# Resources Industry Training Council (RITC)
## Industry Workforce Development Plan
### Oil and Gas

<table>
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<th>Plan Details:</th>
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<td><strong>Plan Title:</strong></td>
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<td><strong>Issue Details:</strong></td>
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<td><strong>Approval Authority:</strong></td>
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<td><strong>Submission Authority:</strong></td>
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**Approval:** Ms Sanchia Tolomei (Chair, RITC Industry Advisory Board)

**Approval Authority:** Chair of Training Council Advisory Board

**Signature:**

**Date:** 10 September 2015

**Endorsement:** Department of Training and Workforce Development

**Signature:**

**Date:** 10 September 2015
FOREWORD

The Resources Industry Training Council (RITC) is a State Government funded partnership between the Chamber of Minerals and Energy of Western Australia Inc (CME) and the Australian Petroleum Production and Exploration Association (APPEA). Members of these peak organisations account for over 95 per cent of mineral and energy production in Western Australia and over 98 per cent of national oil and gas production.

The RITC is funded by the Department of Training and Workforce Development (DTWD) to provide strategic information and advice on vocational education and training and workforce development needs of industry in Western Australia. For its stakeholders, the RITC aims to create a forum where industry leaders, skills development organisations, and other key interest groups and interested enterprises can collaborate to address workforce development issues as they affect industry in Western Australia.

Industry coverage of the RITC is extremely diverse, comprising mining and mining exploration, oil and gas exploration, extraction and production, and a group of industries that can best be described as comprising process manufacturing. This last group is particularly varied in its composition and includes industries from paint and cement manufacture, to rubber and plastics manufacture, to metallic and non-metallic mineral production, to laboratory operations.

The Western Australian resources sector is currently in the process of transitioning from construction to operations or production. For the state’s oil and gas sector, construction activity nears completion on a number of major oil and gas projects. According to the Department of Industry And Science’s Resources and Energy Major Projects report\(^1\) for April 2015, there were 39 major resources projects at the committed stage, with a combined value of around $226 billion. Of this total, LNG/gas/oil projects accounted for approximately $200 billion or 90 per cent of the total. This underscores the importance of these projects to the Australian economy at present and into the future.

Based on no changes to project timing, Australia is on track to become the largest LNG exporting country in the world, eclipsing Qatar. Growing from the current 8 operating LNG trains to a total of 21, Australia’s LNG production will rise by 260 per cent by 2018. Focus will now turn to the operations and maintenance phases of these projects which Accenture forecasts will require an investment of some $450 billion over the operating life of these projects (around 25 years). In addition, the emerging onshore gas industry provides great potential to create a new energy source and employment in Western Australia.

The workforce development impact of this expansion is significant. Although not a large direct employer of labour, the oil and gas industry requires specialist high level skills. With the oil price (per barrel) having fallen from around $US115 in mid-2014 to less than $US50 (as at August 2015), there is a sharp focus around controlling costs and maximizing efficiencies and productivity. This is expected to continue into 2016 and beyond.

\(^{1}\) Department of Industry and Science, Resources and Energy Major Projects – April 2015.
In such an environment, workforce development has a role to play. This plan provides an insight into the industry operating environment and priority workforce development issues. It helps to inform government priority setting and decision making regarding vocational education and training.

The RITC will continue working with the oil and gas industry to progress and promote issues relating to workforce development as detailed in this plan.

Ms Sanchia Tolomei
Chair of the Resources Industry Training Council Industry Advisory Board
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OVERVIEW

Issuing Authority

This plan is issued under contract between the Department of Training and Workforce Development and the Training Council in accordance with the requirements of Schedule 2 of the Service Agreement and is maintained by the Training Council.

Aim

The aim of the plan is to outline industry workforce development trends, strategies and actions that provide high-level advice to the Department to inform future strategic directions and Skilling WA – A Workforce Development Plan for Western Australia.

Objectives

The objectives of this plan are to provide the Department with:

a. A profile of the oil and gas industry in Western Australia;

b. High-level state and national industry data and forward projections in regards to:
   I. Economic trends and impacts on workforce planning;
   II. Current and future labour market modeling consistent with information provided for the development of the State Priority Occupation List (SPOL);
   III. Regional variations that may affect workforce planning;
   IV. Training and education including vocational education and training delivered to school students (formerly VETiS); and
   V. Industry critical aspects that may impact on future planning.

c. Identification of issues that impact on State Workforce Planning and that inform and are linked to Skilling WA strategies.

These objectives are established so that effective development of workforce planning in regions and at state level can occur.
SECTION 1 EXECUTIVE SUMMARY

1.1 Introduction

The Resources Industry Training Council (RITC) covers a diverse range of industries ranging from mining and oil and gas production through to plastics and rubber manufacturing and laboratory operations. While these industries are experiencing different economic fortunes, they all share similar issues in terms of ensuring access to a suitably skilled workforce which is necessary for their continued sustainability.

Training package coverage of the RITC is provided below. The oil and gas sector in Western Australia is experiencing rapid growth. According to Accenture estimates\(^2\), Australian LNG production will increase by 260 per cent over the period 2014 to 2018 making Australia the world’s largest LNG producing country. At the same time, parts of the RITC industry coverage from the more mature basic chemical and chemical product manufacturing sectors, polymer product and rubber manufacturing sector and non-metallic mineral product manufacturing sectors are experiencing weaker trading conditions and profitability levels, despite lower energy input prices and a lower Australian dollar.

1.2 Industry Sectors and Training Package Coverage

<table>
<thead>
<tr>
<th>Resources Industry Training Council (RITC)</th>
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<tr>
<td>Industry Sectors</td>
</tr>
<tr>
<td>(a) Mining</td>
</tr>
<tr>
<td>(b) Oil and Gas</td>
</tr>
<tr>
<td>(c) Downstream Process Manufacturing</td>
</tr>
<tr>
<td></td>
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To contextualize the RITC industry and training package coverage in Western Australia, the table overleaf provides an overview of the projected economic and activity conditions for relevant oil and gas sectors.

\(^2\) Accenture, Ready or Not? – Creating a world-leading oil and gas industry in Australia, May 2015
Table 1: Key RITC Industry Areas – Projected Economic and Activity Conditions (Australia)
Source: IBISWorld 2015

<table>
<thead>
<tr>
<th>ANZSIC Code</th>
<th>Industry</th>
<th>Revenue 13/14 ($Bn)</th>
<th>Annual Growth (09 - 14)</th>
<th>Annual Growth (14 - 19)</th>
<th>Businesses (#)</th>
<th>Activity in WA (%)</th>
<th>WA Revenue ($b)</th>
<th>WA Businesses (No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B0700</td>
<td>Oil and Gas Extraction</td>
<td>48.3</td>
<td>7.7%</td>
<td>11.6%</td>
<td>24</td>
<td>70.0%</td>
<td>33.8</td>
<td>17</td>
</tr>
<tr>
<td>B1011</td>
<td>Petroleum Exploration</td>
<td>4.3</td>
<td>0.5%</td>
<td>3.4%</td>
<td>625</td>
<td>68.2%</td>
<td>2.9</td>
<td>426</td>
</tr>
<tr>
<td>C1701</td>
<td>Petroleum Refining and Petroleum Fuel Manufacturing</td>
<td>39.7</td>
<td>-5.0%</td>
<td>-0.6%</td>
<td>134</td>
<td>21.2%</td>
<td>8.4</td>
<td>28</td>
</tr>
<tr>
<td>C1709</td>
<td>Other Petroleum and Coal Product Manufacturing</td>
<td>1.9</td>
<td>-0.5%</td>
<td>-1.5%</td>
<td>156</td>
<td>16.1%</td>
<td>0.3</td>
<td>25</td>
</tr>
<tr>
<td>C1811</td>
<td>Industrial Gas Manufacturing</td>
<td>4.1</td>
<td>1.6%</td>
<td>2.5%</td>
<td>43</td>
<td>30.1%</td>
<td>1.2</td>
<td>13</td>
</tr>
</tbody>
</table>

1.3 The RITC Industries in 2015
The Western Australian economy has benefited from high levels of activity in the resources sector. Western Australia’s resources sector is expected to contribute $3.7 billion to state government revenues through royalty payments in 2015/16. This is down from the $6 billion in 2013/14 due to weaker global commodity prices.

According to the Chamber of Minerals and Energy State Growth Outlook 2013, it was anticipated that Western Australia’s resources sector workforce was likely to reach 125,000 people in 2014. However, the transition from construction to production happened earlier than expected, with the sector reaching peak employment levels in August 2012 at 122,500 people. Since this time employment has declined to reach 96,200 in the May quarter 2015.

Despite this decline in employment, increased production/export volumes and a weaker Australian dollar saw the value of Western Australia’s mineral and petroleum industry reach just over $114 billion in 2014 according to the Department of Mines and Petroleum’s mineral and petroleum industry 2014 review. Iron ore retained its position as the state’s highest value commodity accounting for $65 billion or 75 per cent of total mineral sales by value in 2014. A total of 697 million tonnes of iron ore were exported in 2014, representing an increase of 25 per cent (138 million tonnes) on the previous year.

Gold sales were $8.7 billion in 2013/14 and petroleum product production reached a record of $27.6 billion. Petroleum production can be expected to further increase as new capacity comes on line between 2015 and 2018. In terms of investment into the resources sector, ABS data shows that investment fell by 3 per cent to $46.8 billion in 2013/14 which reflects the sector’s transition from construction to operations. This represents 52 per cent of national capital spending. The Department of Mines and Petroleum notes that over the 5 years to 2013/14, new capital expenditure in the Western Australian mining industry increased at an annual rate of 15 per cent.

Looking forward, as at March 2015, there was $180 billion worth of resources projects either committed or under construction. Potential projects and those at an early stage of planning accounted for a further $118 billion as shown in the following table:
### Table 2: Investment in Major Projects (as at March 2015)

Source: Department of Mines and Petroleum

<table>
<thead>
<tr>
<th>MAJOR PROJECTS</th>
<th>CAPEX MILLIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commodity</strong></td>
<td><strong>Committed/ Under Construction</strong></td>
</tr>
<tr>
<td>Gold</td>
<td>117</td>
</tr>
<tr>
<td>Iron Ore</td>
<td>13,946</td>
</tr>
<tr>
<td>Nickel</td>
<td>471</td>
</tr>
<tr>
<td>Other Minerals and Infrastructure</td>
<td>12,234</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>28,508</strong></td>
</tr>
<tr>
<td>Crude Oil and Condensate</td>
<td>683</td>
</tr>
<tr>
<td>Gas</td>
<td>2,971</td>
</tr>
<tr>
<td>LNG</td>
<td>148,403</td>
</tr>
<tr>
<td>Pipelines and Infrastructure</td>
<td>140</td>
</tr>
<tr>
<td>Other</td>
<td>300</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>152,497</strong></td>
</tr>
<tr>
<td><strong>Total Forecast Investment</strong></td>
<td><strong>179,265</strong></td>
</tr>
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In close collaboration with our two main stakeholders, CME and APPEA, the RITC continues to advocate for a three pillared strategy to address workforce development issues:

- Up-skill the workforce;
- Diversify the workforce;
- Mitigate skill challenges with skilled migration.

In a cost constrained environment, where a premium is placed upon higher levels of productivity, greater flexibility in skilling is being sought by employers. A study undertaken in 2013 by NCVER on behalf of the Chamber of Minerals and Energy (CME) indicated CME member companies spent around $470 million on training activities during 2011/12, representing approximately 5.3 per cent of payroll. Of this expenditure, 98 per cent was industry funded with the remaining 2 per cent being derived from government subsidies. The study also found apprentices and trainees made up 5 per cent of the CME member company total workforce. Indigenous apprentices and trainees accounted for 11 per cent of the total. In terms of gender diversity, the study found female apprentices and trainees accounted for 13 per cent of the total.

The labour market for critical occupational groups within the mining sector at the professional, trade and skilled worker level has eased further in 2015 as the sector continues its transition from construction to operations.

