how they might better use more than

300 billion litres of dewatering discharge a year," Mr Redman said.

"We have already seen cases where this water has benefited regional town scheme supplies and irrigated pasture production.

"The new strategic policy for the use of water produced by dewatering identifies opportunities and the approvals required for the use of this water and works alongside the Water in Mining Guideline to support regulatory processes from feasibility to reality," he said.

"These improvements will make it easier for mining and exploration companies to continue leading in water efficiency and will bring benefits to other water users in the communities where they operate." •



# FORTESCUE OPENS FIRETAIL



*Fortescue CEO Nev Power and Chairman Andrew Forrest (above and below right) at the official opening of the new Firetail mine.*

Fortescue Metals Group has officially opened its Firetail iron ore mine, the first stage of the company's US\$3.2 billion Solomon project.

Fortescue Metals Group officially opened its Firetail mine in May – the mine is the first stage of the company's massive US\$3.2 billion Solomon iron ore development.

The Solomon development is located about 60 kilometres north of Tom Price in Western Australia's Pilbara region and is the third major development for Fortescue in the past five years. The company's first two mining operations, Cloudbreak and Christmas Creek, are located east of the Solomon project at the Chichester hub.

Solomon will produce up to 60 million tonnes per annum (Mtpa) of iron ore and consists of two stages – the Firetail mine, which will produce 20Mtpa and the Kings mine, to produce 40Mtpa.

Mining commenced at Firetail in late 2012, with the train loading operations facility commissioned in late November and the first ore transported on the new Fortescue Hamersley line in December 2012.

The official opening of Firetail was attended by Fortescue founder and chair Andrew Forrest, Fortescue Chief Executive Nev Power, and Minister for Mines and Petroleum Bill Marmion.

Mr Power said the opening of Firetail, combined with production at the Kings mine, would see the company deliver an enhanced product.

"This represents a valuable source of new production from long life, low cost mining operations that allow us to blend with Chichester ores to create an enhanced product for our customers – the new Fortescue blend," Mr Power said.

The company said with the commissioning of Firetail's ore processing facility, production would ramp up swiftly, increasing Fortescue's capacity to 115Mtpa.

The development of the Kings mine, the 40Mtpa second stage of Solomon, is set for completion by the end of the year and will take the project's total production capacity to 60Mtpa.

The Solomon and Chichester iron ore operations take Fortescue's overall annual iron ore production capability to 155Mtpa – consolidating the company's position as the world's fourth largest iron ore producer. •





Photo: Fortescue Metals Group.

Fortescue chairman Andrew Forrest, WA Treasurer and Minister for Transport Troy Buswell and Fortescue CEO Nev Power.

# FMG OPENS NEW HEDLAND PORT BERTH

In August, Fortescue Metals Group officially opened the US\$2.4 billion expansion of its port facilities in Port Hedland.

FMG's fourth berth at Herb Elliott Port represents the last major component of an expansion that has lifted the company's iron ore export capacity to 155 million tonnes per annum (Mtpa).

Fortescue said the new berth was another crucial step towards its US\$9 billion plan to triple production capacity across its mine, port and rail operations by the end of the calendar year.

Fortescue chief executive officer Nev Power said the berth works were completed within the company's revised schedule and budget.

"We've taken a significant step towards the completion of our expansion to 155 million tonnes per annum," Mr Power said.

"Our world-class infrastructure at Herb Elliott Port will support a substantial increase in shipments of ore from our Pilbara operations to customers in China and South East Asia."

He said the company was only months away from completing the final leg of its expansion, the construction of the 40Mtpa Kings mine at Solomon.

The port expansion included the construction of two new berths, a second and third out loading and in loading circuit, two ship loaders, two reclaimers, one stacker, two train unloaders, 15.5 kilometres of conveyor systems,

transfer stations, drive stations, two sample stations, power and control systems and associated infrastructure.

The company announced it had secured approval to construct a fifth berth at the port, which would allow it to further develop its highly successful and efficient lay-by berth configuration.

Fortescue expects to begin the construction later this year. •



Photo: Fortescue Metals Group.

Fortescue chairman Andrew Forrest.



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# RESOURCE SUPPLY CONTRACTS DELIVER JOBS FOR WA

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More than 108,000 jobs have been created in Western Australia over the past two years as part of A\$43 billion in locally awarded resource supply contracts, according to recently released State Government figures.

The State Government's Local Content report for May showed that the level of local content for projects in the construction phase was averaging 77 per cent.

"This report highlights the real benefits being delivered to West Australians by mineral and energy investment in this State, with an estimated 108,000 jobs created or maintained over the past two

years," Minister for Commerce Michael Mischin said.

"There has been A\$43 billion in publicly announced, locally awarded resource supply contracts since July 2011 when the State Government launched its Local Industry Participation Framework initiative.

"The report demonstrates that Western Australia is enjoying significant stimulus in terms of business activity and employment."

The Minister said contracting outcomes from major project proponents, Woodside, BHP Billiton, Rio Tinto and Chevron, were also included in the report.

"Levels of local content for projects in the construction phase currently average 77 per cent, representing a continuous improvement on previous reporting periods," he said.

"Project proponents provide figures to the State Government as part of their State Agreements and current figures further demonstrate that the State Government's policy approach is working."

Mr Mischin said the report was the fifth in a series detailing local industry participation trends and outcomes in the State's mineral and energy projects. •

## RIO TINTO PLANS NEW PILBARA MINE

Mining giant Rio Tinto has submitted plans to the Western Australian Government for the proposed development of a major new mining operation in the State's central Pilbara region.

Hamersley Iron, a wholly-owned subsidiary of Rio Tinto, lodged a formal proposal in June with the Environmental Protection Authority for the proposed Koodaideri mine.

Centred around the company's Koodaideri deposits – located 110 kilometres west-north-west of Newman – the project would involve the construction and operation

of a greenfields mine and associated infrastructure, with new roads and power and water supply infrastructure required.

The mine would consist of open pits and supporting infrastructure, including a 167 kilometre railway connecting into Rio Tinto's main Dampier-Tom Price rail network.

The new iron ore mine would eventually produce up to 70 million tonnes per annum, making it one of the biggest in the Pilbara region, with a mine life of 30 years.

Pending approvals and Rio Tinto's decision to pursue the project,

construction would commence around late 2014 with the project to be commissioned in 2016.

Rio Tinto estimates that the project would create about 1,500 to 2,000 construction jobs and about 700 people would be required for operations – later increasing to 1,000 people by 2030 in line with increased production rates.

Submissions for the public environmental review closed in early September. Following a report by the State and Commonwealth Governments, the Minister for the Environment will announce a decision on the project. •



# IROC DELIVERS BIG PICTURE FOR BHP

BHP Billiton Iron Ore's new Integrated Remote Operations Centre (IROC) was officially opened in July by Western Australian Premier and Minister for State Development, Colin Barnett.

The IROC is a world-class operational control centre based in Perth that provides BHP Billiton with a real-time view of its entire Western Australian iron ore operations.

The centre brings together BHP Billiton staff across a range of planning, scheduling, controlling and analysis teams into one central location where operations can be controlled from 'pit to port'.

BHP Billiton Iron Ore President Jimmy Wilson said the centre marked a milestone in technology and innovation for iron ore operations.

"For the first time, we can see our total supply chain, in real-time and in one place, enabling us to proactively make the right decisions for the whole business," Mr Wilson said.

"The IROC plays an integral role in driving our productivity agenda by increasing the availability, utilisation and rate of our existing assets, and is central to our efforts to achieve growth to 220 million tonnes per annum.

"The new facility also opens up a wealth of opportunities for our employees, providing training and up-skilling options and the chance to work in a state-of-the-art facility."

The centre has a control floor that hosts mine, plant, train and port control and on-the-day scheduling, as well as two support floors, which host critical functions including mines production support, monthly





Above (L-R): Premier Colin Barnett with Dean White, Head of Integrated Operations Iron Ore and Jimmy Wilson, President Iron Ore, at the new centre.  
Below (L-R): Premier Barnett with Control Logistics and Infrastructure Manager Kristian Ravn and Mr Wilson at the opening.



scheduling, planning, process control and improvement teams.

All consoles at the IROC are equipped with radio, phone, headsets and webcams to maintain contact with the company's Pilbara-based sites.

Large computer screens display the supply chain status, key performance indicators and other data so everyone at the centre can stay abreast of the big picture at a single glance – and enabling the business to work towards one single integrated schedule.

Mr Barnett congratulated BHP Billiton on the official opening of the centre.

"It is an enormous step forward for the company," the Premier said.

"This is more than a very large iron ore operation, it's a complicated one—with seven mines, 1500 kilometres of rail and two loading port facilities, thousands of people involved, extraordinary capital investment and a continuous chain of supply that is just extraordinary in its scale.

