AUSTRALIAN
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STANDARDS

ESI GENERATION IRC WORKPLAN

AUSTRALIAN INDUSTRY STANDARDS

ESI GENERATION IRC WORKPLAN

This Four-Year Workplan has been submitted by the Electricity Supply Industry (ESI) Generation Industry Reference Committee (IRC) to Australian Industry and Skills Committee (AISC) for approval.

The Workplan identifies the priority skill needs of the ESI Generation industry following a research and stakeholder consultation process conducted by Australian Industry Standards on behalf of the IRC.

Once approved by the AISC the Workplan informs the development of a four year rolling National Schedule for development and review work of the UEP12 Electricity Supply Industry – Generation Sector Training Package. More information on the National Schedule can be found at: www.aisc.net.au/content/national-schedule

This Workplan was agreed to by the ESI Generation IRC Interim Chair on Wednesday, 28 September 2016:

Richard Harvey
ESI GENERATION IRC INTERIM CHAIR

HOW TO USE THIS DOCUMENT

This document contains links to assist the reader to navigate efficiently through the content of the Workplan. The tiles on the cover page, and the divider pages will link to the relevant content when clicked with a mouse, or touched on a tablet device.

The tiles at the bottom of pages can be clicked to return to the beginning of each section, or the front page of the Workplan as required.

ESI GENERATION SECTOR INDUSTRY REFERENCE COMMITTEE

The ESI Generation Sector Industry Reference Committee has been assigned responsibility for the UEP12 Electricity Supply Industry – Generation Sector Training Package.

The UEP12 Electricity Supply Industry – Generation Sector Training Package provides the only nationally recognised Vocational Education and Training (VET) qualifications for occupations involved in the electricity generation sector of the electrical supply industry including: plant operations support, systems operations, plant operations, electrical and mechanical maintenance and large scale wind generation maintenance.

More information about the ESI Generation Sector IRC and its work can be found here: http://www.australianindustrystandards.org.au/committee/esi-generation-sector-industry-reference-committee/

ESI GENERATION SECTOR OVERVIEW

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ESI GENERATION INDUSTRY OVERVIEW

The ESI Generation industry has an estimated annual revenue of $17.2 billion, adding $6 billion to the Australian economy in 2015-16. The industry employs almost 11,500 people across Fossil Fuel and Renewable Generation. Although the demand for electricity is expected to increase over the next five years, public concern about the environment represents a significant challenge for the industry.

Australia's electricity generation fuel mix includes fossil fuel, hydro-electricity, wind and other renewable sources. A majority of Australia's electricity demand is met by fossil fuel power stations that run on black coal, brown coal and natural gas.

Hydro-electricity generation is a significantly smaller sector in comparison to fossil fuel representing just $1.6 billion in revenue. However, the industry is already heavily regulated which restricts the possibility of expansion. Evidence suggests that over the last five years the growth of establishments in the industry has increased only marginally and it suggests that over the next five years this number is set to fall slightly potentially leading to lower employment opportunities and firms focussed on driving up efficiency.

The wind and renewables generation sector, although the smallest revenue contributor at just $2.0 billion 2015-16, has flourished over the last five years in part due to a supportive policy environment and incentives designed to promote renewable energy generation. In addition, rapid technological improvements in this industry has seen a greater demand for electricity from renewable sources suggesting that this sector is set to grow and provide opportunities for employment, skills development and training.

The UEP12 Electricity Supply Industry – Generation Sector Training Package comprises 13 qualifications, four skill sets, 244 units of competency and associated assessment requirements and covers: Generation Operations and Maintenance, Large Scale Renewables and Remote Area Supply.