From an oil and gas industry perspective, a significant amount of construction activity remains underway. With a total of 7 LNG projects moving into production between now and 2018, (there are currently 3 operating LNG plants in Australia) focus will shift towards operations and maintenance cycles and associated workforce skills demand, asset integrity and productivity.
The labour market for LNG process operators, electrical, instrumentation and mechanical tradespersons, engineers, drillers and driller’s assistants (for coal seam gas projects in Queensland), project managers, logistics staff and health, safety and environment professionals are all expected to remain competitive over coming years despite the recent easing in demand for skills from the mining sector. In this environment, productivity is a key issue and the industry has advocated to government a range of measures to address labour productivity and labour mobility.

According to the Department of Industry, by 2018, Australia’s installed LNG capacity will be around 86 million tonnes, the highest in the world with the number of operating LNG trains rising from the current 8 to 21.

This rapid expansion in LNG capacity will not come without some growing pains. LNG plant operators and maintenance workers are highly skilled with a period of around 4-5 years post initial qualification experience being seen as a minimum before an LNG operator can work unsupervised. For maintenance workers, LNG experience is highly valued and the rapid ramp up has the capacity to challenge existing contractors as outlined in the recent Accenture report.

The small number of operating LNG facilities in Australia is seen as a major inhibitor to new LNG operators gaining experience on live LNG plants. Oil and gas operating companies are working on alternative strategies to train LNG operators including utilising overseas LNG plants and through linking up existing training delivery capability across the country. Maintenance contractors are also examining the same issue.

Though collaboration, Woodside has granted Chevron hosted process trainees access to the Karratha Gas Plant to gain valuable experience on a live LNG plant. This collaboration has been facilitated by the Energy Apprenticeships Group (EAG). It is estimated the number of skilled LNG plant operators required for Australia’s new plants will increase the current supply of operators at least six fold over the next 3-5 years. Although definitive, reliable data is not available, it is estimated that approximately 600 skilled LNG plant operators are employed across the three current operational LNG plants in Australia. All oil and gas operating companies have strategies in place to address this demand.

While the oil and gas industry has a commitment to training local workers, it is possible that skilled and experienced workers will be drawn from national skilled labour pools and from overseas. In this context, the commonwealth government’s streamlining of 457 sub-visa requirements is welcome. The commonwealth’s maintenance of its position on labour market testing is disappointing and presents unnecessary red tape and bureaucracy for industry resulting in delays and additional costs.

In addition to skilled migration, industry is searching out ways in which skills development can be accelerated to meet demand and where technology can be further applied to gain cost efficiencies and maximise productivity. It is clear the mining and oil and gas sectors have dominated the Western Australian economic landscape. However, other sectors of Western Australian industry servicing the mining and oil and gas sectors have also benefited from the sustained expansion and experienced positive growth.

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3 Accenture, ibid
1.4 Workforce Development Drivers

CME in its State Growth Outlook 2013 document was projecting demand of around 125,000 people in Western Australia’s resources development sector by 2014 – an increase of approximately 9,000 over the 2012 workforce of 116,000. This peak arrived earlier than anticipated. The Chamber forecast after peaking in 2014, employment would slowly decline as projects transition from construction to operations. This transition will see employment numbers fall to around 92,000 by 2018. This transition is now taking place across the mining industry.

From the perspective of Australia’s oil and gas industry, a number of mega-projects are currently under construction in Western Australia, Queensland and the Northern Territory. Conventional gas projects dominate the oil and gas landscape in Western Australia and the Northern Territory, with Chevron’s Gorgon and Wheatstone projects dominant in the West and INPEX’s Ichthys project currently under construction in the Territory. Unconventional gas dominates in Queensland with a number of unconventional gas to LNG plants being constructed concurrently. This concurrent construction has placed pressure on the national skilled labour market with the attention of many, particularly contractors, turning to the operational/maintenance requirements of the LNG sector. This was addressed in the recent Accenture report.\(^4\)

Access to a skilled workforce is a concern that is shared by the process manufacturing industry. High demand for skilled labour from within the economy combined with relatively low wages in the sector have seen companies tapping into non-traditional labour pools to secure the skilled workers necessary for their operations.

Please see a list below of workforce development drivers impacting the RITC industries in Western Australia, which will be explored in more depth in Section 3.

- a Access to a skilled productive labour force;
- b Impact of automation and technological development;
- c Major project activity/global demand for resources;
- d Training provider capacity and capability; and
- e Transition from construction to operations.

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\(^4\) Accenture, ibid
1.5 Fast Facts

- The Australian LNG industry is a trade exposed sector and characterised by long-term sales contracts, primarily with Asian customers. These contracts provide security for the construction phase of LNG projects.

- Australian LNG productive capacity is in the process of expanding from 8 LNG trains to 21 with this expansion being completed by 2018. Based on current industry plans, Australia will become the world’s largest LNG producing country by 2018.

- Australia’s LNG output is expected to grow from 24 million tonnes per annum in 2014 to 86 million tonnes by 2020 according to the International Gas Union.

- The number of LNG shipments annually is expected to increase from 275 in 2014 to 980 in 2020, an increase of 256 per cent.

- Western Australia accounts for 68.2 per cent of national petroleum exploration spending5.

- Petroleum accounted for nearly 16 per cent of Western Australia Royalty Receipts in 2014 (includes North West Shelf grants).

- In the oil and gas sector cost pressures are intensifying due to skills and capacity constraints that have been generated by strong growth across the Australian resources sector and concurrent project construction. Although construction activity in the broader resources sector has lessened, the industry values oil and gas experience.

- According to Accenture estimates, $450 billion of on-going investment will be required to sustain the LNG industry over the next 25 years.

- The emergence of coal seam gas (CSG) in Queensland will transform skills demand for highly technical and specialist oil and gas workers.

- For employers in Western Australia a focus will be retention of existing skilled workers, particularly engineers and production or process operators.

- The small number of operating LNG facilities in Australia is seen as a barrier to on-the-job training of LNG operators for new LNG capacity that is currently being constructed.

- According to the 2011 Census of Population and Housing, 81 per cent of direct employees in the oil and gas sector worked in oil and gas extraction.

- At the time of the 2011 Census of Population and Housing, 37 per cent of all direct employees were professionals, with 20 per cent of all direct employees working in technician and trades occupations.

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5 IBISWorld B1511, Petroleum Exploration
The average oil and gas industry female workforce participation rate was 26.29 per cent according to the 2011 Census of Population and Housing.

Enterprises are often taking the lead in promoting gender diversity internally, with Chevron winning the 2013 Outstanding Company Initiative at the CME Women in Resources Awards for their partnership project with Challenger Institute’s Australian Centre for Energy and Process Training (ACEPT) the Women in Engineering Program.

The ageing of the oil and gas industry workforce is another workforce development challenge, with over 20 per cent of the current workforce aged 50 and above.

Due to the highly specialist and technical nature of most occupations in the oil and gas industry, and the prevalence of professionals in the sector, most structured training occurs outside of apprenticeship pathways.

The number of employees on offshore facilities is restricted, which is driving greater multi-skilling and cross-skilling, particularly in the electrical and mechanical areas. This trend is expected to continue and accelerate in the medium term driven by the introduction of new technologies such as floating liquefied natural gas (FLNG).
## Summary of Issues Table

<table>
<thead>
<tr>
<th>Issue</th>
<th>Recommended Priority Action(s)</th>
<th>Skilling WA Strategy</th>
<th>Lead Agency</th>
<th>Due Date:</th>
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</table>
| Productivity and collaboration                                       | • Identify potential workforce development collaboration models for the oil and gas industry and to determine industry’s acceptance of and commitment to a preferred model.  
• Work with industry, training providers and other key stakeholders around development of implementation, model aligning with industry. Verification of competence will be the first focus of collaboration. | Strategy 1  
1.1.1  
1.2.6  
1.3.1 | RITC/Collaborative Oil and Gas Steering Group | September 2015 for endorsement of report  
Implementation from October 2015 onwards |
| Industry has little confidence in the training system can produce consistent outcomes. | • High risk work project and testing of concept for longer duration programs for some high risk work areas (scaffolding and crane operations) | Strategy 3  
3.1.1 | RITC | 2nd Quarter 2016 |
| Nationally recognized qualifications at the higher levels address industry skill demand and relate to defined job roles. | • Explore the composition of relevant Diploma and Advanced Diploma qualifications (process, electrical and mechanical engineering focus) and determine whether any changes are needed to ensure they are appropriate to industry needs. | Strategy 4  
4.2.1 | RITC/AC EPT | June 2016 |
Current qualification structures and funding guidelines may discriminate against more flexible and innovative training solutions that are applicable to the oil and gas context

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<td></td>
<td>Explore an approach to pilot the implementation of a skill sets approach to training delivery in a discreet region (Pilbara)</td>
<td>Strategy 4 4.2.1</td>
<td>RITC/ Pilbara Institute</td>
</tr>
</tbody>
</table>
SECTION 2 METHODOLOGY

The Resources Industry Training Council subscribes to an evidenced based planning approach and uses robust and verifiable primary and secondary data sources in developing the Industry Workforce Development Plan.

Primary Data Sources

- RITC social media

The RITC uses this mechanism to provide information and assistance to industry and training providers operating in the mining, oil and gas and downstream process manufacturing industries in Western Australia.

These social media channels include:

- Twitter: https://twitter.com/RITCWA
- Facebook: https://www.facebook.com/RITCWA
- LinkedIn company page and group

- Industry network meetings

The RITC collaborates with relevant Industry Skills Councils around various events, seminars and consultations in Western Australia.

- Individual Enterprise consultations
- Independent validations as needed
- RITC-commissioned research projects, available via our website: www.ritcwa.com.au
- Third-party industry and economic research reports.

Secondary Data Sources

- Australian Bureau of Statistics (ABS)
- Bureau of Resources and Energy Economics (BREE) – Department of Industry
- National Centre for Vocational Education and Research (NCVER)
- CME Diversity Survey 2013
- APPEA reports and submissions
- CME
- IBISWorld Market Research and industry reports
- Industry journals and on-line industry sources
SECTION 3 INDUSTRY PROFILE

3.1 Overview of the Oil and Gas Industry

3.1.1 Oil and Gas Industry Analysis and Trends

2014 was a period of exceptionally weak growth in energy demand. Production growth continued resulting in a general softening of energy prices. Primary energy consumption grew by only 0.9 per cent in 2014, the lowest annual growth since the late 1990’s while energy production increased by 1.4 per cent. Emerging economies continue to account for all the growth in energy demand, with OECD energy consumption continuing to fall. This contraction occurred despite global economic growth reaching 3.3 per cent in 2014.

The slowdown in energy demand largely reflects the impact of China's economic rebalancing. In 2014, the Chinese economy grew by over 7 per cent yet the country’s energy demand increased by only 2.4 per cent. This rebalancing is underpinned by a structural shift from energy intensive industries such as steel making – a fact that was evidenced by the dramatic fall in the iron ore price during 2014. It is unlikely this will be a permanent phenomenon and steel production is expected to rebound at some stage in the short to medium term.

Last year saw a continuation of the dramatic shale revolution in the United States. At its peak, this saw more than 1,800 rigs operating in the United States with around 40,000 new wells being drilled. It is estimated capital expenditure in the United States shale industry was around $120 billion in 2014 which is double capital expenditure from five years earlier. Interestingly, productivity in the industry increased 7 fold since 2007 as the United States industry came to grips with technology around extracting oil and gas from its shale resources.

As a result of this activity, United States oil production increased by 1.6 million barrels per day in 2014 making the United States the first country in the world to increase its production by more than 1 million barrels per day for three consecutive years. United States oil production in 2014 exceeded its previous peak recorded in 1970.

Remarkably, the United States also became the world’s largest oil producing country in 2014 for the first time since 1975.