"This project has a number of advantages—it brings all the control and operating staff together, and gives the ability to see spatial arrangements on screen to give better coordination."

Mr Barnett said that the mining industry was becoming increasingly competitive and future growth was dependent on being cost-competitive and the ability to withstand competition from new markets and new technologies.

"The role of this IROC investment is fundamental in maintaining BHP's position as a highly efficient, low-cost producer over the next decade," he said.

The use of world-class technology at the IROC allows the centre to operate remotely on a 24-hour, 365-days-a-year basis. •

# MINERAL ROYALTY RATE UNDER REVIEW

The Western Australian Government recently invited the State's mining industry to participate in a review of the State's mineral royalty regime.

In August, Western Australian Premier and Minister for State Development, Colin Barnett and Mines and Petroleum Minister Bill Marmion jointly released terms of reference and a stakeholder consultation paper for a Mineral Royalty Rate Analysis. They invited industry and other interested parties to consider the paper and make submissions by 31 October, 2013.

In Western Australia, mineral deposits located on Crown Land and on most

freehold land are owned by the State Government, on behalf of the community.

In obtaining the right to develop a mineral deposit, titleholders agree to make a payment to the State Government that compensates the community for the loss of those resources that they extract and sell.

Currently, the State's mineral royalty regime delivers a return to the State equal to about 10 per cent of the mine-head value of the resource produced.

For most producers, mineral royalty rates operate on a three-tier system reflecting the degree of processing involved in

production to approximate the 10 per cent mine-head value benchmark.

A rate of 7.5 per cent applies to bulk material, 5 per cent for mineral concentrates and 2.5 per cent for minerals in metallic form.

Methods of calculation also vary. The nickel royalty is a percentage of the contained metal value, while for gold it is based on the total amount of gold produced during a month multiplied by the average of gold spot prices for that month.

However, the current system also includes rates negotiated by the producers and the State as part of major investment project agreements.

## MANAGING ROYALTIES:

### NEW SYSTEM NOW ONLINE

A new royalties management system has been introduced by the Department of Mines and Petroleum (DMP), as part of the Western Australian Government's commitment to improve efficiency.

Minister for Mines and Petroleum Bill Marmion said the Royalties Management System (RMS) would allow companies to view and monitor their royalty obligations online, resulting in fewer late payments and royalty return and production report lodgements.

"The new system will assist industry to self-manage and monitor their account details online and provide a simplified and consistent lodgement process," Mr Marmion said.

The RMS will provide a facility for companies to print an online royalty

return, and allow changes to past returns and the re-submission of returns by users.

"The improved customer home page has a number of new features that will encourage companies to use the system, which can now provide a summary of returns, including under payments and over payments," Mr Marmion said.

"DMP royalties staff will be able to offer industry improved response times to queries on royalty status and obligations, while there are now improved system query options for each royalty payer and project."

The improved online interface will eliminate the need for data re-entry, free-up staff for other royalty assessment and audit tasks, provide greater reliability

of royalty data, and improve payments processes and automated accounting systems.

"Over time, the RMS will result in an increase in the online lodgement of returns and reports, creating further efficiencies in the administration, collection and auditing of royalties," Mr Marmion said.

"As royalty revenue has become a major component of the State Budget, so has the importance of its administration, which will be greatly improved by a more effective online data lodgement service, resulting in a reduced operational burden on industry."

The system allows royalty staff to have a 'dashboard' of daily tasks and activities on their own home page, including audits to be completed, outstanding royalty returns



For low value, bulk minerals including coal, salt and basic materials, a rate per tonne is applied.

Mr Barnett said the aim of the review was to ensure the State's minerals royalties operated fairly and efficiently, both for the mining industry, and for the resource owners—Western Australians.

"Royalties are vital to the State's ability to provide the services and infrastructure Western Australians expect," he said.

"It is important that royalty rates deliver a reasonable return to the community without discouraging production or acting as a disincentive to new investment."

In 2013-14, the Department of Treasury expects the Western Australian Government will collect mineral and petroleum royalties totalling A\$5.8 billion, equivalent to about 21 per cent of its 2013-14 budget revenue.

In 2012, the State's total mineral and petroleum output was valued at almost A\$97 billion.

The Premier said the review would:

- examine the efficacy and appropriateness of existing policy
- consider the equity and efficiency implications of any proposed changes to the royalty rates
- focus on identified anomalies in the current structure, rather than consider major changes to royalty arrangements.

Petroleum royalties, which are returning 10 per cent of value at the well-head, are excluded.

Reg Howard Smith, Chief Executive of the State's Chamber of Minerals and Energy (CME), an industry peak body, welcomed the review and committed to his organisation's strong participation.

"CME looks forward to working with the State Government to ensure that industry's views are taken into account and that WA's resources sector remains internationally competitive," he said.

The Departments of State Development and Mines and Petroleum are jointly conducting the Mineral Royalty Rate Analysis and copies of the terms of reference and consultations paper are available from their offices and websites.

When they have considered submissions, the departments will release a summary issues paper and conduct detailed consultation with specific stakeholders and a stakeholder reference group, which includes representatives of industry peak bodies.

This consultation will inform a report that the departments, in consultation with the Department of Treasury, will prepare for the Western Australian Government by late 2014. •

Visit [www.dsd.wa.gov.au](http://www.dsd.wa.gov.au)  
or [www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)  
for further information.



*The team behind the Department of Mines and Petroleum's new Royalties Management System.*

and payments, recent communications, and daily payments received.

The RMS effectively allocates and monitors audit activities to ensure submitted royalty returns are verified according to the audit program and tracked for performance.

An additional benefit is the new system effectively links up with a number of other DMP online processes such as Minedex, Comms Manager, e-file record systems and the Mineral Titles eMiTs system.

"During the 2011-12 financial year, the State Government through DMP collected

more than A\$5.3 billion in royalties from mineral and petroleum producers in Western Australia," Mr Marmion said.

"More than A\$4.4 billion comes from mining, with the funds used by the State Government for law enforcement, education, health, roads and community development programs." •

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# GARGANTUAN GORGON

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The Gorgon Project is one of the world's largest natural gas projects. As these images show, the monumental project is progressing at a rapid pace.

The A\$52 billion Gorgon Project is under construction on Barrow Island, about 60 kilometres off the northwest coast of Western Australia.

The project is developing the Gorgon and Jansz-Lo gas fields, located between 130 and 200km off the Western Australian coast. These gas fields contain some 37 trillion cubic feet of gas—the nation's largest undeveloped gas resource.

The project includes the construction of a three train, 15.6 million tonnes per annum (Mtpa) liquefied natural gas (LNG) plant on Barrow Island and a domestic gas plant with the capacity to supply up to 300 terajoules of gas per day to Western Australia.

As well as being of monumental scale physically, Gorgon is also the largest single resource development in Australia's history.

The project has already committed A\$20 billion to Australian industry, generating thousands of jobs locally.

Speaking at an Australian Petroleum Production and Exploration Association (APPEA) conference held in May, Greater Gorgon Area General Manager Colin Beckett said it is estimated that around \$30 billion – or 60 per cent of construction expenditure – will be spent on Australian goods and services.

"The Gorgon Project has created more than 10,000 jobs for people around Australia – this includes approximately 6,000 people currently working on and around Barrow Island," Mr Beckett said.

Gorgon jobs are located in Perth – across the metropolitan area including Fremantle, Henderson, Kwinana, Spearwood, Bassendean, Redcliffe, O'Connor and South Guildford – as well as in the Pilbara in Dampier, on Barrow Island and across Australia.

The project has provided more than 2,000 jobs in marine classifications including seafarers, stevedores, masters, deck officers, engineers and catering jobs.

In other sectors, including transport, logistics, services and accommodation, local companies in Western Australia, and across Australia, have been internationally competitive in securing significant contracts with the project.

Beyond the construction phase of the project, the focus will move to high skilled long-term jobs in LNG and domestic gas plant operations, maintenance and logistics support, along with continuing exploration and appraisal to support expansion of facilities once they are established.

Construction activities on the Gorgon Project are now more than two-thirds complete with the first LNG due in the first quarter of 2015. Domestic gas is due to be delivered to the market in 2015.

The Gorgon Project is operated by an Australian subsidiary of Chevron and is a joint venture of the Australian subsidiaries of Chevron (47.3 per cent), ExxonMobil (25 per cent), Shell (25 per cent), Osaka Gas (1.25 per cent), Tokyo Gas (1 per cent) and Chubu Electric Power (0.417 per cent).

The Department of State Development is working closely with Chevron and the joint venture partners to facilitate the Gorgon Project. •

For more information, visit the  
DSD website [www.dsd.wa.gov.au](http://www.dsd.wa.gov.au)  
or Chevron Australia  
[www.chevrontaustralia.com](http://www.chevrontaustralia.com)







Photos: Chevron Australia

Top left: Foundations have been poured for all five gas turbine generators, which will provide standalone electrical power generation for the LNG plant and associated facilities. Top right: Construction on the Gorgon Operations Centre is progressing at the Permanent Operations Facility site. Above: Work continues on the 2.1km LNG jetty with 24 caissons in place at the beginning of August. Installation of the jetty roadways is underway.