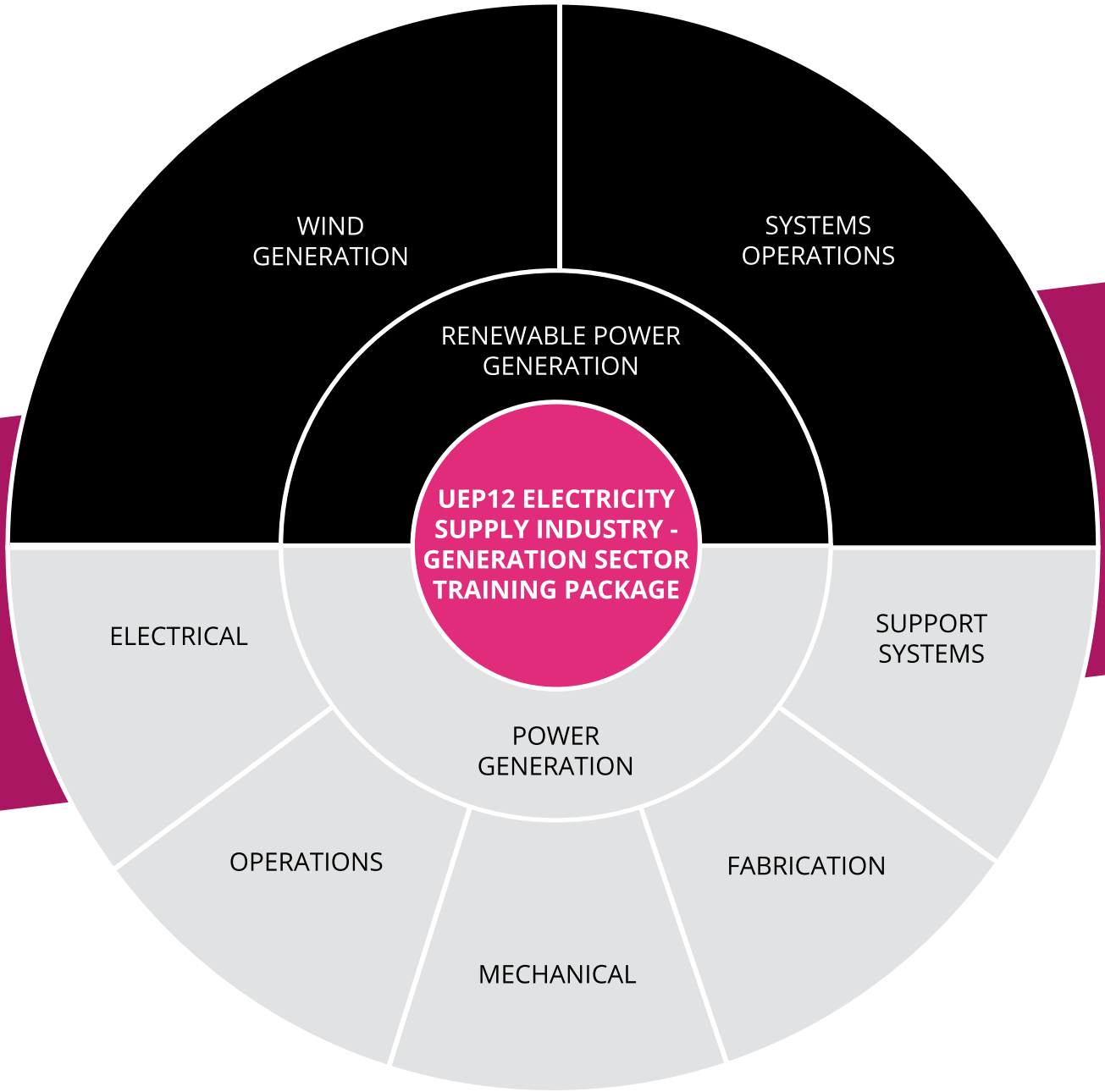
The UEP12 Electricity Supply Industry – Generation Sector Training Package provide the only nationally recognised Vocational Education and Training (VET) qualifications for occupations involved in the electricity generation sector of the electrical supply industry including: plant operations support, systems operations, plant operations, electrical and mechanical maintenance and large scale wind generation maintenance.

The UEP12 Electricity Supply Industry – Generation Sector Training Package contains the following qualifications:

- Certificate II in ESI Generation - Operations Support
- Certificate III in ESI Generation - Systems Operations
- Certificate III in ESI Generation - Operations
- Certificate IV in ESI Generation Maintenance (Mechanical)
- Certificate IV in ESI Generation Maintenance (Fabrication)
- Certificate IV in ESI Generation - Systems Operations
- Certificate IV in ESI Generation Maintenance - Electrical Electronics
- Certificate IV in ESI Generation - Operations
- Certificate IV in Large Scale Wind Generation - Electrical
- Diploma of ESI Generation (Operations)
- Diploma of ESI Generation Maintenance - Electrical Electronic
- Diploma of ESI Generation - Systems Operations
- Diploma of ESI Generation (Maintenance)