This change in the net energy position of the United States has seen a resurgence of its manufacturing sector, a resurgence driven by relatively cheap domestic energy. In 2014, it is estimated the United States energy production was the equivalent of 90 per cent of energy demand as shown in Figure 1.
According to IBISWorld’s report on oil and gas extraction in Australia\(^6\), the industry accounted for:

- $48.3 billion in revenue (with 70 per cent of this coming from Western Australia);
- 2.7 per cent of Australia’s GDP; and
- $32.4 billion in exports.

and is projected to achieve:

- a 7.7 per cent annual growth rate between 2010 and 2015; and
- an 11.6 per cent annual growth between 2015 and 2020.

### 3.1.1.1 Australia’s LNG Industry

According to the Department of Industry, Bureau of Resources and Energy Economics (BREE), over the medium term Australian gas production will more than double, underpinned by LNG production. By 2020, Australia is projected to eclipse Qatar as the world’s largest LNG producing country. Over the period 2013/14 to 2018/19, Australian gas production is expected to increase by 16 per cent a year as seven new LNG plants commence operations. LNG production in Australia is expected to reach 86 million tonnes per annum by 2020.

The end of 2015 is expected to see commencement of all three Queensland based LNG projects with GLNG and APLNG commencing production by year’s end. INPEX’s Ichthys project, Chevron’s Wheatstone project and Shell’s Prelude FLNG project are all anticipated to be operational by 2018 bringing Australia’s installed LNG capacity to around 86 million tonnes per year. This represents a 61.8 million tonne increase (254.3 per cent) over the 2013/14 LNG production level of 24.3 million tonnes.

In value terms, Australia’s LNG sales are expected to increase from $US 11.2 billion in 2014 to approximately US$40.1 billion by 2020, an increase of 258 per cent. By 2019, Japan is

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\(6\) IBISWorld, Industry Report B0700, Oil and Gas Extraction in Australia, July 2014
expected to account for around 50 per cent of Australian LNG exports (40 million tonnes), followed by China (18 million tonnes) and South Korea (13 million tonnes). Of note is increasing demand from China.

The table overleaf shows oil and gas projects that are under construction and committed in Australia. As can be seen, the vast majority of these projects are based in Western Australia, with 50.2 per cent of planned total capital expenditure being accounted for by Western Australian projects.
### Table 3: Department of Industry Resources and Energy Major Projects Listing – April 2015

Source: Department of Industry

<table>
<thead>
<tr>
<th>Project</th>
<th>Company</th>
<th>State</th>
<th>Location</th>
<th>Type</th>
<th>Estimated Start Up</th>
<th>Publicly Announced</th>
<th>Feasibility Stage</th>
<th>Committed Feasibility</th>
<th>Completed Feasibility</th>
<th>Estimated New Capacity</th>
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<th>Resource</th>
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<tr>
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<td>Origin / AWE</td>
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<td>Bass Strait</td>
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<td>2016</td>
<td>y</td>
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<td>y</td>
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<td>y</td>
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<td>LNG</td>
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<td>y</td>
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<td>LNG</td>
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<td>y</td>
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<td>Hess</td>
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<td>y</td>
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<td>y</td>
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<td></td>
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<td>y</td>
<td></td>
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<td>Barrow Island</td>
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<td>y</td>
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<td>Mt</td>
<td>LNG</td>
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<td>Narrabri</td>
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<td>y</td>
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<td>y</td>
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<td>LNG</td>
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<td>Sole</td>
<td>Santos / Cooper Energy</td>
<td>Vic</td>
<td>Gippsland</td>
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<td>y</td>
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<td>Spar 2</td>
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<td>2015</td>
<td>y</td>
<td></td>
<td>18</td>
<td>PJ pa</td>
<td>Gas</td>
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<td>Surat Gas Project</td>
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<td>160 km W of Brisbane</td>
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<td>y</td>
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<td>443</td>
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<td>y</td>
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<td>y</td>
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<td>370</td>
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</table>

*Unconfirmed cost estimate
The following diagram places the project information above in a geographic context and also highlights the major identified oil and gas reserves in Australia.

Figure 2: Location of Australia’s Gas Resources and Infrastructure
Source: Department of Resources, Energy and Tourism, Australian Gas Resources Assessment 2012, Canberra, 2012

3.1.2 Labour and Skill Demand

The availability and productivity of skilled labour is a significant challenge facing Australia’s oil and gas industry as it enters its operations and maintenance phase. Unprecedented levels of investment in new projects (there is approximately $145 billion of oil and gas projects under construction in Australia, $67 billion of which is in Western Australia) is forcing companies to think laterally around strategies to address their skilled labour demand when this new capacity becomes operational.

As reported in last year’s industry workforce development plan, Macquarie estimated LNG projects currently under construction have the capacity to generate 10,000 operational jobs. This is borne out in the Deloitte Access Economics report suggesting over the project construction phase, additional employment (oil and gas projects) will peak at around 103,000 (full-time equivalents) during 2012, moderating to 77,800 in 2015 and 5,500 in 2025.
In May 2015, the Accenture report\(^7\) explored skilled labour demand emanating from the expansion in Australia’s LNG capacity. The report cited data suggesting the overall size of the oil and gas labour force would decline from 34,200 in 2014 to around 30,500 by 2019.

In contrast, AWPA’s 2013 Resources Sector Skills Needs report projected that the transition from construction to operations in the oil and gas sector was likely to result in a 57 per cent increase in operations employment, up from 38,943 people in 2013 to 61,212 in 2018.\(^8\) The report noted that considerable inroads have been made by the industry in engaging under-represented groups in the workforce.

The Accenture report presents a compelling argument why the oil and gas industry should foster greater collaboration around shutdown activity. Based on collaboration around the timing of LNG plant shutdown activity across the country, Accenture estimates the demand for skilled labour could reduce by a factor of 3. In a synchronised shutdown environment, skilled labour demand is estimated to be approximately 3,000. If collaboration around shutdown timing cannot be reached, skilled labour demand is estimated to be 10,000.

In terms of the current workforce profile of the Western Australian oil and gas industry, data accessed from the 2011 Census of Population and Housing assists in demonstrating the spread of employment across different industry areas and occupational groups.

Employment in the oil and gas industry is dominated by oil and gas extraction as the below diagram shows.

**Figure 3: Oil and Gas Employment in Western Australia by Industry Sub-division**

Source: 2011 Census of Population and Housing

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7 Accenture, Ready or Not? – Creating a world-leading oil and gas industry in Australia, Produced in association with APPEA, May 2015.

In contrast to mining, oil and gas displays a higher concentration of professionals and technicians and trades workers with machinery operators and labourers representing a minor share of the industry employment as shown in Figure 4.

Major oil and gas operating companies directly employ relatively low numbers of highly skilled staff to operate and maintain projects, which is reflected in the oil and gas industry's lower share of employment and the higher skill levels of these workers.

According to the Australian Government’s energy green paper, the transition of projects to the operations phase will see marked changes in the occupational profile of the industry. Of the projected 22,268 new employees needed in the industry over the next 5 years, over half (55 per cent) will be managers or professionals.

**Figure 4: Oil and Gas Employment by Occupations in Western Australia**
Source: 2011 Census of Population and Housing

3.1.2.1 **Productivity**

According to APPEA, Australia’s productivity (including that in the oil and gas sector) has been declining for some time. This has resulted in higher project costs and delays in project completions. The Productivity Commission reached a similar view, finding that long run average productivity growth in Australia has been running at around 1 per cent per year. Disturbingly, since the 1990’s when productivity peaked at around 2.3 per cent it has been declining to almost zero.
Deloitte Access Economics found that increases in economy wide productivity have been offset by declines in productivity in Australia’s rapidly expanding resources industry. This is evident in the figure below.

**Figure 5: Comparison of Resource and Non-Resource Sector Productivity**
Source: Deloitte Access Economics, Harnessing our comparative energy advantage, 2012

Deloitte Access Economics argue that there are two unique features of oil and gas and mining projects that distort productivity growth:

- **Capital installation delays** – during project construction, capital inputs grow appreciably ahead of any output through project commissioning resulting in a negative impact on productivity using existing measures; and

- **Frontier exploration** – considerable sums are spent on exploration in the industry that may never result in any output (dry well for example). It is also true that as reserves diminish and “harder” reserves are tapped into, input costs can escalate sharply for no comparable increase in output.

With the seven LNG projects currently under construction moving into operations between 2014 and 2018, it is expected the above productivity gap will diminish. In a sub US$50 per barrel oil environment, productivity will become an even greater focus for the industry – workforce development has a role to play in ensuring the workforce has the necessary skills to maximise productivity.

The Australian Government’s energy green paper, released in September 2014 states that in the past two years, industry has shifted its focus to improving efficiency, in response to lower prices, increased global production, and greater competition. Companies have actively sought to lower input costs by improving workforce productivity and workforce mobility. In the year to September 2013, workforce productivity increased by 7.6 per cent.⁹

The need to control costs and safely maximise production has a workforce development linkage. Through operating in a collaborative sense, the RITC believes that industry could realise savings (and quality improvements) in developing skills necessary for the operations and maintenance phase of LNG facilities under construction. Exploration of models for collaboration in workforce development across the oil and gas industry has been undertaken by the RITC in 2014/15 and has identified a number of opportunities where demonstrable savings can be realized by the

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industry through adoption of a collaborative approach. This work will be continued in 2015 and 2016.

A key feature of the oil and gas industry is its capital intensiveness. According to IBISWorld\textsuperscript{10} the industry is around 3 times more capital intensive than the mining sector and more than 10 times more capital intensive than the economy as a whole.

### 3.1.2.2 Workforce Skills Issues

The oil and gas industry is a relatively small direct employer of highly skilled labour. According to IBISWorld data\textsuperscript{11}, the national industry average direct employment was around 20,300 in 2014/15. By comparison, in 2006, the industry comprised about 3,600 employees. By 2020-21, IBISWorld expects the size of the oil and gas extraction workforce to total 27,590.

The oil and gas industry’s highly technical and specialised nature means it is unlikely the local labour force will have a depth and breadth of skills and experience to satisfy project operational and maintenance demands. It is therefore highly probable that the industry will require a combination of skills development and skilled migration strategies, to ensure that projects have the necessary skilled workforce to transition safely from the construction phase to operations. A marked decline in construction activity across the resources sector potentially provides an additional pool of skilled labour for some trade areas the industry can draw upon to meet demand.

The operations and maintenance phase will be marked by changes in employment levels and skills mix. According to the RITC Construction to Operations Phase Workforce Study\textsuperscript{12} when a new resources project transitions from the construction phase to the operational phase, the size of the total workforce associated with the project decreases dramatically. The degree to which the size of the workforce decreases is unique to the nature of the construction project and the operational specifics of the project. Anecdotally, the operational workforce can be as low as 4 per cent of the size of the construction workforce in the case of an oil and gas project. This is borne out in the Department of State Development’s Prospect publication\textsuperscript{13} which indicates the following:

<table>
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<th>Project</th>
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<td>Chevron – Wheatstone LNG</td>
<td>6500</td>
<td>400 (6.1%)</td>
</tr>
<tr>
<td>Gorgon Joint Venture Gas Processing Project</td>
<td>6250</td>
<td>300 (4.8%)</td>
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</tbody>
</table>

From an operational standpoint, significant pressure continues to be exerted on the process operator/technician and electrical/instrumentation skills base. With 5 operating LNG plants in

\textsuperscript{10} IBISWorld, B0700 – Oil and Gas Extraction in Australia, July 2015
\textsuperscript{11} IbisWorld, B0700 Oil and Gas Extraction in Australia, July 2015.
\textsuperscript{12} Australian Venture Consultants Pty Ltd, Western Australian Resources Industry Construction to Operations Phase Workforce Study – an investigation into the workforce dynamics and implications for skills training and education as major projects transition from a construction phase to an operational phase, June 2014. p4
\textsuperscript{13} Department of State Development, Prospect, October-November 2014 p32
Australia and the current expansion facilitating the entry of new players into the Australian market, there is a significant problem emerging in how to rapidly skill up an operations workforce. Approaches to the issue are diverse and include:

- Gaining access to local and overseas LNG plants for training purposes through existing joint venture arrangements;
- Utilizing existing local provision capacity and capability such as the Australian Centre for Energy and Process Training (ACEPT) based at Henderson, south of Fremantle; and
- A combination of underpinning skills and knowledge (or theory) delivered in an e-learning or classroom environment combined with time on sophisticated full plant simulators.

