

# ELECTROTECHNOLOGY

## 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.

Advancements in technologies continue to emerge and have vital skills related implications for the industry. Over the past 12 months, some areas have changed significantly and will continue to evolve, which will reshape skill needs of the industry's workforce. Some of the most recent areas of change include:

#### The growing Internet of Things

Internet of Things (IoT) connected devices are projected to grow from the current 25 billion to 75 billion in 2025 and this will significantly increase the data available to support technological innovation. Buildings are becoming embedded with smart systems and the plan is to achieve better integration with digital and wireless platforms using IoT technology. It is projected the IoT will deliver annual benefits of \$194–308 billion over a period of 8–18 years and that the uptake of smart devices at home will increase to 381 million nationally in Australia by 2022. With a predicted increase in the demand for workers in the Electrotechnology industry in the next five years, upskilling of the workforce is required to enable the effective operation of these new technologies.

#### Electric vehicle technology and charging stations

The progression of Electric Vehicles (EV) technology is heavily contingent on the Electrotechnology industry because it directly supports the mechanics of charging stations. A current barrier to the fast adoption of EVs is the lack of charging stations. The recent Australian Infrastructure Plan identified rapid charging stations to be a 'High Priority Initiative'. There are currently about 800 charging stations nationally, 70 of which are fast charging stations.

Expansion in the provision of fast-charging station will require skill development amongst Electrotechnology workers.

The recent release of recommendations by the Senate Select Committee on Electric Vehicles highlights that national training arrangements and standards in relation to EVs need to be developed. This, in turn, has implications for the Electrotechnology workforce as new skills and knowledge about EV charger installation, charging cables, plug types, installation standards, EV data acquisition systems and software, and sensors will all be needed.

## **Digital competence**

The increasing expectation that the broader workforce be digitally literate has implications for the Electrotechnology industry and the skill profile required to meet current levels of demand. Advancements in Artificial Intelligence, computer technology, automation, IoT, cloud computing, big data, customer-service platforms and social media are generating a massive volume of data and information. However, capitalising on these opportunities requires a commensurate level of digital skill development in Electrotechnology fields responsible for establishing and maintaining these systems. The Electrotechnology industry will continue to make provision for the scale of the training and skill development challenge that they will face in the coming years.

## **Fifth Generation Standard (5G) and Wireless Technologies**

Readiness to progress the 5G technology also represents an important and pressing concern for Electrotechnology. This new technology offers considerably faster speed, better reliability, improved capacity, and reduced latency (a delay before data transfer begins). 5G uses higher frequency band that allows data to be transferred 100 times faster than the current 4G. Apart from extreme speed, 5G allows for a huge capacity for machine connections to a central computing server, a minimum of one million connected devices per square kilometre. This capacity will especially be conducive to IoT deployment. 5G technology is projected to increase GDP between \$32 billion and \$50 billion based on Australia's current population by 2030. As the prospect of 5G is gaining traction, it is important to develop a capable workforce with the knowledge and skills able to effectively deploy this new technology.

Electronics and wireless technology form the backbone of automated systems and smart devices which have already reshaped the landscape of many industries. Many appliances and equipment at home are embedded with electronics which allow them to be controlled automatically and remotely with the help of radio frequency (RF) communication systems and wireless technology. The Australian Computer Society has flagged the need for enhanced computer science skills, especially in the development and servicing of technologies that can automatically and remotely monitor assets. The Electrotechnology industry will need to anticipate and adapt to these needs in readiness for the widespread integration of these technologies.

## **Industry specific cyber security skills**

New digital technologies are accompanied by new security risks and the Electrotechnology industry needs to be appropriately skilled to identify, manage and reduce the risk of cyber-attacks. Australia has been identified as the nation at greatest risk of cyber-attacks in the Asia-Pacific region with 80% of companies reporting a combined total of 5,000 threats a day, incurring a cost of \$29 billion per annum to Australian businesses. Cyber security specialists within the Electrotechnology sector have been identified as some of the most critical roles in the labour market in addressing these challenges in the future.