AUSTRALIAN INDUSTRY STANDARDS

UEP12 ELECTRICITY SUPPLY INDUSTRY - GENERATION SECTOR TRAINING PACKAGE ARCHITECTURE

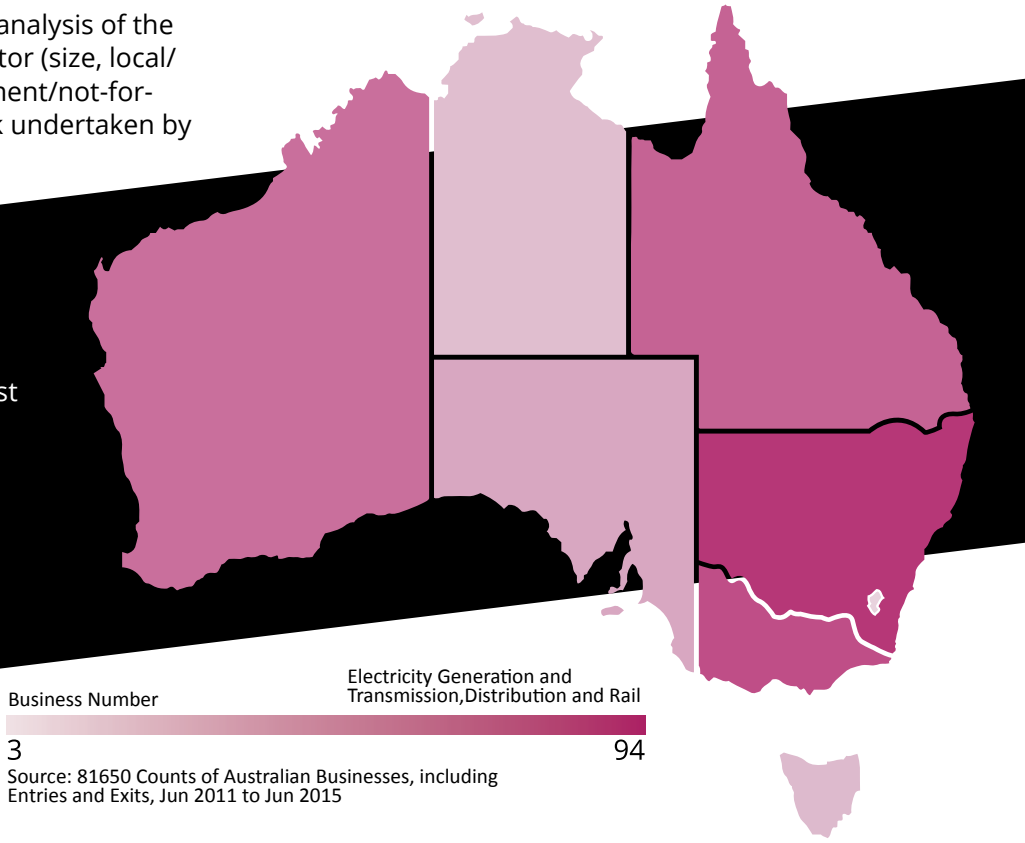


SECTOR OVERVIEW FRONT PAGE

ESI GENERATION BUSINESS ANALYSIS

The following image provides analysis of the businesses involved in the sector (size, local/state/national/global, government/not-for-profit/for-profit, scope of work undertaken by those businesses).

While NSW is home to the most enterprises, WA and NT have the most Electricity Supply enterprises per capita.

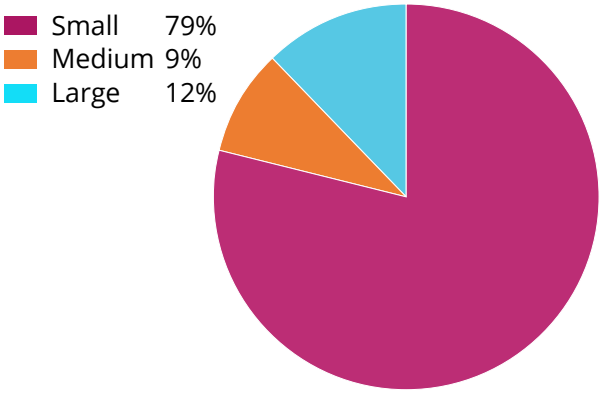


Source: 81650 Counts of Australian Businesses, including Entries and Exits, Jun 2011 to Jun 2015

Business Analysis Metrics

Revenue ($m)	17,675.70
Profit ($ m)	2440.4
Average Wage ($)	106,188.11
No. of Businesses	415
Employment Growth (% to 2021)	-3%

Business Size (Composition)



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KEY ESI GENERATION STAKEHOLDERS

Stakeholder Category	Organisation	
Employers	AGL Aurora Energy Ausgrid AusNet Services Endeavour Energy Energex Ergon Energy Power and Water Corporation - NT	Essential Energy Horizon Power Jemena Powercor Australia SA Power Networks United Energy Distribution Western Power
Employer Representatives	Australian Pump Industry Association Clean Energy Council	Energy Networks Australia The Australian Power Institute
Employee Representatives	Australian Services Union Electrical Trades Union	
Licensing/ Regulatory	Australian Energy Market Commission Australian Energy Regulator Safe Work Australia	
Government	Federal, State/Territory Departments	
Industry Advisory	Electrotechnology, Power and Communications Industries Industry Training Board – Victoria Energy Skills - QLD Energy Skills - SA Industry Skills Advisory Council - NT	Utilities and Electrotechnology Industry Training Advisory Board - NSW Utilities, Engineering, Electrical and Automotive Training Council Utility Market Intelligence
Training Organisations	TAFEs, Private RTOs, Enterprise RTOs	

The Electricity Supply Industry - Generation Sector Training Package is in the Scope of Registration of 44 Registered Training Organisations.

INDUSTRY CHALLENGES AND OPPORTUNITIES

TRANSITION AWAY FROM CARBON INTENSIVE GENERATION

The industry faces future challenges with an increased focus on renewable energy due to concerns about the environment and consequent government policies that promote renewable energy generation. This changed focus will limit fossil fuel electricity production over the next five years, and subsequently reduce total wages and employment numbers in the industry[1]. Within the grid-supplied electricity sector, consumption is predicted to remain flat for the coming years[2], leading to a changed focus from operations to maintenance[3].

CLOSURE OF THERMAL POWER STATIONS

There are concerns about the oversupply of electricity, with more power plants and the focus on renewable energy sources resulting in overcapacity[4]. Industry participants have built new power plants over the past decade based on forecasts of growing electricity demand[5]. New renewable capacity has also been established, but capacity has not been significantly curtailed to avoid oversupply, although some plants have been mothballed[6]. Less-competitive plants are expected to continue to be mothballed or closed over the next five years[7], meaning enterprise and establishment numbers are set to fall slightly over this period. There are also concerns within the industry that the ageing of generation assets and increased maintenance needs could increase the variability of electricity supply over this period[8].

DECENTRALISED ELECTRICITY GENERATION

It is predicted there will be a decline in demand for centrally generated electricity over the next five years. This trend is expected to continue as the decline in the energy-intensive manufacturing industry shows no sign of abating[9].

This trend has occurred across fuel refining and metal processing industries over the past five years, and is set to continue in other manufacturing industries over the next five years.

