



# Minerals Council of Australia Vision 2020 Project

# The Australian Minerals Industry's Infrastructure Path to Prosperity

An assessment of industrial and  
community infrastructure in major  
resources regions.



ACIL Tasman  
Economics Policy Strategy

Prepared by ACIL Tasman for the Minerals Council  
of Australia as part of the **Vision 2020 Project**



# Executive Summary

## **Vision 2020 Project: The Australian Minerals Industry's Infrastructure Path to Prosperity**

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May 2009



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- NSW Minerals Council
- South Australian Chamber of Mines and Energy
- Victorian Division of the MCA
- Northern Territory Resources Council
- Tasmanian Minerals Council
- Centre for Environmental Management, Central Queensland University
- Department of Primary Industries and Resources, South Australia

## Introduction

This study is part of the Vision 2020 Project

This report forms part of the Mineral Council of Australia's Vision 2020 Project – a project with the objective of addressing capacity constraints to growth that have afflicted the minerals industry in the past and are likely to return and erode Australia's market share and thus visit opportunity costs on the industry and the nation into the future. The aim is avoid repeating the mistakes of past inactivity in building the social and physical infrastructure needed to meet the burgeoning global demand of the industrialising and urbanising emerging economies.

The First Phase of the Project, released in 2008, examined the global demand potential for the minerals industry through to 2020 and assessed the supply-side requirements, including the skilled labour, needed for Australia to maintain or grow its share of the global market.

It examines the infrastructure needs of a growing minerals industry

This study, the Second Phase, examines existing and potential capacity constraints in ports, railways and roads; energy, telecommunications and water networks; as well as housing, labour and other social needs that affect the growth of the mining industry and the wellbeing and development of the communities in which it operates across Australia. It considers the potential for growth in 21 Australian resources regions under a scenario that broadly aligns with the Advance scenario outlined in Phase One and assesses the need for infrastructure to support that growth.<sup>1</sup> Separate reports have been prepared for each State and the Northern Territory. While the main focus of the work is on the minerals industry, in some cases the reports for some growth regions have also considered the growth outlook for other industries.

Infrastructure constraints have contributed to the drop in our share of global markets

Expansion of the nation's infrastructure (hard and soft industrial and community infrastructure) has not always kept pace with the rapid and sustained growth in export and domestic demand. Consequently, many growth regions around Australia now have significant infrastructure constraints. This in turn has reduced Australia's ability to meet the global demand for mineral products. Other nations have stepped in to fill that gap and as a consequence Australia's market share has fallen.

Vision 2020's goal is to recapture that market share

This phase of the Vision 2020 Project lays the foundation for developing the policy and regulatory frameworks that will enable the timely provision of the industrial and community infrastructure needed to support an increase in Australia's minerals production capacity. It is hoped that this in turn will enable Australia to rebuild its share of the global minerals market.

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<sup>1</sup> Two reports were produced by Access Economics: *Infrastructure 2020 – Can the domestic supply chain match global demand?* and *Global commodity demand scenarios*.





The global economic crisis will temporarily slow minerals demand growth

However, demand is likely to rebound quickly and strongly

The Vision 2020 Project's growth scenarios were prepared prior to the emergence of the global economic crisis. While the strong negative impacts on global growth and demand are clearly evident, most commentators believe that those impacts are likely to largely play out over next 6-18 months. ACIL Tasman believes that robust economic conditions for the minerals sector will largely return within that timeframe, and that growth is likely to return to longer term trend lines. The Asian markets in particular, with their innate demand driven by large, aspirational populations, are likely to bounce back quickly and strongly.

Three scenarios were prepared by Access Economics - Advance, Holding the Line and Decline. The Access Economics scenarios were developed using a top down approach and provided forecasts of potential growth in national production of seven minerals (lead, coal, copper, iron ore, aluminium, zinc and nickel). They represent, respectively, the production that Australia would need to achieve to increase its market share for these commodities, to maintain its market share and to continue on the current path of declining market share.

It was not possible to disaggregate the scenario forecasts across the growth corridors examined in ACIL Tasman's report. Rather ACIL Tasman developed bottom up growth scenarios based on public reports such as various ABARE publications and State or Territory government documents. Where necessary we have supplemented that information through our own research and consultations with industry.

The regional growth scenarios are credible

The regional growth scenarios have been constructed to reflect credible growth in minerals production for each region. The analysis also includes the development of mines that produce mineral products not included in the Access Economics scenarios. Including these additional resources in the discussion provides a more complete picture of a region's infrastructure needs.

The regional growth scenarios will in aggregate broadly align with the Advance scenario of Access Economics.

But if infrastructure constraints are not addressed growth will be slower

We would note that a failure to implement (or delays in implementing) some of the existing infrastructure expansion plans would lead to the anticipated growth in minerals production being constrained and actual outcomes being pushed more towards those suggested by the Holding the Line and Decline scenarios. Obviously, to the extent that growth in minerals production is lower, then the demand for new or upgraded infrastructure will be reduced.

This analysis of growth corridors does not include a detailed assessment of the effect of an emissions trading system. The Minerals Council of Australia argues that the proposed Carbon Pollution Reduction Scheme in its present form will significantly undermine the competitiveness of Australian minerals sector.

This report examines 21 growth regions

The minerals production outlook and infrastructure needs for each of the growth regions are discussed in turn in this summary. The full report contains much more detail as this executive summary tends to focus on the highlights. Readers interested in a particular growth region (or regions) should read the full report for that region to get a more complete picture of the minerals outlook for the region and the implications across the full range of infrastructure needs of the minerals industry.

## Western Australia

WA is the nation's resources powerhouse

Western Australia is the nation's resources powerhouse and produces some 38 per cent of the country's exports. This report examines the resources regions of the Kimberley, Pilbara, Mid West, Goldfields-Esperance and South West (including Peel). The map in Figure 1 shows the locations of these and other regions. The value of production from these regions is shown in Table 1.

Table 1 Value of regional minerals and energy production, 2007-08

Region	Value (\$m)
Pilbara	21,490
State Offshore Petroleum	870
Commonwealth Offshore Petroleum	18,417
Peel	4,522
Mid West	2,250
Kimberley	1,545
Goldfields-Esperance	7,836
Other	1,680
<b>Total</b>	<b>58,610</b>

Note: Totals may not add due to rounding

Data source: Department of Mines and Petroleum 2008

Strong growth to continue

The Chamber of Minerals and Energy of Western Australia (CME) released a report, *Developing a Growth Outlook for WA's Minerals & Energy Industry*<sup>2</sup> in April 2009. The report found that despite the short-term effects of the global financial crisis, the minerals and energy sector should expect to experience rapid growth of both construction and output to 2014 and ongoing growth to 2020. It found that:

– Increased demand for all inputs

- State-wide demand for labour is projected to grow rapidly for the period 2008-2014, with a peak demand of 38,000 in 2012 due to coincidence of

<sup>2</sup> The Chamber of Minerals and Energy of Western Australia Inc (CME 2009), *Developing a Growth Outlook for WA's Minerals & Energy Industry*, April 2009.

– driving population  
increase

major construction projects. The majority of this growth is expected in the Pilbara and Mid West regions.

- The minerals and energy sector is expected to drive a population increase of up to 125,000 relative to 2007 levels by 2020, creating higher demand for community infrastructure in both regional towns and in Perth.
- Annual State-wide demand for electricity by the minerals and energy sector is projected to grow significantly for the period 2008-2013 to more than 16,000 GWh, followed by steady growth to 2020 to about 19,000 GWh. Most of the forecast growth in demand is expected to be met by self generation rather than grid electricity.
- Gas demand from the minerals and energy sector is forecast to remain relatively static for the period 2008-2010, before resuming strong growth. Annual gas demand by 2020 is expected to reach about 300 PJ, 50 per cent higher than in 2009
- Demand for water is expected to grow strongly from 2010 to about 1300 GL/year, more than 50 per cent above 2009 demand.

Demand for these inputs and for other requirements such as transport will create strong demand for additional and upgraded infrastructure.

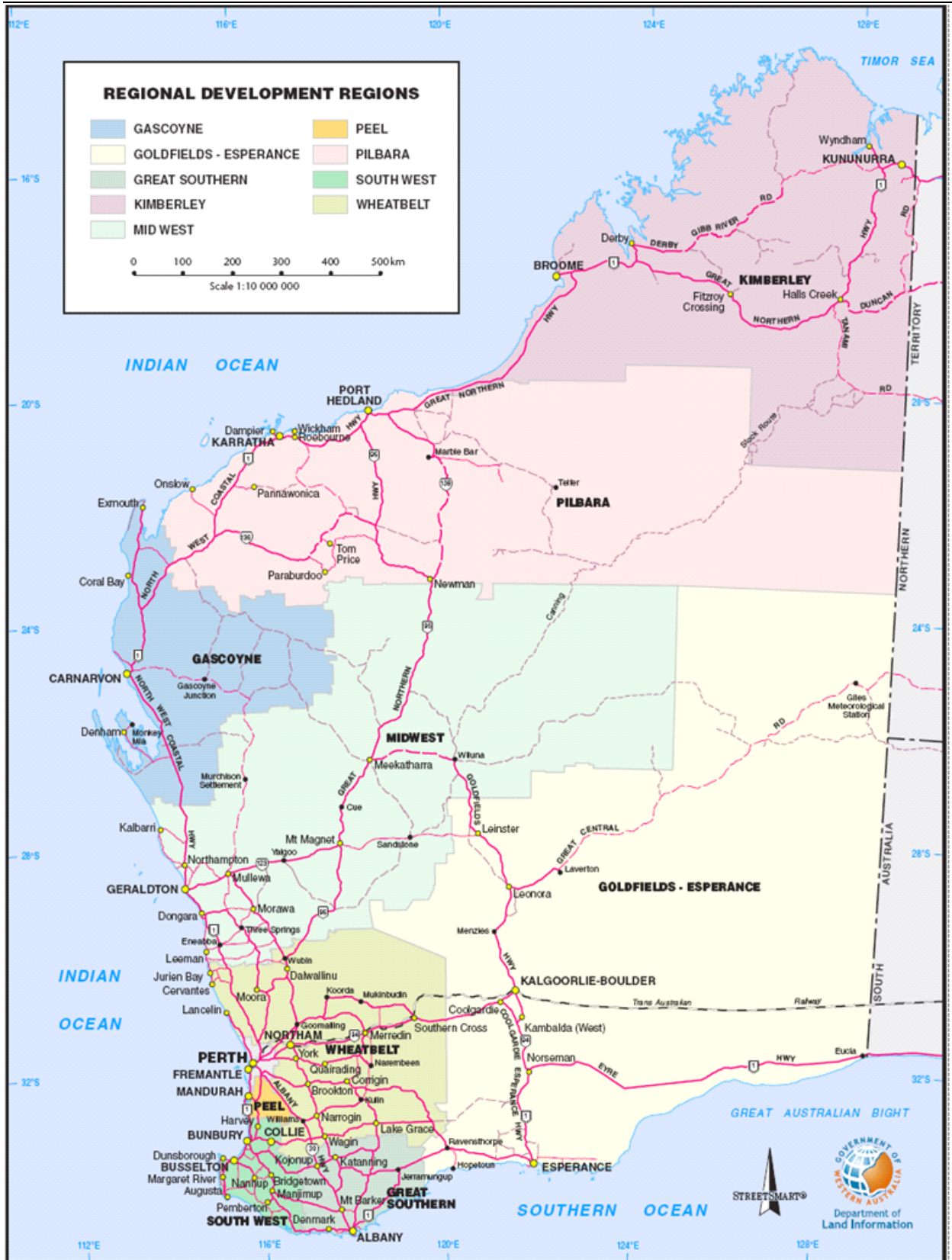
The principal infrastructure shortcomings in Western Australia currently are:

- Inadequate community infrastructure and services in remote regions, particularly to support families with children, educate and train workforces of the future, and support the community profile
- Port infrastructure inadequate to meet mineral export demand
- Impending shortages of water both for industrial and community use
- Energy production and supply networks inadequate for growing demand
- Rail infrastructure inadequate in several regions to meet future demand
- Inadequate airport infrastructure in several regions and Perth
- Telecommunications infrastructure is inadequate in WA's regions.

There is a critical need to address these inadequacies if the resources sector is to continue to grow.



Figure 1 Regional development regions, Western Australia



Source: Department of Local Government and Regional Development 2009  
Western Australia

## The Kimberley growth region

### Minerals and LNG

The Kimberley is a highly prospective region for minerals and energy resources, including copper, lead, zinc, silver, nickel, uranium, coal, tin and mineral sands. Large offshore gas and condensate fields are expected to supply new LNG operations. The availability of domestic gas supplies associated with LNG development could be a key enabler of new mineral developments.

Under the growth scenario, production of iron ore is assumed to reach 10 million tonnes a year, with production of nickel and zinc concentrates each expected to be around 100,000 tonnes a year. Diamonds and gold will continue to be produced.

The resident population of the Kimberley is expected to rise from 39,000 in 2006 to about 58,000 in 2020.

### Kimberley has very limited infrastructure

The Kimberley is a remote region with a small population, limited development and very limited infrastructure. New resources projects will put pressure on existing infrastructure and services and generate requirements for substantial new infrastructure. Table 2 provides a summary of key infrastructure gaps and infrastructure needs in the Kimberley growth region.

Table 2 **Key infrastructure gaps and needs for the Kimberley growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Roads inadequate to support minerals and energy development</li> </ul>	<ul style="list-style-type: none"> <li>Sealed road on Dampier Peninsula to support gas development and gas processing hub</li> <li>Upgraded regional roads to the Kalumburu area in the North Kimberley and Tanami in the East Kimberley</li> <li>Ongoing upgrades of the Great Northern Highway to improve reliability</li> <li>Modifications to town roads and bypasses to accommodate heavy truck traffic in towns and to ports and industrial areas</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Current ports inadequate to support minerals and energy growth</li> <li>New ports required for minerals and energy products</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to existing Broome port to accommodate increased usage</li> <li>New ports for LNG and base metals</li> <li>Supply base(s) required for offshore development and operations</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Airport facilities and capacity inadequate to support minerals and energy growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to Truscott and Kalumburu airstrips in North Kimberley to service future mining and offshore operations</li> <li>In the short term, upgrade Broome Airport to service increased passenger and freight throughput</li> <li>Longer term, establish new Broome Airport to north of town and redevelop current site for residential and commercial use</li> <li>Upgrade Kununurra airport and Balgo &amp; Halls Creek airstrips</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Electricity supply requires expansion to support regional growth</li> <li>Fuel tankage at Broome inadequate to support demand increases from major minerals growth</li> </ul>	<ul style="list-style-type: none"> <li>Additional electricity supply infrastructure to support expanded towns and industrial activity</li> <li>Development of LNG / gas processing hub to host one or more LNG and gas processing plants</li> <li>Expanded fuel tankage and supply infrastructure at Broome Port</li> </ul>





Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Water and wastewater	<ul style="list-style-type: none"> <li>A lack of appropriate quality and quantity of water for drinking and or processing</li> </ul>	<ul style="list-style-type: none"> <li>Additional water supplies for towns to support expanded population and industry</li> <li>Water supplies for minerals and energy projects</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, particularly broadband availability, inadequate to support regional growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgraded broadband and mobile infrastructure to support business and community growth</li> </ul>
Community infrastructure and services	<ul style="list-style-type: none"> <li>Community infrastructure requires upgrades and expansions to support growth and meet the local community profile and needs of residents</li> <li>Land availability restricted for housing, commercial and industrial use, inflating costs</li> </ul>	<ul style="list-style-type: none"> <li>Upgraded community infrastructure to cope with increased population in Derby, Broome and Kununurra</li> <li>Developed land for housing, commercial activities and light industry in Broome, Kununurra and Derby</li> <li>Health and education systems re-examined to meet the expected increase in population and local health and education profiles</li> </ul>

The Kimberley requires major new infrastructure of all types to support resources development.

#### Roads

Mining and energy developments in remote regions would generate requirements for major upgrades of current low quality roads, for example:

- The Tanami Road in the East Kimberley
- Access roads to the North Kimberley off the Gibb River Road
- A road to service the LNG / gas processing hub at James Price Point.

#### Port infrastructure

In order to service gas developments and to export mineral products, additional port infrastructure will be required, including:

- A supply base for offshore petroleum operations, located in the vicinity of Broome or Derby
- Dedicated ports and export facilities for mineral concentrates located at sites within feasible transport distance from mines and with adequate deep water
- LNG export facilities adjacent to LNG plant(s).

Upgraded airports are needed, and longer term, a new airport is required for Broome.

#### LNG precinct

Agreement has been reached between traditional owners, government and industry to build an LNG precinct at James Price Point north of Broome. LNG projects provide the opportunity for domestic gas supply for minerals processing.