In the current labour market environment, it is essential that individual enterprises have robust retention strategies in place. Separations from enterprises are very costly both in terms of financial costs and also from a knowledge management perspective. Woodside in its 2010 annual report\textsuperscript{14} cited an annualised turnover rate for 2010 of only 5.4 per cent which it attributes, in part, to its employee equity plan and further investment in the company's career development processes. This had risen to 6.8 per cent in 2011\textsuperscript{15} and to 9.4 per cent in 2013\textsuperscript{16}. This is seen as being indicative of intense competition for experienced oil and gas workers across the local industry.

Queensland’s coal seam gas to LNG sector and the shale gas sector in the United States and Canada are anticipated to test local industry retention strategies over coming years.

It is likely as internal industry recruitment (for experienced operators) intensifies approaching commissioning, upward pressure will be further exerted on employee remuneration. Industry projections based on Department of Industry project data shows that total process operator salaries for the industry (based on $160,000 salary with 30 per cent on-costs and 5 per cent increase annually) will rise from around $48 million in 2011 to $770 million by 2020. This is based on the LNG process operator workforce increasing from an estimated 239 in 2011 to 2,339 by 2020. Given current market conditions, these estimates are likely to be very conservative.

The oil and gas sector believes it is vital to provide school students with good quality information on the important role of energy in the economy, and accurate information on the oil and gas industry today.

Improving young people’s understanding of the industry will not only help develop their awareness of the importance of energy in our everyday lives, but it will also assist in ensuring that school children make positive and well-informed choices regarding science, technology, engineering and mathematics (STEM) options.

3.1.2.3 A Recruitment Perspective

Hays (a global oil and gas recruitment company) undertakes a survey each year that represents a barometer of what is happening in the global oil and gas industry from a recruitment, salary and issues perspective. The 2014 survey noted salaries and contractor day rates increased by 1.3 per cent. With the oil price having halved since completion of the survey, it is expected the 2015 survey will show a reduction in salaries across the industry. Australasian salaries continued to be above those of other oil and gas regions globally. Skill shortages persist in the

\textsuperscript{14} Woodside, Annual Report 2010
\textsuperscript{15} Woodside, Annual Report 2011, accessed 31 October 2011
\textsuperscript{16} Woodside, Annual Report 2013, accessed 13 October 2013
global industry – particularly for engineers and technical personnel with ten years or more industry experience. In fact, skill shortages remained the number one concern for oil and gas employers globally for the coming year, although the proportion of employers responding to the survey expressing skill shortages were a concern was notably lower in Australasia (27.9 per cent) when compared to other regions such as Asia (34.2 per cent), Europe (37.8 per cent) and North America (42.8 per cent).

The 2014 survey noted that over 72 per cent of employers felt they had to make improvements to their employee offering in order to attract the right talent.

The Hays survey outlook for Australasia cites significant employer concerns with economic instability.

3.1.3 Regulatory Requirements

The resources development and oil and gas sectors are subject to a high level of regulation. Approvals processes (both green and red tape), in particular, can pose significant delays and place considerable cost burdens upon industry. Lack of consistency in interpretation and uncertainty in outcome has the potential to act as a disincentive for those companies looking to gain access to natural resources. The debate surrounding access to unconventional gas is a case in point.

In work commissioned by APPEA\textsuperscript{17}, regulatory impacts are categorized under the following headings:

- Offshore operations;
- Gas markets;
- Environment and heritage;
- Native title laws;
- Occupational health and safety; and
- Taxation.

The Department of Mines and Petroleum's publication Western Australia's Petroleum and Geothermal Explorer's Guide – 2014 Edition\textsuperscript{18}, provides a comprehensive overview of the legislative and regulatory approvals process as they apply to the state of Western Australia, its onshore and state waters and islands which are administered under the following legislation:

- Petroleum and Geothermal Energy Resources Act (2007);
- Petroleum (Submerged Lands) Act (1982);
- Petroleum Pipelines Act (1969); and
- Petroleum Act (1936).


The following diagram\textsuperscript{19} provides examples of where respective commonwealth and state petroleum and geothermal acts apply.

\textsuperscript{17} Deloitte Access Economics, Advancing Australia – Harnessing our comparative energy advantage, June 2012
Figure 6: Applications of Commonwealth and State Acts in Western Australia


The Department of Mines and Petroleum has also released a document that outlines the regulatory framework that applies to natural gas from shale and tight rocks in Western Australia\(^\text{20}\). The below table land based oil and gas operations are covered by regulation through the Western Australian Department of Mines and Petroleum (DMP).

\(^{20}\) Department of Mines and Petroleum, Natural Gas from Shale and Tight Rocks – An overview of Western Australia’s regulatory framework, February 2014.
### Gender/Age Participation

#### Gender Diversity

In a tight labour market, it makes good business sense for enterprises to be pursuing strategies that are focused on diversity groups. According to the Hays 2014 survey women in the oil and gas industry accounted for 9.8 per cent of respondents (up from 9.2 per cent in the 2013 survey). This is well below the November 2013 CME diversity survey outcome of 22 per cent.
across the mining and energy sectors in Western Australia. From a job role perspective, the 2013 CME survey found a concentration of women in professional occupations (37 per cent) and administrative roles (20 per cent).

In 2013, the RITC commissioned a desktop research project\(^{21}\) to determine a benchmark rate for the representation of women in the oil and gas sector together with international comparisons and an identification of key policy issues and drivers influencing gender diversity.

This report estimated women’s participation in the Western Australian oil and gas industry to be 27.2 per cent. The National Resources Sector Employment Taskforce (NRSET) report\(^{22}\) identified a number of strategies and initiatives that oil and gas companies have instituted in efforts to address gender balance issues. These include: paid parental leave, access to part-time employment, job sharing, working from home, compressed work hours, purchased leave, and access to childcare. The NRSET report, however, noted that “the sector needs a new strategy to increase female workforce participation”\(^{23}\) and that “the taskforce recognizes change must occur at the company level.”\(^{24}\) The RITC study\(^{25}\) found similar strategies were in place in Western Australia’s oil and gas industry but also highlighted that “there is a need to encourage and support companies to review the success of their strategies linked with improved organizational monitoring and reporting”.

The Hays oil and gas global salary guide survey for 2015 shows that almost 40 per cent of all female respondents are in their first four years of working in the oil and gas industry providing a potentially rich pool of talent for senior positions in future years.

In the 2011 Census employment data in terms of the gender and age profile of the oil and gas sector can also be interrogated, as outlined in the charts below:

\(^{21}\) Curtin University – Maureen Bickley Centre for Women in Leadership and Curtin Graduate School of Business, Project Report: Gender Diversity in the Oil and Gas Sector in Western Australia, 2014.

\(^{22}\) National Resources Sector Employment Taskforce (NRSET), Resourcing the Future – National Resources Sector Employment Taskforce Report, July 2010.

\(^{23}\) NRSET, ibid, p78.

\(^{24}\) NRSET, ibid, P78.

\(^{25}\) Curtin University, ibid, p4.
3.1.4.2 Workforce Age Profile

Figure 9 below indicates that a strong proportion of the oil and gas workforce is aged 25-49 (72%). This reflects the industry’s preference for skilled workers with experience and well-developed/entrenched safety behaviours.
In the absence of strategies to attract younger people into the industry, Western Australia’s oil and gas industry will be facing significant ageing issues in coming years. Relatively high salaries enable long-term oil and gas sector employees to consider retirement at a relatively earlier age. According to the 2011 Census (Figure 11) nearly 23 per cent of the oil and gas workforce was aged 50 years and over.

While Figure 9 outlines the age profile of the oil and gas sector in general, additional analysis for the top five employers by industry area was undertaken to show the varied age profiles within the industry (Figure 10):
This analysis compares the top five industries by employment with the average for the whole oil and gas sector. In this way it is possible to compare the “younger” industry subdivisions, with a higher proportion of workers aged 15-25, such as petroleum refining, with “older” industry subdivisions, such as oil and gas extraction. It should be noted though, that the sample sizes are limited for this group.
3.1.5 Under-represented Groups Participation

According to the NRSET report\(^{26}\), the 2006 census showed that there were 2,488 Indigenous Australians employed in the mining industry accounting for 2.3 per cent of the mining industry workforce. From an oil and gas industry perspective, the need to assist in creating opportunities for Indigenous Australians and their communities is well understood.

Most major oil and gas operating companies have a range of integrated strategies in place aiming to increase Indigenous participation in the contract or supply chain as well as direct employment.

**Figure 11: Oil and Gas Indigenous Participation Rate in Western Australia, compared with total employment across each industry sub-division**

Source: 2011 Census of Population and Housing

This chart outlines the Indigenous workforce participation rate in the Western Australian oil and gas industry, which is mapped to total employment figures across the industry.

It should be noted that the average Indigenous participation rate, that is the average workforce participation rate of Aboriginal and Torres Strait Islander peoples in the Western Australian oil and gas industry is 1.17 per cent.

Programs such as the APPEA Indigenous Engineering Scholarship are positive industry examples of promoting and championing different Indigenous employment strategies aligned to the workforce needs of the sector.

\(^{26}\) NRSET, ibid, p78
3.1.6 New and Emerging Skills

Technological change within the oil and gas industry is a key driver of new and emerging skills. In a report recently commissioned by the RITC on automation and its skill impacts, it was noted that increasing technological change is blurring existing occupational boundaries resulting in changes to training regimes and also a wide range of industrial relations matters. The RITC is proposing to investigate higher level VET qualifications (Diploma and Advanced Diploma) to determine their alignment with current and future job roles to determine whether any changes are necessary to existing qualification structures.

Limited available accommodation on offshore oil and gas facilities drives cross skilling, particularly in a number of trade and technical areas. This trend is expected to continue and accelerate in the medium term driven by the introduction of new technologies such as floating liquefied natural gas (FLNG) facilities. It will also challenge the structure of training products and training packages in particular. Flexibility in training product and the delivery of that product will be critical in meeting industry skill demands.

This blurring of occupational boundaries presents a number of challenges in terms of occupational coding. The existing ANZSCO classification does not have sufficient flexibility to cater to the needs of a rapidly changing and technologically advanced industry such as the oil and gas industry.

For VET processes which are “data driven” (eg DTWD’s SPOL process) it is likely the oil and gas industry will be disadvantaged as occupational boundaries blur. It is also questionable whether existing ANZSCO skill levels accurately reflect the skill level of roles such as process operator/technician. This matter has been brought to the attention of DTWD.

3.1.7 Occupations in Demand (ANZSCO Code)

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<th>ANZSCO</th>
<th>Occupation</th>
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<tr>
<td>233512</td>
<td>Mechanical Engineer</td>
<td>In terms if RITC coverage, mechanical engineers are employed across the mining, oil and gas and downstream process manufacturing industries. Typically, mechanical engineers are engaged in large numbers during the design and initial construction of resources projects. Despite this demand for mechanical engineers will continue during the production and maintenance phases as projects transition from construction over the short to medium term. Although WA has one of the highest retention rates for engineers in the country, only about 60 per cent of engineers are employed in recognized engineering occupations, many moving away from practicing directly in their discipline into senior management positions particularly in the resources sector. Together with the breadth of occupational reach and decline in recent university graduates, these have led to employers expressing difficulty in recruiting competent,</td>
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experienced mechanical engineers across resource sector projects and turning to migration as a source of skilled mechanical engineers.

