

ELECTROCOMMS AND ENERGYUTILITIES INDUSTRY SKILLS COUNCIL (EE -ISC)

TRADING AS EE-OZ TRAINING STANDARDS

2011 ENVIRONMENTAL SCAN

FINAL

BOARD ENDORSED

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Environmental Scan 2011

EXECUTIVE SUMMARY

Introduction & Objectives

The ElectroComms and EnergyUtilities Industry Skills Council (ISC), trading as EE-Oz Training Standards, is the Industry Skills Council for the Electrotechnology, Communications, Electricity Generation, Transmission and Distribution, Rail Traction and Gas Supply Industries.

On an annual basis, each of the eleven Industry Skills Councils, including EE-Oz Training Standards, develops an 'Environmental Scan', for the information and utilisation of the National Quality Council (NQC), Skills Australia, the Department of Education, Employment and Workplace Relations (DEEWR), industry and training stakeholders.

The intent of the Report is to alert these bodies of "*potentially significant issues at a product, operational and systemic level*". This level of immediacy is the document's key characteristic and relies on real-time industry views and evidence captured from across Australia.

Methodology

EE-Oz Training Standards has an extensive and comprehensive formal consultative structure. This consultative structure comprises; the EE-Oz Board of Directors, General Standing Committees of the Board, Sector Councils, industry-specific National Training Advisory Groups (NTAGs) and sector-specific Technical Advisory Committees (TACs), National Project Steering Committees and other committees of regional, state, national and international significance.

In addition to these groups, EE-Oz actively collects 'grass-roots' industry intelligence from a number of key stakeholder consultation forums, namely: an annual National Workshop Series involving one or more stakeholder consultation workshops in each state and territory; the Annual EE-Oz Conference and associated meetings, and; specific industry/sector and project meetings conducted throughout the year.

EE-Oz Training Standards has also initiated strong working relationships with the network of State and Territory Industry Training Advisory Bodies (ITABs) servicing the ElectroComms and EnergyUtilities industries across Australia. Each year, EE-Oz Training Standards formally engages the ITAB network to provide state/territory-specific industry intelligence. This intelligence and ITAB reports to Government have been utilised to inform this 2011 Environmental Scan.

Key Messages 2008-2011

In April 2008, ISCs entered into a three year Service Agreement with the Australian Government, represented by the Department of Employment, Education and Workplace Relations (DEEWR). The Environmental Scan is the primary annual deliverable under this Service Agreement.

This is the fourth Environmental Scan to be delivered under the current Service Agreement.

In 2008, the 'Top 5' influences shaping workforce development within the industries under the ISC's coverage, in no priority order, were:

- demand for knowledge and skills;
- skill shortages;
- the aging workforce;
- new technologies, and;
- managing increasing demand whilst meeting regulatory, environmental and safety compliance requirements.

Whilst these impacts continued to influence workforce development within the industries during 2009, in that year the 'Top 5' influences shaping workforce development within the industries under the ISC's coverage, in no priority order, were:

- the Global Financial Crisis;
- the Australian Government's increasing focus on reducing Australia's carbon footprint;
- The natural disasters of early 2009, namely; flooding in Queensland and fires in Victoria;
- Harmonisation of Energy Technical and Safety Regulation, and;
- The role of VET in regard to these key influences.

Then in 2010, EE-Oz's research identified that the 'Top 5' influences shaping workforce development within the industries under the ISC's coverage, in no priority order, were:

- Government policy around reducing Australia's carbon footprint
- Skills shortages and the aging workforce
- New technologies
- Harmonisation of energy technical and safety regulation
- Economic climate and infrastructure development

This year's 'Top 5' influences shaping workforce development within the industries under the ISC's coverage, are similar in name, although different in detail, to those of 2010. The 'Top 5' influences for 2011, in no priority order, are:

- **Demand for technical knowledge & skills** (incl. Skill Shortages)
- New Technologies and work practices (incl. Renewable Energy/Energy Efficiency)
- Industry and Safety Regulation
- Energy Infrastructure development and maintenance (Electricity & Gas)
- System Integration (smart grids, smart systems, NBN, peak load management)

As evidenced from the above summaries, the dynamics of the industries under EE-Oz's coverage is remarkable. The industries are being continually called upon to change in response to technological advances, regulatory arrangements and the need to assist Australian Governments realise energy efficiency and infrastructure development policy initiatives.

During 2010/11, EE-Oz Training Standards has continued to establish itself as a leader in the provision of advice to government, industry and training agencies regarding workforce development and training for Australia's ElectroComms and EnergyUtilities industries. Specifically, advice has been provided in response to:

- 1. Direct requests from Government, Industry or Training agencies.
- 2. Requests from Industry to provide Government, Industry or Training agencies with information.
- 3. Calls from Government, Industry or Training agencies for responses to research/policy/initiative papers.

BACKGROUND & CONTEXT

ElectroComms and EnergyUtilities Industry Skills Council (ISC), trading as EE-Oz Training Standards, is the Industry Skills Council for the Electrotechnology, Communications, Electricity Generation, Transmission and Distribution, Rail Traction and Gas Supply Industries.

In 2008, against the backdrop of a new policy framework, *Skilling Australia for the Future*, EE-Oz Training Standards entered into a new three year funding agreement with the Australian Government, as represented by the Department for Education, Employment and Workplace Relations (DEEWR).