Telecommunications require extensive upgrade to provide the levels of service needed by industry and expanded communities.



**Land and community infrastructure**

Priorities for community infrastructure are land for housing, education facilities and health care facilities.

**The Pilbara growth region**

The Pilbara is crucial to the economy of the State and the nation, providing two of the largest export revenue earners – iron ore and liquefied natural gas. Iron ore alone amounted for almost \$19.5 billion of the region's exports in 2007-08. The region is the fastest growing minerals and energy production centre in the nation.

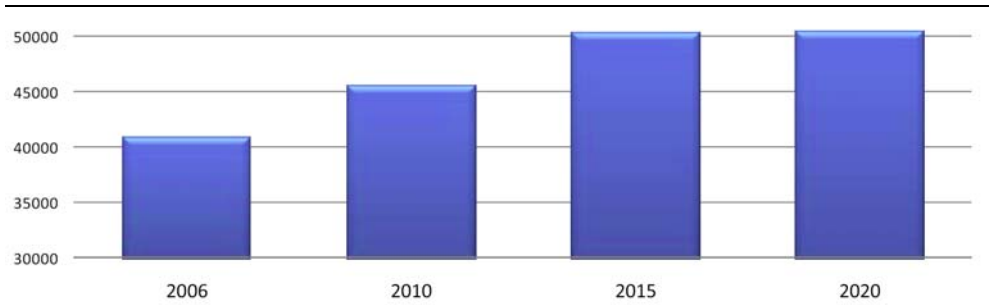
**Rapid production growth to continue**

The outlook is for that rapid growth to continue. Iron ore production is expected to increase from the current 235 million tonnes per annum (Mtpa) to more than 600 Mtpa by 2020. Three new LNG production facilities and other gas-based industries such as ammonia are expected to be built over the same period. LNG production is expected to increase from around 16 Mtpa in 2008 to between 45 and 50 Mtpa by 2020. New copper, gold, manganese and uranium projects are expected to be developed.

**Population will increase significantly**

The Pilbara's population is projected to grow significantly to meet the demand for labour from the minerals industry (see Figure 2). More than 50,000 people are expected to reside in the Pilbara by 2020. The number of employees participating in fly-in, fly-out (FIFO) is projected to more than triple from 5,000 to as many as 17,000 by 2015.

Figure 2 **Pilbara population projections to 2020**



Source: Pilbara Industry's Community Council (2008), Planning for Resources Growth in the Pilbara: Employment & Population Projections to 2020

Table 3 provides a summary of key infrastructure gaps and needs in the Pilbara growth region.

Table 3 **Key infrastructure gaps and needs for the Pilbara growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Land	<ul style="list-style-type: none"> <li>Land availability in Pilbara towns is inadequate to meet current and future demand for housing</li> </ul>	<ul style="list-style-type: none"> <li>Expedite planning, land release and approvals need to meet the accommodation needs of rapidly growing population, reduce housing costs and improve service worker attraction and retention</li> <li>Possibly establish a single authority to facilitate land planning and development</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Education facilities and services inadequate to support Pilbara community profile and meet needs of families</li> <li>Health facilities and services inadequate to support Pilbara community profile and meet needs of residents</li> <li>Childcare facilities inadequate to support Pilbara community profile and meet needs of families</li> </ul>	<ul style="list-style-type: none"> <li>Improvements to education to provide:               <ul style="list-style-type: none"> <li>adequate schools and education services to meet needs of increased populations and to be able to attract and retain families, particularly those with teenage children</li> <li>special attention to Indigenous education and training to overcome the major gap in outcomes and workforce participation</li> </ul> </li> <li>Re-engineer the Pilbara health system to redress the lack of relevant and adequate services and align capacity with demand</li> <li>Increase the amount, quality and availability of childcare to support families, broaden employment choices and attract and retain skilled workers in the region</li> </ul>
Roads	<ul style="list-style-type: none"> <li>Highways and regional roads require upgrades and extensions to meet industry and community growth needs</li> <li>Road infrastructure in towns</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade highways and regional roads to accommodate construction traffic, minerals transport and traffic associated with movement of workers and community members</li> <li>Upgrades to road infrastructure in towns to service additional residents and businesses</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Uncertainty over third party access arrangements for current single user railways</li> </ul>	<ul style="list-style-type: none"> <li>Resolve third party access arrangements to existing single-user railways to provide investment certainty to all parties</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Port infrastructure requires major expansion to support major increases in export tonnage</li> </ul>	<ul style="list-style-type: none"> <li>In order to service gas developments and to export mineral products, additional port infrastructure will be required, including:               <ul style="list-style-type: none"> <li>expanded iron ore export facilities at existing sites</li> <li>two new ports for iron ore export</li> <li>expanded export facilities for mineral concentrates</li> <li>one or two new supply bases for offshore petroleum operations</li> <li>LNG export facilities</li> </ul> </li> </ul>
Airports	<ul style="list-style-type: none"> <li>Perth Airport terminal facilities inadequate for current and future passenger traffic</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade airports in the Pilbara and Perth Airport to deal with passenger and freight growth</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Lack of an integrated electricity system in the Pilbara inhibits efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Develop business cases for all stakeholders for the proposed integrated Pilbara electricity network</li> <li>Provide gas supplies and infrastructure to new customers</li> </ul>
Fuel	<ul style="list-style-type: none"> <li>Fuel import infrastructure requires expansion to supply mining demand growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade the import tankage capacity in both Dampier and Port Hedland to service mining growth</li> </ul>
Water	<ul style="list-style-type: none"> <li>Lack of a region-wide, integrated water strategy</li> </ul>	<ul style="list-style-type: none"> <li>Develop a strategic approach to long term water supply, matching sources and supplies to demand - an overarching water supply strategy is required</li> </ul>



**Community infrastructure is a priority**

Community infrastructure and services such as schools, health care facilities, and sporting and recreation facilities do not meet the needs of residents. These shortfalls are a key reason for the problems in attracting and retaining workers in the Pilbara, including persons who work in the service industries.

**Land availability is critical**

This is the reason why the Pilbara Industry Community Council (PICC) has identified land for accommodation as a critical factor for improving services delivery by government and business and ensuring the sustainability of Pilbara's communities. Better processes are needed to expedite land releases and development approvals.

Efficient rail infrastructure is critical to the success of the Pilbara as one of the world's premier iron ore mining regions. Third party access arrangements need to be resolved to provide investment certainty to all parties.

In order to accommodate large growth in minerals exports additional port infrastructure will be required, including both expanded and new iron ore export facilities and expanded export facilities for mineral concentrates. In addition, there will be a need for new LNG export facilities and for additional supply bases for offshore petroleum operations.

Airports in the region will need to be upgraded to accommodate additional throughput of passengers, particularly the FIFO work force.

Onshore LNG developments may result in additional domestic gas becoming available for use in power generation and by gas processing operations. Gas customers will need to negotiate commercial arrangements for gas supply and transport. Government may need to facilitate access to land for infrastructure corridors.

Import tankage capacity in Dampier and Port Hedland will need to be upgraded to meet large increases in the demand for diesel fuel.

While short term water supplies are adequate, long-term water supplies are less assured. An overarching water strategy is required for the Pilbara to resolve serious uncertainties for the minerals and energy sectors in the region.

**Mid West growth region**

**Emerging mining region**

The Mid West has a broad economic base dominated by mining but with major contributions also from the agriculture, retail, tourism, fishing and manufacturing industries. Due to the strong demand for resources from China and other Asian economies, there is strong and growing interest in the Mid West's resources, in particular iron ore.

The Mid West's mineral resources also include gold, nickel, mineral sands, iron ore, zinc-copper, talc, lead, gypsum, lime sands and garnet. The region also produces oil and gas.

Iron ore production in the region is poised to grow significantly – up to 80 Mtpa by 2020. Other production will include nickel, copper and gold.

Table 4 summarises infrastructure requirements for the Mid West in 2020 under the growth scenario.

Table 4 **Key infrastructure gaps and needs for the Mid West growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Regional roads and some highways are inadequate to support major minerals growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades of highways and regional roads are required to accommodate construction traffic, minerals transport and traffic associated with movement of workers and community members</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Current rail infrastructure is inadequate to transport large tonnages of iron ore and not sufficiently extensive to service more than 25 Mtpa</li> </ul>	<ul style="list-style-type: none"> <li>Rail infrastructure and rolling stock upgrades required for first stage iron ore exports through Geraldton port</li> <li>For production over 25Mtpa, new rail lines are required to transport ore from north and east minesites to the Oakajee port</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Geraldton Port inadequate to cope with more than about 15 Mtpa</li> <li>Maximum capacity of Geraldton after upgrades well below potential production</li> </ul>	<ul style="list-style-type: none"> <li>New rail unloading, shipping berths and loading facilities are required at Geraldton Port to handle increased tonnages (up to 25Mtpa)</li> <li>Oakajee Port to be developed as dedicated bulk port</li> </ul>
Ore pipelines	<ul style="list-style-type: none"> <li>No slurry pipelines yet exist to transport magnetite ore</li> </ul>	<ul style="list-style-type: none"> <li>Pipelines for transport of magnetite slurry from minesites to Geraldton port and/or Narngulu</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Electricity supply capacity falls well below needs of future mining</li> <li>Gas pipeline capacity currently below future demand</li> </ul>	<ul style="list-style-type: none"> <li>Major new capacity in transmission and generation is necessary to provide the energy for new minerals projects</li> <li>Capacity increase for Dampier to Bunbury pipeline, other potential pipelines and feeder line upgrades to support mining and industry developments</li> </ul>
Water	<ul style="list-style-type: none"> <li>No comprehensive, integrated plan for water</li> </ul>	<ul style="list-style-type: none"> <li>Prepare comprehensive regional water plan to ensure efficient supply and use of water for mining and other users</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure in smaller towns inadequate to service populations that mining could attract</li> </ul>	<ul style="list-style-type: none"> <li>Enhanced community infrastructure to service increased populations in towns</li> </ul>
Land and infrastructure corridors	<ul style="list-style-type: none"> <li>Land use planning not yet adequate to service needs of communities and mining industry</li> </ul>	<ul style="list-style-type: none"> <li>Developed land will be required for the industrial estate at Oakajee, new residential subdivisions, new and expanded industrial estates</li> <li>Infrastructure corridors will be required for new and future rail lines, slurry pipelines, gas pipelines and electricity transmission lines, utilities to service urban development</li> </ul>

Minerals development and population growth will require development of a region-wide water plan to assure adequate supply.

Roads will need to be upgraded to accommodate construction traffic, minerals transport and traffic associated with movement of workers and community members.



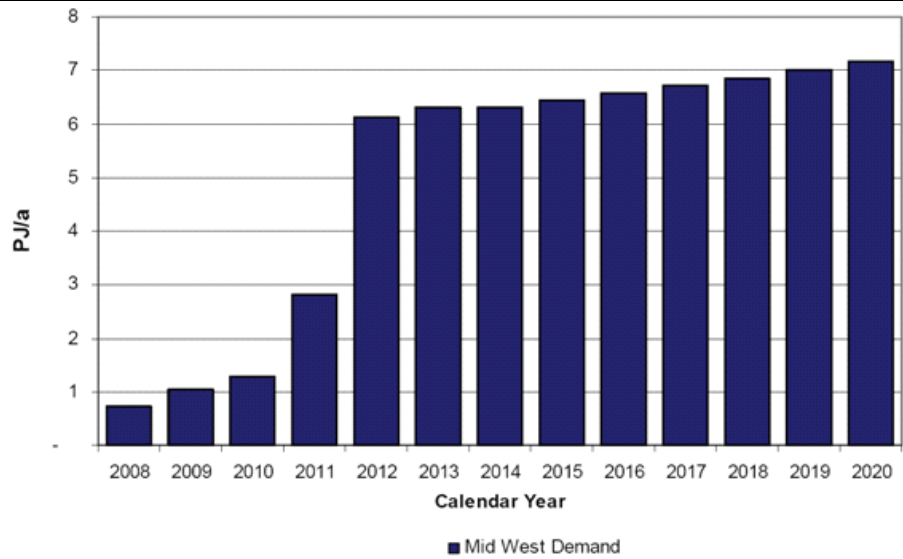
Rail and port upgrades needed

The existing rail network will initially need to be upgraded to accommodate increasing iron ore transport requirements to the Port of Geraldton. New rail routes to the future port of Oakajee and connections to Narngulu need to be built.

New berths and loading facilities at Geraldton Port are required at Geraldton Port to handle increased tonnages (up to 25Mtpa). The Oakajee deepwater port needs to be developed to service additional iron ore tonnages. The importance of these developments has been recognised in the Infrastructure Australia report delivered in May 2009 and the proposed federal and State funding contributions.

Minerals development will result in increases in electricity demand. Uncertainty regarding the timing, scale and energy requirements of new mining proposals is an impediment to more detailed planning for supply and distribution of electricity. Gas demand from the minerals sector is forecast to grow sixfold between 2009 and 2012 (see Figure 3).

Figure 3 Incremental gas demand from the minerals and energy sector



Source: CME 2009, based on survey data with extrapolated growth and GEM Consulting analysis

Land and community infrastructure

Developed land will be required for the industrial estate at Oakajee, new residential subdivisions, and new and expanded industrial estates. Infrastructure corridors will be required for new and future rail lines, slurry pipelines, gas pipelines and electricity transmission lines, and utilities to service urban development.

Enhanced community infrastructure will be needed to service increased populations in towns, particularly small towns close to mining operations.

## Goldfields-Esperance growth region

### Global nickel production centre

The economy of the Goldfields-Esperance region is based on the extraction and processing of mineral resources, principally gold and nickel. By 2020, the region is likely to have consolidated its position as one of the world's major nickel producing region, with up to three large scale laterite nickel mining and processing operations, plus ongoing sulphide nickel production. Production of gold, base metals, and iron ore will also increase. The coalfields at Salmon Gums could supply a coal-to-liquids (CTL) fuel plant.

Table 5 summarises infrastructure requirements for the Goldfields-Esperance region under the growth scenario to 2020.

Table 5 **Key infrastructure gaps and needs for the Goldfields-Esperance growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Roads require progressive upgrades to cope with increased traffic</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing road upgrades as planned</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Railways require upgrades to transport greater tonnages of iron ore</li> </ul>	<ul style="list-style-type: none"> <li>Track upgrades to improve safety, reliability and speeds</li> <li>Additional and longer passing loops for additional and larger trains</li> <li>Establishment of a multiple-user intermodal terminal hub in Kalgoorlie-Boulder</li> <li>Possible rail realignment in Kalgoorlie-Boulder to improve efficiency and community amenity through noise attenuation</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Port of Esperance and associated transport corridor inadequate for increased tonnages of iron ore and for increased imports to service the mining industry</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of the Esperance Port Enhancement Program , including: <ul style="list-style-type: none"> <li>upgrades to the sea port including a new berth</li> <li>enhancement of the transport corridor and construction of a rail balloon loop and additional car dumper for efficient iron ore unloading</li> <li>development of Shark Lake Industrial Park inland port</li> </ul> </li> </ul>
Energy	<ul style="list-style-type: none"> <li>Energy infrastructure will require expansion to meet increased demand</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing upgrades to electricity infrastructure to match demand</li> <li>Expanded and extended gas supply pipelines as required</li> </ul>
Water and wastewater	<ul style="list-style-type: none"> <li>Water supplies to Goldfields will require upgrades and diversification of supply to ensure amenity, security and competitive costs</li> </ul>	<ul style="list-style-type: none"> <li>Ensure water supply of adequate quantity and quality, and at competitive cost</li> </ul>
Land	<ul style="list-style-type: none"> <li>Land for housing in Kalgoorlie insufficient to meet growth</li> </ul>	<ul style="list-style-type: none"> <li>Ensure sufficient land is developed for housing to accommodate increased population, in particular in Kalgoorlie-Boulder</li> </ul>

### Rail upgrades

Rail transport upgrades will be needed including additional and longer passing loops to cope better with iron ore traffic as well as additional nickel traffic from the Kalgoorlie region, a balloon loop to allow for more efficient and higher capacity iron ore unloading at the Port of Esperance if tonnage is to rise above 11 Mtpa, and the establishment of a major multiple-user intermodal terminal hub in Kalgoorlie-Boulder.



**Port expansion**

The Esperance Port Enhancement Program Pre-Feasibility Study included a detailed market demand study. The implementation of this study should ensure that the port will meet the needs of the minerals sector over the outlook period. It should be noted that significant expansion of the port will require large capital expenditure.