# INCENTIVES FOR EXPLORATION



Minister for Mines and Petroleum  
Bill Marmion.

The Western Australian Government's Exploration Incentive Scheme (EIS) sends a strong signal to global investors that Western Australia is serious about attracting exploration investment. *Prospect* takes a look at where funding for the latest round of the scheme's Co-funded Drilling Program is being allocated.

Round seven of co-funded exploration drilling subsidies has seen almost A\$7.2 million shared between 61 drilling projects around Western Australia.

The Goldfields-Esperance region will receive the largest share of funding with more than A\$2.4m across 22 projects, followed by the Mid-West region with A\$2.13m across 19 projects.

Successful applicants in the Pilbara are earmarked for more than A\$1.4m across 12 projects, followed by the Gascoyne A\$550,000 (two projects), Perth and



(L-R) WA Trade Office Middle East and Africa Commissioner, Pankaj Savara; DSD Africa Desk Project Officer, Diana Phang; WA Trade Office Commercial Manager, Africa, Filippo Raggi; COMESA Secretary General His Excellency Sindiso Ngwenya; and DSD's Africa Desk Market Development Officer, Veronica Nivatvongs and Manager, John Shute at the conference.



Wheatbelt A\$470,000 (four projects) and the Kimberley A\$188,000 (two projects). Funding will also be provided to two prospecting projects.

Minister for Mines and Petroleum Bill Marmion said the projects would involve drilling for a wide spectrum of commodities across 2013-14.

"The Co-funded Drilling Program provides incentives to drill in underexplored areas to ensure the continued economic prosperity of the State's resources industry, particularly in the current financial environment," he said.

Established four years ago, the highly competitive drilling program offers two rounds of co-funding a year and has already assisted various WA discoveries,

including the Oxley potash, Nova nickel, Handpump gold, Yeneena copper and East Tropicana gold deposits.

The program provides co-funding of up to 50 per cent of direct drilling costs with caps of A\$150,000 for a multi-hole project, A\$200,000 or A\$400,000 for a single deep hole (depending on the target commodity), and A\$30,000 for prospecting projects.

Regional Development Minister Brendon Grylls said the program encouraged industry to drill in areas that had mineral, petroleum or geothermal potential.

"This will ultimately help industry identify new opportunities to ensure the future prosperity of Western Australia's resources sector," Minister Grylls said.

The State Government's Royalties for Regions Program has funded this program from 2008-09 to 2013-14 to an amount of A\$100.6m, with State Government support continuing to end of 2015/16—reaching a total of almost A\$130m.

Information acquired by companies is publically released on the Department of Mines and Petroleum website after a short confidentiality period. This adds to the geological knowledge of the State, and reduces the risk for subsequent explorers. •

A list of successful applicants and a map of project locations is available at: [www.dmp.wa.gov.au/eisdrilling](http://www.dmp.wa.gov.au/eisdrilling)

## AFRICA DOWN UNDER

August saw Perth host the annual Africa Down Under conference – a popular event attended by African mines ministers, business leaders and executives from mining services industries.

Over the past ten years, there has been a surge in the growth rates of nearly all African countries, with the demand for commodities from China one of the key drivers behind this growth.

The African continent holds about 30 per cent of the world's total mineral reserves and an even higher share of deposits such as diamonds, vanadium, manganese, platinum, cobalt and gold.

East Africa is the most rapidly developing region in Africa, with recent discoveries of oil and gas, while several Common Market for Eastern and Southern Africa (COMESA) member countries are rich in mineral reserves.

The three-day Africa Down Under conference included a full-programme of events and 140 exhibitors from the resources sector and mining equipment technology and services (METS) sectors.

Western Australian mining companies have been active in the COMESA zone for several decades.

According to mining industry data, 35 ASX-listed WA mining companies were involved in 120 projects in the region in August this year.

The three-day Africa Down Under conference included a full-programme of events and 140 exhibitors from the resources sector and mining equipment technology and services (METS) sectors.

The Department of State Development (DSD) played a key role in facilitating visiting African dignitaries for the conference and was one of the exhibitors, along with the Department of Mines and Petroleum, at the conference.

The Western Australian Government has a Middle East and Africa Trade Office that is available to assist with trade and investment queries regarding the regions. •

For further information visit [www.dsd.wa.gov.au](http://www.dsd.wa.gov.au)

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# SETTING THE STANDARD IN SAFETY REGULATION

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Safety regulations at Western Australia's major hazard facilities have been taken to a new level as the Department of Mines and Petroleum (DMP) ramps up audits.

Reviews of the State's 19 major hazard facilities have been increased to three times a year, and more if necessary. This includes one in-depth three-day audit and two six-monthly performance review meetings and inspections.

The department's Director of Dangerous Goods, Philip Hine, said the rigorous audits had set a new benchmark in Western Australia.

"While the ultimate responsibility for worker and community safety rests with

**"This makes our major hazard facilities' safety and health system one of the most thorough in the world."**

companies – who will continue to present their own audit results to the department – DMP is providing an additional level of scrutiny by carrying out its own compliance audits," Mr Hine said.

"This makes our major hazard facilities' safety and health system one of the most thorough in the world."

Mr Hine said the high safety standards required at these types of facilities,

which handle anything from natural gas to ammonium nitrate, are of crucial importance.

"With this in mind, the new auditing process allows our safety experts to identify critical safety issues on-site, recommend areas of improvement, and if necessary issue remediation or 'improvement' notices that require an 'immediate fix'," he said.

Five remediation notices have been issued to Western Australian major hazard facilities in the past 12 months, all for relatively minor non-compliance, such as having inadequate electrical earthing.

"While the majority of major hazard facilities are doing an excellent job, the department will enforce regulations for any that do not comply," Mr Hine said. ●

## Major Hazard Facilities

A Major Hazard Facility (MHF) is a site with dangerous goods that the Department of Mines and Petroleum's Chief Dangerous Goods Officer has determined will be classified as an MHF.

Sites designated as MHFs are places with more than the critical quantity of dangerous goods that have a potential for a major incident, and require more rigorous and tailored safety regulation.

'Major incidents' are those that cause serious harm to people, property or the environment, such as a fire, an explosion, or a release of energy.

The MHF Regulations incorporate the principles of the National Standard for the Control of Major Hazard Facilities and apply in addition to the storage and handling regulations because they invoke particular requirements for safety management to deal with major incidents.

Operators must demonstrate that measures have been taken to identify all foreseeable major incidents, their likelihood and consequences, and must justify the adequacy of the control measures used to minimise risk (both on-site and off-site).





*(L-R) Inspectors of Mines Richard Shedlock, Marcus Rader, Jeb Bromley, Greg Bailey and Craig Little receiving their certificates from Minister for Mines and Petroleum Bill Marmion (third from left).*

## SAFETY EXPERTS FOR WA

Western Australia has reaffirmed its commitment to safety in the resources industry, with the appointment of seven new specialist safety inspectors.

The new safety specialists take the total number of Department of Mines and Petroleum (DMP) inspectors to 111, including 67 mines safety inspectors, 16 petroleum safety assessors and risk analysts, and 28 dangerous goods officers.

Minister for Mines and Petroleum Bill Marmion said the State Government had boosted its safety inspector workforce by nearly 30 per cent since late 2009, when the Reform and Development at Resources Safety (RADARS) commenced.

“RADARS was established following a series of independent inquiries and mining deaths, and continues to ensure high safety standards are being maintained at WA’s 975 operational mines and 65 petroleum sites,” Mr Marmion said.

“These new expert safety inspectors are crucial to the ongoing health and wellbeing of the State’s 98,000 resources workforce.

“While 2012 marked the first time in more than a century where there hadn’t been a mining death – we know a young contractor lost his life at a Pilbara mine site earlier this year, so industry and government must continue to work to achieve ‘zero harm’.”

The new safety specialists share structural, mechanical, electrical, mining and petroleum engineering expertise.

Four have been appointed to the mines safety inspectorate team, which carries out 2,400 site inspections a year.

Three are working as petroleum safety assessors and risk analysts, performing safety documentation assessments, inspections, audits and investigations related to oil and gas operations.

The new personnel are now undertaking a rigorous six month training course, which includes familiarisation with WA safety regulation, as well as stakeholder liaison, four-wheel-drive and helicopter survival courses. •

# A STORY TWO BILLION YEARS IN THE MAKING

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While geologists from around the world are attracted to the Western Australian mining industry, most are new to its landscapes and rocks.