EMPLOYMENT

EMPLOYMENT STATISTICS

WORKFORCE CHALLENGES AND OPPORTUNITIES

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EMPLOYMENT

EXPLANATORY NOTES

Workforce

The size of an industry's workforce is established by the Australian Bureau of Statistics (ABS) using two different approaches. The Labour Force survey, which provides a 30-year view of the industry, assigns each industry category based on the main job of the respondent. The Australian Industry dataset (which the Workforce Projections charts are based on), uses a top-down approach where industries are primarily classified by the single predominant industry class associated with a business' ABN. An industry's workforce therefore is bounded in the first instance by the occupations of workers and in the second by the primary business of an enterprise. The different approaches can therefore result in quite different workforce figures.

AIS has chosen to distinguish these approaches using the terms **Workforce – Occupation based** and **Workforce – Employer based**.

Enterprise size

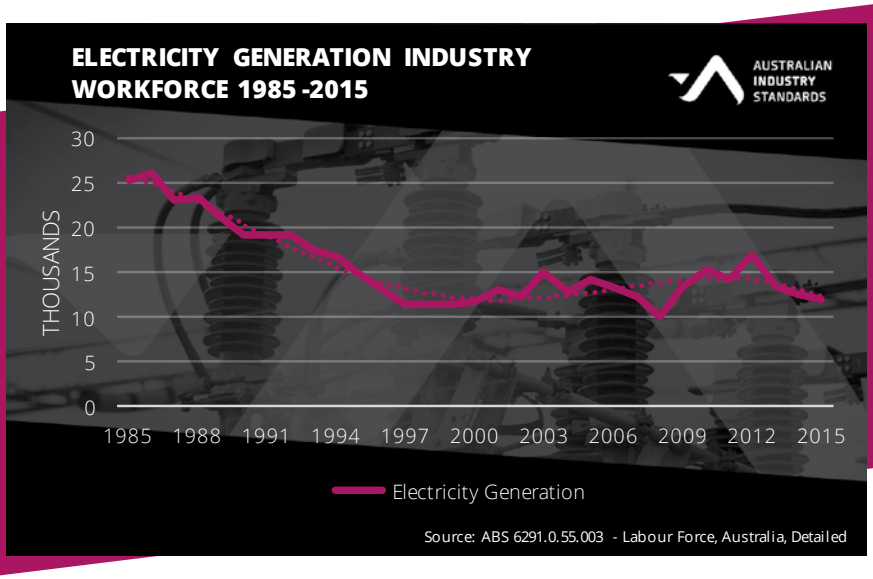
Industry definition by ABN also applies to the Counts of Australian Businesses data (size and distribution). Furthermore, low level values in these tables are subject to perturbation to anonymise the data. This may result in some areas with a low level value being perturbed to zero.

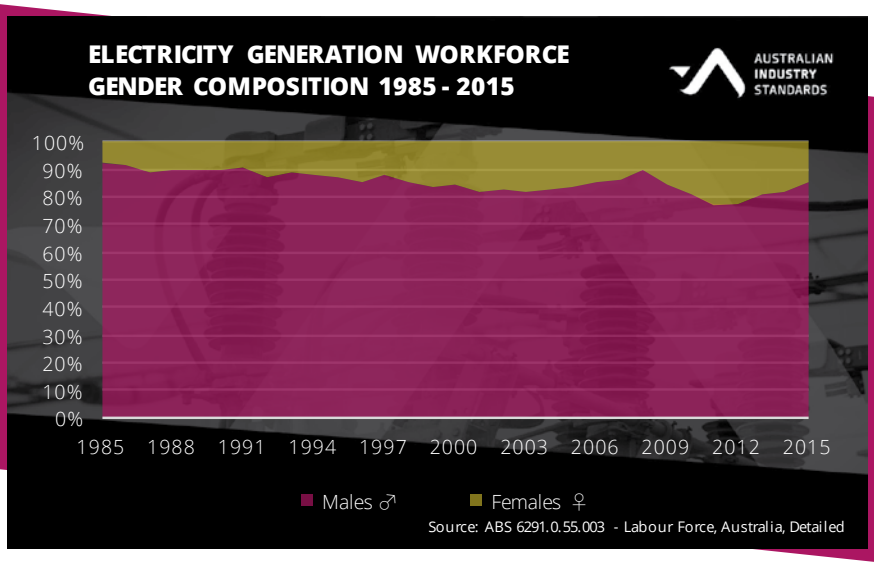
Exemptions

The scope of the Labour Force Survey is limited to the civilian population of Australia and therefore members of permanent defence forces are excluded from the survey.

EMPLOYMENT HISTORY - OCCUPATION BASED

The Electricity Generation workforce halved to around 12500 from 1985 to 2000 and has remained relatively stable since.





The proportion of females in the industry has almost doubled to 15% since 1985.