**South West growth region**

**15 per cent of world's alumina**

This growth region encompasses both the South West and Peel regions. The growth region is a globally significant minerals region, producing some 15 per cent of the world's alumina, as well as mineral sands (including zircon), gold and coal. The manufacturing of titanium dioxide pigment and silicon are significant mineral related industries.

**Growing alumina and gold production**

There are a number of developments that will significantly increase minerals production in the region. The Worsley Alumina Refinery will increase its capacity from 3.5 Mtpa to 4.6 Mtpa from the first half of 2011. The proposed Wagerup Refinery expansion would increase production from 2.6 Mtpa to 4.7 Mtpa. The latter project is currently on hold due to global economic conditions.

The Boddington gold mine will commence operations during 2009. Annual production will be around 800,000 oz of gold and about 30,000 tonnes of copper over a 17 to 20 year mine life.

Table 6 summarises infrastructure requirements under the growth scenario to 2020.

Table 6 **Key infrastructure gaps and needs for the South West and Peel growth regions**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>While N-S linkages are generally adequate, E-W linkages are inadequate for future freight and passenger vehicle traffic</li> <li>High wide load corridor has not been adequately defined for over-dimension loads such as plant modules</li> </ul>	<ul style="list-style-type: none"> <li>Definition of a high wide load corridor</li> <li>Provision of adequate road infrastructure to cater for the expansion of communities and industrial facilities</li> <li>Ensuring adequate east-west linkages to the main highways for rapidly growing areas, so that freight can access the road network</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Rail network currently congested at key locations and capacity is inadequate to cope with growth in traffic</li> </ul>	<ul style="list-style-type: none"> <li>Improve capacity of rail network initially in congested areas and later over whole route</li> </ul>
Ports	<ul style="list-style-type: none"> <li>No dedicated handling facilities for coal at Port of Bunbury – all coal shipped via Fremantle</li> <li>Water depth at Port of Bunbury is insufficient for fully-loaded Cape-size vessels</li> </ul>	<ul style="list-style-type: none"> <li>Rail unloading facilities and dedicated stockpile areas for coal</li> <li>A high capacity bulk loading facility for coal</li> <li>Deepening the port's inner harbour to accommodate fully-loaded Cape-size vessels</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Electricity transmission capacity needs to be upgraded between Collie and demand centres</li> </ul>	<ul style="list-style-type: none"> <li>Provide adequate transmission capacity to connect generation with customers (underway)</li> </ul>



Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Water and wastewater	<ul style="list-style-type: none"> <li>Water planning and current water sources and supply infrastructure is inadequate for future growth of industry and population</li> </ul>	<ul style="list-style-type: none"> <li>Develop integrated regional water plan to overcome future shortages for industry use</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Demand from fast growing population runs ahead of supply of community infrastructure and services</li> </ul>	<ul style="list-style-type: none"> <li>Continue to develop community infrastructure to provide for fast growing population, anticipating needs where possible</li> </ul>

**Rail upgrades**

The Perth-Bunbury rail corridor is already near capacity and when planned plant upgrades and new export projects come into operation, demand will exceed the capacity of the existing rail network. The existing number and length of passing loops currently limit the length of freight trains. Immediate priorities are to increase capacity (including to Bunbury Port) through greater axle load limits, duplication of the more heavily trafficked sections. More train passing opportunities will also be needed to provide capacity for the greater volumes of freight transport predicted.

**Road links**

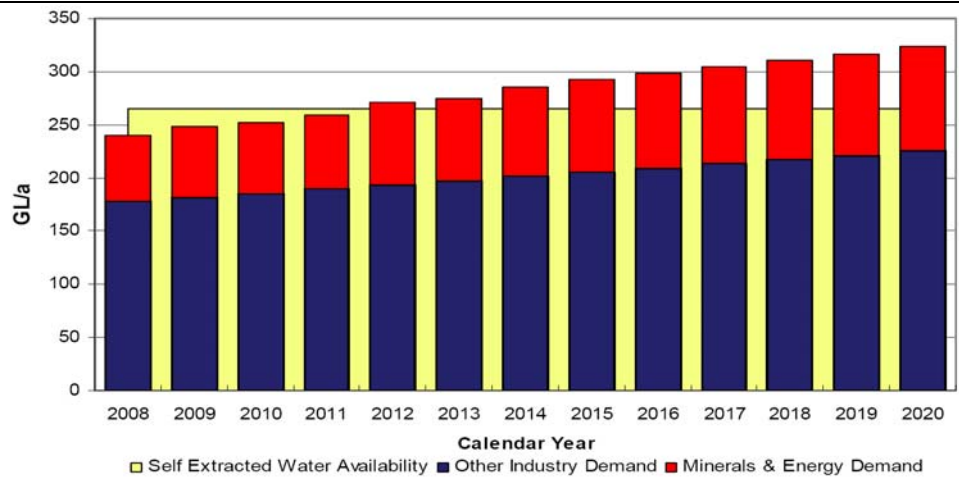
For roads, priorities include providing adequate east-west linkages to the main highways for rapidly growing areas, so that freight can access the road network, and establishing defined high wide load routes for indivisible loads.

Longer term priorities include providing adequate infrastructure to cater for the expansion of communities (such as Mandurah, Binningup and Myalup) and industrial facilities, such as Kemerton Industrial Area.

**Coal loading facilities**

The bulk loading facilities at the Port of Bunbury are constrained by limited capacity and issues of incompatibility of products. These constraints currently severely limit the ability of the port to handle coal for export.

Figure 4 Outlook for self extracted water, South West and Great Southern



Source: CME 2009, based on survey data with extrapolated growth and GEM Consulting analysis

#### Water constraints

As can be seen in Figure 4, total groundwater demand for the region is expected to exceed current allocations from 2012. Developing a regional water plan would help avoid potential future shortages in water supplies for industry use.

## Queensland

#### Minerals the engine room of Queensland economy

The mining industry is the engine room of the Queensland economy. The industry and the communities it supports depend on infrastructure of all kinds to be able to operate efficiently and to reach their potential. The following Queensland growth regions are discussed in this report:

- North Queensland Minerals Province (Mt Isa – Townsville growth region)
- Central Queensland Coal Regions – including the Bowen and Galilee coal basins
  - Newlands-Abbot Point/Bowen growth region
  - Central Bowen Basin-Mackay growth region
  - Gladstone-linked (Fitzroy) growth region
- Surat Basin growth region
- Moreton Basin growth region.

#### Coal, bauxite, base metals

While coal dominates mining production in Queensland, the State is also a major producer of other minerals, including base metals, gold, phosphate, magnesite and bauxite. The North West Queensland Minerals Region is a world class base metals province. Queensland also produces oil and gas and has large resources with potential for shale oil production. There is excellent potential for uranium and coal seam gas to become significant export industries.

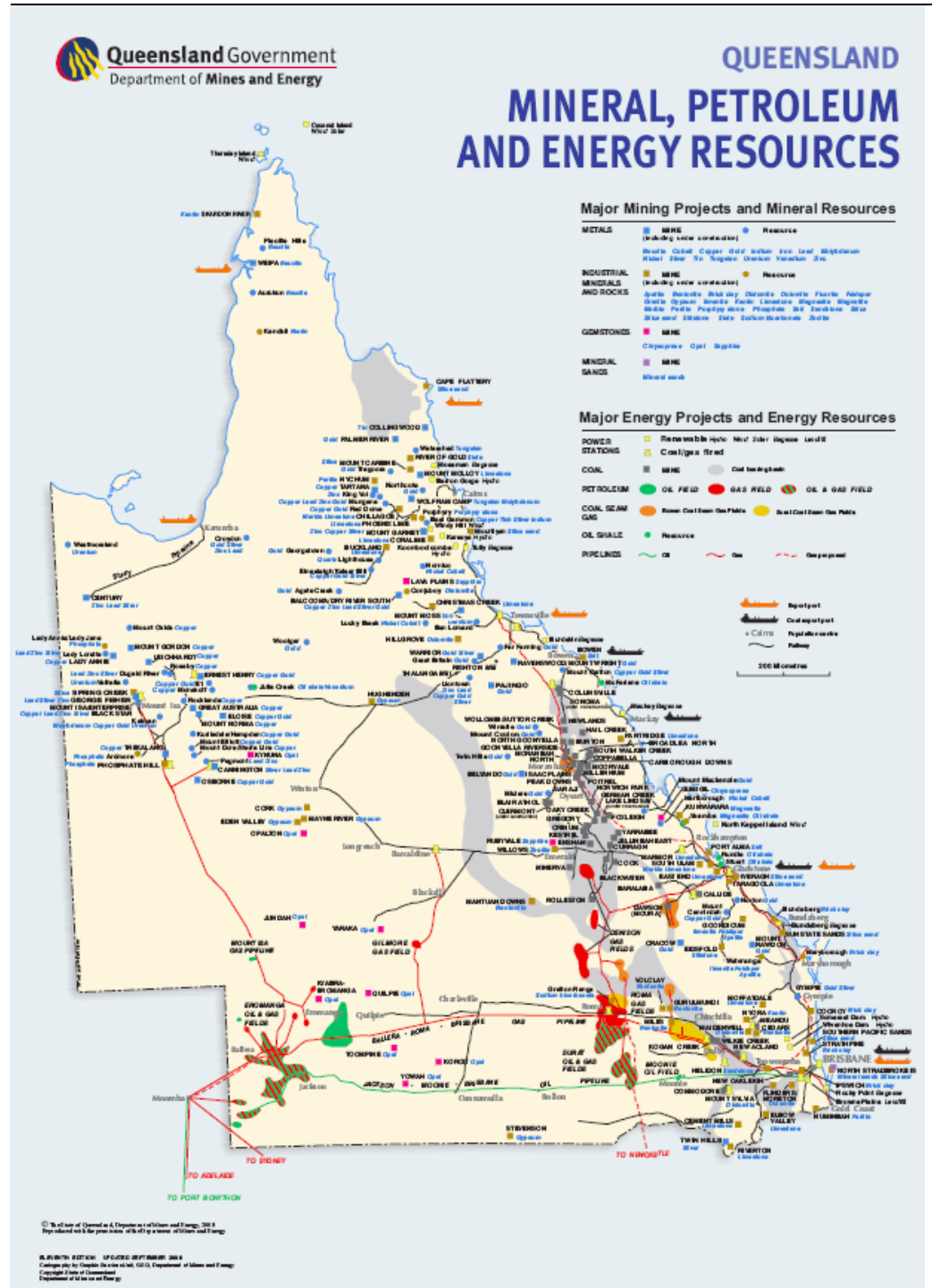
#### Infrastructure constraints

The principal infrastructure shortcomings in Queensland currently are:

- Supply chains that are unable to meet industry transport needs
- Uncertainty as to how expected future demand for water will be met  
Inadequate community infrastructure and services, particularly to support families with children and to educate and train workforces of the future
- Inadequate road and air transport infrastructure.

There is a critical need to address these inadequacies if the resources sector is to continue to grow in Queensland.

Figure 5 Queensland mineral, petroleum and energy resources



Source: Department of Mines and Energy

### Mt Isa – Townsville growth region

This region contains Australia's largest deposits of copper, lead-zinc-silver, and phosphate rock, and substantial deposits of gold, uranium and other minerals. There are at least ten new mines that were scheduled to commence operations by 2012, although that time frame might now be a little less certain.

Realisation of the growth scenario would greatly increase infrastructure requirements in the region. The various infrastructure planning exercises that have been proposed would need to be accelerated and expanded.

Table 7 provides a summary of key infrastructure gaps and needs in the Mount Isa-Townsville growth region.

Table 7 **Key infrastructure gaps and needs for the Mount Isa-Townsville growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Railways	<ul style="list-style-type: none"> <li>Great Northern Railway inadequate to meet mineral tonnage growth</li> <li>New lines required to service mines and provide port access</li> </ul>	<ul style="list-style-type: none"> <li>Expand the capacity of the Great Northern Railway between Mt Isa and Townsville to cope with a 165 per cent increase in tonnage by 2013</li> <li>Build spur lines to new mines (eg Lady Annie phosphate)</li> <li>Provide new rail access route to the Port of Townsville in the Port Eastern Access Corridor</li> <li>Upgrade North Coast line to enhance rail access to Abbot Point State Development Area, including a direct link between the Great Northern Line and North Coast Line</li> <li>Possible railway built by private sector from Mt Isa to Tennant Creek to provide alternative, standard gauge link to another Port (Darwin)</li> </ul>
Roads	<ul style="list-style-type: none"> <li>Roads generally require upgrades to service mineral and supplies haulage</li> <li>Townsville port access road requires re-routing</li> </ul>	<ul style="list-style-type: none"> <li>Provide new Port of Townsville Access Road constructed in the Port Eastern Access Corridor</li> <li>Upgrade road from Chillagoe to Charters Towers; Gregory Development Road (north and south of Charters Towers) and Burke Development Road (Cloncurry to Normanton) to support transportation of concentrates to railhead and port facilities as well as services to remote mining communities</li> <li>Upgrade roads to improve pavement width, strength and road reliability, particularly in periods of flooding</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Townsville Port inadequate to services minerals growth</li> <li>Additional port required for major expansion</li> </ul>	<ul style="list-style-type: none"> <li>Accelerated implementation of the Port of Townsville Master Plan</li> <li>Development of the Abbot Point State Development Area and multi-user port</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Airports will require upgrades to accommodate increased passenger traffic</li> </ul>	<ul style="list-style-type: none"> <li>Upgrading of Townsville, Mount Isa and Cloncurry airports to cope with increased passenger and freight traffic</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Mt Isa electricity supply inadequate to support new mines</li> <li>Energy costs are high in the Mt Isa region</li> </ul>	<ul style="list-style-type: none"> <li>Expand the capacity of the Mount Isa Interconnected System to supply new and expanded minerals projects</li> <li>Continue to facilitate exploration for oil and gas in the Georgina Basin that may help to lower energy costs in the north-west minerals province</li> <li>Develop a new base load power station in the region to support new development and reduce transmission costs</li> </ul>
Water	<ul style="list-style-type: none"> <li>Water resources and infrastructure are inadequate to support new mines and expanded populations</li> </ul>	<ul style="list-style-type: none"> <li>Plan to provide adequate water to support further development of mining activities in the region</li> </ul>



Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, notably broadband, inadequate and costly in many parts of the region</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate the development of competition in broadband and mobile telecommunications across the region, and in broadband backhaul</li> </ul>
Land	<ul style="list-style-type: none"> <li>Serviced land required for industry in major towns</li> </ul>	<ul style="list-style-type: none"> <li>Ensure serviced land is available for future light and heavy industrial development in Mount Isa, Cloncurry, Townsville and Bowen</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure in regional towns is inadequate for current population and for growth</li> </ul>	<ul style="list-style-type: none"> <li>Give much greater attention to planning for, and provision of community infrastructure (eg health, education, family services) in the region in order to provide facilities and services that will support the liveability of resource communities and help to attract and retain employees and their families</li> </ul>

**Rail capacity**

Additional investment in rail capacity will be required to transport up to 10 Mtpa of product to Townsville by 2010-11. Carriage of additional tonnages to the port of Townsville would require new rail access to the port via the Port Eastern Access Corridor.

**Road reliability and capacity**

Parts of the region's road are narrow or in poor condition. This, coupled with old, low-strength bridges limit these roads' capacity to handle future demand. A number of major roads are subject to seasonal flooding that can disrupt traffic for periods up to several weeks. Roads require upgrading to meet demand from minerals growth. In addition, new roads are required to provide access to mines and more efficient access to ports.

**Port expansion**

Significant expansion of Townsville port facilities and associated infrastructure is required to facilitate both imports and exports of minerals. Implementation of the master plan for the port will need to be accelerated. The proposed development of a multi-purpose port at Abbot Point could relieve pressure on the Port of Townsville by taking some of the export load

**Water**

Availability of adequate water of appropriate quality is vital to the further development of mining in the region. A comprehensive plan is needed for water supply and use.

**Energy competitiveness**

Energy prices in the region are relatively high. Access to competitively-priced electricity and gas in the region has been assessed as a critical issue for further exploitation of the region's mineral resources and the development of energy-intensive mineral processing activities.

**Housing and community infrastructure**

The growth of mining and processing has been constrained by the difficulty of attracting and retaining staff who are concerned about the adequacy of health, education, and child care services, as well as the price and availability of housing. Adequate housing and community infrastructure is therefore a priority.



### Newlands-Abbot Point/Bowen growth region

The Newlands-Abbot Point/Bowen growth region encompasses the far northern end of the Bowen Basin coal resources, a world class coal province. The region currently produces some 27 Mtpa of coal. If the necessary transport and export infrastructure was available then this could potentially increase to more than 100 Mtpa.

The Chinese aluminium producer CHALCO is investigating building an alumina refinery at Abbot Point. Capacity would be 2.3 Mtpa of alumina manufactured from up to 10 Mtpa of bauxite shipped from Aurukun on Cape York.