*Prospect* reviews a new book by the Department of Mines and Petroleum's Geological Survey of WA (GSWA) that will go a long way to assist geological understanding of our unique State.



Author Dr Simon Paul Johnson, Geological Survey of WA (GSWA), Department of Mines and Petroleum.



'The birth of supercontinents and the Proterozoic assembly of Western Australia' by GSWA's Dr Simon Paul Johnson is a review of the story of Proterozoic tectonics in Western Australia.

This involves some two billion years of Earth history, from 2500 million years ago to 540 million years ago—looking at the creation, amalgamation, and dispersal of the supercontinents Nuna, Rodinia, and the beginnings of Gondwana.

"The book is primarily written for geologists, but in such a way that will attract the more general reader as well," Dr Johnson said.

"There are many geologists coming to WA to work in the mining industry, but many are new to our landscapes and rocks.

"This book will engage their interest and give them an overview of Proterozoic tectonics.

"Students will also find this helpful for their studies in WA Proterozoic geology."

Dr Johnson said the Proterozoic had long been regarded as the poor relation to the Archean when it came to mineralisation in WA.

"However, world-class deposits such as those at the Telfer gold mine, the Tropicana gold deposit, diamonds in the Kimberley region, copper at DeGrussa or the new nickel province in the Albany-Fraser Orogen have enhanced the prospectivity of the Proterozoic for world-class orebody discovery," he said.

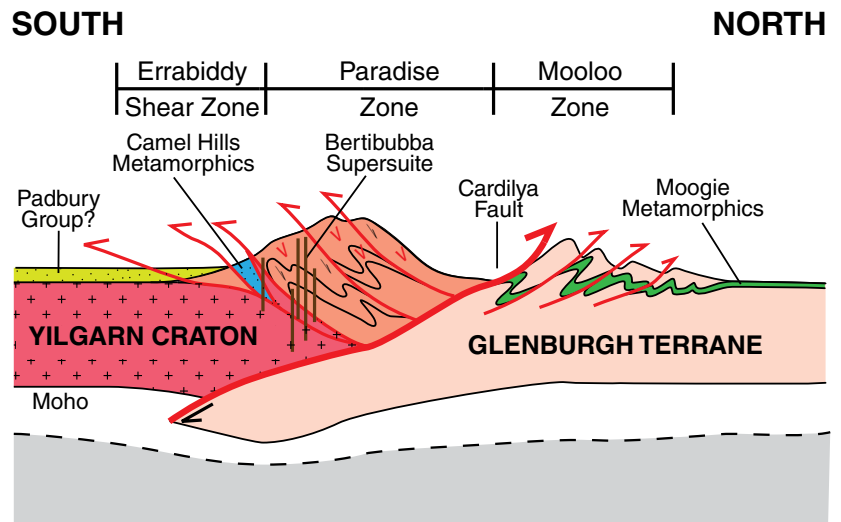
Dr Johnson said this had been aided by recent Exploration Incentive Scheme (EIS) funding of deep across the Proterozoic Orogens such as the Capricorn and Albany-Fraser Orogen studies, which are providing a holistic view of the deep crustal architecture of the State for the first time.

"These results demonstrate a direct link between deep crustal structures and world-class orebody formation," he said.

The book tracks the periods of magmatism, sedimentation, deformation, metamorphism and associated crustal structures, and provides links to mineralisation. There is also a detailed time-space plot that shows the distribution of all these tectonic and mineralising events. •

The book is available from the Department of Mines and Petroleum Information Centre, Mineral House, 100 Plain Street, East Perth, WA 6004 or phone: +61 8 9222 3459 or fax: +61 8 9222 3444. It can also be purchased online at: [www.dmp.wa.gov.au/ebookshop](http://www.dmp.wa.gov.au/ebookshop)

Books are A\$33 (incl. GST), or if five or more copies are purchased A\$22 (incl. GST) each. The book is also available in PDF form from: [www.dmp.wa.gov.au/GSWApublications](http://www.dmp.wa.gov.au/GSWApublications)



**Figure 11. Schematic cross section showing the crustal architecture of the collision zone between the Yilgarn Craton and Glenburgh Terrane following the 2005–1950 Ma Glenburgh Orogeny**



## The birth of supercontinents and the Proterozoic assembly of Western Australia

by  
**Simon P Johnson**



Government of Western Australia  
Department of Mines and Petroleum

Geological Survey of  
Western Australia



**Dr Johnson's new book: 'The birth of supercontinents and the Proterozoic assembly of Western Australia'.**



*Ord-East Kimberley Expansion project phase one – aerial view of irrigated crop fields.*

# ORD:

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## MOVING FORWARD

The Ord development takes an important step forward with a multi-million dollar investment agreement set to develop industry in the Ord region, marking an exciting new era for the East Kimberley and northern Australia.

The Western Australian Government has taken a key step in developing thousands of hectares of prime Ord River agricultural land in the East Kimberley following an agreement with development proponent Kimberley Agricultural Investment (KAI).

Western Australian Premier and Minister for State Development Colin Barnett said the agreement between the State Government and KAI is set to deliver the biggest agricultural development in Australia's north in more than 40 years.

"This project will create opportunities for the Miriwung and Gajerrong people and local communities and demonstrates what can be done when all levels of Government, Traditional Owners and the private sector work together," the Premier said.

In late May, the State Government confirmed KAI as the proponent to lease and develop 13,400 hectares of irrigated farmland as part of the Ord-East Kimberley Expansion project (see box).





## Ord-East Kimberley Expansion Project

- A comprehensive and integrated package of funding initiatives, to be delivered in the East Kimberley region through a partnership between the Commonwealth and Western Australian Governments.
- Will provide opportunities for growth and economic sustainability, and improve social, community and common-use infrastructure in the region.
- Two main elements of the project: (1) the expansion of the Ord Irrigation Area to stimulate sustainable economic growth and (2) the East Kimberley Development Package (EKDP), a comprehensive infrastructure package delivered jointly by the State and Federal Governments.
- Total public investment in the project is A\$517m comprising: (1) EKDP – A\$195m from the Commonwealth Government, of which the WA Government has delivered A\$177.9m of projects; and (2) Ord Irrigation Expansion Project – A\$322m from the WA Government's Royalties for Regions fund.

For more information visit: [www.dsd.wa.gov.au](http://www.dsd.wa.gov.au)



**State Government funded and constructed main irrigation channel – Ord-East Kimberley Expansion project.**

To support the Ord expansion, the State Government has invested A\$322 million in arterial roads and irrigation infrastructure.

Regional Development Minister Brendon Grylls said the KAI proposal marked an exciting new era for the East Kimberley and northern Australia and the Government's investment had helped to unlock the region's potential.

"The Government's investment in key infrastructure through this project has built the foundation for the development of a long-term, sustainable agricultural industry in the north of this State," he said.

Kimberley Agricultural Investment is an Australian company wholly owned by Shanghai Zhongfu (Group) Co, whose parent company is the major Chinese construction group Shanghai Zhongfu Real Estate Co.

KAI proposes to invest A\$700m to develop new agricultural land in the

Goomig and Knox Plain area of the Ord Valley and develop export industries in the Ord region.

The KAI proposal includes:

- Contract grower opportunities for existing landholders in sugar and rotational cropping
- Multiplier effects on local businesses
- Future employment opportunities for about 300 local people
- Strategies to support local Indigenous civil contractors
- Potential construction of a sugar mill
- Potential future development of co-generation power
- Potential construction of an ethanol plant
- Potential for medium density fibre board plant, annually producing up to 300,000 tonnes

- Possible establishment of an industrial park at Kununurra
- Future improvements to Wyndham Port facilities to facilitate export of products.

Mr Barnett said the first stage of the proposal involved the development of 13,400 hectares of Ord land, representing an initial investment of A\$200m. KAI has commenced ground works with more than 500 hectares now cleared.

Land will be leased to KAI for terms ranging from 10 to 50 years if KAI achieves active irrigated agriculture on the Goomig and Knox lands and implements an Aboriginal Development Package within the next four years. Options for extension for a 25 year period will be subject to the company meeting further agreed development milestones. •

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# RESEARCH PROJECT DRILLS DOWN FOR RESULTS

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Five recently released scientific research projects, based on the landmark Harvey 1 well drilling operation by the Department of Mines and Petroleum (DMP) in the South West, support ongoing research to analyse the suitability of the area as a carbon storage reservoir.

In 2012, the department's Geological Survey drilled the Harvey 1 stratigraphic well to gather core samples and important information about the Lesueur Sandstone formation.

DMP Coordinator Carbon Strategy Dominique Van Gent said a partnership of scientific organisations then spent 18 months carefully analysing samples and sifting through the data generated.

"The results confirmed our geological expectations about the Lesueur and how it was formed during the Triassic Period 250 to 200 million years ago," he said.

"Importantly, the Harvey 1 well did not unearth anything that would rule out the Lesueur as a suitable carbon storage reservoir at this stage."