A key deliverable under the new Agreement was the compilation of an annual Environmental Scan to inform the work of the Department, the National Quality Council (NQC), the newly formed Skills Australia Board, industry and training stakeholders.

All three agencies, and other stakeholders, have acknowledged the value of the realtime industry intelligence provided by the 2008, 2009 and 2010 Environmental Scans. The same methodology has been utilised for this Environmental Scan.

SECTION 1 LATEST INDUSTRY INTELLIGENCE

1.1 Introduction

EE-OZ Training Standards has conducted extensive research into the factors influencing the industries under its coverage at the present time. This research has been supplemented by relevant statistical information from key industrial and economic research houses (eg; ABS, NCVER, Monash, ABARE) and various Government Departments.

The following sections provide a broad analysis of the changes, evolving trends and new factors in the three primary environments which impact and shape workforce development in the industries under EE-Oz coverage, namely;

- 1. *Macro-environment* broad factors and emerging trends across and between industries, and global trends or changes which impact on the need and nature of skills.
- 2. *Industry* enterprises, professional and industry associations and other key stakeholders
- 3. Market the VET environment, VET stakeholders and peak organisations

1.2 The Macro-Environment

Global demand for energy is increasing. At the same time, the energy sector is undergoing significant change. The ongoing pressure of ensuring energy supply meets demand, rising costs, and the need to address climate change, are driving global energy sector restructures.

New energy markets are developing worldwide; nations are realigning in new ways; corporations are adjusting their priorities, changing how they do business and making investments to secure market opportunities, and; climate change mitigation policies are driving research and investment into new, cleaner energy sources and technologies.

Australian ElectroComms and EnergyUtilities industry organisations are meeting the challenges through changing operating practices and the integration of 'smarter' technologies into their systems, services and networks.

These changes will mean that the ElectroComms and EnergyUtilities organisations of the future will not only deliver and support 'essential' services, but also be enablers for a range of other products and services that will benefit both the Australian community and the environment.

1.3 The Industry Environment

Broadly, the Australian ElectroComms and EnergyUtilities industry sectors are characterised by the following factors:

- Industry regulation and a strong emphasis on Occupational Health and Safety
- Significant technical knowledge and skills
- Structured work roles
- Continual change in response to advances in technology and work practices
- Responsiveness to Government policy and acting as an agent for policy implementation.

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- Energy Infrastructure development and maintenance (Electricity & Gas)
- System Integration (smart grids, smart systems, NBN, peak load management)
- Demand for technical knowledge & skills (incl. Skill Shortages)
- Technical and Safety Regulation

New Technologies and Work Practices (incl. Renewable Energy/Energy Efficiency)

The Australian Governments are committed to creating an enabling environment that provides the skills, training and knowledge required for workers, investors, and entrepreneurs to participate in, and benefit from, the transition to a sustainable, low carbon future (DEEWR).

The last three years particularly have seen considerable momentum in the area of Government policy and initiatives to increase Australia's energy efficiency and reduce its carbon footprint, including considerable Government support for the acceleration of the large scale development, adoption, demonstration and deployment of new, clean energy technologies.

Over the period, EE-Oz Training Standards has continued to establish itself as a leader in the provision of advice to government regarding workforce development and training for Australia's Energy industries.

As an active member of the ISC Forum, EE-Oz Training Standards has also contributed to the suite of briefing papers and responses submitted by the Forum for Government consideration.

It is the organisations and individuals of the Australian ElectroComms and EnergyUtilities Industries that will be responsible for the development and deployment of Renewable Energy and Energy Efficiency technologies. Hence, EE-Oz's coverage includes a predominance of occupations that will 'make a difference' in terms of measurable sustainability and economic effects.

For the Australian ElectroComms and EnergyUtilities industries there is not one but two very distinct areas of skill need. Like all industries, operatives require 'sustainable work practice' skills. Unlike other industries, they also require the technical skills and knowledge to design, develop, install, commission, maintain, repair and/or decommission renewable energy and energy efficiency technologies.

EE-Oz Training Standards, as the custodian of the industries' Training Packages, is therefore responsible for assisting industry to develop the Clauses, Units, Qualifications and Skills Sets to meet both areas of skill need.

A considerable amount of work has been undertaken in consultation and cooperation with industry to ensure Industry's training needs are reflected in the EE-Oz suite of Training Packages. Specifically, during 2010, EE-Oz Training Standards:

• Repackaged all 119 qualifications in its current suite to include core units which support sustainable work practices.

- Revised 78 sustainability-specific units.
- Revised 113 technical units.
- Included units, skill sets and qualifications in the EE-Oz suite of Training Packages covering:
 - Domestic grid connected photovoltaic (solar) arrays design, development, installation, maintenance and grid connection.
 - New solar generation technologies design, development, installation, maintenance and grid connection
 - New wind generation technologies design, development, installation, maintenance and grid connection
 - Smart Meters design, development, installation, maintenance and grid connection
 - o 'Stand alone' remote area power generation systems
 - o Co-generation, Tri-generation and local generation
 - Use of natural refrigerants and the reclamation of synthetic refrigerants in airconditioning and refrigeration systems
 - o Illumination. Advanced energy efficient lighting design and installation.
 - Fuel Cells
 - Integrated Systems
 - Renewable Energy Inspections
 - Gas flow measurement
 - Gas Operations
 - Hydro Electricity
 - Inspection and measurement of energy load

In addition to the above, and in light of the Australian Governments' current suite of policies and initiatives, Industry will very soon require new and amended units, qualifications and skill sets covering the following:

- Energy Efficiency Advisors residential, commercial and industrial
- Energy Efficiency Auditors residential, commercial and industrial
- Electric Cars (multiple occupations)

EE-Oz is currently working in consultation and cooperation with industry, to develop and amend units, qualifications and skill sets necessary to address the training needs associated with these new and emerging technologies and occupations.