Table 8 provides a summary of key infrastructure gaps and needs in the Newlands-Abbot Point/Bowen growth region.

Table 8 **Key infrastructure gaps and needs for the Newlands-Abbot Point/Bowen growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Railways	<ul style="list-style-type: none"> <li>Rail link missing between Goonyella and Newlands systems, inhibiting mine development and efficient coal transport</li> <li>If new port developed, will require new rail links from NW minerals province</li> </ul>	<ul style="list-style-type: none"> <li>Construct the Goonyella-Abbot Point Expansion (GAPE) “northern missing link” and consequential upgrades to the Newlands line</li> <li>Electrify the Newlands line</li> <li>If freight volumes justify, construct a direct link between Great Northern Line and North Coast Line near Bowen</li> <li>Provide direct rail access to the multi-cargo/user port</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Abbot Point Coal Terminal requires expansion to facilitate exports</li> <li>Multi-cargo, multi-user port required for other minerals shipments</li> </ul>	<ul style="list-style-type: none"> <li>Expand and upgrade the Abbot Point Coal Terminal to 100+ Mtpa capacity</li> <li>Develop the Abbot Point State Development Area and multi-cargo/user port</li> </ul>
Roads	<ul style="list-style-type: none"> <li>Roads require upgrades to service minerals industry and larger population</li> <li>New roads required to service new mines and port</li> </ul>	<ul style="list-style-type: none"> <li>Provide access roads to the Abbot Point State Development Area</li> <li>Provide access roads to new mines in the region</li> <li>Upgrade existing roads to improve pavement width, strength and road reliability, particularly in periods of flooding. Further upgrades of Bruce Highway and regional roads needed to support growth</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Current Proserpine airport inadequate for the region’s current and future needs</li> </ul>	<ul style="list-style-type: none"> <li>Upgrading of Proserpine Airport or further development of new Laguna Whitsundays airport</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Generation and transmission require upgrade and expansion to service industry and population growth</li> </ul>	<ul style="list-style-type: none"> <li>Develop a new base load power station in North Queensland to support new development and reduce transmission costs</li> <li>Provide transmission infrastructure to mines railways, ports and industry in the Abbot Point State Development Area</li> </ul>
Water	<ul style="list-style-type: none"> <li>Water supply inadequate to service mines, industry and population</li> </ul>	<ul style="list-style-type: none"> <li>Proceed with Water to Bowen project to supply minerals industry, horticulture and domestic/commercial consumers</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, notably broadband, inadequate and costly in many parts of the region</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate the development of competition in broadband and mobile telecommunications across the region, and in broadband backhaul</li> </ul>
Land	<ul style="list-style-type: none"> <li>Serviced land required for light and heavy industry</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that serviced land in Abbot Point State Development Area is available for industrial development</li> <li>Land for housing and light industry will be required in Bowen and Collinsville</li> </ul>



Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure inadequate for larger population</li> </ul>	<ul style="list-style-type: none"> <li>Give much greater attention to planning for, and provision of community infrastructure (eg health, education, family services) in the region in order to provide facilities and services that will support the liveability of resource communities and help to attract and retain employees and their families</li> </ul>

**Join and upgrade rail systems**

Industry is keen to progress the development of the GAPE “northern missing link” and consequential upgrades to the Newlands line. Significant upgrades will be required to allow opening of new mines in the region and to provide an alternative export outlet for coal from the central Queensland coal region.

**Expand coal terminal capacity**

The Abbot Point Coal Terminal will need to be expanded to deal with increased coal exports. Construction of the Abbot Point State Development Area and the initial stage of a multi-cargo, multi-user port would be required to support the development of the CHALCO alumina refinery. Further development of the area and port would be required for other minerals processing and the export of concentrates and other bulk minerals such as phosphate.

**Proposed new rail link to service exports from North West Queensland**

The *Northern Economic Triangle Infrastructure Plan* proposes a direct link between the Great Northern Railway (Mt Isa-Townsville) and the North Coast Line near Bowen to provide access for minerals traffic from the North West Queensland Minerals Province to the proposed multi-cargo, multi-user port at Abbot Point – if freight volumes justify it.

Much greater attention is required to planning for, and provision of community infrastructure (eg health, education, family services) in the region.

**Northern Bowen Basin-Mackay (Goonyella) region**

The Northern Bowen Basin-Mackay growth region is a major coal production hub. Optimistic forecasts for coal production suggest it could top 160 Mtpa by 2020 and 175 Mtpa by 2025. The Dalrymple Bay Coal Chain (DBCC) group has aspirations for exports of up to 290 Mtpa through three coal terminals (including the Abbot Point Coal Terminal) at some time in the future.

To support growth to 160 Mtpa, service population of coal towns in the region could rise by 30 per cent to around 39,000.

Table 9 summarises infrastructure gaps and needs for the Northern Bowen Basin-Mackay growth region.



Table 9 Key infrastructure gaps and needs for the Northern Bowen Basin-Mackay growth region

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Coal supply chain	<ul style="list-style-type: none"> <li>Supply chain does not operate to rated capacities of each element – mines, rail, port</li> </ul>	<ul style="list-style-type: none"> <li>Better planning and coordination of supply chain</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Goonyella system requires upgrades and major augmentation to meet capacity needs, plus access to third port</li> </ul>	<ul style="list-style-type: none"> <li>Construct the GAPE “northern missing link” and consequential upgrades to and electrification of the Newlands line</li> <li>Upgrades of the Goonyella System to carry additional coal of up to 30 Mtpa to DBCT and APCT</li> <li>Construct new heavy haul railway(s) to carry coal from Galilee Basin mines to new or expanded ports</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Ports require further expansion to meet coal export needs</li> </ul>	<ul style="list-style-type: none"> <li>Expand DBCT to say 100 Mtpa capacity</li> <li>Expand APCT by up to 50 Mtpa</li> </ul>
Roads	<ul style="list-style-type: none"> <li>New mines require access roads</li> <li>Roads in region require progressive upgrades to meet industry and community needs</li> </ul>	<ul style="list-style-type: none"> <li>Provide access roads to new mines in the region</li> <li>Upgrade existing roads to improve pavement width, strength and road reliability. Further upgrades of regional roads needed to support growth</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Regional airports require upgrades to meet needs</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade regional airports to support commuter flights</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Transmission infrastructure requires upgrades and expansion to service growth</li> </ul>	<ul style="list-style-type: none"> <li>Provide transmission infrastructure to mines railways, ports</li> </ul>
Water	<ul style="list-style-type: none"> <li>Current water sources and infrastructure inadequate for industry and communities and to support growth</li> </ul>	<ul style="list-style-type: none"> <li>Complete Moranbah Pipeline Project and eastern and southern pipeline extensions to supply minerals industry and domestic/commercial consumers</li> <li>Undertake longer-term planning for water</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, notably broadband, inadequate and costly in many parts of the region</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate the development of competition in broadband and mobile telecommunications across the region, and in broadband backhaul</li> </ul>
Transport	<ul style="list-style-type: none"> <li>Lack of viable public transport system</li> </ul>	<ul style="list-style-type: none"> <li>Develop integrated and viable transport services for the region</li> </ul>
Land and housing	<ul style="list-style-type: none"> <li>Land and housing supply inadequate to meet needs of communities, particularly accommodation for service workers</li> </ul>	<ul style="list-style-type: none"> <li>Undertake much more rigorous planning for housing to provide more market information to encourage investment and provide adequate housing for government service workers</li> <li>Ensure that serviced land is available for light industrial development in coal service towns</li> <li>Provide land for housing</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure inadequate for sustainable communities</li> </ul>	<ul style="list-style-type: none"> <li>Give much greater attention to planning for, and provision of community infrastructure (eg health, education, family services) in the region in order to provide facilities and services that will support the liveability of resource communities and help to attract and retain employees and their families</li> </ul>

**Goonyella Abbot Point rail expansion**

Achieving production of 160 Mtpa by 2020 would require the construction of the Goonyella Abbot Point Expansion (GAPE) and consequential upgrades to and electrification of the Newlands line, upgrades of the Goonyella System. Beyond this, construction of a new heavy haul railway(s) to carry coal from Galilee Basin mines to new or expanded ports is required to develop mining in that area.

**Coal terminal expansion**

The future sustainable capacities of the Dalrymple Bay (DBCT) and Hay Point (HPST) coal terminals are considered by the port owners/operators to be 85

Mtpa and 55 Mtpa respectively, giving a total of 140 Mtpa. Therefore, major expansion of the Abbot Point Coal Terminal is also required.

**Water sustainability**

The long-term supply of water to the resources sector and associated industries in the Bowen Basin is likely to be a continuing constraint on future development. Industry and government need to work together to address the longer term issues of water demand, supply and reliability in the region.

**Community infrastructure**

If the anticipated expansion of coal production proceeds then there will be a need to give greater attention to planning for, and provision of, community infrastructure in the region in order to provide facilities and services that will help attract and retain both mining industry and service sector workers and their families.

**The Fitzroy growth region**

**Coal, minerals processing, future LNG**

The coal region linked to Gladstone (broadly, the Fitzroy Region) is Queensland second major coal producing region. Gladstone is the coal port for the region and is also a major mineral processing centre and is poised to become a major LNG export hub as well, utilising coal-seam gas from the region and the Surat Basin.

Alumina refining and aluminium smelting also generate significant resource exports. There are two alumina refineries Gladstone. In 2008 they processed over 13 Mt of bauxite shipped from Weipa on the Cape York Peninsula.

The Wiggins Island coal terminal (WICT) is expected to have a capacity of 90 Mtpa by 2020. If one or more of the Galilee Basin coal projects are developed, an additional 50 Mtpa of coal could be railed to the coast by 2020.

ACIL Tasman projects that up to three LNG plants could be built near Gladstone (out of five currently proposed) with a total capacity of up to 20 Mtpa.

To support this growth (and general economic growth in towns such as Emerald), the service population of coal towns in the region could rise by 30 per cent to around 49,000 by 2020. Gladstone population is projected to grow to about 80,000, although LNG development could push population higher.

Table 10 summarises infrastructure gaps and needs for the Fitzroy growth region.

Table 10 **Key infrastructure gaps and needs for the Fitzroy growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Railways	<ul style="list-style-type: none"> <li>Rail system requires upgrades and expansion to service additional production and new Wiggins Island Coal Terminal</li> </ul>	<ul style="list-style-type: none"> <li>Major upgrades to QR Network rail system to increase capacity and to supply the new WICT</li> <li>New railway(s) to serve new Galilee Basin mines</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Wiggins Island Coal Terminal (under construction) requires expansion to service additional production</li> <li>Additional coal terminal required for Galilee Basin production</li> </ul>	<ul style="list-style-type: none"> <li>Expand the new Wiggins Island Coal Terminal to 90 Mtpa</li> <li>Construct new coal terminal in Fitzroy region and expand existing terminals (in Fitzroy and/or Northern Bowen Basin) to service Galilee Basin mines at 50 Mtpa</li> </ul>
Roads	<ul style="list-style-type: none"> <li>New mines require access roads</li> <li>Roads in region require progressive upgrades to meet industry and community needs</li> </ul>	<ul style="list-style-type: none"> <li>Provide access roads to new mines in the region</li> <li>Upgrade existing roads to improve pavement width, strength and road reliability, particularly in periods of flooding. Further upgrades regional roads needed to support growth</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Gladstone Airport runway inadequate to service air traffic and fully meet standards</li> <li>Regional airports require upgrades to meet needs</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade Gladstone runway to accommodate larger planes and meet aviation safety standards</li> <li>Upgrade regional airports to service population and industry growth</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Transmission infrastructure requires upgrades and expansion to service growth</li> </ul>	<ul style="list-style-type: none"> <li>Provide transmission infrastructure to mines railways, ports</li> </ul>
Water	<ul style="list-style-type: none"> <li>Current water sources and infrastructure inadequate for industry and communities and to support growth</li> </ul>	<ul style="list-style-type: none"> <li>Proceed with planned water projects to supply minerals industry and domestic/commercial consumers</li> <li>Undertake longer-term planning for water</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, notably broadband, inadequate and costly in many parts of the region</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate the development of competition in broadband and mobile telecommunications across the region, and in broadband backhaul</li> </ul>
Transport	<ul style="list-style-type: none"> <li>Lack of viable public transport system</li> </ul>	<ul style="list-style-type: none"> <li>Develop integrated and viable transport services for the region</li> </ul>
Land and housing	<ul style="list-style-type: none"> <li>Land and housing supply inadequate to meet needs of communities, particularly accommodation for service workers</li> </ul>	<ul style="list-style-type: none"> <li>Undertake much more rigorous planning for housing to provide more market information to encourage investment and provide adequate housing for government service workers</li> <li>Ensure that serviced land is available for light industrial development in coal service towns</li> <li>Land for housing</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure inadequate for sustainable communities</li> </ul>	<ul style="list-style-type: none"> <li>Give much greater attention to planning for, and provision of community infrastructure (eg health, education, family services) in the region in order to provide facilities and services that will support the liveability of resource communities and help to attract and retain employees and their families</li> </ul>

#### Rail capacity

Rail capacity will need to be expanded to match growth in mine output, with line duplication, new lines, railway yards and rolling stock all needed. Greenfields rail infrastructure will also be needed to service new coal mines in the Galilee Basin.

#### Coal terminal capacity

The Wiggins Island Coal Terminal (WICT) is being constructed to lift coal export capacity from Gladstone.

#### Community infrastructure

Much greater attention will need to be applied to planning for, and provision of, community infrastructure (particularly in relation to health, education and family services) in order to help attract and retain workers.

#### Surat Basin growth region

#### Emerging coal mining and gas production region

The Darling Downs is a farming region on the western slopes of the Great Dividing Range. The coal deposits of the Surat Basin underlie much of the western and northern parts of the Darling Downs. Export coal production is currently about 5 Mtpa. The Surat Basin is likely to become a major coal and gas production region in the future. The Surat Basin rail project, linking the region with Gladstone, will be the key facilitator of this.

The Surat Basin hosts coal bed methane and underground coal gasification operations. These sectors are likely to grow rapidly in response to demand for export LNG and domestic gas supplies.

The growth scenario to 2020 for coal from the Surat Basin growth region assumes that following the slowdown, growth will return to the strong levels seen earlier. Coal production in the Surat Basin region is expected to reach 40 Mtpa by 2020.

To support this growth, the population of some towns in the region is expected to rise substantially.

Table 11 summarises infrastructure gaps and needs for the Surat Basin growth region.

Table 11 **Key infrastructure gaps and needs for the Surat Basin growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Railways	<ul style="list-style-type: none"> <li>Rail infrastructure inadequate for major coal exports</li> </ul>	<ul style="list-style-type: none"> <li>Completion of Surat Basin Rail project</li> </ul>
Ports	<ul style="list-style-type: none"> <li>New and expanded coal export infrastructure required</li> </ul>	<ul style="list-style-type: none"> <li>Completion of the new Wiggins Island Coal Terminal and expansion to 90 Mtpa</li> </ul>
Roads	<ul style="list-style-type: none"> <li>Roads will require upgrades to support industry and population growth</li> </ul>	<ul style="list-style-type: none"> <li>Provide access roads to new mines in the region</li> <li>Upgrade existing roads to improve pavement width, strength and road reliability. Further upgrades regional roads needed to support growth</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Regional airports will need upgrades to support traffic growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade regional airports to service population and industry growth</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Mines and expanded towns will require additional energy supplies</li> </ul>	<ul style="list-style-type: none"> <li>Provide transmission infrastructure to mines</li> </ul>





Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Water	<ul style="list-style-type: none"> <li>Comprehensive water planning for mining growth is yet to be undertaken</li> </ul>	<ul style="list-style-type: none"> <li>Undertake integrated planning for water</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Telecommunications, notably broadband, inadequate and costly in many parts of the region</li> </ul>	<ul style="list-style-type: none"> <li>Facilitate the development of competition in broadband and mobile telecommunications across the region, and in broadband backhaul</li> </ul>
Transport	<ul style="list-style-type: none"> <li>Public transport under-developed and requires upgrading to support community growth</li> </ul>	<ul style="list-style-type: none"> <li>Develop integrated public transport services for the region</li> </ul>
Land and housing	<ul style="list-style-type: none"> <li>Land supply and housing not adequate to support major growth</li> </ul>	<ul style="list-style-type: none"> <li>Undertake rigorous planning for housing, encourage investment and provide adequate housing for government service workers</li> <li>Ensure that serviced land is available for light industrial development in towns</li> <li>Provide land for housing</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community infrastructure inadequate to support growth</li> </ul>	<ul style="list-style-type: none"> <li>Give close attention to planning for, and provision of community infrastructure (eg health, education, family services) in the region in order to provide facilities and services that will meet the current and future projected needs for these resource communities, and avoid the serious shortfalls experienced in other areas such as the Bowen Basin</li> </ul>

**Coal transport and loading**

To support growth, the Surat Basin Rail project needs to be completed. In addition, the Wiggins Island Coal Terminal needs to be expanded beyond its first stage to handle increased tonnages.