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<tr>
<th>Code</th>
<th>Occupation</th>
<th>Description</th>
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<tr>
<td>233513</td>
<td>Production or Plant Engineer</td>
<td>It is likely this occupation will remain in high demand over the next five years as more projects become operational across the country in both mining and oil and gas industries. In a world of rapid technological change, the need for experienced production engineers is critical as the mining industry ramps up production, the oil and gas plants come online and manufacturing employs engineers across most industry areas for their wide range of analytical and problem solving skills to propel it into the next growth area in the Australian economy. Given the extensive education, specialization and experience required for employment into these roles, production and plant engineers will remain in high demand particularly across onshore and offshore production and processing operations. As Australia’s mining and oil and gas industries continue the transition into production, these roles will become increasingly critical and reliant on migration to meet demand.</td>
</tr>
<tr>
<td>233612</td>
<td>Petroleum Engineer</td>
<td>There are shortages for skilled and experienced petroleum engineers to work in offshore and onshore operations and with seven LNG plants being commissioned between 2015 and 2018, demand for petroleum engineers is expected to remain high. According to Engineers Australia, in 2013-14 permanent visas granted petroleum engineers increased by close to 20% and in the absence of local supply meeting demand (particularly in relation to experience) industry will rely upon skilled migration as a primary mechanism for meeting its demand. Recent anecdotal industry evidence suggests petroleum engineer salaries have increased at a higher rate than other oil and gas professions, providing evidence of shortages in the industry. Similarly, the Hays Quarterly Report October – December 2014 forecast Australia to be on the verge of an exceedingly tight labour market for some highly skilled professionals in high skill industries, including petroleum engineers, maintenance and production supervisors with instrumentation technicians and heavy diesel fitters particularly sought after in Western Australia.</td>
</tr>
<tr>
<td>341111</td>
<td>Electrician (general)</td>
<td>As the projects transition into the operations phase electricians will still be in demand for maintenance positions, particularly those holding engineering based</td>
</tr>
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electrical qualifications. Given the number of projects under construction and operation in Australia (8 mega projects under construction in Australia, valued at more than $5 billion and 44 projects at the Committed Stage with a combined value of $228 billion, of which $116 billion is in Western Australia), the significant number of electricians in training will result in critical shortages in the period 2015 to 2018. Already enterprises have expressed difficulty in recruiting experienced electrical workers, complementing their existing trade apprenticeship programs. Increasing use of technology on resources projects will see strong demand for electrical and instrumentation skills continue into the medium to long term. It can be expected to intensify in the longer term.

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<th>Code</th>
<th>Occupation</th>
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<tr>
<td>341112</td>
<td>Electrician (special class)</td>
<td>Electricians (special class) play a crucial role in large scale projects, in particular those in the resource development sector, where they maintain the raft of electrical infrastructure on site. With the introduction of new technologies to mitigate operational costs, the skills of electricians and instrumentation tradespeople for installation and maintenance purposes will continue to grow. Enterprises have expressed difficulty in recruiting experienced electrical/instrumentation workers. According to AWPA's Resources Sector Skill Needs 2013 report, electricians comprise 3% of total mining industry employment. As projects commence operations (particularly oil and gas projects) demand for special class electricians is anticipated to remain firm. Given the number of projects under construction and operation in Australia the significant number of electricians in training will result in critical shortages in the period 2015 to 2018.</td>
</tr>
<tr>
<td>399211</td>
<td>Chemical Plant Operator</td>
<td>Chemical plant operators will be in very high demand, especially in highly technical processing and refining environments across WA. The numbers of these facilities are likely to increase considerably in the next few years, ramping up demand for skilled operators. If the recent falls in the oil price translate into reductions in energy input costs for a number of chemical and related manufacturing sectors, increases in activity may also drive demand for chemical plant operators. Consultations with the Kwinana Industries Council (KIC) has identified that chemical company employers within the Kwinana heavy industry zone have reported recruitment difficulties for process plant operators. Significant and rapid expansion of Australia's LNG</td>
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399211
sector has seen skill shortages continue for experienced LNG process plant operators. The current seven LNG trains in operation across Australia are expected to increase by another 14 trains by 2016 as the sector enters further production. With oil and gas operating companies reporting international skill shortages for LNG process operators, it is likely that chemical plant operators may pursue opportunities in the LNG sector.

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<tr>
<td>399212</td>
<td>Gas or Petroleum Operator</td>
</tr>
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</table>

Operators in the oil and gas industry will be in very high demand over the next few years, from upstream oil and gas production operations, to LNG production and petroleum refining. Highly skilled and experienced process operators, with knowledge of the oil and gas industry, have consistently been in short supply and it is estimated the number of skilled LNG plant operators required for Australia’s new plants will increase the current supply of operators at least six fold over the next 3-5 years, exacerbated as the number of LNG processing facilities and upstream oil and gas production facilities increases across Australia.

As reported in AWPA’s Resources Sector Skills Needs 2013, Deloitte Access Economics modelling projects shortages in several professional and technical and trade occupations as oil and gas operations move into production capacity between 2015 and 2018, one of which is gas, petroleum and power generation plant operators. By 2018 Australia’s installed LNG capacity will be around 86 million tonnes. LNG plant operators are highly skilled with a period of around 4-5 years post initial qualification experience being seen as a minimum before an LNG operator can work unsupervised.

These shortages are particularly concerning given the significant investment profile of liquefied natural gas projects (LNG). Already there is evidence that skill shortages are affecting the competitiveness of Australian LNG prospects by contributing to delays and increased project costs. Wage growth reflects the difficulty in obtaining suitable candidates for given occupations and the overall lack of supply. Oil and gas operating companies indicate operator salaries have been increasing at a greater rather than CPI and increases have been well above the vast majority of VET qualified job roles in the sector.
In addition to the focus list, the following were also submitted within the non-focus list:

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<th>ANZSCO</th>
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<tr>
<td>233111</td>
<td>Chemical Engineer</td>
<td>Shortages of engineering professionals and chemical engineers in particular are clear across the three RITC industry areas. The raft of projects in the pipeline indicate that the specialist and technical knowledge of chemical engineers will be in demand across the state, as evidenced by industry consultation and the considerable number of job advertisements for this occupation online. Engineering skill shortages are common in the WA resources sector across multiple disciplines. The time lag for graduate engineers to progress to skilled professionals is also a factor for resource sector companies.</td>
</tr>
<tr>
<td>234211</td>
<td>Chemist</td>
<td>There are consistent shortages across RITC industries for technically competent and experienced chemists, who are in high demand across the state in the mineral and hydrocarbons industry and the downstream process manufacturing industry, with particular emphasis on the manufacture of organic and inorganic chemicals. Forecasts for skilled labour across Australia suggests chemists will long be in high demand by the industry. Skilled labour is a supplement to this issue in the short term but in the long term encouraging science as a career pathway should be encouraged.</td>
</tr>
<tr>
<td>311411</td>
<td>Chemistry Technician</td>
<td>Chemistry and laboratory technicians work closely with laboratory managers or supervisors to carry out the specialist testing requirements of the laboratory's clients fuelled by the demand from WA's mining industry for mineral assay laboratories or more generally in forensic, pathology or food testing laboratories. The ageing population will see a greater demand for medical testing and analysis to be performed and this will higher level laboratory skills. The current transition from construction to operations across the resources sector will cause significant increase in demand for laboratory services associated with assaying and QA of mineral products. Also, industry activity in the upstream resource sector, which is a key source of business for the laboratory operations industry, is a strong indicator that demand will continue.</td>
</tr>
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An increasing focus on technology (automated sample analysis) is changing the nature of qualifications demanded by industry. In automated laboratories, the bias in qualifications is moving towards higher level VET qualifications with these people being typically supervised by a tertiary qualified professional. This is not reflected well in the SPOL.

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<th>Occupation</th>
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<tr>
<td>511111</td>
<td>Contract Administrator</td>
<td>As reported at the 2015 AOG conference, some roles which do not have a standard qualification, such as contract administrators or contract or procurement managers, are crucial roles within a project. A 2014 report by Ernst &amp; Young, <em>Five things – Getting the basics right in procurement</em>, observe that there continues to be a mismatch in the supply and demand of high quality procurement professionals in the market and believe that the market fundamentals will not change in the short term. These administrators are fundamental enablers of business strategy for achieving sustainable cost reductions. In a marketplace with low commodity prices, new contract and project management strategies are needed to manage major projects in the resources industry. Skilled administrators improve productivity and the bottom line through improvements in workplace practices which result in operational efficiencies. They are critical to achieving supply chain optimization. As reported by Mining Australia companies are faced with developing solutions to meet reduced operating and maintenance budget without compromising on quality, safety and equipment performance. The 8 mega projects under construction in Australia have significantly increased the demand for experienced project managers and administrators. It is now that investment needs to be made in supporting pathways for project administrators and managers to ensure that we have necessary stocks of experience to deliver the next phase of investment in Western Australia's resources sector.</td>
</tr>
<tr>
<td>511112</td>
<td>Program or Project Administrator</td>
<td>AWPA report and The October 2013 BREE Resources and Major Projects report contain information that is relevant to this occupation. According to the BREE report, of committed investment in 2008, only 34 per cent of investment was in &quot;mega projects&quot; (projects over $5 billion). By October 2013 this proportion had more than doubled to 82 per cent. This shift towards mega projects has significantly increased the demand for experienced project managers and administrators. It is now that investment needs to be made in supporting</td>
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pathways for project administrators and managers to ensure that we have necessary stocks of experience to deliver the next phase of investment in Western Australia's resources sector.

591116 Warehouse Administrator

The transition from construction to operations across the resources sector will alter the skills mix required by the sector. The production phase will bring increased operational requirements that will cause an increase in demand for warehousing facilities and associated occupations such as warehouse administrators. The likelihood of a marine supply base being established in the Kimberley to deal with FLNG projects off Western Australia will create further regional demand for warehouse administration occupations.

In addition to these occupations, the following have been identified as being of priority to the industry:

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<tr>
<td>311000</td>
<td>Laboratory Manager</td>
<td>Laboratory managers work across a wide range of industries including mining, construction, health, professional services and education. They work closely with and supervise chemistry technicians working in laboratories. The shift of the resources industry moving into operations, industry activity in the upstream resources sector, higher skills required in more automated laboratories and the demands of an ageing population will continue to drive the need for laboratory managers across industry groups.</td>
</tr>
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### 3.1.8 Workforce Development Opportunities

Unlike other sectors within resources development, construction activity associated with oil and gas projects continues with the Gorgon, Wheatstone and Prelude projects all due for commissioning in the period 2015 to 2018. With seven new LNG projects being commissioned in Australia over the period to 2018, the transition to operations will focus demand on maintenance skills linked to LNG operations and shutdown schedules. Trades workers and technicians will form the bulk of shutdown skills required with pressure being exerted on a number of specialist areas within these broad occupational groupings. The recent Accenture report underscores this point.

According to AWPA, national employment in the oil and gas operations sector (under its base case scenario) is expected to increase from 38,943 in 2013 to 61,212 by 2018, a 57.2 per cent increase. While the overall workforce size remains relatively small, it is highly skilled and technologically advanced.
In the transition to operations, asset integrity\textsuperscript{27} and maintenance will be key to maximise productivity. Liquefied natural gas shutdown work is particularly lengthy and complex, involving hydrostatic testing, flushing and hot oil flushing, chemical cleansing, explosive venting, valve testing and leak detection, and installing or replacing extra equipment. These activities may require a workforce with a high skill level or years of experience. Major liquefied natural gas train shutdown work can take several months to complete. According to EnergySkills Queensland’s CSG to LNG Industry Workforce Plan\textsuperscript{28} covering the period 2014-2034, approximately 600 workers will be required per LNG train (in addition to the industry core operations workforce) to perform scheduled shutdown work. The Accenture report cites demand for approximately 10,000 shutdown maintenance workers should operating companies fail to effectively synchronise their LNG plant shutdown schedules.

It is likely a highly specialised contract shutdown skilled labour capability will be formed in Australia, being mobilised from state to state to perform shutdown work on LNG projects. The synchronization of this work across the country will be an issue placing a premium on asset maintenance schedule co-ordination and asset reliability.