Energy infrastructure development and maintenance

Predictions that Australia's recovery from the economic downturn would be a *'utilities led recovery'* appear to be accurate. In 2008, ABARE estimated that \$30-35 billion of new energy infrastructure will be required to 2020. At the Australian Energy and Utilities Summit in July 2009, industry representatives confirmed that \$97 billion

dollars worth of energy infrastructure development would be required in the next 5 years to meet growing community demand for energy.

In December 2010, the Australian Energy Regulator (AER), released figures indicating significantly higher levels of electricity distribution investment in the current five-year regulatory period than in previous periods (Table 1).

Table 1: Increases in electricity distribution investment over the current regulatory period.

Sector	Jurisdiction	5 year Regulatory Period	Ave increase in investment from current period (%)	Increases sought by network businesses (%)
Electricity	NSW	2008-13	80%	112%
Electricity	QLD	2010-15	30%	50%
Electricity	SA	2010-15	88%	113%
Electricity	VIC	2011-16	45%	70%

Source: Australian Energy Regulator, as published in Energy Source & Distribution (Dec 2010).

Now, in the aftermath of widespread flooding in South East Queensland, Northern New South Wales and Victoria, Cyclone Yasi and the bushfires in Western Australia (Table 2), the estimated necessary expenditure on energy infrastructure will be even higher.

When looked at holistically, the breadth and depth of infrastructure development and maintenance projects that the Australian ElectroComms and EnergyUtilities industries are currently intricately involved in is quite considerable, specifically:

- 'Normal' scheduled infrastructure development and maintenance activities to meet growing community demand for energy (ie; establishing and upgrading powerlines, substations and other network infrastructure, help ensure quality and reliability of supply and also support the rapid growth in demand for energy).
- Recovery activities in light of the Queensland floods, Cyclone Yasi and the Western Australian bushfires.
- State/Territory and Federal Governments' infrastructure development 'Nation building' initiatives
- Renewable/sustainable energy initiatives eg; 'Smart Meter' rollout, Solar Energy 'Feed-in Tariffs' etc
- National Broadband Network roll-out

The workforce development and training ramifications for the industries are significant and there is considerable concern amongst industry enterprises that there simply will not be enough industry members to service the number and size of infrastructure development, 'roll-out' and recovery projects, particularly given the significance of the industries' skills shortages and ageing workforces.

Added to this is industry concern regarding the strain that major resources sector projects will place on the industry. As detailed below (Section 2), the ElectroComms and EnergyUtilities industries employ personnel particularly suited to occupations within the resources industry; in terms of skills and knowledge, but also in terms of

work ethic, occupational health and safety consciousness and industry culture. Consequently, many sector personnel may move to the resources industry.

The peak industry bodies are, however, exercising their minds regarding strategies to address the unprecedented demand for labour currently being experienced by the ElectroComms and EnergyUtilities Industries. The provision of workforce development and training opportunities are being seen as integral to the solution.

Event	Website Extracts	Source
Queensland Floods	An estimated quarter of a million properties lost power	Energex
	There are 10,000 -12,000 properties in need of significant repairs or rebuilds before power can be restored.	website
	ENERGEX crews will also continue to reconnect around 2,000 individual homes and businesses in flood affected areas as they are safety certified by licensed electricians	
	Extract from Anna Bligh – Condolence address by Premier Anna Bligh to the State Parliament - 15 February 2011	Premier The Honourable Anna Bligh
	More than 28 per cent of our state rail network was left twisted and displaced.	website
Cyclone Yasi	Extract from Media Release – 10 February, 2011	Ergon Energy
	Chief Executive Ian McLeod revealed today more than \$5.5 million in raw materials had so far been obtained to substantially restore the main population centres, with a military-style operation still required to bring electricity to large areas of the Cassowary Coast.	website
	"Seven days ago we had around 200,000 customers in the impacted area without power"	
	"One week into the operation Ergon Energy has acquired and/or used:	
	• more than 500km of cable and conductor line;	
	almost 2000 poles and cross arms;	
	• 22,000 fuses and lightning arrestors;	
	• 5562 insulators, and	
	 281,782 hardware items like bolts, screws, brackets and clamps. 	
	• 25,000 meals for restoration and support teams"	
	"To get North Queensland re-connected we have rolled out the largest ever deployment of electricity supply field staff in Australia's history.	
	"We've have more than 2000 people working on the repair and restoration of the network, including more than 1000 field staff, and that's soaking up enormous amounts of materials," Mr McLeod said.	
	The job is far from over and we're working as fast as we can to bring the Cassowary coast and Ingham, where major repairs are needed, back to normal," Mr McLeod said.	

