ESI GENERATION

Annual Update to Industry Skills Forecast and Proposed Schedule of Work 2020

IRC Skills Forecast and Proposed Schedule of Work (ISF) are required once every three years. In the intervening years SSOs will report on the research questions listed below.

SSOs can also include additional cases for change to training packages as necessary. This will require evidence on why additional proposal(s) should be considered during an intervening year between the full ISFs (see item 4).

It is important that SSOs work with IRCs and other relevant stakeholders to provide evidence demonstrating to the AISC the veracity of claims. Where possible, statistical data should be used as an evidential basis.

SECTION A

1. Inform the AISC of any new industry workforce, skills developments or trends to emerge since the submission of a full ISF.

Over the past 12 months advancements in technologies continue to evolve and emerge, resulting in significant skills related implications for the industry's workforce. Some of the most recent areas of change include:

Digital technologies

Automation and digitalisation have lead to increased reliability and affordability of energy services.[1] Installation of sensors and implementation of data analytics can reduce energy costs and increase the operating life of equipment, lowering maintenance expenditure through predictive maintenance.[2] Technologies such as big data, cloud computing, Machine Learning, and Artificial Intelligence (AI) provide real-time information and more visibility over electricity consumption and potential power outage and fault identification[3]. Asset conditions can be monitored in real time and preventive actions can be taken proactively to troubleshoot network issues before they occur[4]. Research is being conducted to use AI to predict changing weather conditions in order to predict and forecast demand for utilising renewable resources.[5]

[1] Vardy, S. (2019). "Automation – The Key to Unlocking the Future of Energy Grid." Energy Magazine. June, Issue 6.
[2] Vardy, S. (2019). "Automation – The Key to Unlocking the Future of Energy Grid." Energy Magazine. June, Issue 6.
[3] Vardy, S. (2019). "Automation – The Key to Unlocking the Future of Energy Grid." Energy Magazine. June, Issue 6.
[4] McGrail, T. (2019). "Condition Monitoring in an Age of Modernisation: How and Why to Adapt." Australasian Power Technologies: Purchasing Directory. April-May.
[5] AEMO Energy. (2018). "The Intelligent Future of Industry." Retrieved from http://energylive.aemo.com.au/News/Siemens-Digitalization-2018

Successful execution of automation and digital technologies requires a comprehensive upskilling program to enable workers to prepare for a digital workplace.

The modern decentralised grid

Innovative technologies, such as solar panels, are transforming the electricity grid, changing it from its traditionally centralised structure to a more decentralised one, which allows consumers to be producers of electricity (prosumers) as well. Electricity consumers can send their excess solar power energy back into the grid[6]. These innovations have enabled Virtual Power Plants (VPPs) which are cloud-based power plants that can integrate electricity from solar panels and wind farms and release it into the grid. VPPs offer consumers the opportunity to tap into their stored solar power during peak times.[7] These innovations require upskilling the current and future workers to be able to work from remote operating centres to monitor and review demand in real-time and analyse and interpret data that is generated from home-based batteries and VPPs.

Distributed energy resources

Distributed Energy Resources (DERs) are bringing unprecedented changes to the way electricity is produced and consumed in Australia. DERs are smaller generation units such as solar photovoltaic (PV), battery storage, and wind generating units connected to the central grid. DERs are instrumental in managing electricity supply reliability gaps.[8] Energy storage reduces load on grids at peak times and enables energy providers to manage their supply and demand more effectively.[9]

Renewables, microgrids, and system integration

In Australia, renewable generation accounted for 17 per cent of all power generation in 2018-19. A CSIRO report considers the energy transition to renewables as among the top five key shifts in the Australian economy.[10] Renewable energy growth in Australia is ten times faster than the world average and nearly three times faster than the next fastest country, Germany.[11] South Australia is leading the way in renewable energies and managed to generate half of its electricity from renewables over the last 18 months.[12]

Hydro is the largest contributor to renewable generation, producing 36 per cent of renewable generation in 2017–18 (7 per cent of total electricity generation). Wind and solar generation also contributed 34 per cent and 23 per cent of renewable energy generation respectively in 2018.[13] Solar installation has been steadily growing with currently over two million installations in Australia[14] with 90 per cent of solar power generation coming from rooftop solar PVs.[15] Australia is also becoming less reliant on coal to produce electricity. Therefore, renewables have