## Renewable energy technologies and natural refrigerants

There has been growing uptake in solar installations and this is anticipated to double by the mid-2020s. Storage solutions for renewable electricity capture continue to diversify, improve efficiency, and lower prices. This has led to increased growth and adoption of solar panel and battery arrays across Australia. Renewable technologies are projected to create more than 60,000 jobs in the next decade. As these technologies develop further, Electrotechnology workers will need the necessary skills for the installation and maintenance of solar systems.

The decision to reduce hydrofluorocarbon (HFC) emissions from 1 January 2018 onward, also has implications for the Electrotechnology industry workforce. The government has set a target to reduce HFC emissions by 85% by 2036. Alternative refrigerants with lower Global Warming Potential (GWP) are ecofriendly, but also create a range of risks for the workers engaged with them as they are more flammable. Skill development across the Electrotechnology workforce will be needed to ensure understanding and knowledge of the associated risks with new technologies and to ensure adequate safety training in the operation, installation and maintenance of these updated systems.

## WHS and Silicosis developments

Recent research findings highlight a number of emerging concerns over Workplace Health and Safety (WHS) and silicosis. Installation, maintenance, and repair of electrical wiring often requires drilling and riveting into materials such as concrete, and this can create airborne dust containing a chemical compound called silica. When inhaled, silica can cause lung cancer, or a dangerous dust lung disease called silicosis.

Medical investigation of these conditions will continue to deepen in the coming years. At the national level, steps are also being taken to deepen understanding of the WHS challenges created by exposure to silica. The Federal Government has committed \$5 million to establish a task force to examine the issue and funding will include the establishment of a national dust disease register to facilitate research on this issue. Safe Work Australia is currently evaluating the 'Workplace Exposure Standards for Airborne Contaminants' to ensure they are based on the highest quality evidence and supported by a rigorous scientific approach. The industry has made commendable efforts through training workshops to raise awareness regarding silica hazards. A recent parliamentary report on dust diseases in Australia recommends the industry review safety standards and consider regulatory changes necessary to protect workers.

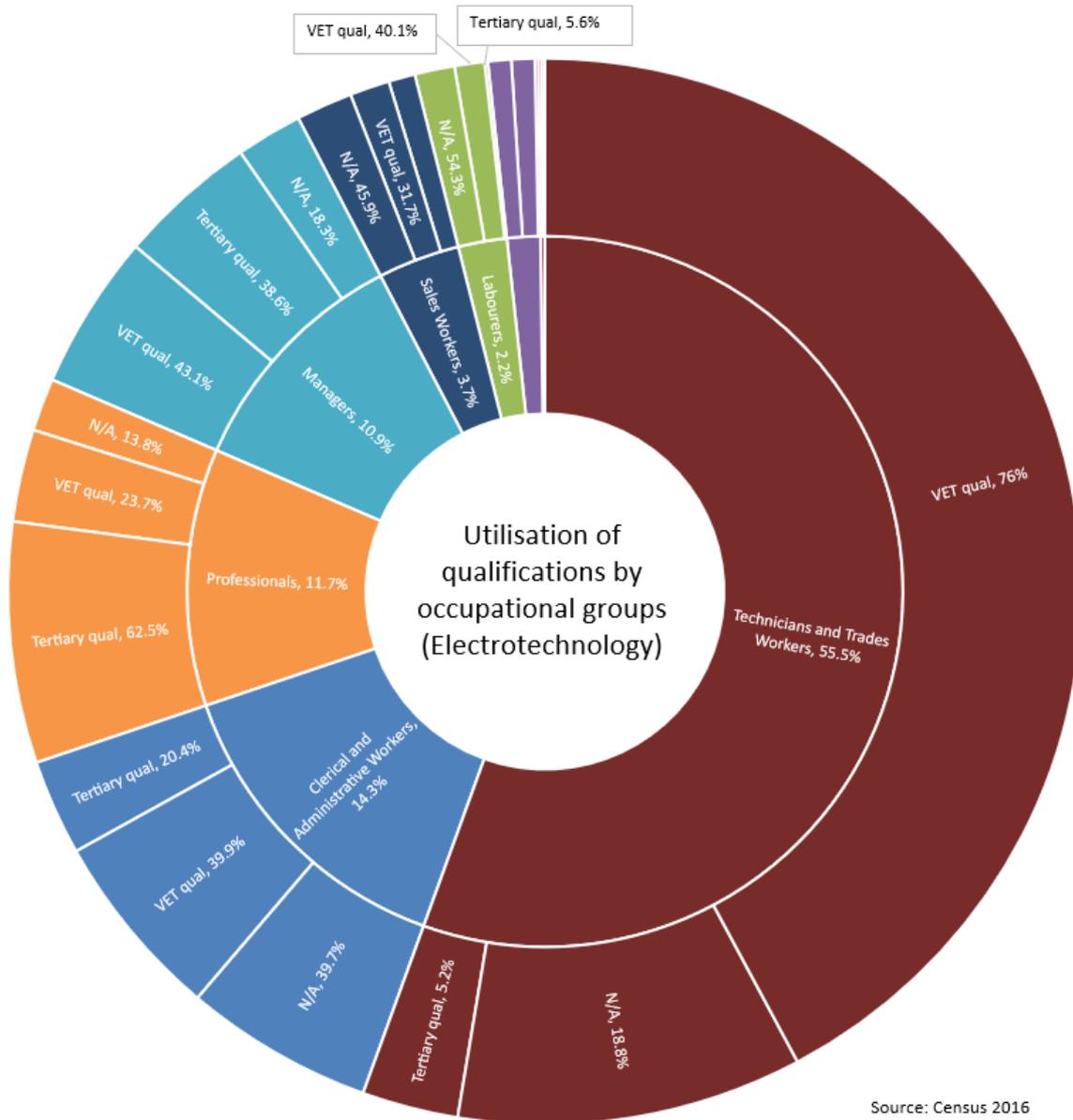
## 2. Qualification utilisation:

### Identify circumstances in which employers:

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

As an occupational group, Technicians and Trades Workers make up more than half of the Electrotechnology workforce (55.5%). More than three quarters (76%) of this group holds a VET qualification and only 5.2% hold a tertiary degree. At 14.3%, Clerical and Administrative Workers make up the second largest group, and hold VET qualifications at a rate of 39.9%, which is about twice the rate of tertiary qualifications. The next largest groups, Professionals and Managers,

make up nearly equal portions of 22.5% of the workforce and hold VET qualifications at rates of 23.7% and 43.1% respectively. Professionals are nearly three times more likely to hold tertiary qualifications while Managers are only slightly less likely to hold tertiary than VET qualifications. Each of the remaining groups makes up less than 4% of the workforce and generally hold qualifications outside of the UEE11 training package.



Source: Census 2016

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

Accredited course	2015	2016	2017	2018
22267VIC - Diploma of Electrical Project Management	96	120	30	31
10145NAT - Course in Electrician - Minimum Australian Context Gap	0	85	136	293
40537SA - Certificate II in Electrotechnology (Career Start)	0	0	0	6
22261VIC - Certificate II in Electrotechnology Studies (Pre-vocational)	2157	2358	2414	2431
10146NAT - Course in Refrigeration and Air Conditioning - Minimum Australian Context Gap	0	0	12	28
39145QLD - Course in Restricted Electrical	11	35	27	76

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

AIS conducted a public consultation process from 25 October 2018 onwards concerning the deletion of zero enrolment materials as part of the transition of UEE11 to UEE.

Following this process, nine qualifications and 33 Units of Competency with zero enrolments over the previous four years were identified for deletion at the publication of UEE Release 3.0. A further 28 Skill Sets will also be deleted at this time.

#### Units due for deletion

- UEENEEA107A Make up wiring looms for internal wiring of appliances and machinery
- UEENEEC023B Participate in gaming electronic work and competency development activities
- UEENEEC027B Participate in rail communications and networks work and competency development activities
- UEENEEE077B Write specifications for automated systems projects
- UEENEEE131A Solve problems in ELV circuits for non electrical workers
- UEENEEE145A Apply computation when using equipment/materials/concepts in an energy sector environment
- UEENEEE149A Contribute to the operation of support plant and equipment used in electricity supply industry