Table 2: ElectroCon	mms & EnergyUtilities ۱	response to 2011 natural disasters
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Western Australian Bushfires	Extract from Media Release: 7 February, 2011 There are currently 1612 customers without power in the Kelmscott/Roleystone area.	Western Power
	Power was shut off to these areas yesterday at the request of FESA, to keep the area safe for firefighters.	
	FESA will advise when Western Power crews can enter the area and begin assessment and restoration work.	
	Western Power will continue to provide updates.	

Demand for technical knowledge & skills (including Skills Shortages)

Today's industry members, regardless of sector or discipline, work in highly technical and continually changing environments. Science and technology continue to influence existing products and trigger new processes and equipment to meet global and local community demands. Hence, the industry requires personnel able to apply their knowledge and skills, communicate ideas both orally and in writing, control highly technical equipment, critically assess and appraise situations and apply creative, diagnostic and problem solving techniques on a day-to-day basis, whilst simultaneously maintaining pace with technological advancement.

Technical Skill Shortages (Trade & Post Trade)

For almost two decades, the ElectroComms and EnergyUtilities industries have suffered Skills Shortages at trade-level. Additionally, skill shortages at post-trade level (Certificate IV to Advanced Diploma and above) are more prevalent than ever before, across all industries under the ISC's coverage.

Industry intelligence indicates that a further 23,000 tradespeople will be required across all sectors of the energy industries including; electricity generation, transmission and distribution, gas and electrotechnology. Additionally, The Climate Institute has recently predicted that, *"with strong and decisive pollution and climate policies – including a price tag on pollution – close to 34,000 new jobs could be created in Australia by 2030"* in response to clean energy investments (Climate Institute, 2011).

This is in addition to the jobs that will be created in response to the industries' own infrastructure development and maintenance projects; recovery activities in light of the Queensland floods, Cyclone Yasi and the Western Australian bushfires; Governments' infrastructure development 'Nation building' initiatives; the National Broadband Network roll-out and other Renewable/sustainable energy initiatives eg; 'Smart Meter' rollout, Solar Energy 'Feed-in Tariffs' etc.

The recent earthquake in Christchurch, New Zealand, may also place demand on the industries, as industry operatives move across the Tasman to assist in re-building activities.

Strategies to address the current technical skill shortages and future labour demands are exercising the minds of industry employers and representative bodies (ie; Unions, Employer Associations).

Industry acknowledges that workforce development and training strategies will be integral to a successful response.

In a Media Release specifically addressing potential skill shortages in relation to the NBN rollout, CEPU NBN Project Co-ordinator, Allen Hicks, stated that:

"The bottom line is that if industry and NBN Co develop an appropriate training plan, the changes of skill shortages will be greatly diminished. Everyone needs to take a deep breath and commit themselves to this, so there won't be a problem down the track. The National Broadband Network presents a great opportunity for individual workers to retrain and for the nation to collectively develop a pool of highly skilled workers that can go on to contribute to the resources boom and future communications and other projects" (February, 2011).

EE-Oz is continuing to provide advice on industry influences and labour demand areas so that shortages and gaps can be addressed. Occupations currently experiencing skill shortages are comprehensively detailed in Section 2.3 below.

EE-Oz is also working with industry and its training partners to ensure that all necessary units, qualifications and skill sets are available to the ElectroComms and EnergyUtilities industries.

Resources now need to be applied to encourage the implementation and delivery of the training programs based on these national competency standards. EE-Oz will continue to work with all stakeholders to facilitate effective training solutions. This is further discussed in Sections 4 and 5 of this report.

Technical Trainer Skill Shortages

Similarly, all four industry sectors under the ISC's coverage have identified considerable concern regarding the present severity of technical trainer shortages.

Skilled, knowledgeable and experienced technical teaching staff are critical to the continued development and success of the Australian ElectroComms and EnergyUtilities industries. The particularly technical nature of the industries and the advances in technology that are occurring in response to climate change, dictate that the industries' trainers must be highly skilled and qualified personnel, able to deliver effective training in accordance with continuously changing technologies and work practices.

The industries are, however, suffering severe skills shortages and an ageing workforce in this critical occupational area, with recent ABS, NCVER and Productivity Commission studies identifying that over two thirds of VET professionals across all sectors are aged over 45 and an EE-Oz online survey indicating that this is more extreme for the energy sector trades, where the average age is 55 years. Additionally, as these trainers retire over the next decade, experience will be lost which cannot be quickly replaced.

Registered Training Organisations (RTOs) report that they are unable to compete with industry to recruit skilled tradespeople into training roles. This is significantly affecting the training system's ability to expand capacity in existing areas of delivery

or to implement new programs in response to growing industry demand (eg; for renewable energy qualifications/skill sets).

The matter is cause for concern and strategies to expand the industry's technical teaching workforce and improve the currency of those already in the system are required.

Industry stakeholders have identified the need for a campaign to develop suitably qualified and experienced trainers for the industries. The Certificate IV TAE qualification, currently the standard requirement for VET trainers, provides a preliminary basis in pedagogical theory, although few industry representatives consider this an ideal level of training.

Additionally, the Productivity Commission's research into the VET Workforce has identified that the TAE represents more "an adequate entry-level standard for VET teaching and assessing [providing] a solid basis on which other skills can be built" (Productivity Commission, 2010). The Productivity Commission's paper also acknowledges that "VET trainers and assessors are required to be 'dual professionals', with both industry currency and educational capabilities".