[6] Tomevska, S. (2018). "Standards Uptake." Electrical Comms Data Magazine. Vol: 17, No. 2.
[7] McKinsey. (2017). Digital Australia: Seizing the Opportunity from the Fourth Industrial Revolution.
[8] AEMO. (2019). Technical Integration of Distributed Energy Resources: Improving DER capabilities to benefit consumers and the power system.
[9] Australian Trade and Investment Commission. (2017). Microgrids, Smart Grids and Energy Storage Solutions.
[10] CSIRO. (2019). Australian National Outlook 2019.
[11] Stocks, M., Blakers, A., $ Baldwin, K. (2019). "Australia in the Runway Global Leader in Building New Renewable Energy." The Conversation. Sep 25th, 2019.
[12] The Australia Institute. (2019). National Energy Emissions Audit: Providing a Comprehensive Up-to-Date Indication of Key Electricity Trends in Australia.
[13] Department of Environment and Energy. (2019). Australian Energy Update 2019.
[14] Smart Energy. (2019). "The Rise of Renewable Energy." Vol 39, Issue 153
[15] Department of Environment and Energy. (2019). Australian Energy Update 2019.

an essential role in the energy outlook and there is an opportunity to retrain coal plant workers to enable them to transition into the renewable energy workforce.[16] The industry will need to focus on building the skills required for workers in renewables, especially developing skills for first responders for installation, maintenance, and operation of equipment as the industry continues to evolve.

Supplying remote areas and communities with affordable and reliable electricity is a significant task. Renewables sources such as wind and solar energy as well as battery storage technology have proven highly useful in addressing this challenge. One solution implemented in Australia is microgrids defined as autonomous/isolated grids (remote power systems) or hybrid generation systems which are small scale and can either operate separately or be connected to the main grid. As solar, wind, and wave energy become more viable, their energy can be integrated into the grid or be stored in batteries. As microgrids are becoming more reliant on renewable energies and new technologies, the workforce will require new skills especially in microgrid project design and assessment of the feasibility of these systems.[17]

Renewable energy sources have greatly diversified the energy sector. These technologies provide greater energy reliability, availability, and efficiency as they become integrated into the energy grid.

Energy literacy across the ESI Generation industry

Recent research by the University of Queensland and National Energy Resources Australia highlights the need to lift the level of energy literacy universally. The report indicates that despite the development of recent energy technologies and the high level of public exposure and commentary about low-emissions energy, there has been little improvement in the levels of energy understanding in the community, also known as 'energy literacy'.[18] The report recommends identifying gaps in energy information and developing a plan to address them. The report calls for a coordinated national approach to enhance energy literacy and greater industry impetus to build the required skills. More informed communities and consumers play a significant role in transitioning to a carbon-free future.

2. Qualification utilisation:

Identify circumstances in which employers:

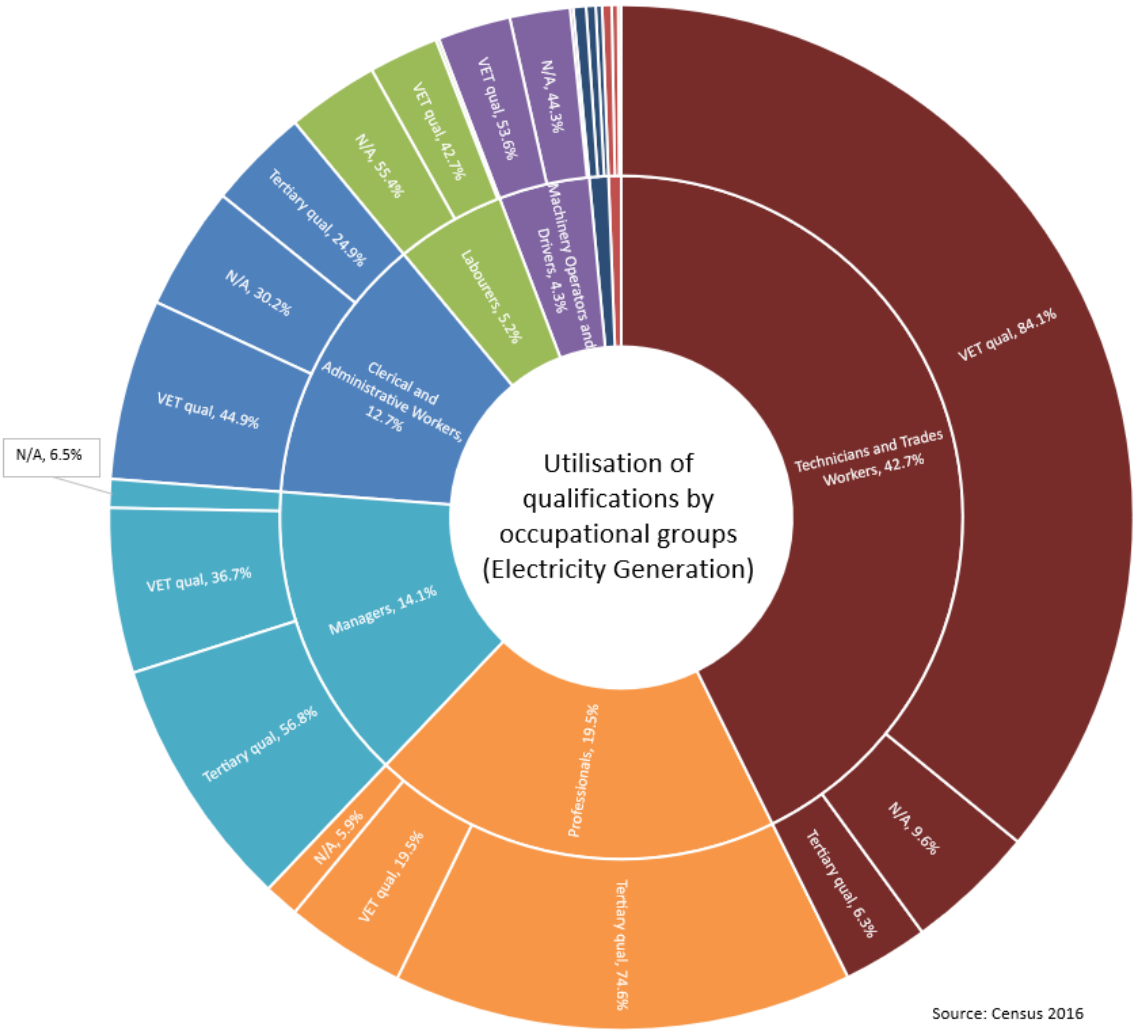
- employ people with VET qualifications
- do not employ people with VET qualifications

Qualification utilisation by occupational group

The Technicians and Trades Workers occupational group, which is mainly comprised of Plant Operators, Electricians and Fitters, are primarily VET qualified (84.1%), and make up 42.7% of the Electricity Generation workforce. This group is more likely to have no qualification (9.6%) than a tertiary qualification (6.3%). By contrast, the next largest group, Professionals, are dominated by tertiary qualification holders (74.6%) with VET qualifications coming in a distant second (19.5%). This group is primarily made up of Engineering Professionals of different types. Managers, which

[16] Engineers Australia. (2017). The Future of Australian Electricity Generation.
[17] Ibid.
[18] University of Queensland & National Energy Resources Australia. (2019). Building Australia's Energy Literacy

make up 14.1% of the workforce, are also more likely to have tertiary qualifications than VET qualifications (56.8%|36.7%). Clerical and Administrative Workers account for 12.7% of the workforce and hold more VET qualifications than tertiary (44.9%|24.9%). Each of the remaining groups account for approximately 5% of the workforce or less and primarily hold qualifications outside of the UEP training package.



3. Are employers using training outside the national system and if so, why?

A review of 1,176 accredited and courses qualifications with enrolments listed in VOCSTATS yielded no known current accredited courses or qualifications in the Electricity Generation field. (to be discussed further at Thursday's IRC meeting)

4. Identify qualifications with low and no enrolments. Provide reasons and evidence for the need to retain/delete these qualifications.