The feasibility study is structured so it will only move forward if research confirms the area is suitable for carbon storage.

"The research confirms that the Wonnerup member of the target Lesueur formation is a 1.5km thick formation of clean, coarse-grained sandstone," Mr Van Gent said.

"The formation possesses good properties for a CO<sub>2</sub> reservoir in terms of porosity and permeability.

"The variation in salinity levels between the Wonnerup and the Yalgorup member which lies immediately above, indicates that layers of shale provide a potential sealing unit and there is no connectivity between the layers."

The research was funded by Australian National Low Emissions Coal Research & Development (ANLEC R&D), the national Carbon Capture and Storage research funding organisation, and DMP.



*Dr Lionel Glendenning, NGL Operations Manager, with the Raman Spectrometer. The equipment's microscopes will be used to perform essential research for the South West Hub project by determining rock characteristics before and after the injection of CO<sub>2</sub>.*

The detailed research was conducted by the University of Western Australia, Curtin University and the CSIRO

"Western Australia has many of Australia's leading scientists in petroleum developments and they were able to utilise the technology and expertise available in Perth to rigorously examine the carbon storage potential of the Lesueur," Mr Van Gent said.

The results of the research support further research of the potential of the South West Hub project.

"No decision to store CO<sub>2</sub> will be made until we have the geological data that proves it will be safe to do so," he said "The project will then have to go through a formal and public approval process."

The research summary document is available online through the DMP website [www.dmp.wa.gov.au/ccs](http://www.dmp.wa.gov.au/ccs).

Further detailed technical results, including the full research papers are available online through [www.dmp.wa.gov.au/petroleum](http://www.dmp.wa.gov.au/petroleum) and geothermal information (WAPIMS). For assistance with obtaining the documents go to [www.dmp.wa.gov.au/documents/how\\_to\\_download\\_documents\\_in\\_WAPIMS.pdf](http://www.dmp.wa.gov.au/documents/how_to_download_documents_in_WAPIMS.pdf)

The research papers are also available from the ANLEC R&D website [www.anlecrd.com.au](http://www.anlecrd.com.au) •

## The National Geosequestration Laboratory

CSIRO, Curtin University and The University of Western Australia have been providing the initial scientific research for the South West Hub project through their capacity as National Geosequestration Laboratory (NGL) partners.

The NGL is a national research and development facility established to develop innovative solutions to minimise risk and uncertainty regarding long term geological storage of carbon dioxide.

The facility's establishment is aided by \$48.4 million in funding from the Federal Government and utilises existing buildings, plant and equipment in the three institutes, and builds on the successes of the Western Australian Energy Research Alliance

As well as gaining access to state-of-the-art equipment and facilities, organisations that partner with NGL can take advantage of some of the finest geoscience capability in the country.



# BOND RETIREMENT REACHES \$100M MILESTONE

The Western Australian Government has now retired more than A\$100 million in environmental bonds since the introduction of the Mining Rehabilitation Fund (MRF) in July.

Department of Mines and Petroleum Environment Division Executive Director Dr Phil Gorey said the industry response to the fund was overwhelmingly positive.

"The fund was introduced on a voluntary basis by the Department of Mines and Petroleum over two months ago," Dr Gorey said.

"In that time, about 600 tenement holders have voluntarily registered and more than A\$2.5 million has been contributed to the fund.

"We have also retired more than A\$100 million in environmental bonds."

Dr Gorey said the fund was developed after extensive consultation with industry

and stakeholders, and provides significant cost savings to industry.

"The new system encourages early rehabilitation and will provide a mechanism for the State to rehabilitate abandoned mine sites in the event that a company defaults on its obligations," Dr Gorey said.

"This really is a win-win for the sector and the environment."

Under the previous system, more than A\$1 billion in environmental bonds were held by the State Government.

"This money was previously sitting idle," Dr Gorey said.

"We now have a system that encourages early and ongoing rehabilitation by companies, frees up considerable funds for re-investment in the sector, and allows us to address the issue of abandoned mine sites."

Stakeholder consultation will continue with the creation of an advisory panel to help shape the future of the fund.

Dr Gorey said the advisory panel will provide advice to the State Government on defining and identifying abandoned mines, and priorities for rehabilitation.

"The advisory panel will play an important role in the future of the Mining Rehabilitation Fund," Dr Gorey said.

Expressions of interest for membership of the advisory panel closed during September and the panel members are due to be announced before the end of the year.

The voluntary opt-in period for the fund continues until 1 July, 2014, when it becomes mandatory. •

For more information go to  
[www.dmp.wa.gov/mrf](http://www.dmp.wa.gov/mrf)



*Minister for Mines and Petroleum Bill Marmion (second from right) with (L-R) Ron Chamberlain and David Harley from Gunson Resources and Kobus Potgieter from Pluton Resources; the first entrants into the Mining Rehabilitation Fund.*

## AGRICULTURE

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

#### WA STATE GOVERNMENT

The Ord East Kimberley Expansion Project is a good 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. The State Government committed \$322m to increase the existing amount of irrigated land in the Kununurra region by releasing approximately 15,000ha of additional Ord farm lands. This funding has enabled 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 State Government has announced that Kimberley Agricultural Investment (KAI) is the preferred proponent to lease and develop 13,400ha of irrigation land in the Goomig and Knox Plain areas. KAI, a subsidiary of China's Shanghai Zhongfu Group, proposes to establish a sugar industry in the Kununurra region. To achieve a diverse agricultural mix for the region and to support local enterprise, an additional 1,700ha of newly developed land in the Ord West Bank will be available for the development of up to 25 new farms. The Commonwealth Government has invested \$195m for construction of social and common use infrastructure in the East Kimberley region through the East Kimberley Development Package (EKDP) National Partnership Agreement (NPA). The Yawoorroong Miriung Gajerrong Yirrgab Noong Dawang Aboriginal Corporation (MG Corporation) building and the Department of Housing transitional housing projects have been successful nominations for the Australian Institute of Architects 2013 Western Australian Architectural Awards.

Expenditure: \$517m.

Employment: Construction: 761

## GOLD

### Boddington – Gold Mine

#### NEWMONT BODDINGTON GOLD PTY LTD

Newmont Boddington Gold (NBG), a major gold and copper mine in the south east of Western Australia, 120km from Perth, commenced operations in 2009 after a \$3b expansion of the original Boddington Gold Mine, a joint venture which had been in care and maintenance for several years. NGB is now 100 per cent owned and operated by United States global miner Newmont Mining Corporation. First gold was poured in September 2009 and 18 months later the operation achieved its first one-million-ounce milestone. An estimated 700,000-750,000 ounces of gold per annum is expected to be produced for the life of the mine, officially more than 24 years, but it is possible the mine life could be further extended. NBG also produced 67Mlbs of copper in 2012 and this amount is expected to increase to between 70-80Mlbs in 2013.

Employment: Operation: 650

## INFRASTRUCTURE

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

#### WA STATE GOVERNMENT

Kemerton Industrial Park (KIP), 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. The KIP currently includes a silicon smelter, a titanium dioxide plant, a chlor-alkali plant, two peak load power stations and a waste water treatment plant. 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 2014/15, by which time the structure plan and zoning adjustments will also have been completed.

## IRON ORE

### Pilbara – Hope Downs 4 Iron Ore Mine

#### RIO TINTO IRON ORE

Rio Tinto and Hope Downs Iron Ore Pty Ltd, as equal joint venture participants, are developing the Rio Tinto operated Hope Downs 4 iron ore mine at an estimated capital cost of US\$1.2b. The open-cut mine will have a production rate of 15Mtpa of iron ore. The development of Hope Downs 4 involved 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. First ore left the Hope Downs 4 mine in April 2013.

Expenditure: \$1.556b.

Employment: Construction: 2100; Operation: 720

### Pilbara – Port Hedland – Atlas Iron

#### ATLAS IRON LTD

Atlas Iron Ltd is an iron ore explorer and miner focused on developing a number of projects in the Pilbara region of Western Australia. Atlas commenced exporting in December 2008 from its Pardoo mine, east of Port Hedland. Atlas' second mine, Wodgina, commenced operations in 2010. Production has recently commenced at its third mine, Mt Dove, located 65km south of Port Hedland. The company plans to bring five mines into production in five years with the addition of Abydos Mine in June 2013, and the first phase of the Mt Webber Mine in the first half of 2014. Atlas aims to export between 9.8Mt and 10.3Mt in the 2013 financial year. Atlas plans to progressively expand its exports, targeting 15Mtpa by 2015 and 46Mtpa during the 2017 calendar year. Atlas operates its current mines on the basis of road haulage to Port Hedland. For the longer-term developments and production beyond 15Mtpa, rail haulage will be preferable due to the scale and distance to port. Atlas is engaging with a number of infrastructure owners and developers with the intent of unlocking the value of Atlas' Horizon 2 assets.