EE-Oz, in consultation and cooperation with industry, has identified appropriate training, in the form of a Diploma qualification, to support technical trainer professional development. The training includes technical and theoretical (mathematics and physics) refreshers and the mentoring skills required to work with apprentices.

The intention of this Diploma level qualification is not to replace the Certificate IV TAE qualification, but to support industry technicians transitioning to training roles. Allowing new sector entrants to undertake this qualification part time, supported by a reduced teaching role, would facilitate the development of practical training and assessment skills relevant to industry needs. This would provide prospective trainers with confidence that their abilities will be fostered and the development of a career pathway will be supported. In this manner it is not envisioned that the Diploma will challenge the Certificate IV or act as a barrier for new entrants. Rather, it will increase the utilisation of the Certificate IV and the attractiveness of training careers, by supporting the development of effective teaching skills.

Inclusion of the qualification in the UEE07 Training Package has, however, met with some resistance from the State and Territory Training Authorities (STAs). However, due to the severity of trainer skill shortages in across all sectors, industry has requested EE-Oz continue to liaise with the STAs towards a solution.

Aging Workforce

The 2010 Intergenerational Report identifies that "population ageing, and the associated decline in workforce participation, is projected to reduce the potential economic growth rate of the Australian economy. Over the past 40 years, real GDP growth has averaged 3.3 per cent a year. For the next 40 years, real GDP growth is expected to slow to 2.7 per cent a year...The ageing population will see the number of people aged 65 to 84 years more than double and the number of people 85 years and over more than quadruple...The number of people of working age to support every

person aged 65 years and over is projected to decline to 2.7 people by 2050 (compared with 5 people now)" (Australian Treasury, 2010).

The Australian Energy industries are no exception. The Electrotechnology industry demographic is typical of the Australian workforce. The large majority of workers in the Gas and Generation industries are approaching 50 years of age and the demographic of the ESI-Transmission, Distribution and Rail industry is such that nearly half the workforce is under 35 years of age (due to the broad scale apprentice recruitment drives of recent years) and over half the workforce is over 45 years of age. Similarly, in many of the Electrotechnology industry sectors, particularly the communications sectors, 45-50% of the workforce is expected to retire in the next five years (TITAB, 2009).

Research conducted as part of a recent EE-Oz project has confirmed that even with the efforts currently being devoted to the recruitment and training of large numbers of apprentices and operatives (hundreds in the case of the larger Electricity Supply companies) across Australia, the severity of skills shortages across all industry sectors and levels are such that the number of recruits will not cover the age retirements expected in the next five years.

System Integration

(incl. Energy Efficiency, Smart Grids, Smart Meters, Smart building systems, NBN)

The scope and scale of the technologies and systems that can be integrated across domestic, commercial and industrial settings to contribute to increased energy efficiency is very broad.

Technologies which are currently being increasingly integrated to improve energy efficiency include:

- Distributed generation local power supply systems which provide on-site generation including micro turbines, heat exchangers, micro wind and solar systems
- Smart building technologies, including energy efficient lighting, heating, cooling and security systems.
- Demand side management via smart meters and integrated data systems
- Electricity supply system design and control technologies
- Power system optimisation technologies
- Domestic integrated energy management systems
- Commercial/industrial integrated energy management systems

EE-Oz, in consultation and cooperation with industry is continuing to develop new and amend existing training standards for these new and emerging technologies and systems.

EE-Oz also sees value in assigning a particularly high priority to the development of training standards for energy auditing and performance monitoring which will underpin the design, deployment and successful operation of energy efficient integrated systems.

Specifically, there are new roles emerging for qualified personnel to:

- Audit and assess current installations, both holistically and at a systems level
- Provide advice on the reconfiguration and optimisation of existing systems for energy efficiency
- Provide advice on the design, deployment and integration of new technologies to increase energy efficiency.

And

- Monitor and report energy usage, both holistically and at a systems level
- Assess energy efficiency
- Optimise individual and integrated systems to achieve maximum energy efficiency.

These roles will be particularly relevant in commercial/industrial premises where energy usage is a significant economic and environmental cost and opportunities exist for efficiencies and savings.

Smart Networks

The Energy Networks Association's 'National Strategy for Smart Electricity Networks' (September, 2010) provides the following explanation of a 'smart electricity network';

The technologies, devices and systems that make up a smart network will vary across electricity distribution businesses, just as existing electricity networks vary according to the geographic, climatic, ownership and business parameters that the businesses operate within. Examples of smart network components include:

»»integrated communications infrastructure that enables near real-time, two-way exchanges of information and power

»»smarter measurement devices (including advanced metering infrastructure) that record and communicate more detailed information about energy usage

»»sensors and monitoring systems throughout the network that keep a check on the flow of energy in the system and the performance of the network's assets

»»automatic controls that detect and repair network problems

»»advanced switches and cables that improve network performance, and

»»IT systems with integrated applications and data analysis.

The Strategy goes on to clarify the difference between smart network components and technologies that can be enabled by smart networks;

There are a range of other technologies, devices and applications that are often associated with smart networks, such as customers' energy management systems, renewable energy supplies, electric vehicles and energy storage technologies. However, it is important to understand that these are new opportunities that are enabled by smart networks, rather than being a component part of smart networks. In essence, the transition to smart electricity networks will instigate significant changes to the industry's operations, work practices and, consequently, its required qualifications and skill sets.

