



AUSTRALIAN
INDUSTRY
STANDARDS

ELECTROTECHNOLOGY IRC **SKILLS FORECAST**

KEY FINDINGS DISCUSSION PAPER 2017

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KEY FINDINGS

DISCUSSION PAPER

MARCH 2017

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. Once approved by the Australian Industry and Skills Committee (AISC) the Skills Forecast will replace the 2016 Electrotechnology IRC Workplan.

Several targeted strategies were employed to collect industry intelligence about the opportunities and challenges for the Electrotechnology workforce and any 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 **March 17th 2017**.

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 IRC will provide to the 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 (FY17/18–FY20/21)** for the UEE11 Electrotechnology Training Package to be submitted to the AISC on April 28th 2017.

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 a number of other 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 \$87.3 billion revenue industry employing over 340,000 people.

ELECTROTECHNOLOGY INDUSTRY METRICS

Revenue (\$b)	87.3
Profit (\$m)	12,044
Average Wage (\$ per year)	72,648.58
No of Businesses	53,856
Employment Growth (% to 2022)	4.6

Scope: Fire and Security Alarm Installation Services, Electrical Services, Elevator Installation and Maintenance, Computer and Electronic Equipment Repair, Wired Telecommunications Network Operation, Domestic Appliance Repair and Maintenance, Air Conditioning and Heating Services, Telecommunications Services¹

KEY FACTS:

- **19 per cent of suitable private dwellings equipped with a roof-top solar PV system** as of 2015²
- **172 per cent increase in solar electricity production** between 2009-10 and 2013-14²
- **105 per cent increase in wind electricity production** between 2009-10 and 2013-14²
- **192,000 remote refrigerated display cabinets and 900,000 integral refrigerated storage cabinets used commercially in Australia and New Zealand in 2013** – using 7,700 GWh of electricity per annum³
- **4,092,086 premises in Australia equipped with NBN capabilities**⁴
- **199,930 poker/gaming machines in Australia as of June 2005**⁵

¹ IBISWorld Industry Reports. <http://www.ibisworld.com>

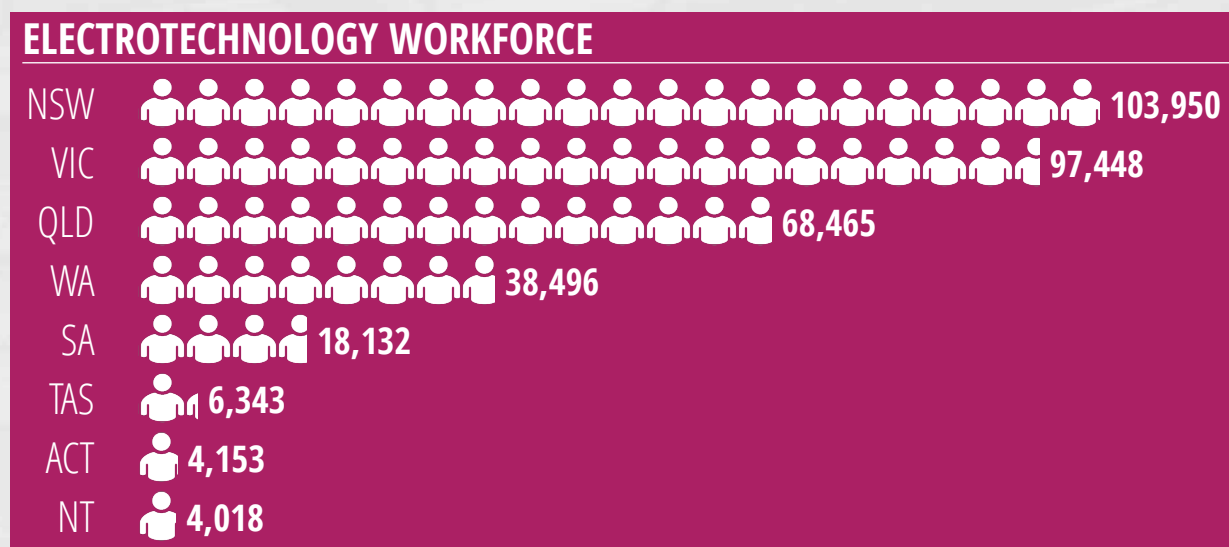
² Australian Bureau of Statistics. 2014-15. 4631.0 *Employment in Renewable Energy Activities, Australia, 2014-15*.

