ELECTROTECHNOLOGY INDUSTRY
2018 KEY FINDINGS DISCUSSION PAPER
ELECTROTECHNOLOGY IRC SKILLS FORECAST KEY FINDINGS DISCUSSION PAPER 2018

The purpose of the paper is to provide industry stakeholders with a summary of the key findings from the recent industry intelligence gathering activities overseen by the Electrotechnology Industry Reference Committee (IRC). The key findings will be used by the IRC in the development of the Electrotechnology IRC Skills Forecast and Proposed Schedule of Work for the UEE11 Electrotechnology Training Package.

Several targeted strategies were employed to collect industry intelligence about the opportunities and challenges for the Electrotechnology workforce and any UEE11 Electrotechnology Training Package review work necessary to meet these industry needs. These included:

- A Call for Submissions process inviting stakeholder responses about key issues affecting skills and workforce development;
- An IRC Skills Forecast Survey seeking information on priority skill needs, skill shortages and issues relating to workforce training and;
- A comprehensive review of Data and Research Sources nominated by the Electrotechnology IRC.

Australian Industry Standards has been tasked by the IRC to collect feedback from interested stakeholders about these issues on its behalf.
HOW TO PROVIDE FEEDBACK

Stakeholders are invited to submit their comments on the findings outlined in this paper by close of business on 20 February 2018.

It is acknowledged that the information provided about issues in this paper is deliberately brief. The purpose of this paper is to validate and confirm the findings, which will inform the advice the Electrotechnology Industry Reference Committee (IRC) will provide to the Australian Industry and Research Committee (AISC).

In considering the key issues and themes identified in this paper, we are keen to have any feedback that either confirms your issue has been covered, or else raises an issue you feel should be addressed in the Proposed Schedule of Work (FY18/19–FY21/22) for the UEE11 Electrotechnology Training Package to be submitted to the AISC on 30 April 2018.

Responses can be emailed to enquiries@australianindustrystandards.org.au.

For further information please contact:

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ELECTROTECHNOLOGY INDUSTRY OVERVIEW
The Electrotechnology industry includes the design, maintenance, installation and repair for all electrical and electronic equipment. The technology stretches across many sectors including mining, manufacturing, ICT and communications, construction, renewables, domestic and commercial refrigeration and air-conditioning. The electrical services industry (a subsector within Electrotechnology) involves electrical wiring or fittings in buildings and other construction projects, and repair and maintenance of existing electrical equipment and fixtures. The Electrotechnology industry is an $87.1 billion revenue industry employing almost 340,000 people.

KEY ELECTROTECHNOLOGY METRICS

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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<tbody>
<tr>
<td>Revenue ($b)</td>
<td>87.11</td>
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<tr>
<td>Profit ($b)</td>
<td>11.73</td>
</tr>
<tr>
<td>Average Wage ($)</td>
<td>72,493.27</td>
</tr>
<tr>
<td>No of Businesses</td>
<td>53,649</td>
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<tr>
<td>Employment Growth to 2023 (%)</td>
<td>5.0</td>
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</tbody>
</table>

Scope: Air Conditioning and Heating Services, Computer and Electronic Equipment Repair, Domestic Appliance Repair and Maintenance, Electrical Services, Elevator Installation and Maintenance, Fire and Security Alarm Installation Services, Telecommunications Services, Wired Telecommunications Network Operation

KEY ELECTROTECHNOLOGY FACTS

21 per cent of suitable private dwellings equipped with a roof-top solar photovoltaic (PV) system as of 2016. Average 4 kW capacity per installation

59 percent increase in renewable electricity production between 2009-10 and 2014-15 (solar, wind, hydro, biogas)¹

50 per cent efficiency increase of small split air conditioning systems (compared with 2001)²

2.6 million premises signed up of 5.8 million equipped with NBN capabilities in Australia³

ELECTROTECHNOLOGY WORKFORCE

ELECTROTECHNOLOGY WORKFORCE BY STATE/TERRITORY

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Number</th>
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<tbody>
<tr>
<td>New South Wales</td>
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<td>Victoria</td>
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<tr>
<td>Northern Territory</td>
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</table>


ELECTROTECHNOLOGY SKILL SHORTAGES

71.6 per cent of employers reported experiencing a skills shortage in the last 12 months. The occupations reported as being in shortage were:

1. Refrigeration / Air Conditioning Technicians
2. Electricians
3. Educators
4. Engineers (various)
5. Renewables Specialists

Reasons for Shortage

Employers identified the following reasons for the shortage with the most frequent response listed first.