- UEENEEE151A Transport apparatus, equipment and materials
- UEENEEE162A Select drive components for electrical equipment design
- UEENEEE164A Design electrical machine drives and production layout plans
- UEENEEF103A Install and maintain telecommunication cabling for services in lifts
- UEENEEG126A Install and maintain field power and distribution systems with a low voltage demand up to 200 A per phase
- UEENEEG166A Install and maintain escalators, moving walks and treadways
- UEENEEH120A Fault find and repair gaming and games equipment
- UEENEEH122A Fault find and repair remote control apparatus
- UEENEEH123A Fault find and repair microwave heating apparatus
- UEENEEH136A Design commercial video/audio installations
- UEENEEH158A Design integrated security systems
- UEENEEH159A Design integrated complex security systems for multiple sites
- UEENEEH174A Troubleshoot audio - video recording equipment
- UEENEEH175A Troubleshooting in security system installations
- UEENEEH179A Diagnose and rectify faults in digital television circuits and apparatus
- UEENEEH187A Solve problems in electronic musical equipment circuits
- UEENEEI128A Set up and configure controls on complex fluid systems
- UEENEEI129A Set up electronically controlled mechanically operated complex systems
- UEENEEI136A Manage automated control systems projects
- UEENEEI137A Plan automated and control systems projects
- UEENEEI143A Develop access control of electrical integrated systems using logic-based programming tools
- UEENEEI144A Develop interfaces for multiple access methods to monitor, schedule and control an electrical integrated system
- UEENEEM067A Assess the fitness-for-purpose of hazardous areas explosion-protected equipment - coal mining
- UEENEEM069A Assess the fitness-for-purpose of hazardous areas explosion-protected equipment - dust atmospheres
- UEENEER004B Contribute to the trial of a product/application/ service
- UEENEER005B Contribute to intellectual property management

### Qualifications due for deletion

- UEE20411 Certificate II in Winding and Assembly
- UEE20811 Certificate II in Electrical Wholesaling
- UEE31111 Certificate III in Gaming Electronics
- UEE31511 Certificate III in Rail - Communications and Networks

- UEE40811 Certificate IV in Electrical - Fire Protection Control Systems
- UEE40211 Certificate IV in Electrical - Data and Voice Communications
- UEE50811 Diploma of Research and Development
- UEE61511 Advanced Diploma of Instrumentation and Control Engineering
- UEE61111 Advanced Diploma of Automated Systems Maintenance Engineering