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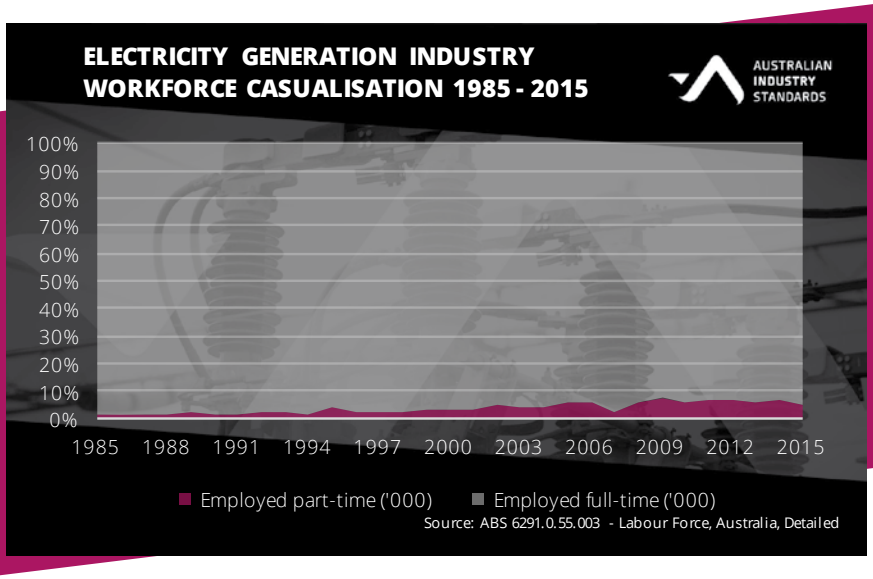
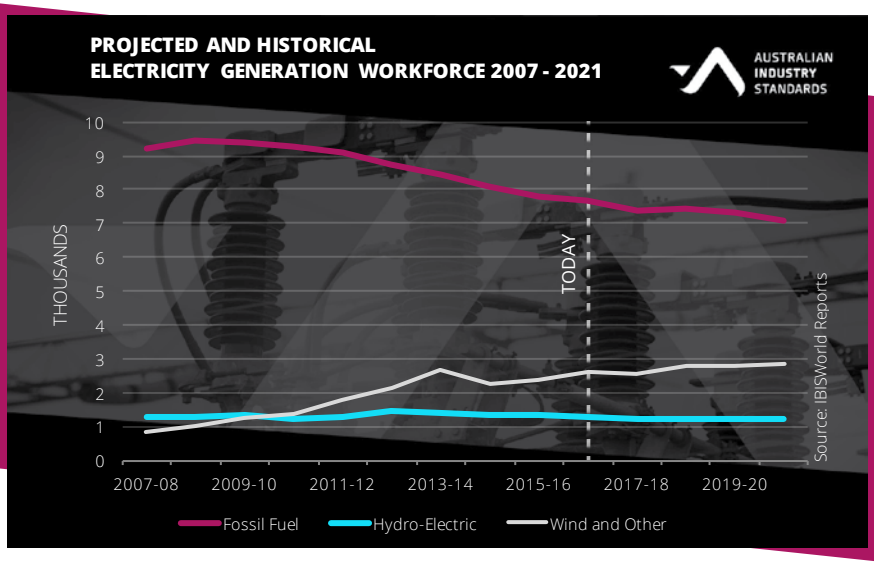
The Electricity Generation industry historically has had relatively few part-time workers, with as little as 1.6% in 1985 but that number has grown to almost 5% today.



EMPLOYMENT PROJECTION - EMPLOYER BASED



The workforce is expected to fall by as much as 3% in the coming five years but this will be offset somewhat by increases in the Renewable Energy sector.

EMPLOYMENT FRONT PAGE

WORKFORCE SUPPLY-SIDE CHALLENGES AND OPPORTUNITIES

AUTOMATION AND TECHNOLOGY CHANGES

Technology represents a challenge and a fillip for the electricity generation industry. Industries are using technology to modernise their workforces, reduce costs and improve production.

Automation can either be applied to a relatively small part of a larger plant control system, or scaled up to fully-automated power stations[10]. The Department of Industry, Innovation and Science, ranks Power Generation Plant Operators as being at mid-range risk of automation[11].

Another significant change is the introduction of remote monitoring, where experts can remotely log-in to check the status of a whole control system, detailing findings and any actions required.

Predictive analysis tools are also assisting and enhancing maintenance activity. Predictive analysis of sensor data - process, condition monitoring and electrical sensor data - provides early warnings of emerging reliability, efficiency, throughput and environmental and safety compliance issues. Technology has led to a fall in labour costs due to improved plant automation and operation.

SKILLS OUTLOOK

INTERNATIONAL / NATIONAL WORKPLACE TRENDS

PRIORITY SKILLS

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SKILLS OUTLOOK

TECHNOLOGY AND RENEWABLES

There are a number of trends that are shaping the workplace and job design of the ESI Generation industry. There has been a move away from carbon intensive power generation, the closure of thermal power stations and a rise in renewable energy generation. The sector is also operating in an increasingly automated operating environment with the use of big data for decision making and efficiency gains.

The industry faces future challenges with an increased focus on renewable energy supported by government policies that promote renewable energy generation.

The industry faces automation which can either be applied to a relatively small part of a larger plant control system, or scaled up to fully-automated power stations. Predictive analysis of sensor data - process, condition monitoring and electrical sensor data - provides early warnings of emerging reliability, efficiency, throughput and environmental and safety compliance issues.

These trends will see the skill set change for those working in the industry, with greater demand for skills in renewable energy systems, innovative operating systems, and big data analytics. The workforce will operate in an increasingly automated environment with a requirement to understand and apply new technologies.

Significant stakeholder feedback indicates that the Training Package has not kept pace with the changes in the industry, and that this has been the case for some time.