On the 29th of October 2009, the Federal Government officially invited bids to transform Australia's energy grid through the *SmartGrid/Smart City* initiative. The three year, \$100 million initiative, being led by the EnergyAustralia consortium¹ has begun across five sites in Sydney and the Hunter and represents Australia's first commercial-scale smart grid.

At a community level, the technology will allow residents to see their household's real-time electricity usage with view to assisting them make better decisions about energy efficiency in their homes.

At an industry level, the SmartGrid/Smart City initiative will demonstrate and test the new world of real-time grid performance data collection, analysis and utilisation technologies and systems, with view to improving network owner grid management.

A recent Access Economics study has predicted that investment in smart grid technology has the potential to reduce electricity usage in Australia by 4% over 10 years (Energy Source & Distribution, Dec 2010).

Smart meters

As at 17 February, 2011, 500,000 Smart Meters had been installed under the Victorian Smart Meter Rollout Program (ENA, 2011).

As reported in EE-Oz's 2010 Environmental Scan, Industry is particularly concerned that this work be undertaken by appropriately qualified personnel as there are a number of aspects that must be appropriately dealt with, especially where retrofitting is required.

- Asbestos in old installations
- Correct installation of apparatus, taking into account the age of existing systems
- The need to address other appliance and fixed wiring related issues
- Accommodating changes in technology over the life of the roll-out
- Ensuring compliance with service rules.

This industry concern has proven to be founded, as the ENA has reported that, "qualified smart meter installers have so far found a total of about 3500 homes with electrical defects, and more than a third of these had to be immediately disconnected for safety reasons" (ENA, 2011).

EE-Oz has advised DEEWR that approximately 12,000 skilled workers will be required to successfully achieve the roll out of the 2.8 million meters in Victoria by the end of 2013, in line with the mandate of the Victorian Government.

EE-Oz is continuing to work with Department of Resources, Energy and Tourism (DRET), the Victorian Department of Primary Industries (DPI), Skills Victoria and

¹ Consortium: GE EnergyAustralia, IBM, AGL, Sydney Water, Hunter Water and Newcastle Council

the Victorian Energy Safety Regulator, ESV, to ensure industry endorsed training is in place to support this roll-out. Specifically, EE-Oz has identified a pathway via the *Certificate IV in Electrical – Renewable Energy* for practitioners to achieve the competencies required to carry out new installations and retrofits of smart meters and associated communications technologies.

Smart Building Management Systems

Smart Building Management Systems encompass a wide variety of technologies, across commercial, industrial, institutional and domestic settings. Building Managment Systems include both energy management and building controls with the purpose being to control, monitor and optimise building services such as:'

- Lighting
- Heating
- Security
- CCTV and alarm systems
- Access and attendance control (including Lifts)
- Audio-visual and entertainment systems
- Ventilation, filtration and climate control
- Data networks

The potential of these integrated technologies is considerable, both in terms of improving living and working environments and increasing energy efficiency.

Control technologies are the corner stone of Smart Building Management Systems. These technologies allow the integration, automation, and optimisation of all the services and equipment within the building concerned.

Programmable Logic Controllers (PLC's) formed the original basis of the control technologies. More recently commercial and residential applications have been based on 'distributed-intelligence microprocessors'. This continues to be an area of rapid and continual change. Consequently, EE-Oz is working closely with industry to ensure the units, qualifications and skill sets are available to industry to maintain pace with technological advances.

National Broadband Network

In 2008, the Australian Government published its plan for the National Broadband Network initiative. The Government will provide nearly \$5 billion to rollout fibre to over 90% of the Australian population. The roll-out will take 5 to 7 years to complete, commencing in regional areas and working back into metropolitan centres.

ACMA registers currently total 60,000 operatives, including electricians with ACA licenses. The registrars assume that there are another 10,000 unregistered operatives within the industry. Despite these numbers, current industry estimates indicate that another 10,000 new operatives will be required to adequately service the governments' initiatives. Eighty per cent (80%) of these new industry operatives will be required in the areas of construction (rigging, backboning/backhauling), cabling (customer access network, data communications – optical, coaxial, copper, customer premises cabling & equipment, electronics & communications) and technical operations (installation,

commissioning, maintenance, tech support), 10% will be required in the areas of engineering (network, design, infrastructure), planning and design (computer systems, networks, infrastructure) and 10% will be required in industry support roles.

The workforce numbers will build during 2011 and 2012 towards a full workforce in 2013. This means that industry has two years to prepare a suitably skilled and knowledgeable workforce.

Industry is seeking to ensure that new entrants and existing workers employed in this project are provided with appropriate industry induction and technical training programs.

EE-Oz is working in consultation and cooperation with industry to develop and amend units, qualifications and skill sets to support the development of the workforce towards 2013.

The Electrotechnology Training Package includes a large number of competencies and 14 qualifications (4 x CII, 3 x CIII, 4 x CIV, 3 x AD) which will support the National Broadband Rollout. A new Certificate II qualification has also been developed, as have a number of Skill Sets.

The take-up and implementation of these training programs in the short term will be critical to meeting industry labour demands in 2013. In this light, industry has identified that the following issues must also be addressed as part of a holistic national approach to training:

- Upskilling of the RTO workforce to deliver training to meet the needs of the Broadband Roll-out.
- Training materials and delivery resources required to support training
- New capital equipment investments for VET providers.