Education and training infrastructure needs to mirror current industry usage, and training delivery needs to be delivered with a strong safety focus, realistic employment conditions and within processes that are utilized by industry. Training needs to be conducted by trainers with current industry competencies and under typical industry conditions (workplace policies and procedures). Due to the high level of activity in the industry, training providers are often challenged in finding suitably qualified and experienced people to take up teaching and learning roles. This extends to activities on site such as mentoring and supervision. This is not a new issue and is one which has unable to be satisfactorily addressed over a period of time. It is linked to industry concerns about quality and consistency of training outcomes.

Challenger Institute of Technology’s Australian Centre for Energy and Process Training (CEPT) facility was developed in response to industry demands for a more realistic training venue, i.e. one that simulates industry practices and processes. Overseen by an advisory board comprising industry leaders, this facility shows that a joint commitment to the development and management of realistic training venues is possible and should be encouraged. ACEPT remains the industry "provider of choice" for process operator training in Western Australia.

With the rapid expansion of LNG in Australia, ACEPT is well positioned to expand its delivery offerings and create specialist streams using the Certificate IV in Process Plant Technology as a base. Such specialist streams could include LNG, FLNG, etc. The importance of asset integrity and maintenance from an operations standpoint can be expected to see industry demand for higher level VET programs increase in the short to medium term. This will challenge the existing capacity and capability of providers and may be a catalyst for greater cross-sectoral effort with the higher education sector. Approval of stage 2 of the ACEPT development which integrates higher level engineering programs on the Henderson site will create further skilling opportunities for existing workers and new entrants into the industry.

The rapid expansion of Australia’s LNG industry (conventional gas sourced on the west coast and unconventional gas on the east coast) and the lack of industry infrastructure on which to train operators (there are four operating LNG plants in Australia) is focusing companies to

\textsuperscript{27} Defined as a continuous process of knowledge and experience applied throughout the lifecycle of an asset to manage the risk of failures and events in design, construction and during the operation of facilities to ensure optimal production without compromising safety, health and environmental requirements.

\textsuperscript{28} EnergySkills Queensland, Queensland CSG to LNG Industry Workforce Plan 2014-2034, 2013.
explore different ways to produce capable and well-skilled operators in the shortest possible time.

Some operating companies are taking advantage of joint venture arrangements and skilling up operators on local/overseas projects. The Chamber of Commerce and Industry’s Energy Apprenticeships Group (EAG) has recently announced that its process operator trainees hosted at Chevron have gained access to Woodside’s Karratha gas plant for training purposes. Chevron is a joint owner of the facility. It is highly likely that operators will be sourced from the more mature gas fields overseas and from the global labour force that the large multinational operating companies have at their disposal.

Shell continues to work with a consortium that includes Curtin University and Challenger Institute (ACCEPT) to develop an FLNG training program that will combine processing skills with maritime skills necessary for an FLNG environment. This “cross-skilling” is also a requirement for many of the modern process operator positions, with process operators being cross-skilled with electrical/instrumentation and mechanical skills that enable field based operators to undertake maintenance tasks. This “process operator/maintainer” will be in high demand in coming years as the many LNG projects current under construction/consideration (see attached table) commence production. It also highlights issues around the future of electrical/instrumentation skill sets in the industry, an issue canvassed in the RITC automation project.

This cross-skilling will also challenge training packages and training products. Unless adequate flexibility exists to accommodate industry demands, the national training framework may become increasingly irrelevant to industry.

AWPA, in its Resources Sector Skills Needs report, suggested “the strongest jobs growth is projected in oil and gas operations with the subsector likely to experience an acute undersupply of appropriately skilled workers across all occupational groups, with professionals and technical and trades workers the most affected.” The report also recommended industry and education and training providers develop strategic, collaborative responses to address skills challenges arising from expansion in Australia’s LNG industry.

Operating companies have signaled a strong desire to explore ways and mechanisms of collaborating across key areas of activity as a mechanism to reduce costs and promote higher levels of productivity. The RITC has commissioned collaborative oil and gas workforce development to capitalise on this development. This project will examine existing oil and gas industry collaborations in the workforce development space and explore models for holistic collaboration that industry would be prepared to support. This examination will include governance and resourcing. It is expected this project will be finalised mid-2015.

### 3.1.8.1 Apprenticeships

Trades workers will play an increasingly important role in the oil and gas industry and projects transition from construction to operations. AWPA, in its 2013 Resources Sector Skills Needs report, estimates trades workers and technician employment levels nationally to increase from 8,166 in 2013 to 11,904 in 2018, an increase of nearly 46 per cent (base case scenario). Tradespersons and technicians are projected to comprise approximately 20 per cent of the oil and gas operations workforce in 2018.

As a result of the increasing activity in the resources and construction sectors, there will need to be an increase in training delivery, particularly with apprenticeships in traditional trade areas and

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29 AWPA, Resources Sector Skills Needs 2013 Report – Executive Summary, p2
in paraprofessional studies related to process/operational technicians and mechanical engineering.

The approach to paraprofessional apprenticeships taken by the Energy Apprenticeships Group (EAG) in packaging a broad level of qualifications together (e.g. process, instrumentation and operator maintenance) is an example of flexible but in-depth skill building. It is possible the transition to operations may bring demand for a raft of higher-level traineeships in the oil and gas industry. This will be a focal point of industry discussions/consultations during the course of 2015. The advent of national occupational licensing for electrical occupations had a strong potential to significantly disrupt oil and gas industry training regimes for electrical apprentices. In December 2013, COAG decided not to pursue the proposed National Occupational Licensing Scheme reform. States agreed to work together through the Council for the Australian Federation to develop alternative models for minimising licensing impediments to improved labour mobility.

Since the early 2000’s two pathways have been open to an electrician’s licence – the utilities pathway (UEE) and the metals and engineering pathway (MEM). In 2010, the Electrical Regulatory Authorities Council (ERAC) agreed to no longer recognise the MEM pathway for issuance of an electrician’s licence. Western Australia’s oil and gas and resources industry generally regards the UEE qualification’s “domestic orientation” to be not suitable in a heavy industry environment or context. In 2012, Manufacturing Skills Australia (MSA) commenced a process to develop a new MEM industrial electrician qualification that would meet ERAC requirements for issuance of an electrician’s licence. This process has been arduous and been underpinned by extensive industry consultation. The new MEM industrial electrician qualification has now been endorsed by states, territories and the commonwealth through VET system processes. The Western Australian Electrical Licensing Board has also endorsed the qualification as meeting the requirements for an electrician’s licence in this state. In early September, the new MEM industrial electrician qualification was also recognized as an apprenticeship in Western Australia.

3.1.8.2 School-based Apprenticeships

Industry believes that school-based apprenticeships are better focused on general technical trade levels (they are not oil and gas industry specific), and that these school-based schemes must ensure the curriculum (which can become very crowded) maintains the necessary science, technology, engineering and mathematics (STEM) and literacy levels required in the high-technology-skills world. AWPA in its 2013 resources sector skills needs report noted participation in STEM subjects has declined considerably in schools in recent years across the country. This must be addressed to ensure an ongoing and increased supply of necessary skills for the future. AWPA recommended engagement with the industry working group established by the Office of the Chief Scientist to develop a national strategy for schools – industry STEM initiatives. Improvements in Australia’s STEM performance are also a critical plank of the Australian Government’s recently released Industry Innovation and Competitiveness Agenda with an investment of $12 million being made to improve the focus on STEM subjects in primary and secondary schools across Australia.

EAG has explored a model based on the UK Oil and Gas Upstream Technician Training Scheme that would be instrumental in developing opportunities for young people wishing to enter the oil and gas industry. This was also a recommendation of AWPA’s 2013 Resources Sector Skills Needs report.
Processes are underway to establish the Certificate III in Process Plant Operations as an apprenticeship in Western Australia with a three year nominal term. This qualification pathway would be industry’s preferred method of entry into the industry (as a process operator) for school leavers. It is expected at this stage (September 2015), the first intake under this new pathway would occur in early 2016.

3.1.9 VET Training Data by Qualification

3.1.9.1 Pre-Employment

Pre-employment programs are designed as short courses for new entrants.

Challenger Institute of Technology, through ACEPT offers the Certificate II in Process Plant Operations as a pre-employment program to provide those interested in entering the oil and gas, minerals and chemical processing industries with key entry level skills. This program is offered as a short eight week intensive course or alternatively through part time evening classes for those looking at re-skilling in a new career.30

Figure 12: RITC IBT VET Enrolments for PMA Training Package
Source: Department of Training and Workforce Development; June 2015

The chart above is an overview of VET enrolments for the PMA08 training package. Of interest is the even distribution of enrolments in 2013 data across qualifications at Certificate II, III and IV levels and the growing share of Certificate III qualifications over the period 2009 to 2013. This is

the industry preferred “entry level” qualification for Western Australia’s oil and gas industry. The significant increase in Certificate II enrolments in 2014 suggests interest in entering the industry from people with no current employment relationship. It is likely the bulk of these Certificate II students would not enter the oil and gas industry.

3.1.9.2 Apprenticeships and Traineeships

Additional analysis regarding the oil and gas industry in particular has been undertaken, including the following industry areas, as classified by ANZSIC.

- 0700 – Oil and Gas Extraction
- 1011 – Petroleum Exploration
- 1701 – Petroleum Refining and Petroleum Fuel Manufacturing
- 1811 – Industrial Gas Manufacturing (including LNG)

Between the first quarter of 2011 and the corresponding quarter this year (2015) there has been a relatively small increase in the number of apprentices and trainees in the Australian oil and gas industry. The number of apprentices and trainees in Western Australia’s oil and gas industry also increased modestly over the same period.

Figure 13: Apprentices and Trainees in the Oil and Gas Industry - ANZSIC 0700, 1011, 1701 and 1811
Source: NCVER VOCSTATS; March 2015

In terms of the share of the apprentices and trainees in Western Australia by occupation grouping and industry subdivision, as at 31 March 2014, please see Figures 14 and 15 overleaf.
As can be seen above, 56 per cent of the apprentice and trainee workforce are technicians and trade workers. It is expected that the majority of these workers would be “operators and technicians” and not trades workers.

Apprentices and trainees are also concentrated in the oil and gas extraction sector of the industry as the following shows.

**Figure 15: Share of Apprentices and Trainees in Western Australian Oil and Gas Industry**
Source: NCVER VOCSTATS; March 2015
3.1.9.3 VETiS

VET in Schools programs only form a relatively small proportion of all institutionally-based training across RITC coverage areas.

Challenger Institute of Technology currently offers a Certificate II in Process Plant Operations through its ACEPT facility. Through the Kwinana Industries Council (KIC) and Comet Bay College, a two-year school-based traineeship in process operations (Certificate II in Process Operations) is offered in collaboration with ACEPT. This provides students with a pathway into the Kwinana heavy industry area with a number of chemical and mineral processing companies (eg WesCef, Aloca).

Figure 16 overleaf is a summary of the VET in School enrolments from 2010 – 2014 for the Certificate II in Process Plant Operations. This indicates some interest but limited numbers of enrolments overall, in contrast to other VETiS programs.

**Figure 16: RITC VET in School Enrolments for the PMA Training Package (IBT)**

Source: Department of Training and Workforce Development; June 2015

3.1.10 Higher Education Pathways

3.1.10.1 Universities and Petroleum Engineering

The industry faces a long-term shortage of skilled professional engineers. This has been well documented by a range of organisations including Engineers Australia which in its 2014 statistical overview\(^3\) noted that while the downward trend in domestic completions of bachelor degrees in engineering and related technologies during the first half of the decade (2000-2010) has been arrested but completion numbers have not grown in the past two years and have remained steady at the level achieved in 2001. This lack of growth has occurred at a time when massive growth in the resources sector has been experienced (some 67 per cent of the value of committed capital expenditure was energy related according to ABARES May 2011 major project data) which has led to extreme pressure on the engineering labour market.