FUNDING AND APPRENTICESHIPS

Variations in jurisdictional funding and traineeship arrangements are reported as impacting the viability of delivering training, in particular for narrow markets and in specialist technical areas. Longer term, this situation may lead to capacity constraints for employers and training organisations alike. These conditions also present challenges for RTOs and when considering future investment in training infrastructure and equipment, particularly those involved in new technology. There is also concern that reduced apprentice recruitment and concurrent loss of knowledge and skills due to an ageing workforce is resulting in fewer institutions providing, or having the capability to provide, contemporary and industry-valued training.

PRIORITY SKILLS

ESI GENERATION SECTOR TECHNICAL SKILLS

Australian Industry Standards has developed this list of technical skills from analysis of the qualifications in the UEP12 Electricity Supply Industry – Generation Sector Training Package.

These skills can be grouped into three categories:

1. Power Generation Maintenance
2. Power Generation Boiler/Turbine/Generator Operations
3. Power Generation Supplementary Plant Operations

The interim IRC Chair strongly indicated that ESI Generation Technical Skills were the highest priority for the industry.

GENERIC SKILLS

Ranking of the 12 generic workforce skills in order of importance to the ESI Generation industry.

Skill	Priority
Technology	1
Managerial / Leadership	2
Data analysis	3
Environmental and Sustainability	4
Learning agility / Information literacy / Intellectual autonomy and self-management	5
Science, Technology, Engineering, Mathematics (STEM)	6
Communication / Virtual collaboration / Social intelligence	7
Language, Literacy and Numeracy (LLN)	8
Financial	9
Design mindset / Thinking critically / System thinking / Solving problems	10
Customer service / Marketing	11
Entrepreneurial	12

IDENTIFIED PRIORITY SKILLS

The list of priority skills below is based on advice from the interim ESI Generation Sector Industry Reference Committee Chair.

The priority skills are listed below in order of importance to the ESI Generation industry.

Skill	Priority
Electrical Maintenance	1
Power Generation Supplementary Plant Operations	2
Mechanical Maintenance	3
Boiler Operations	4
Ash and Dust Plant Operations	5

ELECTRICITY SUPPLY INDUSTRY - GENERATION SECTOR SKILLS-RELATED INSIGHTS

The ESI Generation industry is the largest provider of energy to Australian businesses, companies and consumers. The industry employs almost 12,000 people across the fossil fuel and renewable sectors, and has an estimated annual revenue of $17.6 billion, adding $6 billion to the Australian economy in 2015-16.

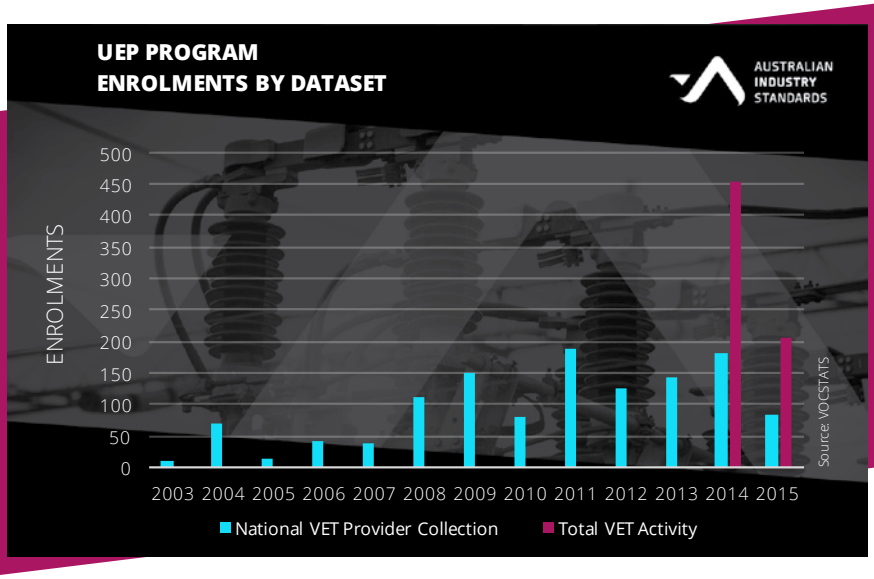
The ESI Generation industry refers to the generation of grid electricity using fossil fuels and renewable sources of energy such as hydropower, wind and other energy sources.

The increased focus on renewable energy both at home and in Government policy represents an enduring challenge to the industry. While grid-connected electricity consumption is predicted to remain flat in the coming years, there are concerns about the overcapacity in electricity supply. Less-competitive plants are expected to continue to be mothballed or closed over the next five years. There are also concerns within the industry regarding the ageing of generation assets and increased maintenance needs.

The interim ESI Generation Industry Reference Committee (IRC) Chair has strongly indicated that ESI Generation Technical Skills are the highest priority for the industry to prepare the workforce for current and future challenges. Technical skills focus on areas related to Electrical Maintenance, Mechanical Maintenance, Boiler Operations, Ash and Dust Plant Operations and Steam Turbine/Generation Plant Operations.