Emerging Policy Initiatives

In addition to the above, the Commonwealth Government has recently announced that the legislative framework for the reduction of carbon pollution is to be established by July 2012. Since 2006, there have been a number of studies conducted both by Government and Industry examining the likely impacts of schemes and initiatives in this space, including; the Garnaut Report, reports from the CSIRO and, more recently, a number of Climate Institute 'snap-shot' publications. EE-Oz has maintained a watching brief on these developments and responded by developing units of competency, qualifications and skill sets relevant to the sector. Instrumentation, measurement, industrial control, and peak demand management technologies will be integrated in industry's response to the policy initiatives that are now to be implemented under a shorter than initially anticipated timeline.

Technical and Safety Regulation

National Occupational Licensing System (NOLS)

In its communiqué outlining the outcomes of its 3 July 2008 meeting, COAG summarised the need for a national occupational licensing system for a range of economically important trades:

"COAG acknowledged that Australia's overlapping and inconsistent regulations impede productivity growth. Without change Australia's future living standards would be compromised, the competitiveness of the economy reduced and our ability to meet the challenges posed by an ageing population diminished."²

On 30 April 2009, the Council of Australian Governments (COAG) endorsed the *Intergovernmental agreement for a national licensing system for specified occupations* identifying the objectives of the national system, to be set out in legislation, are to:

a. ensure that licences issued by the national licensing body allow licensees to operate in all Australian jurisdictions;

b. ensure that licensing arrangements are effective and proportional to that required for consumer protection, and worker and public health and safety, while ensuring economic efficiency and equity of access;

c. facilitate a consistent skill base for licensed occupations;

d. ensure effective coordination exists between the national licensing body and relevant jurisdictional regulators;

- e. promote national consistency in:
 - i. licensing structures and policy across comparable occupational areas,
 - ii. regulation affecting the conduct requirements of licensees, and
 - iii. the approaches to disciplinary arrangements affecting licensees;
- f. provide flexibility to deal with jurisdiction or industry specific issues; and
- g. provide access to public information about licensees.

The Productivity Commission has estimated that the economic benefits of a National Licensing system will be between \$1.5 billion and 4.5 billion per year³.

There is also a significant potential to mitigate the effects of local peaks in skills demand, as a national licensing system will encourage a nationally mobile workforce by removing inconsistencies in regulation, allowing for the effective distribution of skills throughout the economy. Currently occupational trades are licensed to varying requirements in each state and territory.

Workforce mobility is highly beneficial for the broader economy but particularly for resource rich states which are net importers of skills. Uniform regulation will

² http://www.coag.gov.au/coag_meeting_outcomes/2008-07-03/index.cfm

³ COAG, National Licensing System for Specified Occupations: Consultation Regulation Impact Statement, 2008, p.8

lower the compliance costs for industry and effectively increase the recruitment pool for skills, facilitating a more efficient distribution.

EE-Oz is continuing to work with national training system representatives and industry regulators towards the goal of harmonised training and licensing standards. Initially, four occupational areas will be covered by the NOLS: electrical, plumbing and gasfitting, refrigeration and air conditioning mechanics and property occupations. For the electrical and refrigeration trades, the target set by COAG for harmonised national licensing is 2012.

EE-Oz is a member of the Electrical Occupations Interim Advisory Committee (EOIAC) which has been established to provide policy advice to the COAG National Licensing Steering Committee specifically in relation to:

- 1. License categories, scopes of work and license types
- 2. Eligibility requirements, both skill based and non skill based.

The EOIAC has developed a proposal based on seven licence categories and two restricted licence categories.

The Occupational Licensing National Law Act 2010 was passed by Victoria's Parliament as host jurisdiction on Friday, 17 September 2010 and since this time has been applied in Queensland and New South Wales. It is expected that other jurisdictions will pass the legislation by early 2011. The National Law establishes the framework for the NOLS and the National Occupational Licensing Authority (NOLA), which will administer the system from 2011 (EOIAC, 2010).

A key objective at the present time is the maintenance of regulator confidence in the national training system. EE-Oz has always ensured that the industry's regulatory requirements are comprehensively reflected in the units of competency comprising its suite of Training Packages. This practice will continue into the future.

Renewable Energy Regulation

The Renewable Energy (Electricity) Act 2000, along with supporting legislation sets the rules for the Renewable Energy Target (RET) scheme, which is designed to ensure that 20 percent of Australia's electricity supply will come from renewable sources by 2020.

In June 2010, the Australian Parliament passed a number of amendments to the Act including a requirement for the Renewable Energy Regulator to each year inspect a sample of installed small generation units (SGUs). The Office of the Renewable Energy Regulator (ORER) anticipates that these inspections will commence in early 2011.

To assist the Regulator in regard to operational matters relating to the inspection of SGUs, the Government has convened an advisory committee of experts; the RET Inspections Advisory Committee (RIAC). EE-Oz has been invited to join the Committee, which is Chaired by the Renewable Energy Regulator.

EE-Oz Training Standards

EE-Oz will ensure that the requirements of the Renewable Energy Regulator continued to be reflected in the units, qualifications and skill sets related to renewable energy in the suite of EE-Oz Training Packages. However, a key issue is the risk of duplication of process between the Renewable Energy Regulator and the National Occupational Licensing Scheme.