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This will potentially be exacerbated by strong demand for engineers from the infrastructure development sector as state and territory governments pursue asset sales to invest in new infrastructure (capital recycling). According to a survey by Consult Australia\(^\text{32}\) conducted in 2014, up to 30 per cent of firms surveyed identified a range of skills shortages particularly in the engineering field, with the most pressing shortages being in the civil, electrical, structural and transport engineering disciplines.

The oil and gas sector is exploring the setting up of a collaborative approach to achieve world-class delivery of oil and gas engineering in Australian universities. This would ensure that new graduates and postgraduates seeking careers in the oil and gas industry have access to opportunities to learn relevant industry skills before and/or after graduation. There has been similar work done in the mining sector through Mining Education Australia.

The Australian Government’s Industry Innovation and Competitiveness Agenda launched in October 2014 advocated the establishment of Industry Growth Centres in industry areas where Australia has demonstrated competitive strengths. These areas are:

- food and agribusiness;
- mining equipment, technology and services (METS);
- oil, gas and energy resources;
- medical technologies and pharmaceuticals; and
- advanced manufacturing.

The Minister for Industry has sought expressions of interest from business-led consortia to establish five industry growth centres. A total of $188.5 million will be committed over the next 4 years in support of these centres. A proposal has been submitted to establish the Oil, Gas and Energy Resources Industry Growth Centre.

As oil and gas projects move into the operations phase, issues of maintenance and asset integrity will provide greater opportunities for a focus on higher education pathways. This can build on the partnership between Shell, Curtin University and Challenger Institute through ACEPT and potentially other training providers.

3.1.11 Oil and Gas Industry Issues

3.1.11.1 Quality and Flexibility of Delivery

For the VET sector to successfully develop the skills of the resources sector workforce, the training delivered must be relevant, flexible, innovative and industry-led. Currently there are concerns among industry representatives that this is not the case, as raised in consultation with industry. Quality issues, depth of provider market and capacity of the VET sector to provide the training required are leading to a lack of industry confidence in current vocational training provision. The Hydrocarbons Assessor Network (HAN) attempts to raise the bar on quality delivery and develop greater partnerships between industry and training providers in this highly technical sector. The RITC’s collaborative oil and gas workforce development project is aimed at addressing this issue and ensuring the industry has access to the necessary skills it requires to operate safely and productively.

3.1.11.2 Skilled Labour Availability – Operations and Maintenance Workforce

Nationally, the oil and gas industry continues to experience challenges in accessing and retaining the skilled labour it needs, which APPEA has previously referred to as a “pivotal

concern”. The “rapid expansion trajectory and largely concurrent project scheduling” means that industry’s skilled labour demands will rise significantly as project construction phases complete and the seven LNG projects currently under construction across the country commence operations. It is also necessary for the industry to offer long-distance commuting roles as facilities may be in remote areas (eg offshore facilities).

Maintenance requirements associated with a 21 LNG train environment in Australia is growing concern of oil and gas operating companies. The criticality of timing and budget matters in an LNG train shutdown context means operating companies will need to ensure maintenance shutdown crews have the necessary qualifications and industry experience. The Accenture report details difficulties experienced by the oil and gas industry in delivering successful shutdowns. According to the report, as the complexity of the shutdown increases, the over-runs in terms of budget and schedule also increase. According to the report (and Asset Performance Network benchmarks), 68 per cent of all shutdowns in the industry fail to satisfy performance goals (defined as +/-10 per cent of budget and schedule and no trips after start up). With 42 per cent of all shutdowns missing these performance goals by a significant margin (by 30 per cent or more) it is questionable whether existing skilled labour markets can cope with the additional demand a 21 LNG train environment will bring.

Shutdown activity typically requires a significant number of high risk work holders on site to perform work in a compressed timeframe. Industry has expressed concern at the quality of training delivery and assessment of high risk work in Western Australia and also the adequacy of the current licensing regime. In a number of cases, high risk work licence holders have gained tickets without demonstration of their competence in the workplace. In some cases, poor practices in terms of assessment (eg group assessment) has not allowed individuals undertaking training to practically demonstrate their competence in a training environment. This is placing a focus on verification of competence processes as a means of industry determining which providers and assessors are producing industry standard outcomes.

On the basis of industry concerns, the VET regulator in Western Australia, the Training and Accreditation Council (TAC) has initiated a strategic industry audit of high risk work delivery and assessment in Western Australia. The RITC and CME are both represented on the audit reference group.

3.1.11.3 Skill Sets and Funding

Current qualification structures and funding guidelines may discriminate against more flexible and innovative training solutions addressing specific industry job role skill requirements. This is an issue for training package structures and the training package development process.

3.1.11.4 Productivity and the Cost of Doing Business

Australia’s declining productivity and cost competitiveness are factors influencing whether the $180 billion in potential oil and gas projects will be realised.

3.1.11.5 Electrical Licensing

Western Australia’s oil and gas industry has traditionally utilised the metals and engineering electrical qualification (MEM) as the pathway to train its licensed electricians. Creation of an MEM industrial electrician qualification and its endorsement through VET system processes and the electrical regulator in Western Australia will ensure retention of this important pathway.
3.1.11.6 Lack of STEM Focus

A significant number of technical and professional occupations within the highly skilled oil and gas industry require individuals that have well-developed science, technology, engineering and mathematics (STEM) skills. A recent study by the Australian Industry Group found that 41 per cent of technician and trades worker jobs and 27 per cent of professional jobs are experiencing shortages due to deficiencies in STEM skills. These skills are fundamental to Western Australia’s oil and gas sector and efforts must be made within the school system to address this lack of emphasis on STEM subjects.

The Technology and Industry Advisory Council (TIAC) report\textsuperscript{33} on STEM underscores the importance of STEM subjects in schools to ensure capacity for innovation and economic growth is not unduly limited in this state.

\textsuperscript{33} TIAC, Optimising STEM Education in WA Schools, prepared by Edith Cowan Institute for Education Research, February 2014.
Skilling WA: Strategic Goal 1
Increase participation in the workforce particularly among the under-employed and disengaged, mature-aged workers, Aboriginal and Torres Strait Islander and other under-represented groups.

<table>
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<tr>
<th>Issue (from Section 3)</th>
<th>Strategy</th>
<th>Skilling WA Priority Action</th>
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</thead>
<tbody>
<tr>
<td><strong>Greater Female Workforce Participation</strong></td>
<td>The RITC will continue to champion greater female workforce participation in the Western Australian oil and gas industry through independent consultation and communications channels. In addition: • The RITC will promote best practice examples of initiatives that oil and gas companies have in place to deal with the issue of gender diversity and initiatives of the Chamber of Minerals and Energy and APPEA that aim to champion the role of women in the oil and gas industry.</td>
<td>1.1.1 – Industry leadership in workforce participation 1.2.6 – Workforce participation of under-represented groups</td>
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### Skilling WA: Strategic Goal 3

Attract workers with the right skills to the Western Australian workforce and retain them by offering access to rewarding employment and a diverse and vibrant community and environment to live in.

<table>
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<tr>
<th>Issue (from Section 3)</th>
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<tbody>
<tr>
<td><strong>Accessing and Retaining a Skilled Labour Force</strong></td>
<td>- The RITC will continue to promote STEM and careers in the oil and gas industry to young people, co-ordinators of VET programs in schools and those seeking to make career decisions.</td>
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<td></td>
<td>-</td>
<td>3.1.1 – Industry leadership in attraction and retention</td>
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There is a need to provide a clear perspective on employment opportunities and job roles available in the oil and gas industry and what employers are seeking in potential recruits. There is a false perception in the community the industry employs large numbers of people and a general lack of awareness of the industry’s technological sophistication.
### Skilling WA: Strategic Goal 4

Provide flexible, responsive and innovative education and training which enables people to develop and utilise the skills necessary for them to realize their potential and contribute to Western Australia’s prosperity.

<table>
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<tr>
<th>Issue (from Section 3)</th>
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<tr>
<td><strong>Relevance of Delivery</strong></td>
<td>• The RITC will investigate the uptake of higher level VET qualifications (process operations and engineering) across the oil and gas industry to determine whether the existing qualifications align to industry job roles or whether there is a case for change.</td>
<td>4.2.1 – Industry leadership in training</td>
</tr>
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</table>

For the VET sector to successfully develop the skills of the resources sector workforce, the training delivered must be relevant, flexible, innovative and industry-led. Increasing use of technology in the industry has prompted discussion regarding higher level VET qualifications in the industry.
| Skill Sets and Funding | The RITC is keen to promote flexible, innovative and fit for purpose training models to respond to skill demands identified by the RITC industries.  
- A second phase of the RITC skill sets work will be undertaken to examine implementation issues in a discreet geographic area (Pilbara region of Western Australia) | 4.2.1 – Industry leadership in training |
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<tr>
<td><strong>Productivity and Quality of Delivery and Assessment</strong></td>
<td>- The RITC will work with operating companies, RTOs and the oil and gas industry regulator to explore issues associated with the delivery and assessment of high risk work in Western Australia.</td>
<td>4.2.1 – Industry leadership in training</td>
</tr>
<tr>
<td><strong>Electrical Licensing</strong></td>
<td>- The RITC will work with MSA, oil and gas industry representatives and the electrical regulator in the development of a new Industrial Electrician qualification under the metals and engineering qualification that meets electrical regular requirements for issuance of an electrician’s licence in Western Australia.</td>
<td>4.2.1 – Industry leadership in training</td>
</tr>
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</table>

Skill Sets and Funding
Current qualification structures and funding guidelines may discriminate against more flexible and innovative training solutions that are applicable to the resources sector context. Often, training providers and employers are choosing to train people in full qualifications for funding reasons even if the qualification doesn’t align with job role or need.
<table>
<thead>
<tr>
<th>Lack of STEM focus</th>
<th>4.2.1 – Industry leadership in training</th>
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<tr>
<td>A significant number of technical and professional occupations within the highly skilled oil and gas industry require individuals that have well-developed science, technology, engineering and mathematics (STEM) skills. These skills are fundamental to Western Australia’s oil and gas sector and efforts must be made within the school system to address this lack of emphasis on STEM subjects.</td>
<td>The RITC will promote science, technology, engineering and mathematics (STEM) pathways to ensure that VET and HE initiatives reflect the expertise in demand by the Western Australian resources sector.</td>
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<tr>
<td>Issue (from Section 3)</td>
<td>Strategy</td>
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<tr>
<td><strong>Productivity and the Cost of Doing Business</strong></td>
<td>The RITC supports the positions of CME and APPEA in advocating for a policy environment that allows the continuation of fly in/fly out work practices and the accommodation of a FIFO workforce in regional locations.</td>
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</table>

With the oil and gas industry operating in remote locations, it is essential the policy environment is conducive to it offering its employees choice in terms of work arrangements and has the capacity to accommodate its workforce accordingly in regional locations.
### Skilling WA Strategic Goal 4:

**Strategy from Section 4:** The RITC will work with operating companies, RTOs and the oil and gas industry regulator to explore issues associated with a consistent application of processes across the industry to ensure the verification of competence.

<table>
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<tr>
<th>Recommended Priority Action(s)</th>
<th>Steps to Implement Actions</th>
<th>Priority</th>
<th>Date to be completed</th>
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</table>
| Under auspices of the Collaborative Oil and Gas project steering committee, the RITC will facilitate industry adoption of a common standard and approach to verification of competence (VoC) processes across the oil and gas industry, including service providers to the industry. | • Determine existing practices in industry.  
• Determine existing verification of competence tools in use by operating companies  
• Circulate model tools for validation in industry (with a focus on large and small operating companies)  
• Establish governance protocols around who has access to the tools and how they are to be implemented  
• Pilot an approach across a number of operators in a discreet work area  
• Examine results of pilot and extend approach to cover (initially) all high risk work areas. | High | Second half 2016 |

**Lead Agency:** RITC
**Skilling WA Strategic Goal 4:** Flexible, responsive and innovative education and training.

**Strategy from Section 4:** The RITC will commission a collaborative oil and gas training project to identify existing collaborations in the oil and gas industry currently and to identify potential models that industry would be prepared to support to ensure it has access to the skills required during the operations phase of oil and gas project developments.