1. Ageing workforce / current staff retiring
2. Cost/time to achieve the required qualification
3. Wages / salaries considered too low
4. Unattractive job / poor industry image
5. Competition from other organisations
KEY ELECTROTECHNOLOGY SKILL ISSUES

INDUSTRY CHALLENGES AND OPPORTUNITIES

Technology and Automation

Industries across the world are experiencing rapid changes in their daily operations, accelerated by technological innovation. These changes will transform the way industries manage, supply, and regulate their operations. Technological advances will provide challenges and opportunities to the Electrotechnology industry, with the merging of traditional industry sectors and the emergence of new industry subsectors.

New products and services in process and home automation are continuously entering the market in Australia. Packaged home automation systems are now being offered that include smart plugs, doors, windows and motion sensors. Furthermore, the development of fully electric vehicles, commercial automation processes, sensor fit-outs, as well as communications and remediation services are continuing to increase in demand.

These new systems allow consumers to conserve energy and automate the use of certain home appliances. From tailored Programmable Logic Controller (PLC) programming to Supervisory Control and Data Acquisition (SCADA) systems, industrial process automation services and devices are becoming commonplace. New specialist skills will be sought for these new technologies, requiring new and revised training strategies.

Maintenance and Equipment Servicing

As the development of highly autonomous control systems are developed, the industry will face increased demand for skilled equipment and service maintenance workers who can conduct repairs on these systems. The ongoing refinement of process control is pivotal to improving the industry’s efficiencies. However, this is further complicated by the technological advances in consumer markets which reduce the ability for devices and equipment to be repaired. These new products will add pressure on maintenance and equipment technicians as these products become more popular in the market.

Solar and Renewable Energy

Australia has one of the highest rates of rooftop solar PV systems and integration of photovoltaic systems with home battery storage world-wide. Traditional consumers of power are now able to generate, store and trade their own electricity. Storage solutions for renewable electricity capture continue to diversify, improve efficiency and lower in price. This has led to increased growth and adoption of solar panel and battery arrays across Australia.

As these technologies develop further, businesses involved in the Electrotechnology industry will be able to provide new services and technological innovations to domestic and commercial customers. Consequently, Vocational Education and Training for Electrotechnology will need to be continually reviewed to ensure it meets the needs of industry.

Sustainable Environments

Globally, there is an increasing trend to reduce emissions and pollution, as agreed to in the Paris Climate Agreement. Australia’s commitment to the agreement aims to reduce emissions to below 2005’s levels by 2020. CSIRO and Energy Networks Australia have published a Roadmap which seeks to cease the reliance on Carbon-based fuel for electricity by 2050, aligning to the agreement. Furthermore, there are many energy efficiency initiatives under development. These initiatives, introduced by both the Federal and State Governments, are to encourage the development and uptake of new technologies.

The Australian Government’s announcement of the $1 billion Clean Energy Innovation Fund aims to facilitate change. It intends to support emerging technologies, with demand for new jobs expected to emerge. One such funded initiative has investigated the development of a solar-powered system which uses concentrated solar thermal energy to cool Australian commercial buildings. This enables the building to operate and achieve greater energy efficiency than using current air-conditioning systems.
The Government also plans to phase down the importation and use of hydrofluorocarbons (HFCs) used as an alternative to chlorofluorocarbons (CFCs) in refrigeration and other processes. Commencing January 2018, the target aims to reduce HFC emissions by 85 per cent by 2036\textsuperscript{15}. Consequently, alternative synthetic and natural refrigerants will be developed for use in new refrigeration and air-conditioning equipment with a lower global warming potential (GWP) than current refrigerants. While these may be more ‘eco-friendly’, they may also be more flammable, more toxic to humans, or operate at higher pressures. These changes in refrigerants will require revised skills for the current and emerging workers in the industry, creating new skills demands and knowledge requirements.

Technological advancements and new energy efficiency targets will create an increased demand for electrotechnology workers. These workers will also require new skills and knowledge in using these new technologies. Being equipped with the right skills and understanding of new systems will prepare the workforce for the ever-adapting and changing Electrotechnology industry. The design and installation of such products will shape much of the Electrotechnology sectors over the coming years.

**Consumer Behaviour**

Consumer behaviour is rapidly changing the industry. Customers now demand more control over systems such as electrical metering, billing, payments, and pricing. Homes and businesses are now using new integrated technologies to control aspects of the physical world, to reduce the ongoing costs of energy consumption through the development of more efficient systems.

Consumer behaviour, driven by new technological change, further increases competition within the market. As companies compete for more efficient and user-friendly devices and management systems, competition and consumer demand will drive the adoption across the industry. The Internet of Things (IoT), for example, is seeing consumers able to use their smart phones to control and integrate their IT systems, security and intercoms, home functions/operation and electrical services from one central system. These new innovations will open new skill needs and demand for Electrotechnology workers.