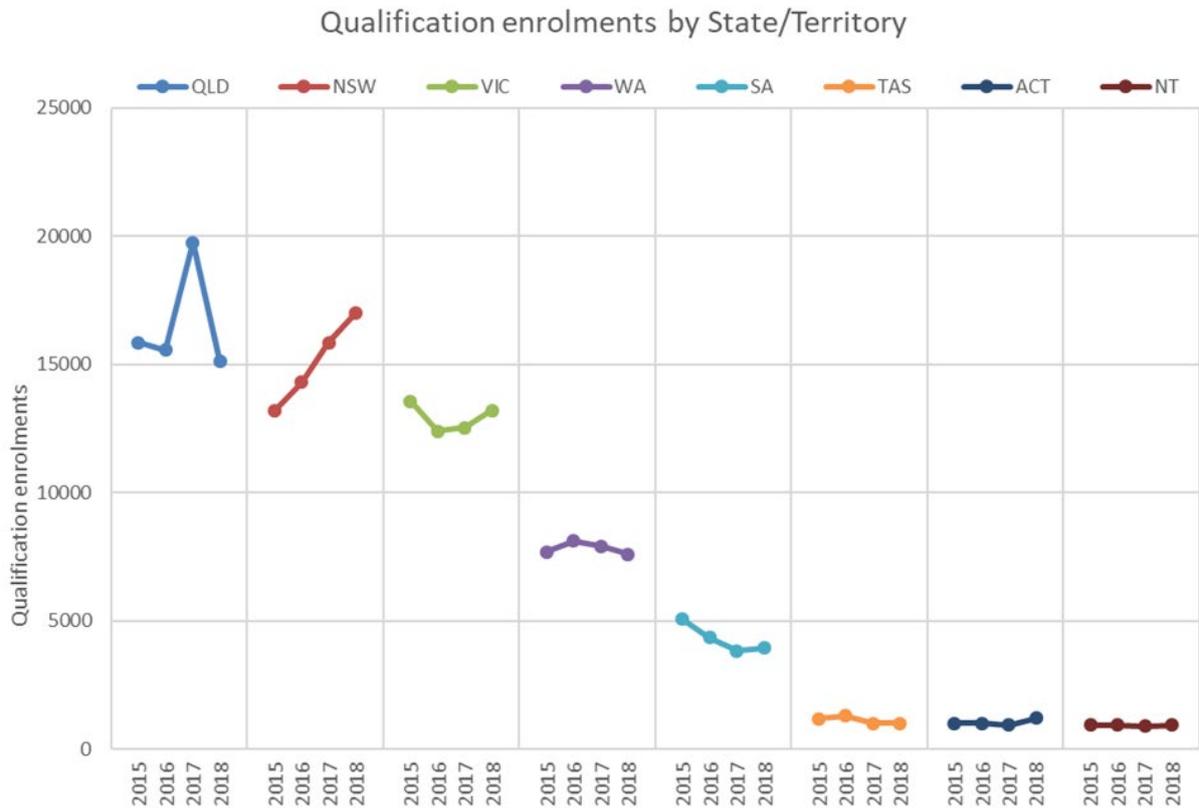
### **Skill sets due for deletion**

- UEES00059 Hazardous Areas - Attend to Breakdowns in Hazardous Areas - Coal Mining
- UEES00060 Hazardous Areas - Carry Out Overhaul and Repair of Explosion-Protected Equipment - Coal Mining
- UEES00128 Hazardous Areas - Classify, Audit and Report on Hazardous Areas - Coal Mining
- UEES00061 Hazardous Areas - Conduct a Conformity Assessment of Explosion-Protected Equipment - Coal Mining
- UEES00062 Hazardous Areas - Conduct Audit of Hazardous Areas Installations - Coal Mining
- UEES00063 Hazardous Areas - Conduct Detailed Inspection of Hazardous Areas Installations - Coal Mining
- UEES00064 Hazardous Areas - Conduct Testing of Hazardous Areas Installations - Coal Mining
- UEES00117 Hazardous Areas - Design and Classification
- UEES00127 Hazardous Areas - Design and Maintain Safe Hazardous Areas Installations - Coal Mining
- UEES00065 Hazardous Areas - Design Explosion-Protected Electrical Systems - Coal Mining
- UEES00066 Hazardous Areas - Develop and Manage Maintenance Programs for Hazardous Areas Electrical Equipment - Coal Mining
- UEES00113 Hazardous Areas - Electrical equipment in dust atmospheres
- UEES00114 Hazardous Areas - Electrical equipment in gas atmospheres
- UEES00115 Hazardous Areas - Electrical equipment in hazardous areas - pressurisation
- UEES00121 Hazardous Areas - Inspect, repair and test reeling, trailing and flexible cables
- UEES00068 Hazardous Areas - Install Explosion-Protected Equipment and Wiring Systems - Coal Mining
- UEES00069 Hazardous Areas - Maintain Equipment in Hazardous Areas - Coal Mining
- UEES00070 Hazardous Areas - Overhaul and Repair of Explosion-Protected Equipment - Coal Mining
- UEES00071 Hazardous Areas - Plan Electrical Installations in Hazardous Areas - Coal Mining

- UEESS00122 Hazardous Areas - Verifying compliance of repaired reeling, trailing and flexible cable
- UEESS00074 Instrumentation - Develop access control of integrated systems using logic-based programming tools
- UEESS00076 Instrumentation - Develop interfaces for multiple access methods to monitor, schedule and control an integrated system
- UEESS00093 Restricted - Disconnection/reconnection of fixed wired low voltage appliances
- UEESS00097 Restricted - Disconnection/reconnection of fixed wired low voltage composite appliances
- UEESS00094 Restricted - Disconnection/reconnection of fixed wired low voltage control devices
- UEESS00095 Restricted - Disconnection/reconnection of fixed wired low voltage motors
- UEESS00096 Restricted - Disconnection/reconnection of fixed wired low voltage water heaters
- UEESS00108 Sustainable - Energy Efficiency Systems Integration

### **Qualification enrolments by state/territory**

While UEE11 enrolments in most States and Territories have declined, enrolments in New South Wales have increased steadily, amounting to 29.2% over four years. A sudden spike is visible in Queensland in 2017, which has since declined by 23.4%. This spike is visible across many qualifications in the state, most notably the Certificate III in Electrotechnology Electrician which peaked and fell by about a third in 2017. The largest decline overall was in South Australia where enrolments are 22.5% lower than they were in 2015.



