

## THE BIG PICTURE

The 'resources' sector or industry refers to all exploration, mining and production activities associated with minerals in the mining, oil and gas (or petrochemical) industries, including construction.

After a period of unprecedented growth - which saw Australia experience the highest level of investment projects, production and sales for minerals produced than ever before – the industry has emerged from a period of downturn where projects were delayed or cancelled and jobs lost. Like any other sector, the resources industry is cyclical and not immune to global market forces.

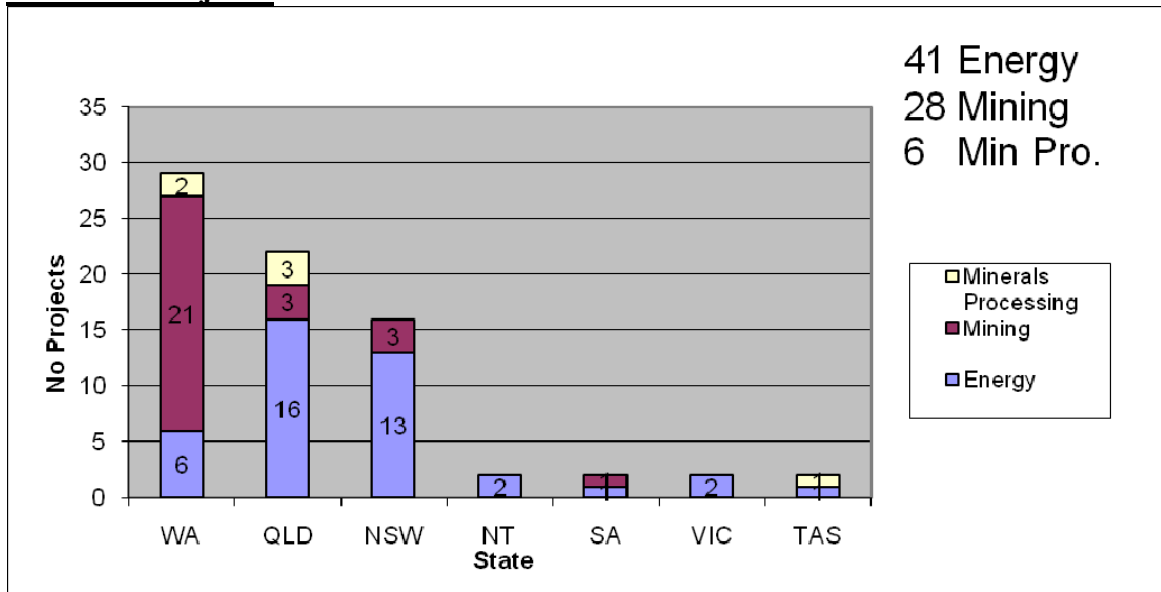
Up until the last quarter of 2008, about 136,000 people in Australia's workforce were employed in resources, up by 55,400 jobs over the last five years. This alone indicates the strong cyclical nature of the industry. Even with jobs losses across the industry in 2009 totalling some 20,000, these losses are coming off the back of unprecedented growth and still don't have the industry back at its original employment levels of five years ago.

If we now consider that around 61,500 new operational jobs will be created in the mining sector by 2015, as well as tens of thousands more in the construction stages (according to estimates released in the National Resources Sector Employment Taskforce report in July 2010), the industry is facing a skills shortage that far exceeds that experienced in the five years preceding 2008.