**Water management**

As a vital input in major coal mines, water will be supplied from coal seam water and the new Nathan Dam. Coal seam water will be a major new resource for multiple uses, including agriculture.

**Land use planning**

Rigorous planning for land, housing and light industry is needed to encourage investment and to provide adequate services.

**Ipswich growth region**

**Constraints of suburban rail**

Currently there has only been limited mine development in the area due to the limitations on the rail system's ability to provide sufficient capacity through the Brisbane suburban area and on the Toowoomba Range. Coal exports in 2007-08 totalled 5.6 Mt, with an additional 500,000 t transported to power stations.

**Port of Brisbane coal export facilities**

Expansion of infrastructure and rail capacity for this region is dependent upon an expansion of the Port of Brisbane's coal export facilities. Further increase in capacity is also contingent upon the cost effectiveness upgrades within the congested Brisbane metropolitan area, and available train paths for coal carrying services down the Toowoomba Range.

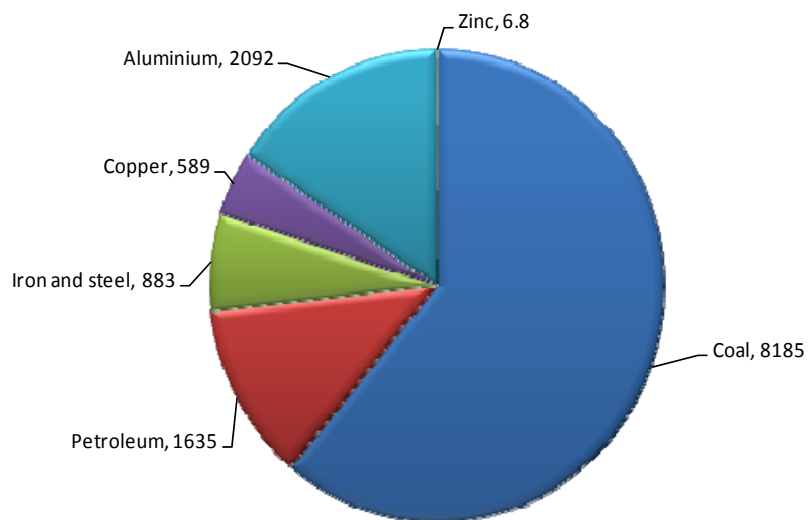
The NSW minerals sector is dominated by coal, aluminium, iron and steel

## New South Wales

Mining has a long history in NSW. The first coal mine was opened in the Hunter Valley in 1799 near Newcastle.<sup>3</sup> Mining remains an important provider of employment and significant contributor to the NSW economy. The mining industry is the State's largest single merchandise exporter.

The estimated value of NSW minerals and metal exports in 2007-08 is shown in Figure 6. The export market is dominated by coal, followed by aluminium, petroleum, iron and steel and copper exports. The provisional estimate of royalties collected from the NSW minerals sector in 2007-08 was \$572 million.<sup>4</sup> Total employment in the NSW mining sector in the May quarter of 2008 was 31,200.<sup>5</sup>

Figure 6 **Estimated value of minerals and metal exports from NSW in 2007-08 (\$million)**



Note: The export values shown for 2007-08 are preliminary estimates.

Data source: NSW Minerals Council Key Industry Statistics 2008

<sup>3</sup> NSW Minerals Council website, <http://www.nswmin.com.au>, accessed 20 May 2009.

<sup>4</sup> NSW Minerals Council Key Industry Statistics 2008.

<sup>5</sup> *ibid.*



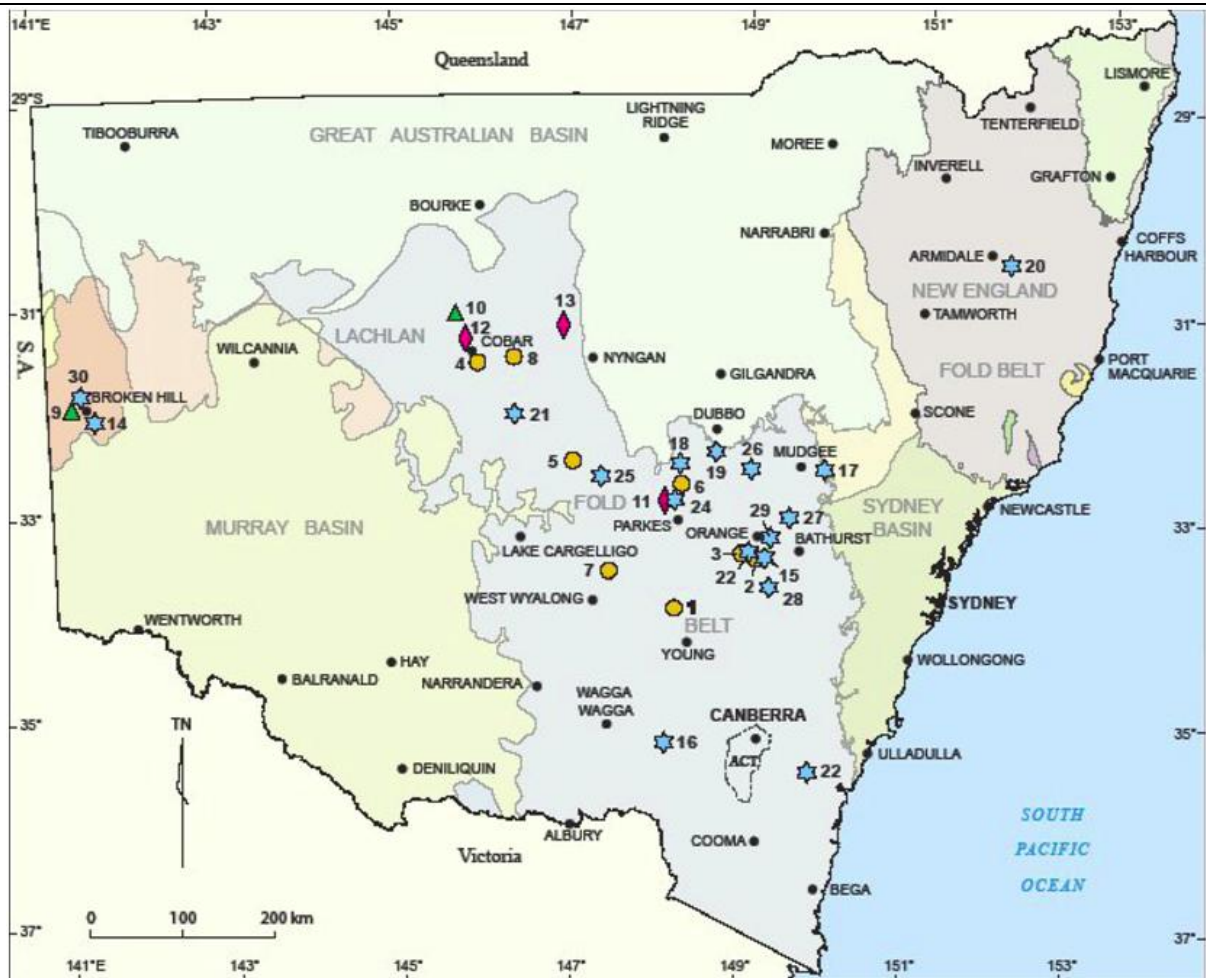
This study draws on the results of a range of existing resources and infrastructure studies to examine potential growth in minerals production and potential gaps in infrastructure in the following three NSW growth regions:

- The Hunter Valley region
- The Southern region
- The Central and Far Western region.

The current and projected principal infrastructure constraints in NSW are:

- Rail and road networks that are unable to meet the minerals industry's current or projected transport needs
- Energy production and supply networks that are inadequate for meeting growing demand
- Port infrastructure that is unable to meet current or projected demand for minerals export services
- Shortages of water both for industrial and community use.

Figure 7 Map of NSW major metallic mines and deposits



Source: NSW Department of Primary Industries

## Hunter Valley growth region

### Coal dominates in the Hunter Valley

The Hunter Valley growth region includes the Gunnedah, Hunter and Newcastle Coalfields, and the northern part of the Western Coalfield. The region also hosts two aluminium smelters, together they produce about 690,000 tonnes of aluminium per year.

### Coal exports are limited by transport constraints

The capacity of the Hunter Valley transport corridor is currently well below what coal producers have advised they would like to produce. Work is already underway to expand the capacity of the Hunter Valley rail network.

### Both rail and port constraints are being addressed

Construction of additional coal loading capacity at the Port of Newcastle is already underway and further capacity additions have been approved although construction start dates have not yet been announced.

Negotiations are underway on the plan, announced by the NSW Minister for Ports, Joe Tripodi, in December 2008. The plan is intended to encourage investment in additional loading capacity at the port of Newcastle and manage the allocation of that capacity. Details of the triggers that would require new capacity to be built and the mechanisms for coal producers to have “guaranteed access” will be critical to the economic and commercial viability of terminal investments and operations. The details are scheduled to be finalised by mid 2009. Given the strong incentives for all parties to address the capacity problem, we are relatively optimistic about the chances for a successful outcome.

### Access to water is an emerging issue.

In the medium term access to adequate water may become an issue. Current extraction limits are expected to be exceeded sometime after 2014.

Table 12 summarises the key infrastructure gaps and needs in the NSW Hunter Valley growth region.

Table 12 **Key infrastructure gaps and needs for the Hunter Valley growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Rail	<ul style="list-style-type: none"> <li>Rail infrastructure insufficient for transporting forecast growth in production</li> </ul>	Implement the ARTC's 2008-2024 <i>Rail Infrastructure Strategy</i>
Ports	<ul style="list-style-type: none"> <li>Lack of sufficient coal loading capacity</li> </ul>	Upgrade the existing coal loaders at the PWCS terminal and the NGIC terminal. Build additional coal loaders as and when required.
Water	<ul style="list-style-type: none"> <li>Lack of water supplies</li> </ul>	Ensure that adequate supplies of water are available, particularly post 2014 when the current extraction limit is likely to be exceeded

## Southern growth region

### Coal mining important in Southern region

The Southern NSW growth region covers the southern part of the Western Coalfield, and the Central and Southern coalfields and relevant transport corridors. In 2007-08, almost 11.5 Mt of coal was exported through Port Kembla, which is the end of the coal supply chain for the NSW southern region.

BlueScope Steel's Steelworks at Port Kembla produces five million tonnes a year of finished and semi-finished flat steel products for sale in Australia and overseas. In 2007-08, Port Kembla exported 13.3 Mt of coal and coke and 3.16 Mt of steel products.<sup>6</sup>

### Coal production expected to grow

Coal production in the region is expected to increase by 1.3 Mt in the near to medium term. The Woodlawn development will produce some 150 kt of Cu, Pb, Zn and Ag concentrates. The start date for this project is now likely to be some time after the originally intended date of 2011. Stage 2 of the Camden coal seam gas project could produce some 12PJ of gas a year.

### Production of coal seam gas and other minerals will also increase

The region will continue to grow in importance as a source of minerals exports. The main infrastructure issue for the region is the capacity of the transport infrastructure (road and rail). The growth in the volume of imports through Port Kembla will add to the pressures on the transport infrastructure in the region.

### Lack of transport infrastructure may limit growth

Congestion on the northern and southern ends of the Sydney to Wollongong/Port Kembla road corridor will need to be addressed. Similarly, the road link between the southern part of the Western Coalfield and Sydney is at or near capacity for about 40 km west of Eastern Creek.

### Both road and rail capacity need to be increased

If more of the transport task associated with vehicles imported through Port Kembla is shifted onto rail then this may delay the need for some road upgrades, however it may accelerate the need for rail upgrades.

Increasing competition between freight and passenger services in the region will need to be addressed. Already planned ARTC upgrades and enhancements should be completed.

Coal loading capacity appears to be adequate for the time being with several million tonnes of spare loading capacity currently available. Given that the coal loading terminal is co-owned by the five major coal mining firms active in the region suggests that capacity expansions will occur in a timely manner.

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<sup>6</sup> Australian Coal Report, October 2008.

There may be a need to upgrade storage and ship loading facilities to allow for increased minerals movements.

**Energy supply infrastructure will need to be built**

The age of the Wallerawang power station suggests that a replacement may be needed before the end of the outlook period. New gas projects (including coal seam methane (CSM)) may require new gas pipelines to be built, including to supply planned new gas fired power stations.

Table 13 summarises the key infrastructure gaps and needs in the NSW Southern growth region.

Table 13 **Key infrastructure gaps and needs for the NSW Southern region**

Infrastructure class	Current and future gaps	Upgraded or additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Some roads are at capacity</li> </ul>	<ul style="list-style-type: none"> <li>Congestion on the northern and southern ends of the Sydney-Wollongong/Port Kembla road corridor will need to be addressed</li> <li>The link between the southern part of the Western Coalfield and Sydney is at or near capacity for about 40 km west of Eastern Creek</li> <li>A second major road link between Sydney and Wollongong /Port Kembla may be needed</li> <li>If more of the imported vehicles transport task is shifted onto rail this may delay the need for some road upgrades</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Rail infrastructure unlikely to meet growth in freight task</li> </ul>	<ul style="list-style-type: none"> <li>Increasing competition between freight and passenger services in the region will need to be addressed</li> <li>Planned ARTC upgrades and enhancements should be completed</li> <li>If more of the imported vehicles transport task is shifted onto rail this may accelerate the need for rail upgrades</li> <li>Improvements to the Moss Vale–Unanderra rail line to improve utilisation</li> <li>Implementation of the Maldon – Dombarton line pre-feasibility study findings</li> </ul>
Ports	<ul style="list-style-type: none"> <li>A lack of capacity to service export growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to storage and ship loading facilities to allow for increased minerals movements. Although coal loading capacity appears to be adequate for the near future</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Generation, transmission and distribution capacity inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Electricity suppliers will need to upgrade their supply infrastructure to deal with increased demand from industrial, commercial and domestic customers</li> <li>A replacement for Wallerawang power station may be required.</li> <li>New gas projects (including CSM) may require new pipelines to be built, this may include pipelines to supply new gas fired power stations</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Community facilities may not keep pace with increase in demand from growing population</li> </ul>	<ul style="list-style-type: none"> <li>The main driver of the need for enhanced community infrastructure will be increasing population in the region. Land for housing, schools, health care facilities, sport and recreation and child care will all need to be addressed</li> </ul>



## Central and Far Western growth region

**Access to water is critical to growth in the Central and Far Western region**

The Central and Far Western region covers much of the rest of NSW. The geography of the region is diverse and in most areas the minerals industry co-exists with agriculture. Water management, complementary land use and access to energy are the key issues for the region.

Access to water will be improved by the development of well-functioning markets which will encourage reductions in water use and provide impetus for investment in improving supply.

**Energy demand likely to outstrip supply by 2013**

NSW energy demand is rising faster than supply with the National Electricity Market Management Corporation predicting a potential short fall in the capacity required to meet its reliability target by 2013/14.<sup>7</sup>

Table 14 summarises the key infrastructure gaps and needs in the Central and Far Western growth region.

Table 14 **Key infrastructure gaps and needs for the Central and Far Western growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Water	<ul style="list-style-type: none"> <li>Access to adequate water supplies</li> </ul>	Aid the development of well-functioning markets which will both ration water and provide impetus for investment. This requires the over-allocation of water entitlements for agriculture in the Murray Darling Basin to be addressed
Energy	<ul style="list-style-type: none"> <li>NEMMCO is projecting a potential short fall in generating capacity required to meet reliability targets by 2013/14</li> <li>Lack of distribution networks away from the central basin</li> </ul>	<ul style="list-style-type: none"> <li>Upgraded distribution infrastructure (power and gas)</li> <li>Additional generation capacity</li> </ul>

## Victoria

**Mining is growing in Victoria**

Mining activity is growing in Victoria on the back of new discoveries, new minerals and new technologies for exploiting existing reserves. There is excellent potential for new gold discoveries, while new geological models suggest that there is potential for discoveries of base metals.