Source: NCVET 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 table below relates to the reasons for study as provided by students enrolled in UEE11/UEE Units of Competency in 2018. Whether passing, failing or withdrawing, students ranked the reasons for study in almost the same order. Differences emerge in the extent of that importance; 60% of students that failed ranked the requirements of their job as being their primary study reason when only a third of those that withdrew held the same opinion. Of the students studying in order to get a job, almost a quarter withdrew from their course which is considerably greater than those who passed (16.7%) or failed (14.4%). Curiously, starting one's own business was given as a reason for study about 50% more often by those that failed or withdrew from study as opposed to those who passed. Conversely, those developing an existing business were approximately three times and two times as likely, respectively, to pass rather than to fail or withdraw.

Study reason	Passed	Failed	Withdrawn
It was a requirement of my job	126984	19954	5771
To get a job	45776	4792	4330

I wanted extra skills for my job	29322	1882	1672
Other reasons	14790	1941	1387
To get into another course of study	14356	500	1038
For personal interest or self-development	13142	1447	1272
To try a different career	11713	952	828
To get a better job or promotion	8729	559	708
To start my own business	5253	1042	531
To develop my existing business	4277	159	168

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

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

There is no current review in the UEE Training Package that would allow for the above units to be incorporated. In saying that, there is an opportunity in the future to include these in the UEE Qualifications that will allow for UEE Units of Competency to be replaced with some of these Units of Competency.

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

With advent of digital technology into the Electrical industry, licensed electricians are having to develop a greater awareness and understanding of digital technology, advanced computer skills, data cabling and problem solving.

The introduction of 'type 2' refrigerants has resulted in Refrigeration mechanics having to be upskilled to safely handle both the installation and decommissioning of these new refrigerants. Whilst the 'type 2' refrigerants are ecofriendly, they create a range of risks for workers as they are more flammable

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

The potential barriers to employers hiring apprentices and trainees include:

- Costs to employers
- Time taken to complete an apprenticeship
- Potential candidates lack basic STEM requirements

## **9. Other relevant activities.**

# **SECTION B**

## **Ongoing Consultation**

### **Stakeholders involved in the UEE consultation process:**

**14** IRC Members

**1030** AIS UEE Electrotechnology Training Package subscribers

**8** State Training Authorities

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
<i>Stakeholder name</i>	<i>Stakeholder sector</i>	<i>State, multi-state or national?</i>	<i>Is stakeholder located in RRR areas or does it represent RRR interests?</i>	<i>SSO activity as per dot points above</i>
Loveday Electrical	Electrical	State	Rural/Regional/Remote	1,3,4
Australian Refrigeration Council	RAC	National	Rural/Regional/Remote	1,2,3,4
Refrigeration & Air-conditioning Contractors Association	RAC	National		1,2,3
Clean Energy Council	Renewable	National	Rural/Regional/Remote	1,2,3,4
Master Electricians Australia	Electrical	National	Rural/Regional/Remote	1,2,3,4
National Electrical & Communications Association	Electrical	National		1,2,3
Electrical Trades Union	Electrical	National	Rural/Regional/Remote	1,2,3
Electrical Regulatory Authorities Council	Electrical	National		1,2,3
Energy Space	Electrical	Multi state		1,2,4

Avery Air conditioning	RAC	State	Rural/Regional/Remote	1,2,4
Box Hill Institute	Electrical	State		1,2,4
Chisholm Institute	Electrical	State		1,2,4
Electro Group Training (EGT)	Electrical	Multi state		1,2,3,4
Royal Melbourne Institute of Technology (RMIT)	Electrical	State		1,2,3
TechRentals	Instrumentation	National		1,2,3
Solar Training Centre	Renewable	National		1,2,3

## SECTION C

### PROPOSED NEW WORK

#### 2020-21

#### Refrigeration and Air-Conditioning – Review and Development

The UEE11 Electrotechnology Training Package is finalising transition to the Standards for Training Packages 2012. Through this process, subject matter experts and industry stakeholder feedback indicated that changes to industry technologies required development of one new Unit of Competency, and one new Skill Set due to changed industry technologies and refrigeration and air-conditioning industry standards and practices.