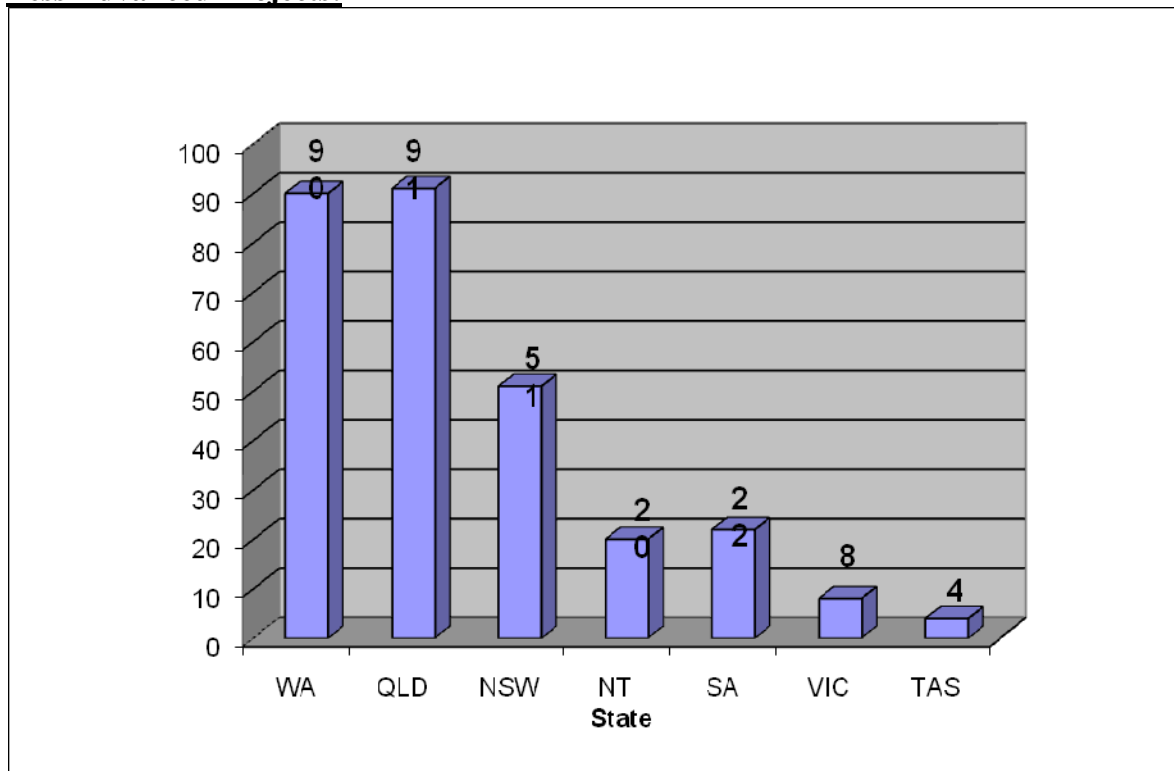
The Taskforce, which was established in late 2009, was tasked with consulting with industry to better understand the skills and employment numbers required for more than 75 advanced major resources projects, and some 286 less advanced projects – most slated to commence production in the period 2010 to 2020.

Of the 75 advanced projects identified, 67 are already under construction (with 30 of these still underway in 2011) and eight are still to start, but will do so within the next three years. 41 projects are in the energy sector (predominantly coal seam gas/liquefied natural gas), 28 are in mining (predominantly coal and iron ore) and six in mineral processing.

**Advanced Projects:**



**Less Advanced Projects:**



The 286 less advanced projects identified cite an operational commencement date, but not a construction start date.

What is interesting to note in the above graph, is that in other states like New South Wales, Northern Territory and South Australia where only a few projects are currently underway, this looks to dramatically change going forward. The locations where some projects are currently drawing labour from – or anticipate drawing labour from – may change once increased opportunities present in home locations for employees and candidates.

The report confirms that confidence in the resources sector is strong. New job vacancy figures released by the Australian Bureau of Statistics on 30 June 2010 show the mining industry needed a record 6,200 new workers nationally in May 2010; far more than at any time during the mining boom of the previous decade.

#### Taskforce analysis shows:

- Construction jobs on new projects could peak at 45,000 in 2012 and 2013, with strong jobs growth for technicians and tradespeople, and machinery operators and drivers.
- Employment growth in mining operations is expected to be 4.9 per cent per annum over the next five years, creating around 61,500 new jobs by 2015 due to increased production, driven by demand from Asia. There will be strong demand for professionals in addition to the skills listed above.
- In addition, further vacancies will occur in mining and gas operations as around 10 per cent of employees leave the sector each year through retirement or transition to other sectors. Replacement demand in mining operations could be around 16,000 persons per annum, including approximately 3,000 retirements.
- In LNG operations, pending the number of LNG trains constructed by 2015, employment could increase by around 3,200 (eg if four new trains are sanctioned and operating in Queensland and six in Western Australia). There will be strong jobs growth for drillers (Queensland only), operators, electrical trades and mechanical technicians.
- Replacement demand in gas operations could be around 2,000 persons per annum, including approximately 500 retirements.

The report cites emerging shortages at present - mainly engineers and other professional staff with more than five years experience. The domestic supply of mining engineers and geoscientists will not be sufficient to meet demand over the next five years with a shortfall of around 1,700 and 3,000 respectively.

While the report claims there is currently a significant number of unemployed tradespeople, the Taskforce expects labour market tightening will result in skills shortages by late 2011 to early 2012, particularly in Western Australia and some regions of Queensland. As a result, the resources sector could be 36,000 tradespeople short by 2015.