The principal current and projected infrastructure constraints in Victoria are:

- Inadequate transport networks, including using a mixture of broad and standard rail gauges

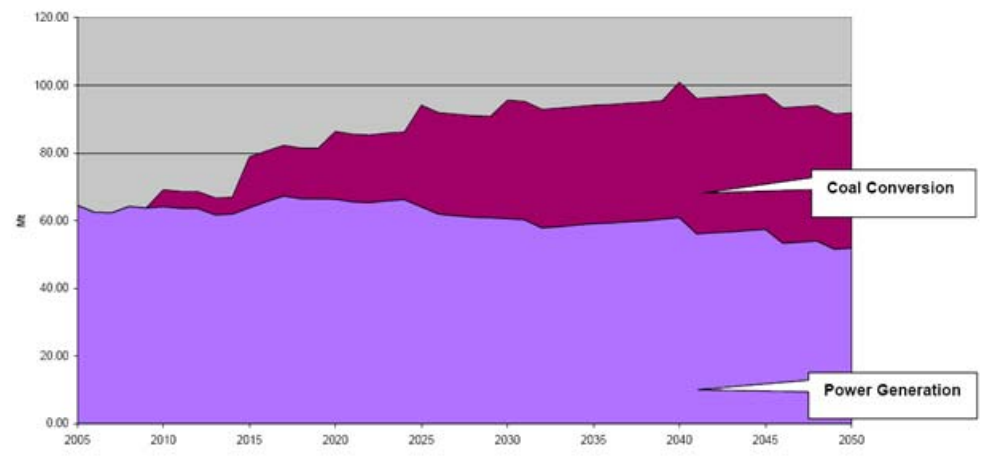
<sup>7</sup> Cited in NSW Minerals Council submission to electricity inquiry June 2007.

- The need for new bulk port facilities outside of metropolitan Melbourne and direct rail and road links from production regions
- Energy supply networks inadequate for growing demand in regional Victoria
- Common-user carbon capture and storage (CCS) infrastructure.

Mineral sands outlook is particularly strong

Victoria's reserves mineral sands are world-scale. Western Victoria is ramping up to become a major production centre for mineral sands, while a large discovery in eastern Gippsland holds promise for another major mine.

Figure 8 **Projected annual coal consumption in scenario 3**



Source: Latrobe 2100 Coal Resources Project, Scenario 3

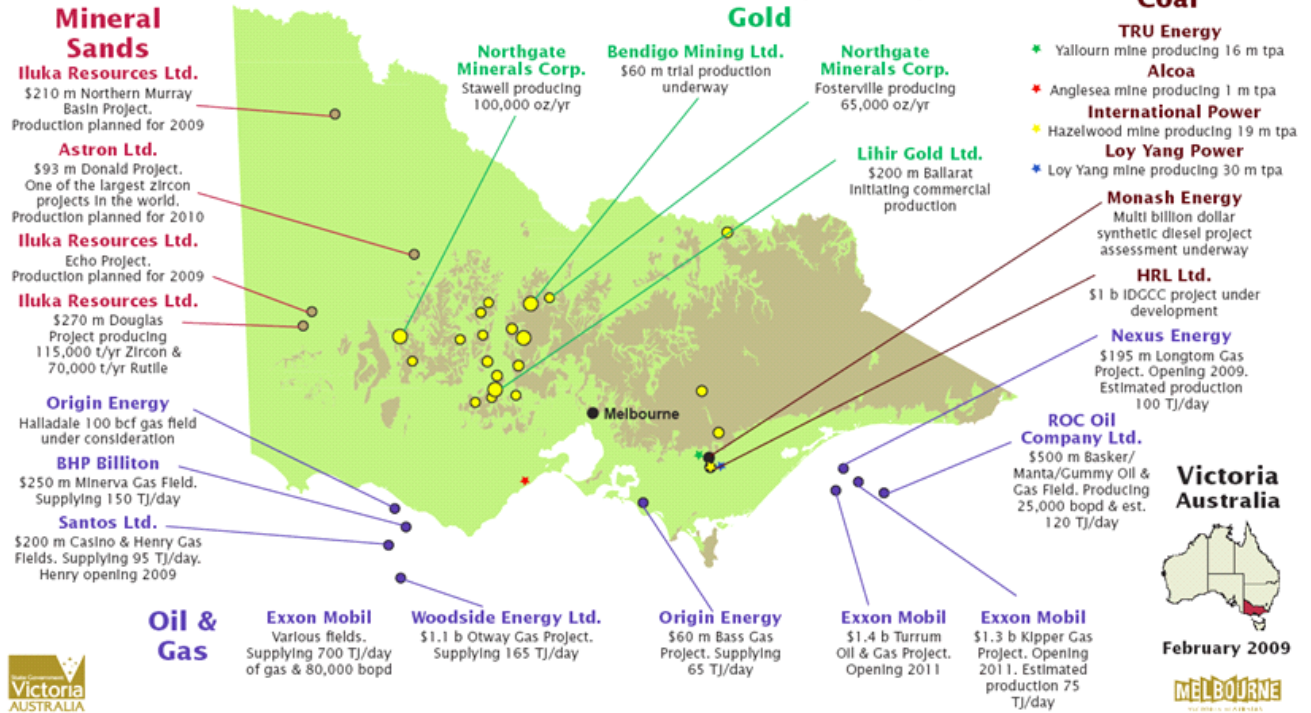
Clean coal technology crucial for future of brown coal

Victoria also has massive reserves of brown coal (lignite). These could supply feedstock for conversion industries for over a hundred years (see Figure 8). This would, however, depend on new technologies being available to reduce emissions associated with brown coal use in power stations or as feedstock in other plants.



Figure 9 Major Victorian resources projects

# Major development and operating projects



Source: Department of Primary Industries, Victoria, February 2009

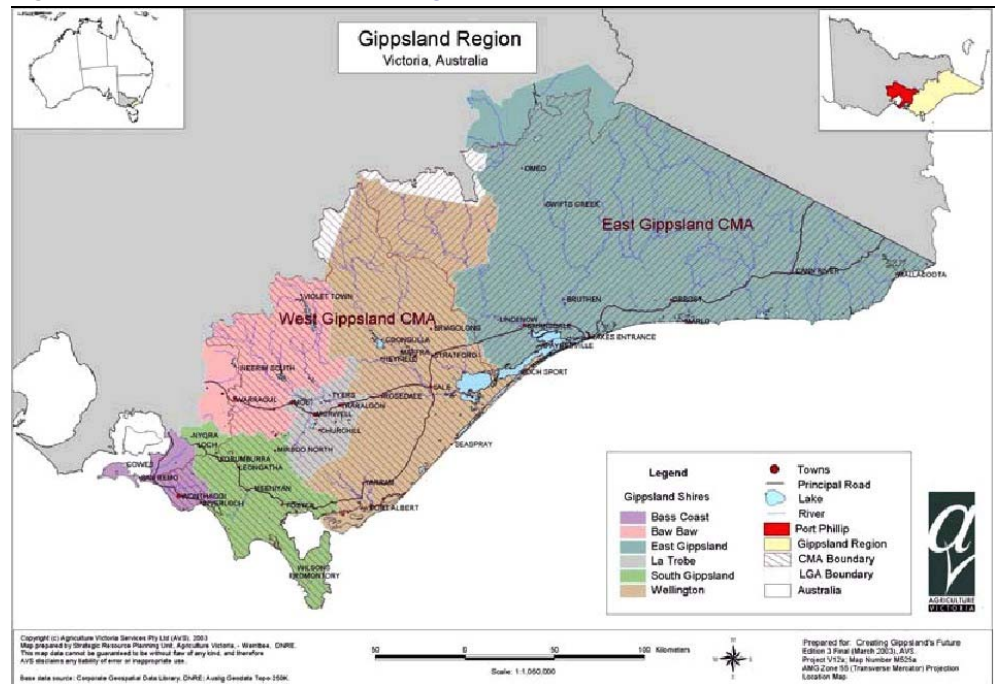
## Gippsland growth region

The export economy of Gippsland is predominantly based on primary and secondary production. Energy production is one of Gippsland's major industries. The region produces around 90 per cent of Victoria's electricity and 97 per cent of Victoria's natural gas, and 46 per cent of Australia's oil comes from the Bass Strait fields. The region also has a range of agribusinesses including agriculture, forestry, fishing and associated processing industries.

Rail infrastructure needs to meet both passenger and minerals demand

Transport infrastructure has been identified as an important need for the future development of the region. Growing demand for passenger services (including for transporting workers for minerals developments) could impede minerals development. Ensuring that Victoria's ports and their land transport connections can meet growing demand from industry will also be crucial.

Figure 10 **Map of Gippsland region**



Source: Department of Primary Industries Victoria

Water shortages are an emerging constraint

Water infrastructure is another key area. The Gippsland Basin water resource is currently over utilised. Groundwater levels are declining, river habitats are unhealthy and the Gippsland Lakes are in poor condition. Unless addressed, this situation could lead to severe restrictions on use of water by mining and other industries, constraining their growth.

Carbon capture and sequestration infrastructure required for brown coal use

The region has potential as a site for future sequestration of CO<sub>2</sub>. There may be justification for government involvement in facilitating early-stage sequestration infrastructure.

Table 15 summarises the key infrastructure gaps and needs in the Gippsland growth region.

Table 15 **Key infrastructure gaps and needs for the Gippsland growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Some highways and regional roads inadequate to support large-scale development</li> <li>Over-dimension corridors inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to highways and regional roads</li> <li>Designation of additional over-dimension load corridor from Barry Beach port</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Railway infrastructure, rolling stock and port access inadequate for bulk minerals</li> <li>No direct route to proposed Hastings bulk port</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing rail infrastructure</li> <li>Construct new rail route to Hastings bulk port when traffic justifies</li> <li>Deal with short term bottlenecks at interim ports</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Existing port bulk handling facilities inadequate and port access routes are congested</li> <li>No dedicated bulk port near Gippsland</li> </ul>	<ul style="list-style-type: none"> <li>Construct new bulk port near Hastings on Westernport Bay</li> </ul>
Fuel	<ul style="list-style-type: none"> <li>Additional capacity required for growth</li> </ul>	<ul style="list-style-type: none"> <li>Growing demand for fuel from mining operations will require the timely construction of new liquid fuel import and storage facilities</li> </ul>
Water	<ul style="list-style-type: none"> <li>Water supply inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Implement integrated water supply strategy involving all sources and uses, including recycling, desalination and new sources</li> </ul>
Carbon capture and storage	<ul style="list-style-type: none"> <li>No integrated plan for CCS yet, although potential recognised, research being conducted and some planning underway</li> </ul>	<ul style="list-style-type: none"> <li>Establish a sound regulatory framework and then investigate and implement common-user CCS systems in close cooperation with the private sector</li> </ul>

### Western Victoria growth region

The Western Victorian region has emerged as an important source of minerals sands – predominantly rutile, ilmenite, and zircon.

**Transport and port infrastructure will need to be upgraded**

Road and rail infrastructure is being progressively upgraded. The lack of a rail unloading facility at the Port of Portland for bulk materials limits the use of the rail network. The throughput at the port is expected to approximately double if planned minerals sands developments proceed. The port's facilities will need to be upgraded to cope with this increase in utilisation.

**Ensuring adequate water supplies will be important**

Water availability continues to limit mineral developments. Upgrades to water supply infrastructure have improved the potential efficiency of the system when the volume of water increases.

Table 16 summarises the key infrastructure gaps and needs in the Western Victoria growth region.



Table 16 Key infrastructure gaps and needs for the Western Victoria growth region

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Gap in the High Productivity Freight Vehicles (HPFV) network between the north and south of the state at its western border</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade to the HPFV network in west of the state</li> </ul>
Rail	<ul style="list-style-type: none"> <li>Parts of Victoria's broad gauge network not yet converted to the standard gauge</li> <li>Lack of a bulk materials unloading facility at the Port of Portland limits viability of rail network as a transport option</li> </ul>	<ul style="list-style-type: none"> <li>Complete conversion of broad gauge network to standard gauge on interstate routes</li> <li>Construct a bulk materials unloading facility at Port of Portland</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Existing port bulk handling facilities inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Construct a bulk materials rail unloading facility at Port of Portland</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Distribution networks failing to keep pace with growth</li> </ul>	<ul style="list-style-type: none"> <li>Address regulatory hurdles creating barriers to the upgrading of electricity distribution networks</li> </ul>
Water	<ul style="list-style-type: none"> <li>Supplies of water likely to be inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Implement measures to increase water supply, including recycling, desalination and new sources</li> </ul>

## Tasmania

Mining is important to Tasmania

Minerals production is expected to increase

The mining industry is a major contributor to the Tasmanian economy. The Cradle Coast growth region is the principal minerals producing region in the State. The volume and value of minerals production has increased in recent years. Projections indicate that the amount of metallic mineral concentrates exported from the State could quadruple to 2 million tonnes a year. Iron ore production is expected to increase to almost 3 Mtpa.<sup>8</sup> Production of other mineral products (tungsten, silica flour and cement) is also forecast to grow.

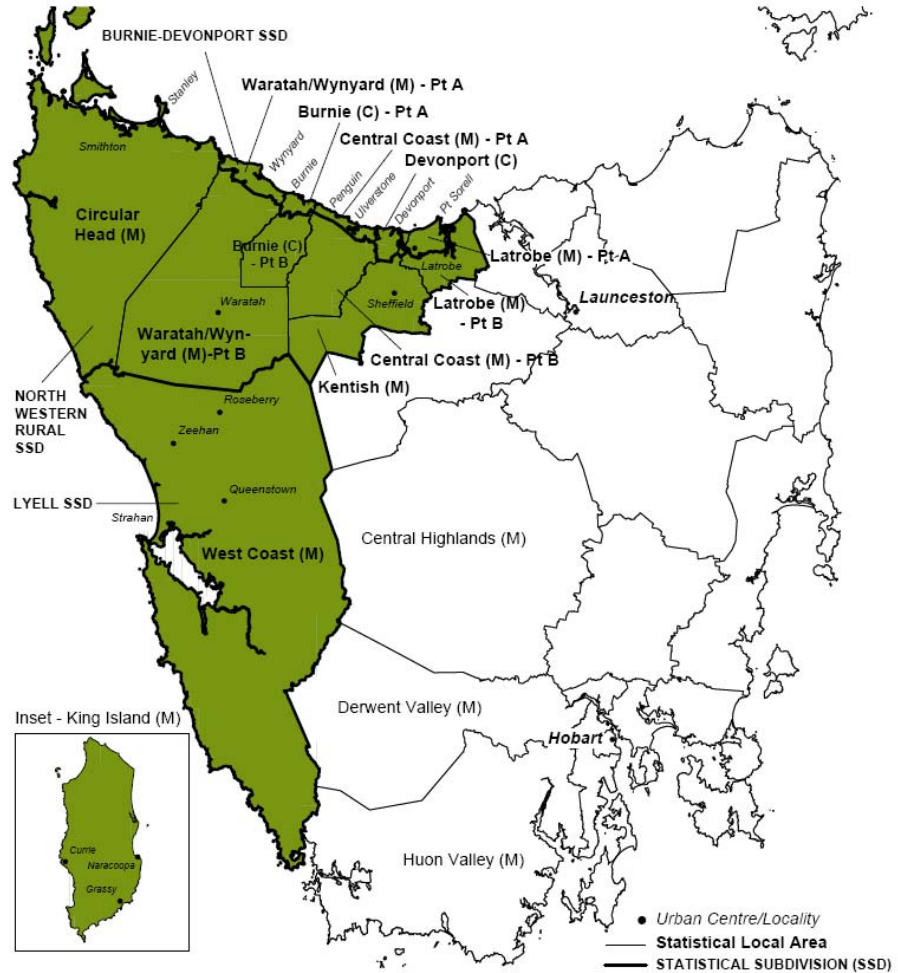
The principal current and projected infrastructure constraints in the Cradle Coast growth region of Tasmania are:

- Single lane road networks are inadequate for the growing volume of users from multiple sectors – mining, forestry and tourism
- Rail networks and port facilities with insufficient capacity for expected growth in minerals traffic
- Lack of gas supplies to the West Coast
- Lack of broadband telecommunications competition.

<sup>8</sup> This represents about 1 per cent of the nation's iron ore production. While the volume is small, it is important to Tasmania because it provides greater diversification in employment opportunities.



Figure 11 **The Cradle Coast growth region**



Source: Department of Transport and Regional Services, Cradle Coast Regional Profile, 2003

**Transport task is expected to increase significantly**

Upgrades of road, rail and port infrastructure in the region will be required to cope with the expanding minerals transport task. Improving road safety will be a priority, to ensure that increasing minerals and forestry truck traffic on narrow winding roads does not compromise passenger car safety.

In 2005/06 around 450,000 tonnes of mineral and metallic ores was transported, the majority by rail (335,000 tonnes). By 2010, this task is forecast to more than double to nearly 1.1 million tonnes, roughly split between road and rail.