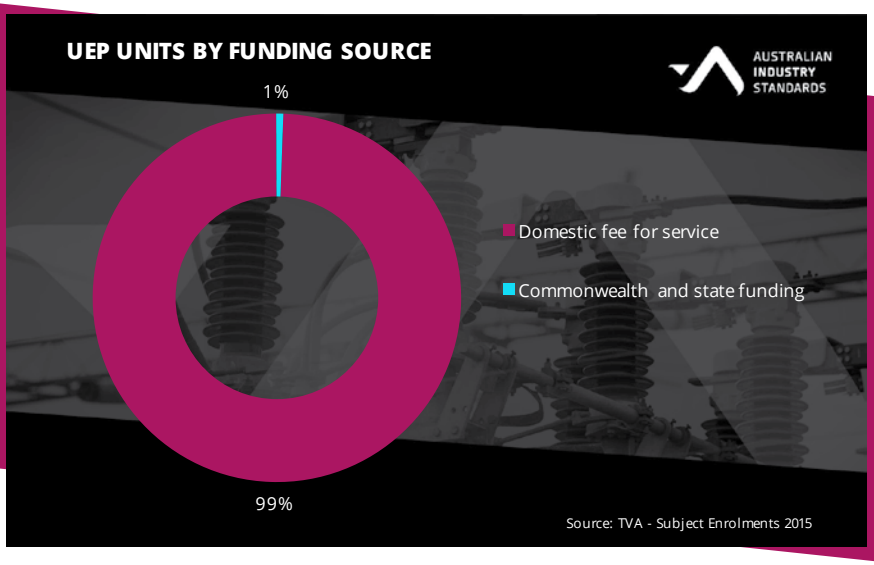
As is the case in most industries, the workforce is at continuing risk of automation but the implementation of various technologies is providing considerable productivity gains. Using remote monitoring, experts can remotely log-in to check the status of a whole control system, detailing findings and any actions required. Predictive analysis tools are also assisting and enhancing maintenance activity.

The industry is supported by the UEP12 Electricity Supply Industry - Generation Sector Training Package consisting of qualifications for systems operations, maintenance and large scale wind generation. Training enrolments have decreased substantially in the past year but for an industry of its size enrolments were already low adding to the year on year volatility. These reductions can also be attributed to a reduction in government subsidies and restricted eligibility for funding, particularly in Queensland and Victoria.



Vocational education enrolments are comparatively quite low for an industry of its size which cannot be explained by a marked skew towards tertiary qualifications.

The Electricity Generation industry funded nearly all (99%) of UEP training in 2015.



The ESI Generation industry workforce as a whole has halved in the last 30 years and is expected to fall by 3 per cent in the coming five years. In line with prevailing trends, employment in fossil fuel generation is projected to continue falling while employment in renewables will offset the decline somewhat. The adoption of home solar panels more widely and the effects of automation are likely to continue to dampen workforce growth.

Despite the wider workforce declines, the proportion of females in the industry has almost doubled to 15 per cent in 30 years. The ESI Generation industry historically has had relatively few part-time workers, with as little as 1.6 per cent in 1985 but that number has grown to almost 5 per cent today.

EXPLANATORY NOTES

The Training Enrolments charts compare two datasets; the **National VET Provider Collection** and the **Total VET Activity (TVA)** dataset. The primary distinction between the two is that Total VET Activity data is collected from all types of providers and not only those in receipt of Commonwealth or state funding. TVA data collection commenced in 2014.

Exemptions

Where the submission of training data to TVA conflicts with defence or national security legislation, or jeopardise the security or safety of personnel working in defence, border protection, customs or Australian police departments, an exemption from reporting training data is available.

Organisations that deliver training for vital services to the community (such as emergency, fire, first-aid and rescue organisations) may have received an exemption to submit data to TVA. From 1 January 2016 however, the exemption from reporting will apply only in respect of training activity not delivered on a fee-for-service/commercial basis.

REFERENCES

INDUSTRY CHALLENGES AND OPPORTUNITIES

[1] IBISWorld Report. Fossil Fuel Electricity Generation in Australia - D2611

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[4] Australian Energy Regulator. Generation Capacity and Peak Demand. https://www.aer.gov.au/wholesale-markets/wholesalestatistics/generation-capacity-and-peak-demand

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WORKFORCE SUPPLY-SIDE CHALLENGES AND OPPORTUNITIES

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UEP12 ELECTRICITY SUPPLY INDUSTRY - GENERATION SECTOR TRAINING PACKAGE REVIEW PLAN 2016/17 - 2019/20

REVIEW PLAN - TIMING AND PRIORITISATION

The Training Package Workplan will be constantly monitored and formally reviewed annually by the IRC allowing the Workplan to remain at the forefront of the IRC priorities and have the flexibility to respond to the industry needs as they arise.

The ESI Generation IRC does not anticipate that any of the ESI Generation qualifications, skill sets or units of competency contained within the Training Package will require to be reviewed more than once in the four-year period. The exception to this would be where there is regulatory or legislative change, or industry driven change due to safety requirements or specific technology advancement.

The ESI Generation IRC has not identified any Training Package components that are expected to be contentious or lengthy in terms of development timelines.

TRANSITION

2016 - 2018

As the ESI Generation IRC is established, additional priorities and development or review work will be identified and proposed. The current priority work for the ESI Generation IRC is the transition of the Training Package to the Standards for Training Packages and includes all 13 qualifications, relevant units of competency, and skill sets.

The planning and prioritisation of work to transition the UEP12 Electricity Supply Industry - Generation Sector Training Package is contingent on the establishment of the Electrotechnology IRC, as the UEP12 Electricity Supply Industry - Generation Sector Training Package has a number of interrelated dependencies on the Electrotechnology Training Package. Both the ESI Generation and Electrotechnology IRC are under review by the AISC.