## **2021-22**

### **Electronics and Communication – Review and Development**

The UEE11 Electrotechnology Training Package is finalising transition to the Standards for Training Packages 2012. Through this process, subject matter experts and industry stakeholder feedback indicated the Electronics and Communications Certificates II, III, IV and Diploma qualifications contained outdated technology learning requirements no longer used by industry. These qualifications are now required to be updated to reflect current industry technologies and work practices.

### **Computer Systems Engineering – Review and Development**

The UEE11 Electrotechnology Training Package is finalising transition to the Standards for Training Packages 2012. Through this process, subject matter experts and industry stakeholder feedback indicated the Advanced Diploma of Computer Systems Engineering qualification contained outdated technology learning requirements no longer used by industry. This qualification is now required to be updated to reflect current industry technologies and work practices.

### **Electrical - Rail Signalling – Review and Development**

The UEE Electrotechnology Training Package is finalising transition to the Standards for Training Packages 2012. Through this process, subject matter experts and industry stakeholder feedback indicated Certificate IV in Electrical - Rail Signalling and relevant 19 Units of Competency contained outdated technology learning requirements no longer used by industry. This qualification is now required to be updated to reflect current industry technologies and work practices.

## **2022-24**

There are no UEE Electrotechnology Training Package products currently identified for review or development during this forecast period.

Where imported Units of Competency are identified as either deleted or superseded, the IRC may elect to revise the affected qualification(s) through the IRC minor upgrade process.

## **2020-21 PROJECT DETAILS**

### **REFRIGERATION AND AIR-CONDITIONING**

#### **Description**

This project will develop one new Unit of Competency and one new Skill Set for technicians that addresses the air handling requirements for fire and smoke control, including maintenance of essential services, relevant standards and regulations, Fire dampers, testing and commissioning, and certification.

## Rationale

This project will ensure technicians licensed under the Refrigeration and Air Conditioning (RAC) scheme are capable of undertaking air handling procedures for fire and smoke control systems within Australian industry through a nationally endorsed Unit of Competency and Skill Set. There is a need for technicians licensed under the Refrigeration Air Conditioning Contract scheme to gain greater competency to safely and correctly carry out this work.

## Ministers' Priorities Addressed

- The project does not propose removal of obsolete and superfluous qualifications from the National Register
- The project will ensure that information is made available about Electrotechnology training delivery to training providers through Training Package Companion Volumes
- The project may support individuals moving from acquired skills and knowledge from one state or territory to another
- The project does not propose creation of Units of Competency that can be owned and used by multiple industry sectors, due to the discrete and targeted nature of the required industry skills and knowledge
- The project does propose the development of an additional Skill Set for Electrotechnology
- The project does not propose the incorporation of existing accredited course materials into the UEE Electrotechnology Training Package

## Consultation Plan

AIS will:

- undertake consultation on the IRCs behalf with all State Training Authorities and other key national stakeholders
- seek public feedback and input into development of material through the project's duration
- communicate to enterprises, State/Territory Training authorities, State/Territory Industry Training Advisory Bodies, Peak Bodies, Registered Training Authorities (RTOs) and other interested parties, of the establishment of the project
- conduct initial consultation with stakeholders to identify and invite key representatives to establish the Technical Advisory Committee (TAC) and posting information about the project on the AIS website and newsletter
- conduct face to face consultation and engagement sessions as required
- conduct the first TAC meeting to explain the process and gather comments/feedback
- communicate the process of drafting, identified Training Package (Qualifications/ Units of Competency/Skill Sets), verify and validate this material with

stakeholders through email, the AIS website and the AIS newsletter for wider stakeholder involvement, throughout the review process

- continue communication on the project via the AIS website and newsletter.

### **Scope of Project**

The project is planned to be undertaken between July 2020 and March 2021, with a Case for Endorsement planned for submission in July 2021.

### **Training Package**

- UEE Electrotechnology Training Package

### **Qualifications**

- Certificate III in Air-conditioning and Refrigeration

### **Units of Competency**

- UEERA999X Undertake air handling procedures for fire and smoke control systems

### **Skill Set**

- UEES9999X Refrigeration-Air Conditioning – Service and Repair Air Handling for Fire and Smoke Control Systems