The road task in the region is forecast to increase from 115,000 tonnes in 2007 to 600,000 tonnes in 2010. The difficult terrain, remoteness and dispersed location of mining sites are major impediments to the movement of mining product by road.

Roads will need to be upgraded...

Regional roads that are deficient in terms of width, horizontal and vertical alignment include the mining-industry critical Murchison Highway (from Zeehan to Ridgley Highway), the Ridgley Highway (to Burnie) and Bass Highway (from Port Sorell to Deloraine, Deloraine to Illawarra Main Road, Burnie and west of Wynyard).

... as will the rail network

Significant improvement in the efficiency and productivity performance of the rail network is necessary if rail is to remain competitive for contestable freight for both existing and new industries. In particular, limitations on train length, load capacity and operating speed, due to short passing loops, tight curves and steep gradients need to be overcome where technically and economically feasible. Rail's share of the freight task is expected to decline, increasing by 165,000 tonnes to a total of 500,000 tonnes by 2010.

Existing port services are not adequate to meet growth

The demand for Burnie port services for minerals exports could increase fourfold by 2023. Burnie suffers from inefficient port infrastructure and is unable to cater to higher freight volumes. Channel infrastructure, storage and handling areas, wharf infrastructure and handling equipment will not meet needs out to 2020.

However, expansion of the port is highly constrained by adjacent land uses (this is also true of other ports). Consequently reclamation of land adjacent to current port areas may be needed to provide for increased storage and operational areas.

Burnie airport can handle only turboprop aircraft and not B737/A320 class jets, and Devonport is marginal for jets. Upgrading one of these airports to jet standard may be necessary under the growth scenario.

Energy supply networks will also need to be enhanced

With its high degree of dependence on hydro, electricity generation can be constrained, particularly during a drought. The transmission network will require additions to connect new generation sources and new load centres. Tasmania currently produces close to half the renewable grid electricity in Australia (hydro and some wind). Further development in this area will be limited by constraints in the transmission network unless there is significant investment in transmission infrastructure.

Table 17 summarises the key infrastructure gaps and needs in the Cradle Coast growth region.



Table 17 Key infrastructure gaps and needs for the Cradle Coast growth region

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Roads inadequate to deal with growth in freight traffic</li> <li>Road safety potentially compromised</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade of the Murchison Highway from Zeehan to Ridgley Highway</li> <li>Upgrade of the Ridgley Highway to Burnie</li> <li>Upgrade of the Bass Highway: Port Sorell to Deloraine, Deloraine to Illawarra Main Road, Burnie and west of Wynyard</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Rail capacity, loading and unloading facilities insufficient for growth in minerals traffic</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to Melba to Burnie line, including additional spurs to link to mine sites, longer passing loops to allow for longer trains</li> <li>Upgrades to Main (Hobart to Tamar) and Western lines, to support higher speeds and increased axle loads</li> <li>Rail loops or duplication, Railton to Devonport Port to facilitate cement and general freight transport</li> <li>Rail infrastructure to support additional major processing industries at Port Latta, if they are to be developed</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Current capacity at Port Bernie unlikely to be sufficient to cope with demand growth</li> </ul>	<p>Infrastructure to handle up to 2Mtpa throughput at Port Bernie:</p> <ul style="list-style-type: none"> <li>Capacity to handle longer trains at ports if rail network infrastructure improvements support this</li> <li>Increased storage and operational areas to overcome existing constraints</li> <li>Provision of channel infrastructure for navigation purposes (greater depths, larger turning basins etc)</li> <li>New handling equipment such as loading machinery</li> </ul>
Airports	<ul style="list-style-type: none"> <li>While currently adequate, airport capacity may need to be increased to deal with demand growth</li> </ul>	<ul style="list-style-type: none"> <li>Upgrading of one of Burnie or Devonport Airports to jet (E170/190 or B737) standard</li> <li>Upgrade of Strahan Airport to develop it as a sub-regional airport</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Gas supply infrastructure is insufficient to meet demand growth</li> </ul>	<ul style="list-style-type: none"> <li>Gas pipeline to supply West Coast mines</li> <li>Transmission infrastructure to connect additional wind and pumped storage facilities</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>Not all regions have adequate access</li> </ul>	<ul style="list-style-type: none"> <li>Independent open access fibre optic backhaul link connecting Tasmania and Melbourne</li> <li>Additional 3G coverage from second carrier</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Service levels may not match needs of growing population</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to deliver services to expected standards, and to deliver enhanced services within the current community infrastructure envelopes</li> </ul>

## South Australia

SA is among the world's most prospective minerals regions

South Australia is a key minerals supplier, with almost 40% of the world's known recoverable uranium reserves and significant volumes of copper, gold and silver. The State has huge mining potential. It was ranked the 4th most prospective location in the world by Canada's Fraser Institute.<sup>9</sup>

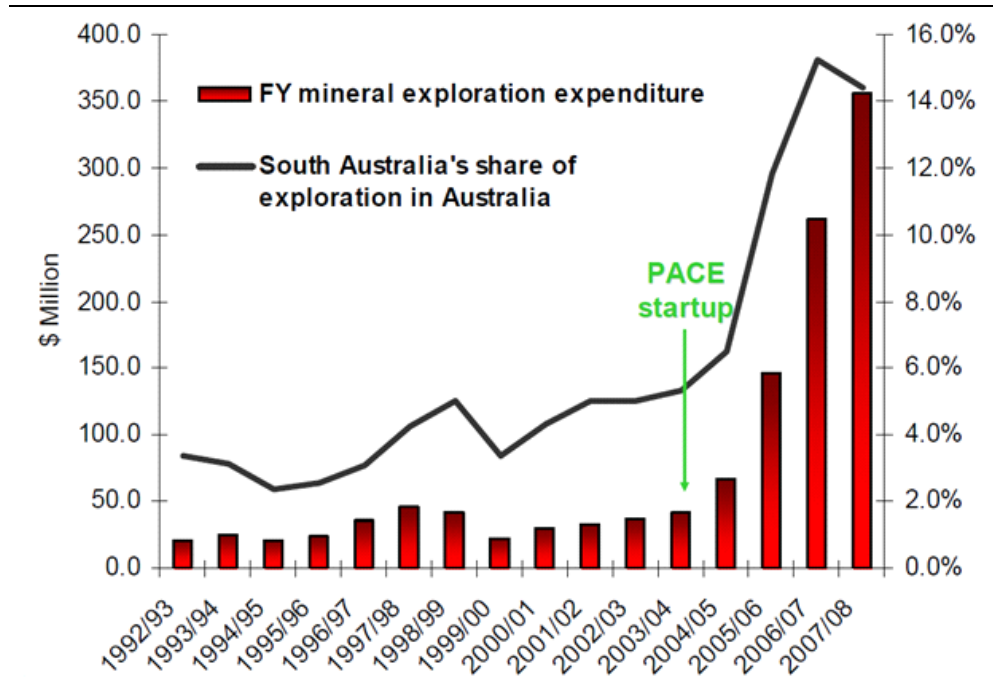
Exploration expenditure has grown strongly

South Australia currently has approximately \$13 billion worth of projects at various stages of development in the minerals and energy sector. Mining contributed \$2.8 billion (4.6%) to the State's Gross Value Added in 2006-07.

<sup>9</sup> Primary Industries and Resources SA, *MESA Journal*, pages 7-41, 2008.

Expenditure on mining exploration was some \$355 million in the year to the June quarter 2008 (see Figure 12).

Figure 12 **Mineral exploration expenditure in South Australia**



Note: PACE – SA government's Plan for Acceleration Exploration

Data source: Presentation to SAIREC 2009 by Paul Heithersay, PIRSA, *South Australia's growing mining sector*, May 2009

The value of mine gate production reached \$2.5b in 2006–07.<sup>10</sup> The bulk of mine gate production was from metallic minerals (88%). The bulk of South Australia's mineral production is exported. The value of exports reached \$2.35b in 2006–07. South Australia's primary mineral exports are copper and uranium.

The Mining industry employed a total of 10,000 people for the year ended February 2008, accounting for 1.3 per cent of employment in South Australia.

This Report considers three growth regions, namely the Northern region, the Eyre Peninsula region and the Fleurieu / Mid North / South East / Riverland regions.

<sup>10</sup> SA Government, *South Australian Resources Production 2006–07*.



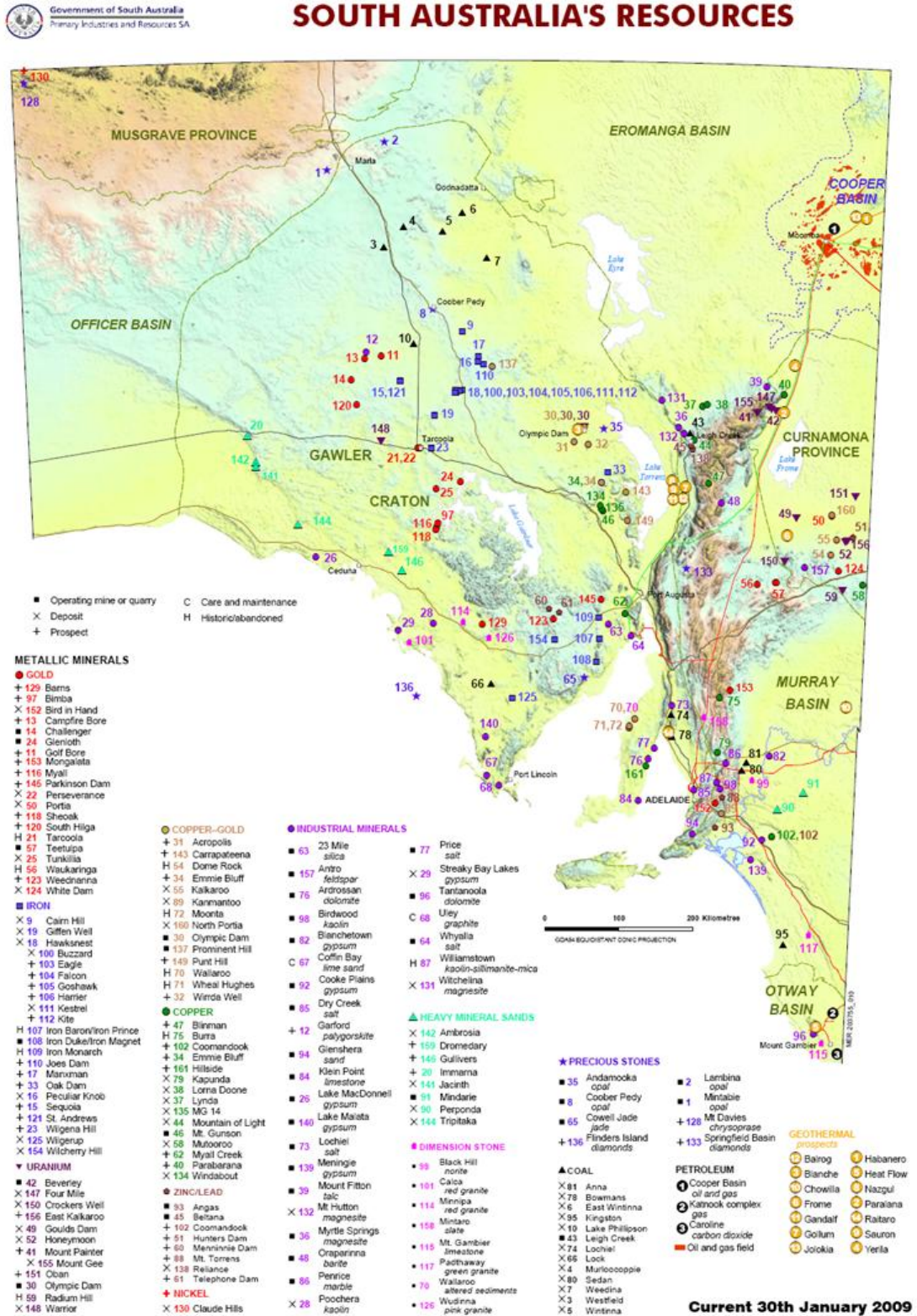
The principal current and projected infrastructure shortcomings in South Australia are:

- Transport infrastructure that is unable to meet projected growth in minerals industry transport task, particularly ports
- Energy production and supply networks inadequate for meeting growing demand
- Access to adequate water supplies both for industrial and community use
- Community infrastructure, particularly accommodation and health care.

Addressing these and other infrastructure constraints will be critical for the resources sector to continue to grow.



Figure 13 South Australia's major operating mines and mineral development projects



Source: Department of Primary Industries and Resources South Australia



## SA - The Northern growth region

The northern region of South Australia (commonly referred to as the Flinders Ranges and Outback) comprises over 80 per cent of the State's land area with less than 5 per cent of the population.

**Minerals production is expected to grow strongly**

The Northern SA region is a highly prospective region for minerals development. There is significant scope for substantial growth in minerals production if policy settings are favourable and infrastructure is available in a timely manner. Such growth could drive a significant expansion of the northern economy.

The growth scenario assumes a significant expansion of mining activity in the region. This will be both from expansion of existing mines as well as the development of new mines. Minerals products include uranium, copper, gold, iron ore, zinc, cobalt and silver.

**Transport infrastructure will need to keep pace**

While rail capacity is generally adequate, the rail connection to Darwin may need to be upgraded if there is a significant increase in the utilisation of that rail corridor to move minerals production from SA to Darwin for export. There may be a need to consider an intermodal facility as part of a state-wide intermodal strategy to improve efficiency of freight movement.

Access roads into Port Pirie need to be improved, as well as the access to the port area for heavy commercial vehicles. Expanded operations at Olympic Dam may require transport services to be augmented. Other road infrastructure to support mining developments in the region will need to be considered on a case-by-case basis.

The export facilities at Whyalla may need to be upgraded to enable the shipping of haematite. The construction of a common user facility at Port Bonython is also a high priority for several mining firms. The project has been acknowledged by Infrastructure Australia in its May 2009 report to the Council of Australian Governments.

An upgrade to airport facilities at Whyalla and Port Augusta may be needed to deal with a larger number of FIFO flights servicing new and expanded mining operations.

**Coal from Leigh Creek may need to be replaced**

If the production life of the Leigh Creek coal mine is not extended then there will be significant implications for power generation in SA since the power stations that are fuelled by that mine currently supply some 40% of the State's power. Should coal seam methane projects be successfully developed then they may provide a possible source of fuel for a new gas fired power plant.

The capacity of the Moomba to Adelaide natural gas pipeline, including links to Port Pirie and Whyalla is at present fully committed, constraining any major increase in gas consumption by industry at either of those two locations.

The Advance scenario is likely to result in large increases in the demand for diesel fuel. This may require upgrades of the import tankage capacity in the region.

Table 18 summarises the key infrastructure gaps and needs in the Northern region of SA.

Table 18 **Key infrastructure gaps and needs for the SA Northern growth region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Roads inadequate to deal with growth in freight task</li> </ul>	<ul style="list-style-type: none"> <li>Augment transport services to deal with new and expanded operations, particularly at Olympic Dam. Construct an intermodal facility to improve the efficiency of freight movement</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Rail capacity insufficient for growth in minerals traffic</li> </ul>	<ul style="list-style-type: none"> <li>While the capacity is currently adequate, the rail connection to Darwin may need to be upgraded if there is a significant increase in the use of the rail corridor to take SA minerals (including coal to liquids product) to the port of Darwin for export</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Facilities may not be adequate for growth in FIFO</li> </ul>	<ul style="list-style-type: none"> <li>An upgrade to airport facilities at Whyalla and Port Augusta may be needed to deal with a larger number of FIFO flights servicing new and expanded mining operations</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Port infrastructure not sufficient to service expected growth in minerals exports</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade the export facilities at Whyalla to enable the shipping of haematite</li> <li>Develop a common user export facility at Port Bonython</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Fuel supplies for power sector declining</li> <li>Generation, transmission and distribution capacity inadequate for growth</li> <li>Fuel import capacity may not be sufficient to service growth<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>Electricity suppliers will need to upgrade their supply infrastructure to deal with increased demand from industrial, commercial and domestic customers</li> <li>If life of Leigh Creek mine is not extended then alternative sources of fuel will need to be identified</li> <li>New gas projects (including CSM) may require new pipelines to be built, this may include pipelines to supply new gas fired power stations</li> <li>SA is an area where imports of petroleum products have been identified as potentially suffering from constraints due to a lack of import infrastructure</li> </ul>
Water and wastewater	<ul style="list-style-type: none"> <li>Process and potable water in short supply</li> </ul>	<ul style="list-style-type: none"> <li>While responsibility for water supply and wastewater management falls on the mine operator, there may be a need for more regional planning and coordination to ensure adequate supplies are available</li> <li>The Olympic Dam expansion will require a significant increase in water supplies</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Service levels may not match needs of growing population</li> </ul>	<ul style="list-style-type: none"> <li>Increasing population in the region the main driver for enhanced community infrastructure</li> <li>Land for housing, schools, health care facilities, sport and recreation and child care will all need to be addressed</li> <li>Investment in transport services and mobile health facilities to improve access to primary and acute health care services</li> <li>Support the development of increased telemedicine supporting rural clinical networks</li> <li>Provide improved communications with and between tertiary health sites in Adelaide</li> </ul>

Note: Infrastructure Australia has included Port Bonython in its list of 28 projects that might receive government funding in the future. <sup>a</sup> ACIL Tasman analysis

## SA - Eyre Peninsula region

**The Eyre Peninsula is highly prospective**

Mining is a smaller industry sector compared to the Northern region. The current mining operations are largely for materials such as sand, gypsum, graphite, jade and granite. Gypsum and salt are the two largest established commodities being mined in the region. Exploration has identified prospective deposits of mineral sands, gold, diamonds, iron ore and coal.