Australia continues to see major projects in design and development phases – most in the oil and gas sector - including:

- ♦ **Chevron's Gorgon Project** in the North West Shelf of Western Australia; anticipated employment in excess of 6,000 during construction;
- ♦ **Woodside's Pluto Project**; already underway, employing thousands via awarded supply and labour contracts;
- ♦ **Queensland's Curtis LNG Project**;
- ♦ **Santos's Gladstone LNG Project**;
- ♦ **Inpex Itcthy's Project** in the Timor Sea and Darwin, Northern Territory;
- ♦ **Murchison Metals' Oakajee Port and Rail, Crosslands Resources and Rocklea Projects.**

Australia has mining activity in all of its states and territories. Particularly significant areas today include the Goldfields and Pilbarra regions of Western Australia, the Hunter Valley in New South Wales, Latrobe Valley in Victoria, the Townsville and Mount Isa regions in Queensland, the North West shelf in Western

Australia for offshore petroleum production and various parts of the Outback. Operations are a combination of residential and/or Fly In, Fly Out.

#### Major active mines/sites in Australia include:

- ♦ **BHP Billiton's Olympic Dam Operation** in South Australia; a copper, silver and uranium mine boasting the world's largest known uranium source with a mine life of 100 years;
- ♦ **Super Pit Gold Mine**; a consolidation of a number of mines near Kalgoorlie, Western Australia and the largest open pit in the southern hemisphere;
- ♦ **North West Shelf** – major centre for offshore exploration, construction and drilling with production plants located on the North West coast of Western Australia.
- ♦ **Timor Sea** – becoming a major centre for new offshore exploration, construction and drilling with Inpex and others establishing major production centres in the region.

#### Major employers in the industry are:

- ♦ **BHP Billiton** – operating in nearly every state of Australia, employs more than 25,000 globally and the world's largest diversified resources company.
- ♦ **Rio Tinto** – significant operations in Western Australia (also Queensland and globally) with ten mines, three ports and a rail network in the Pilbara, and more than 5,000 employees and 6,000 contractors.
- ♦ **Kalgoorlie Consolidated Gold Mine** – operating the largest gold Superpit in the southern hemisphere.
- ♦ **Woodside** – operates a number of off and on shore oil and gas facilities and Australia's largest oil and gas producer.

## MINING

Within the mining industry there are three significant activities - mine operation, mining support and mining construction. Over two thirds of workers in the mining sector are involved in the construction and extraction, production, or transportation and material moving occupations – essentially 'blue collar roles'; trades, operators and technicians.

Materials are extracted from the earth by means of either surface mining or underground mining; this is of course dependent on how close to the surface the desired substance is located.

Surface mining is used when the mineral is located close to the Earth's surface and is sometimes referred to as open-pit or strip mining. The method of extraction is quite simple and much more efficient than underground mining as it involves much fewer workers and is a less complex procedure. The process starts by blasting the surface with explosives and using earth-moving equipment to remove the top layers of rock and soil in order to expose the mineral bed. Once the mineral bed is visible smaller shovels are used to remove the material and place it in trucks to be removed from the site. The advantage of surface mining over underground mining is the increased safety and less complexity in process. However, both environments have unique challenges; the underground environment can be loud, damp, dark and hot with workers often working in isolated 'pockets'. Working on the surface means being exposed to all weather conditions, which may cause the mine to shut for periods over the winter months.

Underground mining is undertaken if minerals are located deep within the Earth's surface. In Australia, there are a number of new underground projects underway – several of which are employing very new mining techniques like block caving. The BHP Billiton Leinster Operation is example of this where block caving will be used to significantly extend the life of mine.

To access the area where the material is located it is necessary to construct at least two shafts; one is used for the transportation of employees, machinery and minerals the other is a ventilation shaft. The shafts can go in all directions depending on the location and directions of the mineral seams. Those looking to work in underground mines have to be able to work in dark, hot, noisy environments and be able to work in extremely confined spaces.

There are three methods used to extract minerals in underground mining:

### **Conventional Mining**

This is the oldest method of the three and is slowly being phased out. A "Kerf" or strip is cut 1.8m to 4.5m in length underneath the seam and is designed to control the direction the ore falls once it has been blasted. Holes are drilled into the seam to allow explosives to be inserted; once the explosives have been inserted and detonated the ore is collected up and transported to the surface.

### **Continuous Mining**

Ore is extracted using a continuous miner, which cuts out the ore and transfers it straight onto a conveyor belt to be transported away to the surface.

### **Longwall Mining**

A machine similar to a continuous miner uses a rotating drum to cut the ore and transfer it to a conveyor belt and at the same time insert hydraulic pillars to support the tunnel roof.



## **OIL AND GAS**

The oil and gas industry represents the most lucrative opportunities for those seeking employment, albeit is more difficult to gain entry and typically requires a trade qualification.