WORKFORCE SUPPLY SIDE CHALLENGES AND OPPORTUNITIES

Ageing Workforce
While the average age of workers in the Electrotechnology industry is 39, 24 per cent of the workforce is aged over 50\textsuperscript{16}. The ageing workforce presents a considerable challenge to the industry. The loss of key skills and industry knowledge created by retiring workers will put strain on the workforce and further increase competition for employment. The loss of experience and corporate knowledge will further strain the workforce. Mentoring and other knowledge-sharing initiatives could be utilised in training to assist in maintaining corporate and industry knowledge.

With the major disruptions and changes in the use of technology, ensuring that workers have the right skills cannot be overstated. Upskilling the existing workforce will be necessary for workers to interact and work safely with new products. Companies will be faced with greater demand to upskill, retrain, or recruit appropriately qualified people to undertake jobs in these emerging roles.

Attraction of New Staff and Retention of Skilled Workers
Attracting new workers to the various sectors within the Electrotechnology industry is challenging, with UEE apprentice enrolments declining\textsuperscript{17}. Increasing costs for apprenticeships and licences, competitive salaries from other sectors, and difficulty attracting women to the industry are contributing to the industry’s struggle to recruit new trainees and retain skilled workers. Licensing requirements for this sector are tightly regulated and require those working in the industry to have the correct accreditation – further narrowing the workforce pool. Employers have reported difficulty attracting applicants with suitable experience using specific technologies, machinery, and equipment\textsuperscript{18}.

Strong competition exists for highly-skilled individuals; therefore, companies will need well-designed human resource initiatives and effective recruitment and retention programs. This may include rewards through recognition and incentives, as well as ongoing professional development and mentoring. There is considerable effort within the industry to increase apprenticeship enrolment figures and completion rates via a new training support model\textsuperscript{19}.

Gender Diversification
The participation of females in the Electrotechnology industry has been gradually decreasing over the past 30 years, from approximately 22 per cent in 1987 to approximately 17 per cent in 2017\textsuperscript{20}. Diverse workplaces are attributed to having improved financial performance, productivity, corporate knowledge, and lower staff turnover costs. Encouraging a diverse workplace and increasing the cohort of women in the Electrotechnology industry would be beneficial to keep up with demand for skilled workers. This will help ensure the sustainable and economic viability of the industry for the future.

Language, Literacy and Numeracy

In 2011, it was estimated 53 per cent of all working age Australians have difficulty with numeracy, while 46 per cent have issues with reading. There is strong industry concern that the language, literacy, and numeracy capability of new apprentices entering with school certification are significantly below the recommended standards to complete Electrotechnology qualifications satisfactorily. Ensuring entrants into entry-level Electrotechnology apprenticeships have the pre-requisite skills is essential. Pre-vocational training, including in-school programs, may be beneficial in addressing this issue.

Higher-Level Skills and Post-Trade Training

To maintain relevance and a competitive edge in the industry, workers should be aware of the new technologies and the requirements of up-skilling. Data from VOCSTAT (the National Centre for Vocational Education Research VET enrolment database) reveals that of the total completions in 2016 of Electrotechnology entry-qualifications (Certificate III) and ‘post-trade’ qualifications (Certificate IV and above), only 15 per cent of completion activity was associated to ‘post-trade’ qualifications.

The reduction of post-trade training has the potential to further widen the ‘skills gap’ between the highly technical systems being manufactured, and the trade technician’s ability to keep those systems operating. This is further affecting the industry’s knowledge-base. Ensuring the Electrotechnology industry has wide coverage of the subsector skill needs, as well as more highly specialised workers for these sub-sectors, will be a significant challenge in the next few years. Methods of promoting post-trade upskilling and qualifications is necessary to ensure the sustainable longevity of an ever-increasingly technical and specialised industry.

Training and Apprenticeships

Current training for the design of renewable energy systems is inadequate for commercial/utility scale installations of greater than 100kW systems. Some of the areas that are not adequately covered include: assessing the impact to the network connection point of the system, network protection requirements, building structural requirements, interpreting commercial electricity usage, and power factor impacts.

The capacity for Registered Training Organisations (RTOs) to deliver training on central plant and other sophisticated technologies, is further impacted by challenges in identifying trainers who are qualified to deliver the training in new and emerging technologies.

With the rapid advancements in technology, the Electrotechnology industry has reported that the Qualification UEE30811 Certificate III in Electrotechnology Electrician is falling behind industry advancements. This is of significant concern to the industry and may be having a negative impact on apprentice job-readiness. The transition project of the UEE Electrotechnology Training Package is prioritising this qualification, which includes the review of 43 Units of Competency to address the currency issues that have arisen in recent years.

PRIORITY SKILLS
The priority skills results are drawn from Electrotechnology stakeholder responses to the IRC Skills Forecast survey conducted between 4 December 2017 and 16 January 2018.