**Minerals have to compete with other products for transport services**

The growth in the volume of minerals traffic is potentially very significant. Freight routes to terminals and port facilities will need to be upgraded in line with that growth. Upgrades to rail (including truncation), road and loading facilities have been identified as priorities. The construction of intermodal transfer facilities may be one area that will need particular attention.

The transport network will also need to deal with the movement of other bulk products such as grain. The Eyre Peninsula Grain Transport Plan should be integrated with similar studies for other sectors to ensure that the planning and implementation of transport infrastructure takes into account the needs of all users of the transport sector.

**Water shortages are a barrier to growth**

Access to water for both drinking and process uses is a key barrier to growth in the region. Existing sources of water (ground water) are already being tapped at or near sustainable rates. Significant augmentation of existing water supplies will be required to realise the growth scenarios. Desalination is one option that is being considered.



Figure 14 Map of the Eyre Peninsula region



Source: SA Office for Infrastructure Development, *Strategic Infrastructure Plan for South Australia*, 2005

**Port capacity will need to increase**

Expanded mineral activity in the Gawler Craton and Eucla Basin will place extra demand on the capacity and efficiency of the region's two ports. The Eyre Regional Development Board's Integrated Eyre Peninsula Ports Master Plan should help ensure that the use of the Port Lincoln and Thevenard facilities are maximised. Upgrades to loading facilities have been identified as local priorities.

The existing deep water port at Port Lincoln is unlikely to be sufficient to satisfy the demand for export facilities if all the planned minerals developments proceed as envisaged under the growth scenario. The proposed port of Sheep Hill would provide an additional deep water port.

Table 19 summarises the key infrastructure gaps and needs in the Northern region of South Australia.

Table 19 **Key infrastructure gaps and needs for the SA Eyre Peninsula region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>Roads may not be adequate to deal with growth in freight traffic</li> </ul>	<ul style="list-style-type: none"> <li>The capacity is currently adequate. Although if rail infrastructure does not keep pace with minerals developments then it will put additional pressure on the road network. Intermodal transfer facilities are likely to be needed</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Age and capacity of rail network</li> </ul>	<ul style="list-style-type: none"> <li>While the capacity is currently adequate, the rail infrastructure is relatively old and is likely to need to be upgraded as minerals projects are developed</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Capacity insufficient for higher FIFO numbers</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to regional airport facilities may be needed to deal with a larger number of FIFO flights servicing new and expanded mining operations</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Insufficient port capacity</li> </ul>	<ul style="list-style-type: none"> <li>The existing deep water port at Port Lincoln is not likely to satisfy demand if planned minerals developments proceed as currently intended</li> <li>The proposed port of Sheep Hill would provide an additional deep water port</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Generation, transmission and distribution capacity inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Electricity suppliers will need to upgrade their supply infrastructure to deal with increased demand from industrial, commercial and domestic customers</li> <li>The region has been identified as having an excellent potential for wave and wind power. Transmission infrastructure may need to be upgraded to deliver production to market</li> <li>SA is an area where imports of petroleum products have been identified as potentially suffering from constraints due to a lack of import infrastructure<sup>11</sup></li> </ul>
Water and wastewater	<ul style="list-style-type: none"> <li>Existing groundwater resources producing at (or near) sustainable levels.</li> <li>A lack of potable and process water</li> </ul>	<ul style="list-style-type: none"> <li>Desalination is likely to be necessary to augment supplies. The potential exists to use wave energy technology to produce desalinated water</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Service levels may not match needs of growing population</li> </ul>	<ul style="list-style-type: none"> <li>Increasing population in the region the main driver for enhanced community infrastructure</li> <li>Land for housing, schools, health care facilities, sport and recreation and child care will all need to be addressed</li> <li>Investment in transport services and mobile health facilities to improve access to primary and acute health care services</li> <li>Support the development of increased telemedicine supporting rural clinical networks</li> <li>Provide improved communications with and between tertiary health sites in Adelaide</li> </ul>

### SA - Fleurieu / Mid North / South East / Riverland region

In the Murray and Mallee region, there are substantial deposits of mineral sands. Geological surveys have highlighted potential for other minerals to be exploited including gold, lead, zinc, iron ore, nickel, chromium, coal, granite, gypsum and diamonds.

Access to water is again a critical issue

<sup>11</sup> ACIL Tasman analysis.

Access to adequate and appropriate quality water supplies both for drinking and industrial purposes is a critical issue for the region. There is already considerable pressure on supplies of water from both the Murray River and groundwater aquifers and predicted changes in rainfall patterns due to climate change over the next 30 to 70 years may exacerbate this situation. Consequently access to water is expected to pose a significant challenge to expansions of the minerals industry.

Rising groundwater levels and dryland salinity are a threat to the use of River Murray water. The Murray-Darling Basin Agreement requires salt interception schemes to be put in place to allow new development to proceed.

**There are competing demands on transport infrastructure.**

The key transport issues in the region are largely the result of the competing transport needs of freight, tourism, commuters and local and regional travel to use road and rail networks. Increases in agricultural production will increase the competition for access to transport infrastructure.

**The social infrastructure needs of the workforce must be satisfied.**

Health services are under pressure from the growing (and aging) population in the region.

**Accommodation and health services are particularly important.**

Access to land for accommodation will be needed to underpin growth in the workforce associated with expansion of mining activity and the improvement and expansion of services such as health care provision. There is already strong demand for accommodation in parts of the region making it difficult for firms and services to attract and retain staff.

Table 20 summarises the key infrastructure gaps and needs in the Fleurieu/Mid North/South East/Riverland region of South Australia.

Table 20 **Key infrastructure gaps and needs for the Fleurieu/Mid North/South East/Riverland region**

Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Transport	<ul style="list-style-type: none"> <li>Competing demands from the agricultural sector may constrain use by minerals sector</li> <li>Some parts of the region have inadequate infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>There is significant and growing demand for the use of roads and rail for transporting agricultural production. Identifying and upgrading local linking freight routes in order to improve the efficiency of freight handling and transfer is likely to be a priority</li> <li>The proposed development of a substantial mineral sands deposit near Mindarie, between Karoonda and Loxton, may require an improved transport link to Tailem Bend</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Generation, transmission and distribution capacity inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Augmentation of electricity and gas networks may be required to meet the demands for energy from both the minerals industry and an expanded workforce</li> <li>The Fleurieu Peninsula region electricity system in particular has been identified as needing major augmentation and upgrading to accommodate increased demand for electricity due to changes to the dairy industry, and continued population and industry growth in areas such as Mount Barker, Barossa and Victor Harbor</li> </ul>





Infrastructure class	Current and future gaps	Upgraded and additional infrastructure required
Fuel	<ul style="list-style-type: none"> <li>Inadequate fuel import infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>SA is one area where imports of petroleum products into have been identified as potentially suffering from constraints due to import infrastructure<sup>12</sup></li> </ul>
Water and wastewater	<ul style="list-style-type: none"> <li>Water availability and quality is a critical issue throughout the region</li> </ul>	<ul style="list-style-type: none"> <li>Salt interception schemes need to be put in place before new developments can proceed</li> <li>Many septic tank effluent disposal schemes (STEDS) across the region are already at capacity. A number of STEDS will need to be upgraded to cater for residential and industrial growth. However, in some cases the ability to do so will depend on access to reliable water supplies</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Land for accommodation in short supply</li> <li>Health care facilities inadequate to meet growing demand</li> </ul>	<ul style="list-style-type: none"> <li>Health services may need to be augmented. Access to land for accommodation will be needed to underpin both growth in the workforce associated with expansion of mining activity and the improvement and expansion of services such as health care provision</li> </ul>

## The Northern Territory

Mining, including petroleum, contributes almost a quarter of the economic activity in the Northern Territory. Industry investment and production have expanded rapidly in recent years, and are forecast to grow further during the next decade. The Northern Territory hosts a number of large scale mining operations, including:

- Gove bauxite and alumina operations operated by Rio Tinto Alcan
- Groote Eylandt manganese operations of BHP Billiton
- McArthur River base metal mine, operated by Xstrata
- ERA's Ranger uranium operations
- Newmont's Tanami gold operations.

In addition, a number of smaller mines operate in several regions. The resources sector's economic contribution is boosted by major petroleum projects, including the Laminaria-Corallina oilfield in the Timor Sea, and gas and condensate production from Bayu-Undan, feeding the Darwin LNG plant.

The growth outlook for minerals and petroleum is strong. A number of new and expanded mines are proposed, including iron ore, gold, rare earths and phosphate. INPEX is proposing to build an LNG plant in Darwin. The Adelaide to Darwin railway is set to provide a valuable transport link for mineral products from both the NT and South Australia.

<sup>12</sup> ACIL Tasman analysis for the Department of Resources Energy and Tourism, 2009.

The principal infrastructure shortcomings in the Northern Territory currently are:

- Darwin port needs to be upgraded to handle increases in throughput of mineral products from the Northern Territory and South Australia
- Additional railway spur lines, sidings, loading facilities and passing loops are required to service new mines and mineral transport requirements
- Electricity supply reliability in parts of Darwin is poor, and generation, transmission and distribution capacity is inadequate for growth
- Land for housing and industry in Darwin needs to be developed
- All classes of community infrastructure are inadequate for projected growth
- Telecommunications services in rural and remote areas are poor.

Addressing these inadequacies will be critical for the continued growth of resources sector in both the Northern Territory and South Australia.

### **The Darwin growth region**

The Darwin region hosts several mining operations and an LNG plant. Darwin is also an important and growing minerals logistics, service and export hub. Darwin's infrastructure serves a much larger area than the Darwin region. Darwin is a growing export port, both for Northern Territory mines and several South Australian mines.

It is likely that more mines will be developed in the Darwin region, more will utilise Darwin as a supply and export hub and that Darwin will host a second LNG plant, supplied with gas from the Browse Basin, with construction commencing in 2010. The existing Darwin LNG plant is also likely to be expanded.

Figure 15 Northern Territory onshore mineral and energy resources



Source: Northern Territory Economy, Budget 2008-09

The rapid growth of resources-related activity and population in the Darwin region is placing strains on both industrial and community infrastructure.

Table 21 summarises the infrastructure gaps and needs for the Darwin region, and the supply chains servicing it, under the growth scenario.



Table 21 Key infrastructure gaps and needs for the Darwin growth region

Infrastructure class	Current and future gaps	Upgraded or additional infrastructure required
Roads	<ul style="list-style-type: none"> <li>National highways prone to flooding and need upgrading for additional heavy traffic</li> <li>Local roads unreliable in the West Season</li> <li>Port access roads inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to Stuart Highway, Victoria Highway and Barclay Highway to and Darwin trunk roads to make them more reliable allow for increased minerals movements</li> <li>Upgrades to local roads in Darwin regions to allow for more reliable movement of people and goods</li> </ul>
Railways	<ul style="list-style-type: none"> <li>Additional loading, unloading facilities and rail capacity required for minerals traffic</li> </ul>	<ul style="list-style-type: none"> <li>New loading sidings and associated infrastructure to service new NT mineral developments along the Adelaide to Darwin railway and in South Australia</li> <li>Additional unloading facilities at the Port of Darwin</li> <li>Possible construction of a Wonarah to Tennant Creek rail link, with possible extension to Mt Isa</li> <li>If minerals projects in SA proceed with plans to export their production out of Darwin then this may require some additions to rail infrastructure</li> </ul>
Ports	<ul style="list-style-type: none"> <li>Port bulk handling facilities inadequate for increased volumes above 2.5Mtpa</li> </ul>	<ul style="list-style-type: none"> <li>Upgrades to storage and ship loading facilities to allow for increased minerals volumes</li> <li>A second ship loader may be required in the longer term, particularly if minerals projects in SA proceed with plans to export their production out of Darwin or if the Wonarah – Tennant Creek rail link proceeds</li> </ul>
Airports	<ul style="list-style-type: none"> <li>Terminal and apron inadequate for increasing passenger and freight traffic</li> </ul>	<ul style="list-style-type: none"> <li>Terminal and apron upgrades will be need to handle increased passenger traffic</li> </ul>
Energy	<ul style="list-style-type: none"> <li>Electricity supply reliability in parts of Darwin is poor</li> <li>Generation, transmission and distribution capacity inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Remotely located companies are responsible for generation and supply of electricity to their own operations</li> <li>PWC will need to upgrade Darwin supply infrastructure to improve reliability and deal with increased demand from industrial, commercial and domestic customers (~7% annual growth)</li> <li>New gas projects will require new pipelines to be built, this may include pipelines to supply mining operations</li> </ul>
Fuel	<ul style="list-style-type: none"> <li>Additional capacity required for growth</li> </ul>	<ul style="list-style-type: none"> <li>Growing demand for fuel from mining operations will require the timely construction of new liquid fuel import and storage facilities</li> </ul>
Water and wastewater	<ul style="list-style-type: none"> <li>Water and wastewater facilities inadequate for growth</li> </ul>	<ul style="list-style-type: none"> <li>Water and sewerage upgrades required for Darwin population growth and industrial expansion</li> <li>Responsibility for water supply and wastewater management falls on the mine operator</li> </ul>
Business infrastructure	<ul style="list-style-type: none"> <li>Lack of common user facilities for large-scale fabrication, storage and supply</li> </ul>	<ul style="list-style-type: none"> <li>An upgrade to the existing common user facility for the fabrication of engineered modules, storage of semi-fabricated structures and servicing of vessels and large-scale equipment</li> <li>Supply base for offshore oil and gas operations</li> </ul>
Community infrastructure	<ul style="list-style-type: none"> <li>Land and all classes of community infrastructure are inadequate for growth</li> <li>Telecommunications services in rural and remote areas are poor</li> </ul>	<ul style="list-style-type: none"> <li>Land for housing, schools, health care facilities, sport and recreation and child care will all need to be addressed. Doing so in the Darwin metropolitan area is likely to be easier than in remote areas</li> <li>Upgrade telecommunications services in rural and remote areas</li> </ul>

Darwin and the minerals industry is very reliant on transport infrastructure, which due to climatic extremes can be unreliable. The closure of the Barkly Highway for several weeks in early 2009 due to flooding is a case in point. Upgrades to highways and major roads are needed to improve year-round reliability.

The Adelaide to Darwin railway is a key enabler of minerals development in both the Northern Territory and South Australia, and exports through the Port of Darwin. The railway is currently operating at below capacity. However, new loading sidings and associated infrastructure may be required to service mineral developments under the growth scenario. Several minerals projects in South Australia may proceed with plans to export their production out of Darwin. Under the growth scenario, the current railcar unloading facility at the Port of Darwin will need to be upgraded and duplicated, and a rail loop installed.

The Port of Darwin's mineral stockpile and reclaiming facilities and the ship loader would require major upgrades to deal with the big increase in export tonnages envisaged under the growth scenario.

A common user facility that firms can access to fabricate engineered modules, store semi-fabricated structures and service of vessels and large-scale equipment has been identified as an important piece of infrastructure for Darwin. During 2008, a 'common-user area' with minimal facilities was opened. A more comprehensive facility, plus an adjacent marine supply base would enable Darwin industry to participate more fully in resources projects and to provide the services that are needed.

The development of a major new LNG project in Darwin would result in a step-change in demand for infrastructure of all types. Increased population in Darwin as a result of minerals and energy industry activity will drive the need for developed land and enhanced community infrastructure, including housing, schools and health care facilities. Integrated planning of infrastructure in the Northern Territory and close coordination with the Australian Government is required.

The 2009/10 Federal Budget allocated \$50 million towards the development of the Port of Darwin, with a focus on mineral export facilities. With the allocation of \$100 million from the Northern Territory Government, the project still only has only half the funds needed. The expected output from South Australian mines (Prominent Hill and Olympic Dam) will not be able to be handled adequately without further funding to complete the development.