³ Commonwealth of Australia, Department of Resources, Energy and Tourism. 2013. *E3 Equipment Energy Efficiency, Commercial Refrigeration – Refrigerated Display and Storage Cabinets*.

⁴ nbn. 19 January 2017.

⁵ Australian Bureau of Statistics. 2004-05. 8684.0 *Gambling Services, Australia, 2004-05*.

ELECTROTECHNOLOGY WORKFORCE



Source: ABS Labour Force, Australia, Detailed, Quarterly, Nov 2016

ELECTROTECHNOLOGY SKILL SHORTAGES

69.86 per cent of employers reported experiencing a skills shortage in the last 12 months⁶. The occupations reported as being in shortage were:

1. Electricians
2. Educators
3. Refrigeration/Air-Conditioning Technicians
4. Renewables Specialists
5. Signalling Technicians

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

Reasons for shortage

Shortage of skilled/qualified personnel

Cost/Time to achieve the required qualification

Ageing workforce/current staff retiring

Remuneration/employment conditions

Geographic location of the vacancy

⁶ Australian Industry Standards, February 2017. *IRC Skills Forecast Survey*.

KEY ELECTROTECHNOLOGY SKILL ISSUES

TECHNOLOGY AND AUTOMATION

Technological advances will see the sector change with the merging of traditional industry sectors as well as the emergence of new industry subsectors.

Power over Ethernet is becoming widely used to support scalability of networks through the transmission of power through network cables. These networks include video, point-of-sale devices, security access control, building automation and lighting and industrial automation.

Self-generation and battery storage are also having an effect on the market⁷ with customers generating, storing and trading their own electricity⁸. Storage solutions for renewable electricity continue to diversify⁹, improve¹⁰ and reduce in cost¹¹ – further bolstering growth in solar panel uptake across Australia¹².

New products and services in process and home automation are regularly coming to market in Australia. Packaged home automation systems are now being offered that include smart plugs, door, window and motion sensors to conserve energy and finely control household devices¹³. From tailored Programmable Logic Controller (PLC) programming to Supervisory Control and Data Acquisition (SCADA) systems, industrial process automation services and devices are also becoming commonplace. New specialist skills will likely be sought for these new technologies, as well as electric cars, commercial fitouts, communications and remediation services.¹⁴

⁷ Price Waterhouse Coopers. 2016. *Customer engagement in an era of energy transformation*.

⁸ Renew Economy. 23 February 2017. *Greensync launches world-first exchange to trade stored household solar power*. <http://reneweconomy.com.au/greensync-launch-es-world-first-exchange-trade-stored-household-solar-power-49889>

⁹ SMH. August 2016. *Melbourne's first Tesla-town to be built in mega Alphington development*. <http://www.smh.com.au/business/property/melbournes-first-tesla-town-to-be-built-in-mega-alphington-development-20160729-gqgr0w.html>

¹⁰ Australian Government, Australian Renewable Energy Agency. 14 February 2017. *Cutting-edge battery tech coming of age with ARENA's help*. <https://arena.gov.au/media/cutting-edge-battery-tech-coming-of-age-with-arenas-help>

¹¹ The Australian. February 2017. *Efficient solar energy storage a game changer in going off grid*.

¹² Energy Matters. 24 February 2017. *Solar cheap as chips and battery boom in Australia*. <http://www.energymatters.com.au/renewable-news/solar-storage-australia-em5922>

¹³ Telstra. *Introducing Telstra Smart Home*. <https://exchange.telstra.com.au/2016/11/15/introducing-telstra-smart-home>

¹⁴ Electrical Comms Data. 7 July 2015. *Electrical services industry powers on*. <http://www.electricalsolutions.net.au/content/business-and-management/article/electrical-services-industry-powers-on-843943375>

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KEY ELECTROTECHNOLOGY SKILL ISSUES

TRAINING AND APPRENTICESHIPS

The training currently available for the design of renewable energy systems is inadequate for commercial/utility scale installations (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 bills
- Power factor impacts

The capacity for RTOs to deliver training on central plant and other sophisticated technologies is further impacted by challenges identifying trainers who are qualified to deliver training on new and emerging technologies. Industry has reported UEE30811 Certificate III in Electrotechnology Electrician is struggling to maintain currency with the rapid changes in technology and training has fallen behind industry advancement. This can have a significant impact on workforce development with apprentices completing a qualification that does not give them the skills to perform the work now demanded of the job role.