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| As the oil and gas industry transitions from construction to operations, the industry is becoming focused on maximising productivity and effectively managing costs. There is a general recognition that existing skills development regimes are not optimised and result in inefficiencies across operating companies, variable outcomes and duplication. There is an appetite to explore alternative models to create a skills development market that better meets the needs of industry. | • Develop a project scope in association with RITC stakeholders.  
• Determine project methodology.  
• Gain industry nominations (senior operations level) to sit on project steering group.  
• Develop understanding of current supply and demand for critical operational and maintenance skills as defined by industry.  
• Determine any areas of mis-match.  
• Develop collaborative models to address identified areas for consideration by industry including resourcing and governance considerations.  
• Develop roadmap for implementation including timelines. | High | October 2015 |

Lead Agency: RITC
Skilling WA Strategic Goal 4: Flexible, responsive and innovative education and training

Strategy from Section 4: The RITC will work with MSA, oil and gas industry representatives and the electrical regulator in the development of a new Industrial Electrician qualification under the metals and engineering qualification that meets electrical regular requirements for issuance of an electrician’s licence in Western Australia.

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| Development of an engineering focused training package industrial electrician qualification that addresses the needs of resources sector employers and meets the requirements of the electrical and VET regulator. | - Advocate on behalf of industry with the WA Electrical licensing Board regarding finalisation of transition arrangements associated with implementation of the new industrial electrician qualification.  
- Work with MSA/SSO/EATC and RTOs to ensure take up of new qualification through professional development sessions around its content and application.  
- Liaise with the WA VET regulator to determine possibility of a follow up strategic audit to evaluate implementation of the new MEM qualification. | High     | October 2015 for finalisation of new qualification and implementation arrangements  
December 2016 for TAC strategic audit.                                               |

Lead Agency: RITC
**Skilling WA Strategic Goal 4:** Flexible, responsive and innovative education and training.

**Strategy from Section 4:** The RITC is keen to promote flexible, innovative and fit for purpose training models to respond to skill demands identified by the RITC industries. A second phase of the RITC skill sets work will be undertaken to examine implementation issues in a discreet geographic area (Pilbara region of Western Australia).

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| Current qualification structures and funding guidelines may discriminate against more flexible and innovative training solutions that are applicable in an oil and gas context, particularly in relation to the adoption of new technology which may blur existing occupational boundaries. | - Identify areas for investigation that relate to industry and community demand in the target region (Pilbara).  
- Investigate policy and funding parameters for skill sets in Western Australia.  
- Determine approach for pilot  
- Engagement with industry/employers in the region in target area  
- Implement pilot | High | June 2016 for implementation of pilot approach |

Lead Agency: RITC/Pilbara Institute
**Skilling WA Strategic Goal 4**: Flexible, responsive and innovative education and training

**Strategy from Section 4**: The RITC will work with operating companies, RTOs and the oil and gas industry regulator to explore issues associated with the delivery and assessment of high risk work in Western Australia.

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| Development of an industry high risk work education strategy for the oil and gas and mining sectors. | • Participate in the TAC strategic industry audit for high risk work training delivery and assessment in Western Australia.  
• Develop a document which outlines best practice relating to high risk work training delivery and assessment practices following consultation with RTOs and industry. | High     | June 2016 following completion of the TAC high risk work strategic industry audit. |

Lead Agency: RITC
SECTION 6 PLAN ADMINISTRATION

Plan Contact
This plan is maintained by the Manager for the Resources Industry Training Council. Feedback regarding this plan should be made in writing to:

a Email: n.haywood@cmewa.com
b Mail: RITC, Locked Bag N984, Perth, WA 6844
c Fax: (08) 9221 3701
d Office phone number: (08) 9220 8538

Review Requirements and Issue History
Schedule 2 of the Service Agreement requires that this plan is reviewed and updated annually.

This issue entirely supersedes the previous issue of the plan. Superseded issues should be destroyed, or clearly marked as superseded and removed from general circulation and the Training Council website.

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<th>Issue No.</th>
<th>Year Approved</th>
<th>Comments/Summary of Main Changes</th>
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<td>2</td>
<td>2014</td>
<td>Updated ABS data, training data, industry intelligence, strategies and priority actions.</td>
</tr>
<tr>
<td>3</td>
<td>2015</td>
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</table>

Distribution List
This plan is issued electronically on the Training Council website after it is approved. Print/paper copies are provided as follows (if applicable).

This IWDP will be issued electronically via the RITC website, www.ritcwa.com.au. It will also be forwarded through to the RITC Advisory Board.

Consultation for this Issue
The review of this issue of this plan was coordinated by the Manager for the Resources Industry Training Council. This issue was updated/re-written as part of the annual review process and the main round of consultation with industry representatives and the Resources Industry Training Council Advisory Board occurred throughout 2015.

Over this period the committee invited comment from a range of stakeholders, at broad forums such as the RITC/SkillsDMC Network meetings, as well as independent industry consultation.

Communications Plan Summary
Once the plan is approved, its update will be:

a endorsed by the Resources Industry Training Council Advisory Board
b noted by the Department of Training and Workforce Development
c posted on the Resources Industry Training Council website and promoted through social media.
Validation of this Plan

Arrangements in this plan will be validated within the annual review cycle through consultation with the Resources Industry Training Council Advisory Board at the quarterly meetings.
SECTION 7 LIST OF TABLES

This section should be used to provide a list of tables and graphs used within the main body of the document.

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<td>Figure 10:</td>
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</tr>
<tr>
<td>Figure 11:</td>
<td>Oil and Gas Indigenous Participation Rate in Western Australia, compared with total employment across each industry sub-division; Source: 2011 Census of Population and Housing</td>
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Figure 12: RITC IBT VET Enrolments for PMA Training Package; Source: Department of Training and Workforce Development; June 2015 ................................................................. 47

Figure 13: Apprentices and Trainees in the Oil and Gas Industry – ANZSIC 0700, 1011, 1701 and 1811; Source: NCVER VOCSTATS; March 2015 ........................................................................................................................................................................ 48

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SECTION 8 GLOSSARY

The following terms that are used in this plan are particular to this Training Council.

**Acronyms**

Please note that all terms are written in full before acronyms are used.

ABS  Australian Bureau of Statistics
ACEPT Australian Centre for Energy and Process Training
ADIA  Australian Drilling Industry Association
AIP  Australian Industry Participation
ANZSCO Australian New Zealand Standard Classification of Occupations
ANZSIC Australian New Zealand Standard Industry Classification
APLAC Asia Pacific Laboratory Accreditation Cooperation
APPEA Australian Petroleum Production and Exploration Association
AQF  Australian Qualifications Framework
ASQA  Australian Skills Quality Authority
AWDC  Aboriginal Workforce Development Centre
AWPA  Australian Workforce and Productivity Agency
AWRA  Australian Women in Resources Alliance
BREE Bureau of Resources and Energy Economics
CME  Chamber of Minerals and Energy of Western Australia
CMT  Construction Materials Testing
COAG  Council of Australian Governments
CPM  Carbon Pricing Mechanism
CSOL  Consolidated Sponsored Occupation List
DEEWR Department of Education, Employment and Workplace Relations
DIAC Department of Immigration and Citizenship
DIDO  Drive-In Drive-Out
DIISRTE Department of Industry, Innovation, Science, Research and Tertiary Education
DIMP Department of Immigration and Border Protection
DMP  Department of Mines and Petroleum
DoI  Department of Industry
DSD  Department of State Development
DTWD  Department of Training and Workforce Development
EAG  Energy Apprenticeships Group
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>EATC</td>
<td>Engineering Automotive Training Council</td>
</tr>
<tr>
<td>EBT</td>
<td>Employment-based training</td>
</tr>
<tr>
<td>EIS</td>
<td>Exploration Incentive Scheme</td>
</tr>
<tr>
<td>EMAs</td>
<td>Enterprise Migration Agreements</td>
</tr>
<tr>
<td>ENS</td>
<td>Employer Nomination Stream</td>
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<tr>
<td>EOWA</td>
<td>Equal Opportunity for Women in the Workplace Agency</td>
</tr>
<tr>
<td>EUPA</td>
<td>Electrical, Utilities and Public Administration Training Council</td>
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<tr>
<td>FID</td>
<td>Final Investment Decision</td>
</tr>
<tr>
<td>FIFO</td>
<td>Fly-in Fly-out</td>
</tr>
<tr>
<td>FLNG</td>
<td>Floating Liquefied Natural Gas (facility)</td>
</tr>
<tr>
<td>GSP</td>
<td>Gross State Product</td>
</tr>
<tr>
<td>HE</td>
<td>Higher Education</td>
</tr>
<tr>
<td>IBT</td>
<td>Institutionally-based training</td>
</tr>
<tr>
<td>ICNL</td>
<td>Industry Capability Network Limited</td>
</tr>
<tr>
<td>ILAC</td>
<td>International Laboratory Accreditation Cooperation</td>
</tr>
<tr>
<td>ILP</td>
<td>Indigenous Leadership Program</td>
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<td>IWDP</td>
<td>Industry Workforce Development Plan</td>
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<td>LAs</td>
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<tr>
<td>LNG</td>
<td>Liquefied Natural Gas</td>
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<td>MCA</td>
<td>Minerals Council of Australia</td>
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<tr>
<td>MEA</td>
<td>Mining Education Australia</td>
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<tr>
<td>MEP</td>
<td>Metallurgical Education Partnership</td>
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<tr>
<td>MGH</td>
<td>Minerals Geoscience Honors</td>
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<tr>
<td>MGM</td>
<td>Minerals Geoscience Masters</td>
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<tr>
<td>MINAD</td>
<td>Minerals Industry National Associate Degree Program</td>
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<tr>
<td>MRRT</td>
<td>Minerals Resource Rent Tax</td>
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<td>MSA</td>
<td>Manufacturing Skills Australia</td>
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<tr>
<td>MTEC</td>
<td>Mining Tertiary Education Council</td>
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<td>NATA</td>
<td>National Association of Testing Authorities</td>
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<tr>
<td>NCVER</td>
<td>National Centre for Vocational Education and Research</td>
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<td>Nfd</td>
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<tr>
<td>NICNAS</td>
<td>National Industrial Chemicals Notification and Assessment Scheme</td>
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<td>NOLA</td>
<td>National Occupational Licensing Authority</td>
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<td>National Occupational Licensing System</td>
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<td>NOM</td>
<td>Net Overseas Migration</td>
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<td>NRSET</td>
<td>National Resources Sector Employment Taskforce</td>
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<td>National Skills Standards Council</td>
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<td>NWS</td>
<td>North West Shelf</td>
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<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<tr>
<td>OS&amp;H</td>
<td>Occupational Safety and Health</td>
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<td>PACIA</td>
<td>Plastics and Chemicals Industries Association</td>
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<td>PwC</td>
<td>Pricewaterhouse Coopers</td>
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<td>Reconciliation Action Plan</td>
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<td>RSMS</td>
<td>Regional Skilled Migration Scheme</td>
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<td>RSPT</td>
<td>Resource Super Profits Tax</td>
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<td>RTO</td>
<td>Registered Training Organisation</td>
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<td>SAMP</td>
<td>Supplier Access to Major Projects</td>
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<td>Safety Institute of Australia</td>
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<td>Strategic Industry Audit</td>
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<td>State Priority Occupation List</td>
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<td>State Training Provider</td>
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<td>Training Accreditation Council</td>
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<td>VET</td>
<td>Vocational Education and Training</td>
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<td>VET in Schools</td>
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<td>VOC</td>
<td>Verification of Competency</td>
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<td>WASMOL</td>
<td>Western Australian Skilled Migration Occupation List</td>
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<td>Women in Mining Western Australia</td>
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<td>WIP</td>
<td>Work Innovation Program</td>
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