In the oil and gas industry, there are two main areas – Upstream and Downstream – comprising different process elements:

## UPSTREAM

1. **Exploration**; includes predicting where oil or gas may be found and drilling activities on or offshore via Drill Rigs.
2. **Construction**; which either occurs through a pipelaying subsea vessel (pipe is laid on the seabed from the source to a processing facility on shore) or through surface construction if the source was located on land.
3. **Production**; extracting the oil and gas; developing fields and producing the oil and gas; well completions, including the installation of valves and pipes to control pressure and flows.
4. **Transporting** – moving oil and gas by sea and pipeline.

Off shore vessels include:

- **Drill rigs** used for exploration (eg Atwood Eagle operated by Atwood Oceanics).
- **Pipe laying barges** used for construction and specifically laying the pipe on the seabed which transports oil and gas from an FPSO to shore for further processing or refining (eg Semac1 operated by Saipem).
- **Floating Production Storage Offtake (FPSO)** facilities (ie Griffin Venture by BHP Billiton). An FPSO is an oil tanker that has been specifically built or converted to process oil and gas. Gas and oil comes from the seabed to the FPSO which will either re-inject it back into the seabed to create more pressure to keep the oil or gas flowing or will be directly piped to shore.
- **Fixed Production Platform** receives oil and gas from the seabed, separates and processes it, and either sends it to a processing facility on shore or directly to an oil tanker which transports directly to a customer (ie Rankin and Goodwin A operated by Woodside).



## DOWNSTREAM

1. **Refining** – Distilling and blending oil products. This includes the distillation process to separate crude oil into useable 'fractions' for further processing into LPG, petrol, jet fuel, diesel and lubricating oils, cracking heavier products into more desirable lighter products such as LPG, petrol and diesel and producing feedstocks for petrochemical and plastics manufacture.
2. **Distribution** – Delivering Petroleum Products to consumers.

The word petroleum originates from the Greek word *petra*, for rock and the Latin *oleum*, for oil. This rock oil has its origins deep below the earth's surface where the ancient remains of plants and animals have decayed and have been compressed to form crude oil and natural gas.

Extracted and refined, this oil and gas provides 80% of the world's transport fuels and 50% of our energy needs. Petroleum is also used in pharmaceuticals, cosmetics and fabrics and is a base ingredient in most plastics. Around 72% of energy consumed in Australia is oil and gas, or derived from oil and natural gas (APPEA – Facts about Oil and Gas, 2004).

The developed countries of the OECD are the largest consumers of petroleum products but only hold 10% of world petroleum reserves, while the producer countries of OPEC use far less but own 75%. Consequently, petroleum products are produced, shipped, traded and distributed across the globe.

The increasing demand for petroleum, along with a desire to diversify the sources of supply, is driving exploration into remote areas of the world, both on and off shore. Oil companies are making huge investments in exploration surveys, drilling programs, and new production facilities in central Europe, Asia and Australia. One exploration well can cost up to \$20m to drill.

This increasing demand is also driving investment in technical innovation. Recent advances in 3D seismic surveys and computer imaging are significantly improving the accuracy of exploration programs. Similar innovation in Directional Drilling techniques used on Australia's North West Shelf reached a reservoir 7.5 km away and 5 km below the Goodwin off shore platform.

Like many capital intensive, technologically advanced industries, the Australian petroleum industry does not employ large numbers of staff. Direct employment in producer companies probably numbers around 15,000 nationally. However, the industry is dependent on many suppliers, contactors and service companies. Consequently, the total number of jobs dependant on the petroleum industry is estimated to be in excess of 30,000. Generally this workforce is highly skilled, and consequently, receives above average wages and salaries.

There are many employers in the Australian petroleum industry. To spread the risk and share the expense, most oil and gas fields are developed by Joint Ventures formed of international oil companies, smaller local firms, and representatives of the major customers. The Joint Ventures will appoint one company to manage the field exploration program, the construction of facilities, and the operation of the production assets.

## ROSTERS

Rosters in the industry vary and may depend on whether you live residentially or elsewhere and need to fly, drive or bus to site from another location. Some common terms you may see in advertising include:

FIFO	Fly in / Fly Out
BIBO	Bus in / Bus Out
DIDO	Drive in / Drive Out

Typical rosters include:

2:1	Two weeks on, one week off
3:1	Three weeks on, one week off (often construction)
4:1	Four weeks on, one week off (often construction)
6:6	Six weeks on, six weeks off (often oil and gas)
4:4	4 days on, 4 days off

8:6	8 days on, six days off
7:7	7 days on, 7 days off

Rosters can include a number of combinations of the above. For example, a roster of 2 weeks on, 2 weeks off, 2 weeks on, 4 weeks off is common for oil and gas operational roles.