Expenditure: \$500m.

Employment: Operation: 570

## SILICON METAL

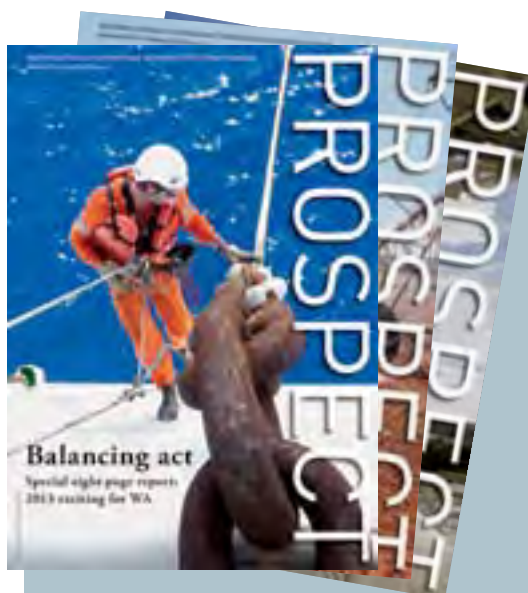
### Kemerton – Silicon Metal Plant Expansion

#### 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, that involved the installation of a third furnace, increased the plant capacity to 48,000tpa and came online in 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



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## 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. Construction is progressing well and the expansion is on track to be operational in the first half of 2014. Expenditure: \$550m. Employment: Construction: 300; Operation: 10

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

#### YARA INTERNATIONAL ASA

Yara, Orica and Apache have formed a joint venture – Yara Pilbara Nitrates Pty Ltd (YPNPL). YPNPL 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. YPFPL 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. Engineering design and procurement activities were finalised at the end of 2012. Construction is in the final stages of completion. The project is on track for first gold production in Q4 2013. Expenditure: \$700m. Employment: Construction: 700; Operation: 400

## HEAVY MINERAL SANDS

### Keysbrook – Heavy Mineral Sands Mine

#### MZI RESOURCES LTD

MZI is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. The project has received environmental approval from the Minister for Environment, as well as development approvals and extractive industry licences from the Shires of Murray and Serpentine-Jarrahdale. Keysbrook has a mineral resource of 78.9Mt at an average grade of 2.5 per cent total heavy mineral (THM) and an ore reserve of 670,000t THM, which underpins the first 5.5 years of operations. The Feasibility Study, which was completed in October 2012, indicated a mine life of 7.2 years based on accessible mineral resources plus shire approvals. Based on the total mineral resource estimate, the potential mine life could be more than 15 years. Approximately 110,000tpa of heavy mineral concentrate from Keysbrook will be trucked 120km south to Doral's mineral separation plant in Picton, near Bunbury, where it will be toll treated under a processing agreement. MZI plans to start site construction in 2013, with first production expected in 2014. The project is expected to produce 62,200tpa of leucoxene products and 28,700tpa of zircon concentrate which will be exported from the Bunbury Port. 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. The ANSIA includes three larger sites for major gas processing proponents, secondary processing sites, areas for general support industries and supply base operations, a port with common user facilities to be managed by the Dampier Port Authority and common user access and infrastructure corridors. Two foundation proponents, BHP Billiton Petroleum and Chevron Australia have been allocated land within the ANSIA. Chevron Australia commenced construction in late 2011 with first LNG exports scheduled for late 2016. BHP Billiton Petroleum is nearing completion of the construction of its domestic gas plant, with gas production scheduled for Q3 2013.

## IRON ORE

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

#### BHP BILLITON IRON ORE PTY LTD

The Port Hedland Inner Harbour Expansion has increased BHP Billiton WA Iron Ore's port capacity to 220Mtpa (100% basis). As of 30 June 2013, the overall project was 92 per cent complete with all major infrastructure having been installed – including a new car dumper at Finucane Island and two additional berths and ship loaders to Nelson Point. Further debottlenecking opportunities that would add substantial, low cost capacity are also being evaluated. First production was achieved in second half of 2013. Expenditure: \$2b.

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

#### BHP BILLITON IRON ORE PTY LTD

This project seeks to enhance the efficiency of BHP Billiton WA Iron Ore's supply chain and will contribute to the company's strategy to deliver capacity well beyond 220Mtpa. The Rail Yard Facilities expansion involves a number of works to the rail operations at Port Hedland, particularly the Mooka Staging Yards, to create flexibility and increase direct load capability. Consistent with the prioritisation of efficient growth in the inner harbour, construction at the South Yard at Nelson Point operations is no longer included in the scope of this project. As at 30 June 2013, the overall project was 86 per cent complete and on schedule for the target completion date in the second half of 2014. Expenditure: \$1.1b. Employment: Construction: 2100; Operation: 720

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

The Jimblebar Mine Expansion will deliver installed mining and processing capacity to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The additional production delivered by the project will bring BHP Billiton WA Iron Ore's overall supply chain to 220Mtpa (100% basis). With the overall project already 89 per cent complete (as of 30 June 2013), Jimblebar is expected to achieve first production ahead of schedule in the December 2013 quarter. The project is on budget in Australian dollars although the capital cost in US dollars is expected to be 10 per cent, or US\$340 million higher than the original budget. This increase has been more than offset by a change in scope of the Port Blending and Rail Yard Facilities project. Expenditure: \$3.2b.

### 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, and construction of two additional berths and associated infrastructure resulting in a rail and port capacity of 120Mtpa. Construction of infrastructure in support of the Solomon Hub, which includes the new 20Mtpa Firetail iron ore mine at Solomon and the 127km railway spur to Fortescue's existing Christmas Creek to Port Hedland rail line, has been recently completed. The Solomon Hub is planned to involve at least two mining areas and two processing plants. First production from the Firetail deposit at Solomon was achieved in November 2012. Fortescue recently announced that first production from its 40Mtpa Kings mine at Solomon is expected in late 2013. Expenditure: \$9b. Employment: Construction: 7000; Operation: 6000

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

The Sino Iron project is located at Cape Preston, 100km south west of Karratha. Construction of the largest magnetite mining and processing project in Australia is at an advanced stage, with production from the first and second of six lines scheduled to commence in 2013. On completion, the project will comprise of in-pit crushers, six autogenous and six ball mills, concentrators, 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 the project will export up to 21.6Mtpa of magnetite concentrate and 6Mtpa of high grade pellets.

Expenditure: \$5.2b.

Employment: Construction: 4000; Operation: 500

**OIL & GAS DEVELOPMENTS****Carnarvon Basin – Greater Western Flank  
Phase 1****WOODSIDE ENERGY**

The broader Greater Western Flank (GWF) area consists of 16 fields located to the south west of the Goodwyn A (GWA) platform which lies off the north west coast of Australia, and is estimated to hold up to 3Tcf of recoverable gas and up to 100MMbbl of recoverable condensate. On 8 December 2011, Woodside, as operator, announced the North West Shelf Project participants had approved the development of the first phase of the GWF Project. The GWF Phase 1 Project will develop the Goodwyn GH and Tidepole fields, via a subsea tie-back to the existing GWA platform and represents the next major development for the North West Shelf Project. Project start-up is expected early in 2016.

Expenditure: \$2.5b.

**Carnarvon Offshore Basin – Barrow Island  
– Gorgon Project****GORGON JOINT VENTURE**

The Gorgon Joint Venture (GJV) made its final investment decision on the Gorgon Project in mid-September 2009. The Foundation Project on Barrow Island is a three train LNG development with a nameplate capacity of 15.6Mtpa and includes a domestic gas plant capable of delivering at least 300TJ/d of gas to the mainland. Cost estimates for the project increased from \$43b to \$52b following a cost and schedule review conducted by Chevron in December 2012. The project involves the processing of gas from both the Gorgon and Jansz/lo gas fields and includes potentially the largest commercial CO<sub>2</sub> geosequestration project in the world. The project obtained State and Commonwealth environmental approvals in August 2009. On-island activity started in late 2009 and the major construction work for the processing plant commenced in 2011. Plant start-up is planned for late 2014 leading to the first LNG cargo in Q1 2015, with the provision of domestic gas by 31 December 2015.

Expenditure: \$52b.

Employment: Construction: 6250; Operation: 300

**Carnarvon Offshore Basin – North Rankin  
– North Rankin Redevelopment****WOODSIDE ENERGY**

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

Expenditure: \$5b.

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

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. Gas production is expected to commence in Q3 2013.

Expenditure: \$1.5b.

Employment: Construction: 700; Operation: 14

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

Chevron Australia Pty Ltd is currently constructing an LNG plant, domestic gas plant and port facilities at the Ashburton North Strategic Industrial Area near Onslow for its Wheatstone project. The project will initially have two LNG trains with a combined capacity of 8.9Mtpa, expandable to five or six trains with a total capacity of 25Mtpa, and a 250Mcf per day domestic gas plant connected to the Dampier to Bunbury Natural Gas Pipeline. The first export of LNG is scheduled for late 2016.