Industry stakeholders have identified the following qualifications to be reviewed as a priority within the transition to the Training Package Standards:

- UEP40412 - Certificate IV in ESI Generation Maintenance (Fabrication)
- UEP40612 - Certificate IV in Large Scale Wind Generation (Electrical)

The units in these two qualifications require updating due to changes in automation and technology within the sector, as well as the increased focus on renewable energy which is resulting in rapid advancements in technologies such as wind generation.

DEVELOPMENT

2017 - 2018

ESI Generation industry stakeholders propose the development of the following qualification in 2017-18:

- Certificate IV Remote Area Generation.

Stakeholders have advised that under the previous Training Package developer preliminary development work had commenced including the identification of suitable existing Electrotechnology units for use in this new qualification.

2017 - 2020

The ESI Generation IRC will identify Training Package review and development priorities, for Workplan inclusion, once it has been formed.

LEGISLATIVE /REGULATORY REQUIREMENTS

Any legislative or regulatory change requirements identified, would take precedence over other reviews planned as these are often associated with higher workplace risk.

As legislation or regulations are updated the UEP12 Electricity Supply Industry - Generation Sector Training Package and Companion volume affected will be updated.

INTERDEPENDENCIES

UEP12 Electricity Supply Industry - Generation Sector Training Package qualifications include imported units of competency, within core and elective qualification packaging rules. Industry sector interdependencies that will potentially initiate future UEP qualification reviews include imported units from 13 interdependent Training Packages (inclusive of predecessor releases).

- BSB07 - Business Services Training Package
- CPC08 - Construction, Plumbing and Services Training Package
- LGA04 - Local Government Training Package
- MEM05 - Metal and Engineering Training Package
- NWP07 - Water Training Package
- RII09 - Resources and Infrastructure Industry Training Package
- TAE10 - Training and Education
- TLI10 - Transport and Logistics Training Package
- UEE11 - Electrotechnology Training Package
- UET12 - Transmission, Distribution and Rail Sector Training Package
- UEG11 - Gas Industry Training Package
- PMA - Chemical, Hydrocarbons and Refining
- PPM - Pulp & Paper Manufacturing Industry Training Package

IRC Training Product Review Plan – 2016/17 – 2019/20
ESI Generation Industry Reference Committee
Contact details: GM IRC Operations, Australian Industry Standards
Date submitted: 30 September 2016

Planned review start (Year)	Training Package code	Training Package name	Qualification code	Qualification name	Unit of Competency code	Unit of Competency name
2016 -2018	UEP - ESI – Generation Sector		UEP20112	Certificate II in ESI Generation - Operations Support	All Training Package Components to be transitioned to the 2012 Standards for Training Packages. This work has commenced as per the executed Additional Activity Order	
			UEP30112	Certificate III in ESI Generation - Systems Operations		
			UEP30212	Certificate III in ESI Generation - Operations		
			UEP40312	Certificate IV in ESI Generation Maintenance (Mechanical)		
			UEP40212	Certificate IV in ESI Generation - Operations		
			UEP40412	Certificate IV in ESI Generation Maintenance (Fabrication)		
			UEP40612	Certificate IV in Large Scale Wind Generation (Electrical)		
			UEP40512	Certificate IV in ESI Generation Maintenance - Electrical Electronics		
			UEP40112	Certificate IV in ESI Generation - Systems Operations		
			UEP50312	Diploma of ESI Generation (Maintenance)		

Planned review start (Year)	Training Package code	Training Package name	Qualification code	Qualification name	Unit of Competency code	Unit of Competency name
2016 -2018	UEP - ESI – Generation Sector		UEP50412	Diploma of ESI Generation Maintenance - Electrical Electronic		
			UEP50112	Diploma of ESI Generation - Systems Operations		
			UEP50212	Diploma of ESI Generation (Operations)		
	UEP - ESI – Generation Sector		Proposed	Cert IV Remote Area Generation	14 units of competency from the Electrotechnology (UEE) Training Package previously identified as fit for this purpose.	
	UEP - ESI – Generation Sector		Review of the units in these qualifications is required to meet changes in automation and technology within the sector.		UEP40412	Certificate IV in ESI Generation Maintenance (Fabrication)
					UEP40612	Certificate IV in Large Scale Wind Generation (Electrical)
2018 -2020	UEP – ESI - Generation Sector		To be prioritised with formation of IRC			

Appendix A

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AUSTRALIAN INDUSTRY STANDARDS

Australian Industry Standards (AIS) provides high-quality, professional secretariat services to the ESI Generation Industry Reference Committee, in our role as a Skills Service Organisation.

AIS provide services to 11 allocated IRCs which cover the Gas, Electricity, Electrotechnology, Corrections, Public Safety (including Police, Fire Services, Defence), Water, Aviation, Transport & Logistics, Rail and Maritime industries. AIS supports these important industry sectors using our world-class in-house capability and capacity in technical writing, quality assurance, project management and industry engagement in the production of Training Packages.

AIS was established in early 2016, 20 years after its predecessor the Transport and Logistics Industry Skills Council (TLISC) was established in 1996. More information about AIS can be found at www.australianindustrystandards.org.au

- We support industry growth and productivity through our modern innovative approach to establishing skills standards.
- We provide high-quality, professional secretariat services to help our allocated industry reference committees develop the skills that industry needs.
- We partner with industry to shape the workforce of the future.

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Australian Industry Standards acknowledges the financial support received by the Commonwealth to operate as a Skills Service Organisation.