The following UEP qualifications have had zero enrolments for at least the last four years. The IRC intends to facilitate significant industry consultation in the next 12 months to address zero enrolment qualifications and units in the Training Package.

- UEP50318 Diploma of ESI Generation (Maintenance)
- UEP50118 Diploma of ESI Generation - Systems Operations
- UEP50418 Diploma of ESI Generation Maintenance - Electrical Electronic
- UEP50118 Diploma of ESI Generation - Systems Operations is currently under review to improve industry relevance.

Of the 97 units with zero enrolments for at least the last four years, 51 are currently under review to improve industry relevance.

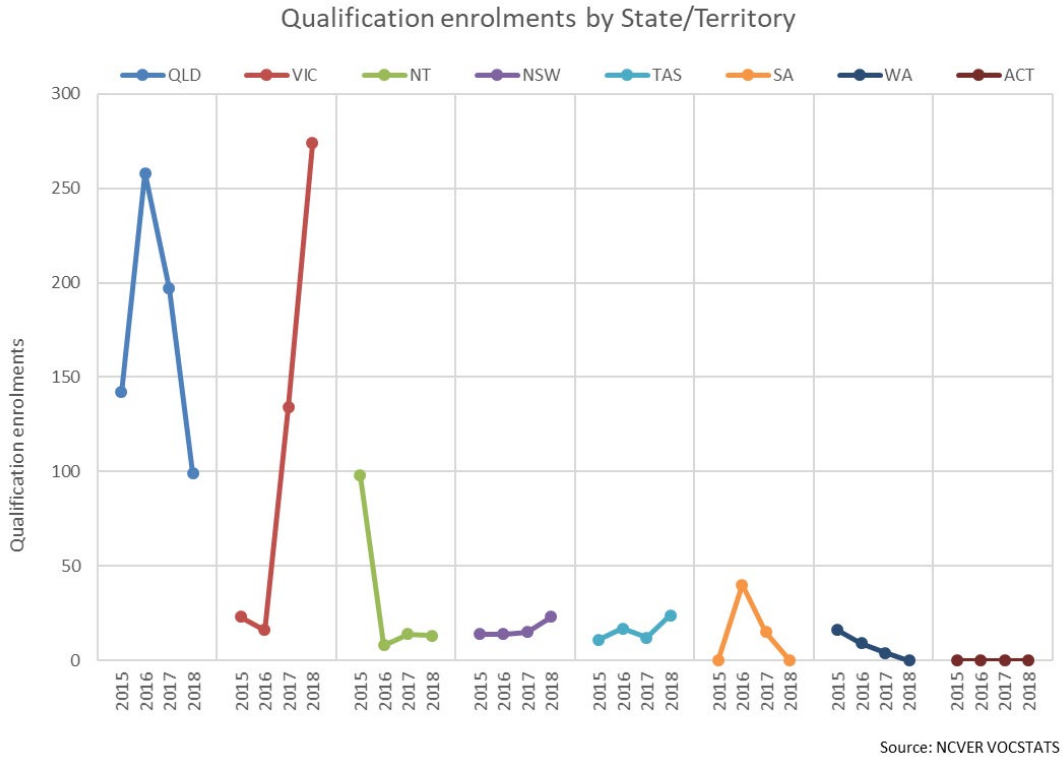
The remaining 46 units are listed below;

- UEPMNT305 Maintain industrial fans
- UEPMNT308 Maintain conveyors and associated equipment
- UEPMNT309 Maintain material feeders
- UEPMNT310 Maintain material crushers
- UEPMNT311 Maintain fuel transport equipment
- UEPMNT313 Maintain internal combustion engines
- UEPMNT315 Maintain wind turbines
- UEPMNT317 Diagnose and repair faults in mechanical equipment
- UEPMNT319 Maintain and test fixed fire protection systems
- UEPMNT320 Inspect and repair faults in mechanical equipment and components
- UEPMNT339 Perform sheet metal work
- UEPMNT345 Install electronic equipment
- UEPMNT352 Test and commission electronic electrical equipment
- UEPMNT355 Install complex electronic instrumentation equipment
- UEPMNT357 Diagnose and repair faults in instrumentation equipment
- UEPMNT359 Test and commission instrumentation equipment
- UEPMNT361 Maintain wind turbine mechanical systems
- UEPMNT362 Maintain wind turbine control systems
- UEPMNT404 Maintain complex mechanical pumps
- UEPMNT406 Install and maintain a steam turbine
- UEPMNT407 Repair a gas turbine unit
- UEPMNT410 Diagnose and repair faults in electronic equipment
- UEPMNT413 Modify electronic electrical equipment
- UEPMNT414 Test and commission complex electrical equipment