Expenditure: \$29b.

Employment: Construction: 5500; Operation: 400

**AMMONIA/UREA****Shotts Industrial Park – Collie Coal to Urea  
PERDAMAN CHEMICALS AND FERTILISERS  
PTY LTD**

Perdaman Chemicals and Fertilisers Pty Ltd is developing a \$3.5b 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 Q2 2014, with the first shipment of urea planned for Q4 2017.

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 company proposes to mine the Happy Valley North and South mineral sands deposits situated on private land and in State Forest. The two deposits contain 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 then be trucked to Cristal's Bunbury Mineral Separation Plant for final processing. The company is awaiting the outcome of its environmental approvals process.

Expenditure: \$35m.

Employment: Construction: 100; Operation: 30

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

Gunson proposes to develop the Coburn zircon project, located south of Shark Bay and approximately 250km north of Geraldton. It contains total ore reserves of 308Mt at an average grade of 1.2 per cent heavy minerals, all of which lie within the portion of the project area that has received Government environmental approvals for mining. An optimisation study was completed in February 2013 which indicates a mining rate of 23.4Mtpa and a mine life of 19 years. As a result of the optimisation study, the project is expected to increase average annual production to 49,500t of zircon, 109,000t of chloride ilmenite and 23,500t of a mixed rutile-leucosene HiTi90 product.

Expenditure: \$202m.

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. The State Government will secure all relevant approvals to establish a 'project ready' Precinct.

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

#### WA STATE GOVERNMENT

The Anketell project involves the establishment of a multi-user, multi-commodity deep water port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha on the Pilbara coast. The port and associated infrastructure will be a proponent-funded but State owned Port which will be managed and operated under the *Port Authorities Act 1999*. The strategic industrial land will fall under the jurisdiction of the Western Australian Land Authority (LandCorp). During its initial phase, it is expected that Anketell will be an iron ore export facility and that, at its peak capacity, not less than 350Mtpa will be exported to customers, mainly in Asia. A number of iron ore producers with mining assets in the Pilbara have expressed interest in using the planned facilities at Anketell. It is likely that the Port will be developed in stages to accord with the development of the various mining operations which are located throughout the Pilbara.

## IRON ORE

### 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 – Weld Range Iron Ore Mine SINOSTEEL MIDWEST CORPORATION LIMITED

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

Expenditure: \$1b.

Employment: Construction: 1000; Operation: 500

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

MCC Australia Sanjin Mining Pty Ltd is developing a 15Mtpa magnetite iron ore mine in the Pilbara and aims to ship its first ore in 2016 via the proposed multi-user 350Mtpa plus port at Anketell. The project comprises a proven JORC compliant 1.9Bt iron ore resource, a beneficiation plant, power plant, desalination plant, port facilities for exporting concentrate and other related infrastructure. MCC has completed feasibility studies for the port, power supply, water supply, accommodation and general site infrastructure. A Native Title agreement was reached with the Ngarluma Aboriginal Corporation and a draft PER document has been submitted to the EPA.

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 primary approvals have been secured and major project works commenced in late 2012. Dredging of the new berth areas at South West Creek was finished ahead of schedule, the airstrip and internal mine roads have been completed, the rail construction villages are completed and works are well advanced on the construction of mine and port accommodation villages. In addition, the new Corporate HQ and Remote Operations Centre at the Perth International Airport business precinct is due for completion in October 2013. Roy Hill hopes to finalise its debt funding in late 2013 to allow the commencement of full construction.

Expenditure: \$9.9b.

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 deposits 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 construction to commence following a decision to proceed by the joint venturers and completion of funding arrangements. Primary State and Federal environmental approvals for the mine and rail elements of the project were received in December 2011, and for the first stage of Anketell Port in the first half of 2013.

Expenditure: \$7b.

Employment: Construction: 3500; Operation: 1000

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

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

Expenditure: \$35m.

## NICKEL

### Mt Windarra – Windarra Nickel

#### POSEIDON NICKEL NL

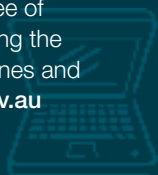
Poseidon Nickel Ltd has submitted a project development proposal for the redevelopment of the Mt Windarra underground nickel mine, the development of the new Cerberus underground nickel mine, the construction and commissioning of a nickel sulphide concentrator, a gold tailings re-treatment plant and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

Expenditure: \$250m.

Employment: Construction: 80; Operation: 180

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## Significant resource projects in Western Australia

Western Australia continues to lead the way as Australia's premier resources investment destination. There are more than A\$140 billion worth of projects either committed or under consideration for the State during the next few years. These would create more than 44,000 construction jobs and more than 14,000 permanent jobs.

This section is intended as an overview and does not constitute an exhaustive list of projects within the Western Australian resources industry. All currency figures are in Australian dollars, as at 01/05/2013.

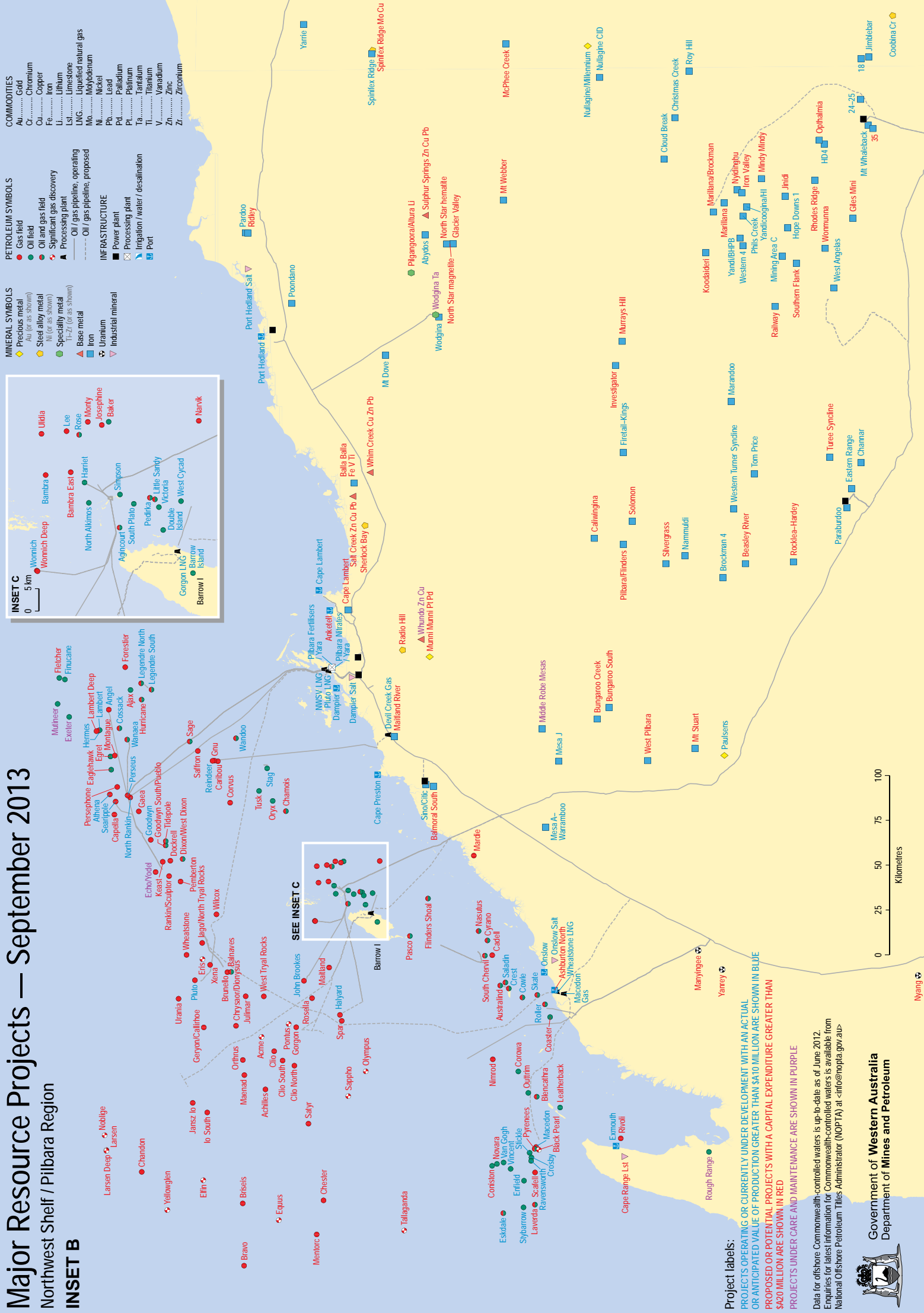
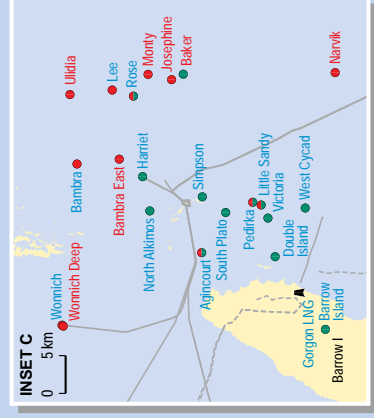
	Project Value (estimated A\$m)	Employment Construction	Permanent
<b>Iron and Steel</b>			
API Management Pty Ltd – West Pilbara Iron Ore Project	7000	3500	1000
Asia Iron – Extension Hill Magnetite Mine	2000	1000	350
BHP Billiton Iron Ore – Inner Harbour Expansion	2000	n/a	n/a
BHP Billiton Iron Ore – Jimblebar Mine Expansion	3200	n/a	n/a
BHP Billiton Iron Ore – Port Blending and Rail Yard Facilities	1100	2100	720
CITIC Pacific – Cape Preston Mine & Processing Projects	5200	4000	500
Fortescue Metals Group – Chichester expansion and Solomon Mine Project	9000	7000	6000
MCC – Cape Lambert Iron Ore Project	3700	3000	1000
Rio Tinto Iron Ore – Hope Downs 4 Iron Ore Mine	1556	2100	720
Roy Hill Holdings Pty Ltd – Iron Ore Mine - Roy Hill	9900	3600	2000
Sinosteel Midwest Corporation – Weld Range Hematite Mine	1000	1000	500
<b>Sub Total</b>	<b>45656</b>	<b>27300</b>	<b>12790</b>
<b>Oil, Gas and Condensate</b>			
BHP Billiton – Macedon	1500	700	14
Browse LNG Precinct	n/a	n/a	n/a
Chevron – Wheatstone LNG	29000	5500	400
Gorgon Joint Venture Gas Processing Project	52000	6250	300
Woodside Energy – Greater Western Flank Phase 1	2500	n/a	n/a
Woodside Energy – North Rankin Redevelopment	5000	n/a	n/a
<b>Sub Total</b>	<b>90000</b>	<b>12450</b>	<b>714</b>
<b>Other</b>			
AngloGold Ashanti/Independence Group – Tropicana Gold Project	700	700	400
Ashburton North Strategic Industrial Area	n/a	n/a	n/a
CSBP – Kwinana Ammonium Nitrate Facility Expansion	550	300	10
Newmont Boddington Gold Pty Ltd – Boddington Gold Mine	n/a	n/a	650
Ord East Kimberley Expansion Project	517	761	n/a
Perdaman Chemicals & Fertilisers – Coal-to-Urea Plant	3500	2000	200
Yara International ASA – Yara Pilbara Nitrates	600	600	65
<b>Sub Total</b>	<b>5867</b>	<b>4361</b>	<b>1325</b>
<b>TOTAL</b>	<b>141523</b>	<b>44111</b>	<b>14829</b>