SKILL CATEGORY
In order of priority to the industry, the following skills were identified as the most important for the Electrotechnology workforce within the next three to five years.
1. Testing/diagnostics
2. Health/Safety
3. Maintenance/Servicing
4. Electrical
5. Air conditioning/refrigeration

GENERIC SKILLS
Ranking of the 12 generic workforce skills in order of importance to the Electrotechnology industry.
1. Technology
2. Design mindset / Thinking critically / System thinking / Solving problems
3. Language, Literacy and Numeracy (LLN)
4. Science, Technology, Engineering, Mathematics (STEM)
5. Learning agility / Information literacy / Intellectual autonomy and self-management
6. Managerial / Leadership
7. Environmental and Sustainability
8. Communication / Virtual collaboration / Social intelligence
9. Customer service / Marketing
10. Data analysis
11. Financial
12. Entrepreneurial
BACKGROUND INFORMATION

INDUSTRY REFERENCE COMMITTEES

New arrangements for training product development commenced in January 2016. These arrangements consider the needs of employers of all sizes, across all industry sectors, and ensure the delivery of high quality Training Packages that are nationally endorsed and internationally regarded.

Industry References Committees (IRCs):

• Provide a forum for industry engagement
• Direct the review, development and implementation of Training Package content relevant to the industry sectors they cover
• Act as a conduit for industry feedback to the Australian Industry and Skills Committee (AISC) and governments on industry trends

IRCs are composed of individuals and industry members with the experience, skills and knowledge of their specific industry sector. IRCs are supported by independent and professional Skills Service Organisations (SSO) to develop and review Training Packages, and to inform Training Package development priorities.

IRCs have a direct relationship with the AISC, and are charged with identifying industry’s skills needs, developing Business Cases setting out the Case for Change, and providing the sign off on training products before they go to the AISC for consideration.

Each IRC will perform the following functions:

• Gather intelligence for their industry sectors to inform advice on Training Package development and review
• Direct the work of its SSO in the development of industry proposals, Cases for Change and Cases for Endorsement
• Oversight the development and review of Training Packages in line with the requirements of the AISC
• Provide sign off for industry proposals, Cases for Change, Cases for Endorsement and other submissions for consideration by the AISC
• Direct the work of the SSO in preparing the support materials where funding for additional activities is provided
• Report to the AISC on progress of its work
• Promote the use of Vocational Education and Training (VET) in the sectors they represent
ELECTROTECHNOLOGY INDUSTRY REFERENCE COMMITTEE (IRC)

The Electrotechnology Industry Reference Committee (IRC) has been assigned responsibility for the UEE/UEE11 Electrotechnology Training Package.

Chair: Larry Moore
Deputy Chair: Mark Burgess

www.australianindustrystandards.org.au/committee/electrotechnology-industry-reference-committee/

The UEE/UEE11 Electrotechnology Training Package provides the only nationally recognised Vocational Education and Training (VET) qualifications for occupations involved in electronics, electrical, communications, control systems, instrumentation, lifts, refrigeration and air conditioning, renewable/sustainable energy, fire and security, appliances, gaming and rail. The UEE/UEE11 Electrotechnology Training Package comprises 87 qualifications, 75 Skill Sets, and 612 Units of Competency and associated assessment requirements and covers electrotechnology, electrical, electronics, hazardous areas, instrumentation, rail signalling, refrigeration and air-conditioning, renewable and sustainable energy. The UEE/UEE11 Electrotechnology Training Package is in the Scope of Registration of 159 Registered Training Organisations.

IRC SKILLS FORECAST AND PROPOSED SCHEDULE OF WORK

The IRC Skills Forecasts focus on the prioritisation of the skill needs of the industry sectors each IRC has responsibility for. They are developed and reviewed annually in consultation with industry stakeholders, and submitted on behalf of the IRC to the Australian Industry and Skills Committee (AISC) for approval.

IRCs are required to consult broadly with stakeholders to ensure a whole-of-industry view about the opportunities and challenges for the workforce and the Training Package review work necessary to meet industry needs.

The IRC Skills Forecast is submitted to the AISC and informs the development of a four-year rolling National Schedule for Training Package development and review work. More information on the National Schedule can be found at www.aisc.net.au/content/national-schedule.
AUSTRALIAN INDUSTRY STANDARDS

Australian Industry Standards (AIS) provides high-quality, professional secretariat services to the Electrotechnology IRC in our role as a Skills Service Organisation. AIS provide services to eleven allocated IRCs which cover Aviation, Corrections, Gas, Electricity Supply (Generation and Transmission, Distribution and Rail), Electrotechnology, Maritime, Public Safety (including Police, Fire and Emergency Services, Defence), Rail, Transport and Logistics, and Water 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 http://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.