The traditional time-based apprenticeship system does not always meet the needs of employers, apprentices or the industry. Alternative methods of implementation including competency-based progression and front loaded training are also being investigated by industry.

SUSTAINABLE ENVIRONMENTS

A number of energy efficiency initiatives¹⁵ are being introduced by the Federal and State Governments to encourage the uptake of technologies such as solar photovoltaic (PV), battery storage and electric vehicles. These initiatives will create an unprecedented demand for electrotechnology workers with skills in energy efficiency technologies. The announcement of the Clean Energy Innovation Fund¹⁶ aims to drive this change and many new jobs are expected to emerge.

One such funded initiative has seen the development of a solar-powered system using concentrating solar thermal technology to cool Australian commercial buildings, achieving greater energy efficiency than current air-conditioning systems¹⁷.

¹⁵ Australian Renewable Energy Agency. <http://arena.gov.au>

¹⁶ Australian Government, Department of the Environment. *Fact sheet: Clean Energy Innovation Fund*. <https://www.environment.gov.au/minister/hunt/2016/pubs/mr20160323-factsheet.pdf>

¹⁷ CSIRO. Solar air-conditioning for heating and cooling. <https://www.csiro.au/en/Research/EF/Areas/Solar/Solar-cooling/Solar-cooling-air-conditioning>

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KEY ELECTROTECHNOLOGY SKILL ISSUES

The Government also plans to phase down the importation of hydrofluorocarbons (HFCs) used as an alternative to CFCs in refrigeration and other processes commencing January 2018, and will reduce HFC emissions by 85 per cent by 2036¹⁸. As a result, other synthetic and natural refrigerants will be used in new refrigeration and air-conditioning equipment which are either more flammable, more toxic or operate at higher pressures, creating entirely new skills demands.

The design and installation of such products will shape much of the electrotechnology sectors over the coming years. The integration of renewable energy into established distribution networks will also be a priority.

CONSTRUCTION MARKET FLUCTUATIONS

Market fluctuations mirror the demands for much of the industry, with growth expected in the commercial, industrial and institutional building sectors. Apartments, townhouses and unit construction continue to decrease¹⁹. Heavy industry construction is also set to decline²⁰.

Large-scale firms will likely take the biggest share of the contract electrical maintenance market, with smaller contractors moving towards household and small building installations. With increasing demand for data and communications services, fire protection and security systems, it is likely demand for skilled electrotechnology workers will increase to meet these needs.

CONSUMER BEHAVIOUR

Consumer behaviour is changing the sector as customers now demand more control over systems such as metering, billing, payments, as well as pricing. Homes and businesses are now using new integrated technologies to control all aspects of the physical world. The Internet of Things (IoT) for example, is seeing consumers use their smart phones to control and integrate their IT systems, security and intercoms, climate control, and electrical services from one central system.

Australia also has one of the highest global rates of rooftop solar PV systems²¹ and integration of PV systems with home battery storage has already begun²². Energy businesses will need to provide new services to domestic and commercial customers. However, renewable energy training is not yet a key focus area for industry.

¹⁸ Australian Government, Department of the Environment and Energy. *Review of the Ozone Protection and Synthetic Greenhouse Gas Management Programme*. <https://www.environment.gov.au/protection/ozone/legislation/opsghm-review>

¹⁹ Australian Financial Review. 7 November 2016. *Construction contracts at fastest rate in nearly 2 years*. <http://www.afr.com/real-estate/building-in-dex-construction-contracts-at-fastest-rate-in-nearly-2-years-in-oct-20161106-gsjffc>

²⁰ IBISworld. Industry Reports: E3232, E3233, J5801, J5800, E3234, OD5424, E3232, E3233, J5801, J5800, E3234, OD5424

²¹ Energy Supply Association of Australia. September 2015. *Renewable Energy in Australia*.

²² CSIRO. October 2015. *Future Energy Storage Trends: An Assessment of the Economic Viability, Potential Uptake and Impacts of Electrical Energy Storage on the NEM 2015-2035*.

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KEY ELECTROTECHNOLOGY SKILL ISSUES

Consumer behaviour driven by new technology changes, further increases competition within the market as companies compete for more efficient and user-friendly devices and management systems.