# Major Resource Projects — September 2013

Northwest Shelf / Pilbara Region

## INSET B



## Project labels:

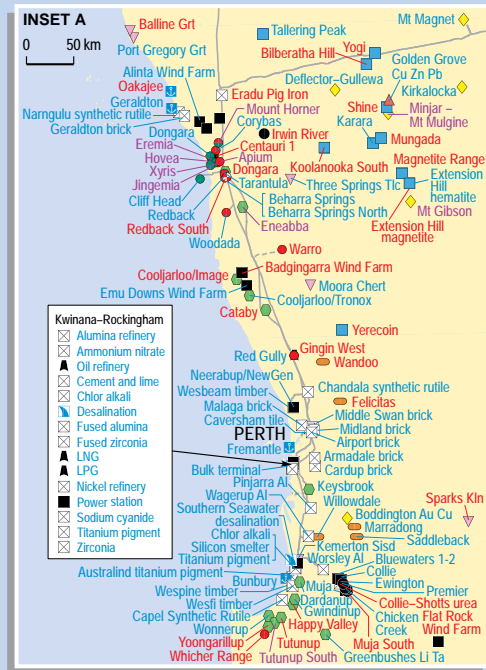
PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$410 MILLION ARE SHOWN IN BLUE  
PROPOSED OR POTENTIAL PROJECTS WITH A CAPITAL EXPENDITURE GREATER THAN \$420 MILLION ARE SHOWN IN RED  
PROJECTS UNDER CARE AND MAINTENANCE ARE SHOWN IN PURPLE

Data for offshore Commonwealth-controlled waters is up-to-date as of June 2012. Enquiries for latest information for Commonwealth-controlled waters is available from National Offshore Petroleum Titles Administrator (NOPTA) at <info@noppta.gov.au>



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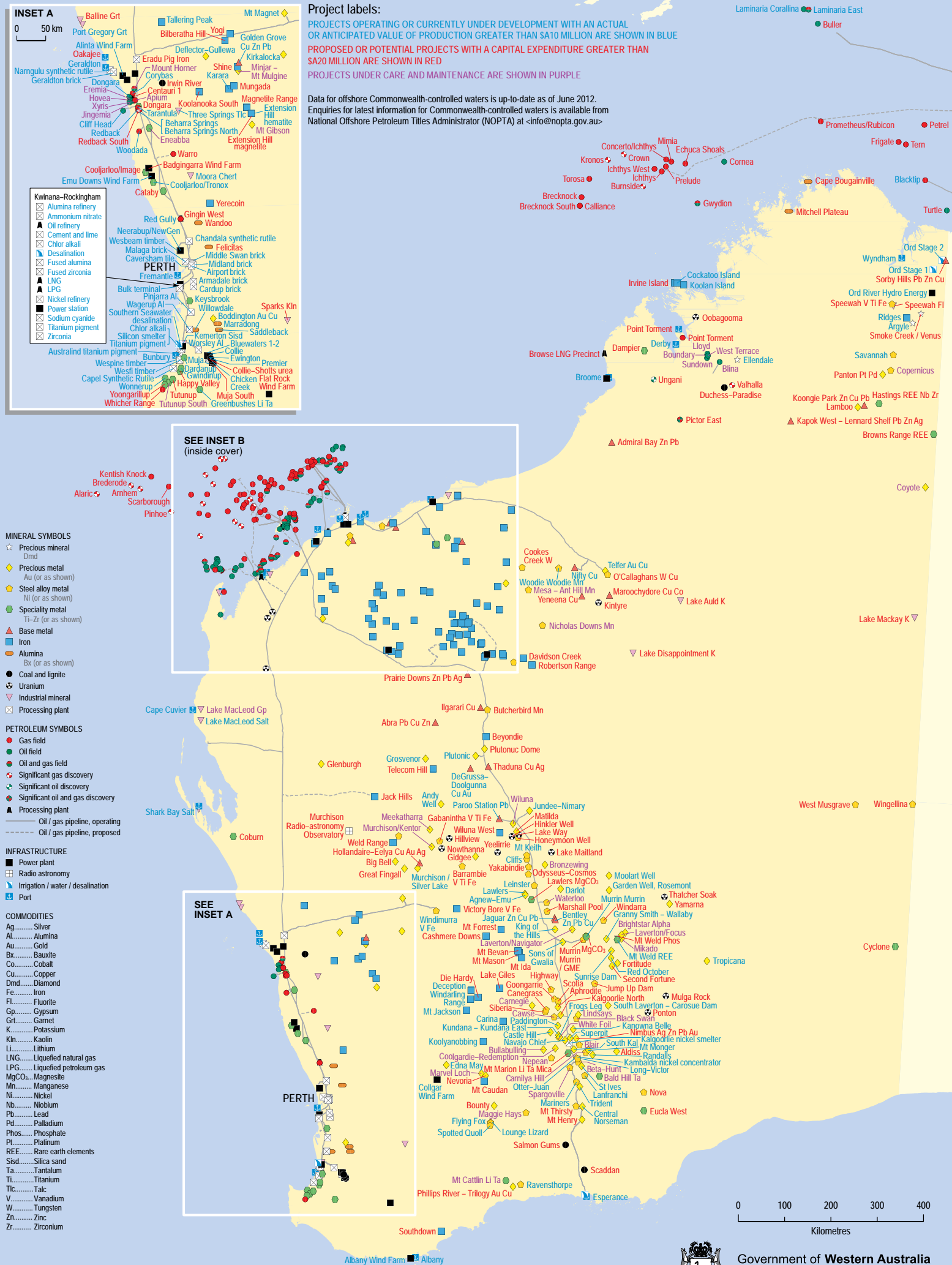
# Major Resource Projects — September 2013



## Project labels:

PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$10 MILLION ARE SHOWN IN BLUE  
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