- UEPMNT415 Diagnose and repair faults in complex refrigeration and air conditioning equipment
- UEPMNT416 Overhaul electrical generator
- UEPMNT424 Monitor efficiency of thermal steam cycle power plant
- UEPMNT425 Maintain complex instrumentation equipment
- UEPMNT426 Maintain electronic instrumentation equipment
- UEPMNT427 Diagnose and repair faults in complex instrumentation equipment
- UEPMNT428 Modify complex instrumentation equipment
- UEPMNT429 Modify electronic instrumentation equipment
- UEPMNT430 Test and commission complex instrumentation equipment
- UEPMNT431 Test and commission electronic instrumentation equipment
- UEPMNT432 Write programs for control systems
- UEPMNT434 Diagnose and repair faults in wind turbine control systems
- UEPMNT435 Diagnose and repair faults in wind turbine mechanical systems
- UEPMNT436 Test and commission wind turbine control systems
- UEPMNT440 Diagnose and repair faults in power plant inverter systems
- UEPMNT441 Test and commission power plant inverter systems
- UEPMNT501 Diagnose and repair faults in electrical and electronic systems
- UEPMNT502 Test and commission electronic electrical systems
- UEPMNT503 Diagnose and repair faults in instrumentation systems
- UEPMNT504 Test and commission instrumentation systems
- UEPOPS372 Operate and monitor generator/alternator auxiliary plant
- UEPOPS453 Monitor Work, Health and Safety policy and procedures compliance

Qualification enrolments by state/territory

UEP Enrolments in Queensland and Victoria mirror each other here with enrolments in Queensland declining 61.6% since 2016 and enrolments in Victoria increasing 17 times (1612.5%) in the same period, more than compensating for the declines in the northern State. Enrolments in Victoria are highly concentrated in Certificate III in ESI Generation – Operations, which accounted for nearly 95% of UEP enrolments in the State in 2018. At the unit level, funding for enrolments in Victoria has been almost entirely driven by domestic fee-for-service contributions.



Source: NCVER VOCSTATS

5. Reasons for non-completion of qualifications and skill sets (including micro-credentials). Where students' complete qualifications or skill sets, what was the purpose of undertaking them (e.g. finding employment, upskilling)?

Data on reasons for non-completion are unfortunately not available at the qualification and Skill Set level in Total VET Activity (TVA) data. Our analysis relates to the study reason of students that passed, failed or withdrew from units of competency.

The most obvious feature of the below data is the very low failure/withdrawal rate of students that provided a known reason for study. 71% of students selected a requirement of their job as the primary study reason and nearly 10% selected wanting extra skills for their job. This suggests that at least 81% of students are those that already hold a job, as opposed to job seekers who appear to represent a small minority in the data. Unsurprisingly perhaps for the Electricity Generation industry, no students selected starting one's own business as their reason for study.

Study reason	Passed	Failed	Withdrawn
It was a requirement of my job	7349	26	215
Other reasons	1455	0	0
I wanted extra skills for my job	1010	9	0
To get a better job or promotion	221	0	0
To get a job	122	0	2
For personal interest or self-development	99	0	2
To try a different career	73	0	0
To develop my existing business	31	0	0
To get into another course of study	4	0	2
To start my own business	0	0	0

6. Identify, where possible, opportunities for use of cross-sector units developed by the AISC.

The following endorsed Cross Sector units may be suitable for future use in UEP qualifications and Skill Sets and will be considered by the ESI-Gen IRC for inclusion where applicable. This will allow for the removal of superfluous Units of Competency from the UEP Training Package.