AGEING WORKFORCE

The percentage of Electrotechnology workers over the age of 45 has risen to approximately 30 per cent over the past 30 years²³. The ageing workforce presents a considerable challenge to the industry with the loss of key skills and the skills gaps created by retiring workers. The ageing workforce also increases the risk of knowledge gaps when industry experience and corporate knowledge is not passed on. Mentoring and other knowledge-sharing initiatives could assist in maintaining corporate and industry knowledge.

With the steady increase in construction projects and major shifts in the use of technology, ensuring workers have the right skills is also important. Upskilling existing workers will be necessary for them to interact and use new products. Companies will be faced with greater demand to upskill or recruit appropriately qualified people to undertake these emerging roles.

ATTRACTION AND RETENTION

Attracting new people to the sectors is challenging, with increasing costs for apprenticeships and licences, competitive salaries from other sectors, and difficulty attracting women to the industry. There are considerable efforts within the industry to increase apprenticeship enrolment figures and completion rates via a new training support model²⁴.

Licensing requirements for this sector are tightly regulated, requiring those working in the industry to have correct accreditation – further narrowing the workforce pool. Employers have also reported difficulty attracting applicants with suitable experience using specific technologies, machinery or equipment²⁵.

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.

²³ Australian Bureau of Statistics. *Electrotechnology and Telecommunications Trades Workers. Employed persons by Age, Occupation sub-major group of main job (ANZCO) and Sex. August 1986 onwards.*

²⁴ Master Electricians Australia. 4 August 2016. *Electricians launch new apprenticeship system to help curb plummeting completion rates.* http://www.masterelectricians.com.au/page/News/Latest_news/electricians-launch-new-apprenticeship-system-to-help-curb-plummeting-completion-rates

²⁵ Department of Employment. June-December 2015. Labour market research – Electrotechnology trades. https://docs.employment.gov.au/system/files/doc/other/auselectrotechtrades_0.pdf

KEY ELECTROTECHNOLOGY SKILL ISSUES

LANGUAGE, LITERACY AND NUMERACY

The industry has concerns about the language, literacy and numeracy capability of new apprentices who present with school certification, but who are significantly below the recommended literacy and numeracy standards required to satisfactorily complete the trade course. This has a direct result on apprenticeship drop-out and failure rates which appear to be increasing.

HIGHER-LEVEL SKILLS

Reduced uptake of 'post-trade' training has the potential to create a widening 'skills gap' between the highly technical systems being manufactured today and the ability of trade technicians to keep those systems operating. This is supported in the data, where enrolments in Certificate IV and above qualifications in the Electrotechnology training package have fallen by more than 42 per cent since peaking in 2011²⁶.

FUNDING

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. Industry feedback also indicates while financial incentives can encourage employers to take on apprentices, navigating the system in order to receive these incentives can act as a deterrent.

²⁶ National Centre for Vocational Education Research (NCVER). *VOCSTATS VET Program Enrolments 2003-2015*.

PRIORITY SKILLS

The priority skills results are drawn from Electrotechnology stakeholder responses to the IRC Skills Forecast survey conducted in February 2017. 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.

SKILL CATEGORY

Information and Communication technology
Renewable energy storage
Fault finding/Diagnostics
Technical
Organisational/Planning

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

GENERIC SKILL

Technology
Design mindset/Thinking critically/System thinking/Solving problems
Science, Technology, Engineering, Mathematics (STEM)
Learning agility/Information literacy/Intellectual autonomy and self-management
Language, Literacy and Numeracy (LLN)
Managerial/Leadership
Customer service/Marketing
Environmental and Sustainability
Communication/Virtual collaboration/Social intelligence
Data analysis
Financial
Entrepreneurial

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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 particular 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.

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BACKGROUND INFORMATION

ELECTROTECHNOLOGY INDUSTRY REFERENCE COMMITTEE

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

Chair: Larry Moore, National Electrical & Communications Association

Deputy Chair: Mark Burgess, Electrical Trades Union

<http://www.australianindustrystandards.org.au/committee/electrotechnology-industry-reference-committee/>

The 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 UEE11 Electrotechnology Training Package comprises 87 qualifications, 75 Skill Sets, 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 UEE11 Electrotechnology Training Package is in the Scope of Registration of 156 Registered Training Organisations.

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BACKGROUND INFORMATION

IRC SKILLS FORECAST & 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 to inform 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 Industry Reference Committee, in our role as a Skills Service Organisation. AIS provide services to eleven allocated IRCs which also cover the Gas, Electricity, Aviation, Corrections, Public Safety (including Police, Fire Services, Defence), Water, Transport and 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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