All currently endorsed Cross Sector units

- BSBXCM301 - Engage in workplace communication
- BSBXCM401 - Apply communication strategies in the workplace
- BSBXCM501 - Lead communication in the workplace
- BSBXDB301 - Respond to the service needs of customers and clients with disability
- BSBXDB401 - Develop and implement recruitment processes that are inclusive of people with disability
- BSBXDB501 - Support staff members with disability in the workplace
- BSBXDB502 - Adapt organisations to enhance accessibility for people with disability
- BSBXTW301 - Work in a team
- BSBXTW401 - Lead and facilitate a team
- TAEXDB401 - Plan and implement individual support plans for learners with disability
- TAEXDB501 - Develop and implement accessible training and assessment plans for learners with disability

7. If there are jobs that have experienced changes in skill requirements, provide evidence for these changes and their impact.

The occupations in the ESI Generation industry have not experienced significant changes in skill requirements recently. Several job roles and functions have remained the same; however, they have been extended to incorporate new technologies.

8. Identify barriers to employers hiring apprentices and trainees. Are employers using alternative pathways/labour strategies to address these barriers?

Regulatory compliance

The different state regulatory requirements are becoming a barrier to learners, training and industry; workers cannot freely move across the country or other roles in the energy sector. This is impacting workers flexibility and industry's ability to alleviate skill shortages.

Auditing systems

There is a need within industry to develop Training Package products for auditing systems, processes and procedures, aimed at workplace supervisors.

STEM/Foundation skills

The ESI Generation Industry is struggling to find candidates with the appropriate STEM/Foundation skills to complete a vocational trade. The need to attract candidates with these skills, as well as attracting more females to this sector has become a priority.

9. Other relevant activities.

SECTION B

STAKEHOLDER CONSULTATION

An extensive consultation process has been undertaken in the development of the Skills Forecast.

Stakeholders involved in the consultation process;

7 IRC Members

395 AIS UEP12 Electricity Supply Industry- Generation Sector Training Package subscribers

8 State Training Authorities

Ongoing Consultation

The AISC seeks to ensure SSOs undertake broad and meaningful (e.g. face-to-face) industry consultation, including rural, regional and remote stakeholders.

Provide details of employers and businesses for each sector and state that SSOs have met with as part of:

1. ongoing engagement and validation with industry and stakeholders
2. collection of industry intelligence
3. promotion of the VET system
4. cultivating and maintaining networks and partnerships with industry including engagement in rural and regional areas.

This section relates to ongoing consultation as well as that during specific training package development work, as per Schedule 3 (Items 3, 12, 14, 18 and 19) of the funding agreement.

Entity Name	Sector	State	Rural/Regional/Remote (RRR)	Activity
Stakeholder name	*Stakeholder sector*	*State, multi-state or national?*	*Is stakeholder located in RRR areas or does it represent RRR interests?*	*SSO activity as per dot points above*
ActiveTreeServices	Transmission	State	Regional, Rural	1,2,3
AGL	Electricity Generation	National	Rural, Regional, Remote	1,2,3, 4
Aurecon Australia	Engineering	National	NA	1,2
Dalton Training Services	Training	State	Regional	1,2
Darwin Solar	Renewable	State	Rural, Remote	1.2
Entura Clean Energy and Water Institute	Engineering	National		1,2,3,4
Industry Skills Advisory Council NT (ISACNT)	Training	State	Remote, Regional, Rural	1,2,3
Jemena	Electricity Generation	Multi state	Remote, Regional, Rural	1,2,3,4
Navitas Professional	Training	Multi state	NA	
Territory Generation	Electricity Generation	State	Remote, Regional, Rural	1,2,3
Zinfra	Electricity Generation	Multi state	Regional, Rural	1,2,3,4

Thomson Bridge	Training	Multi state	Regional, Rural	1.2.3
Origin Energy	Electricity Retail	Multi state	Regional, Remote, Rural	1,2,3,4
Delta Energy	Electricity Generation	State	Rural, Regional	1,2,3
Electrical Trades Union	NA	National	Regional, Rural, Remote	1,2,3,4

SECTION C

PROPOSED NEW WORK

2020-24

ESI Generation Training Package

The IRC have not identified Training Package materials for review or development during this forecast period. Where imported elective Units of Competency are identified as either deleted or superseded, the ESI Generation IRC may elect to revise the affected qualification(s) through the IRC Minor Change process.