The main issue at this point is the relationship of these regulations to the role of state/territory industry technical and licensing authorities and the requirements of the Energy Network owners.

Any non-compliance under this Act will trigger disciplinary action by these authorities. As the NOLS is seeking to reduce regulatory complexity for all of industry considerable administrative benefits could be achieved if this regime were integrated into occupational licensing requirements under the coverage of existing and proposed national frameworks, rather necessitate additional regulatory and bureaucratic processes.

This would enable a single, integrated training, regulation and licensing system.

National Rail Safety Regulation

The National Rail Safety Regulator is due to commence operations in January 2013. At present, the draft Regulatory Impact Statement, Bill and Regulations are being finalised for release for public consultation in July 2011.

The National Rail Safety Regulator provided a presentation to all members of the Rail Sector at the 2010 EE-Oz Annual Conference. EE-Oz will continue to work with Industry and the Regulator to ensure that the rail signaling and rail traction units within the UEE and UET Training Packages reflect sector's new regulatory arrangements.

It is also worthy of note, that the NSW Government has instituted an Independent Rail Regulator as a result of enquiries into recent serious rail accidents and that this authority is charged with ensuring the national competencies underpin the accreditation of operatives in the NSW rail sector. EE-Oz has been working with the NSW IRR, UEITAB and NSW rail industry representatives to identify appropriate units and qualifications to cover the skills requirements of the NSW Rail Regulator.

National VET Regulation

In 2009 the Council of Australian Governments (COAG) agreed to establish a national regulator for the vocational education and training (VET) sector. The new regulator will be an independent Commonwealth statutory authority (DEEWR, 2011).

Subject to the passage of legislation establishing the national VET regulator through the Commonwealth Parliament, the regulator is expected to commence operations in July 2011.

The Bill to establish a national VET regulator was introduced into the Commonwealth Parliament in November 2010.

On 10 February 2011, the Senate jointly referred the following legislation to the Education, Employment and Workplace Relations Legislation Committee for inquiry and report:

- the National Vocational Education and Training Regulator Bill 2010 [2011]
- the National Vocational Education and Training Regulator (Consequential Amendments) Bill 2011
- and the National Vocational Education and Training Regulator (Transitional Provisions) Bill 2010 [2011]

The latest edition of the National VET Regulator's 'National Update' identifies that:

- The *National Vocational Education and Training Regulator Bill 2010* is still expected to be considered at the autumn sitting of the Commonwealth Parliament. It is anticipated that it will be passed early in 2011, allowing the regulator to begin operations in April 2011.
- The National Vocational Education and Training Regulator (Consequential Amendments) Bill 2011, which makes changes to the Education Services for Overseas Students Act 2000 amongst others, will also be introduced early in 2011.

EE-Oz will continue to work with the National VET Regulator, Industry and its training partners to ensure that arrangements for the registration of RTOs under the National VET Regulator are as seamless as possible.

SECTION 2: Identified workforce development needs

2.1 Introduction

It is impossible to forecast precisely how demand for labour will evolve, as there are many factors involved. What is important, is to identify the skills for which demand will grow, or where a significant replacement will be necessary (e.g. for retirement). Rather than producing complex, elaborate projections, it is better to devise systems to quickly identify trends and approaches to respond and adjust as necessary.

To this end, the following sections detail each sector's labour force characteristics and workforce development needs as determined by EE-Oz and industry data collection activities.

2.2 Methodology

EE-Oz Training Standards has an extensive and comprehensive formal consultative structure. This consultative structure comprises the EE-Oz Board of Directors, General Standing Committees of the Board, three industry-specific Sector Councils supported by four industry-specific National Training Advisory Groups (NTAGs), one NTAG Chairs' Committee and seventeen sector-specific Technical Advisory Committees (TACs), National Project Steering Committees and other committees of regional, state, national and international significance (refer Figure 2 and Appendices).

Each year, EE-Oz Training Standards actively collects intelligence from a number of key stakeholder consultation forums, namely;

- 1. National Workshop Series (stakeholder consultation workshops in each state and territory)
- 2. Annual EE-Oz Conference and associated meetings
- 3. Specific Industry/Sector Meetings

EE-Oz Training Standards utilises these forums to collect 'grass-roots' intelligence, gauge national client satisfaction levels and identify opportunities for improvement of the ISC's products and services from stakeholders in each State and Territory. The EE-Oz *Annual Stakeholder Survey* and *Survey to inform the Environmental Scan* are key mechanisms in this data collection methodology.

The surveys are also distributed by the EE-Oz network of State and Territory ITABs, posted on the EE-Oz Training Standards website and included in the Summer edition of the EE-Oz Magazine and a number of EE-Oz E-bulletins. The magazine and E-bulletin are distributed to over 3000 EE-Oz Training Standards clients.

EE-Oz Training Standards also utilises each and every meeting, forum, workshop, conference or industry gathering throughout the year to collect information for incorporation in the Annual Environmental Scan. Advice provided to Government and industry throughout the year is also re-iterated in the Scan.

EE-Oz Training Standards is very fortunate to have strong working relationships with the network of State and Territory Industry Training Advisory Bodies (ITABs) servicing the ElectroComms and EnergyUtilities industries across Australia. Each year, EE-Oz Training Standards formally engages the State and Territory ITABs to provide industry intelligence. This State/Territory based intelligence has informed this 2010 Environmental Scan.

As a conservative estimate, well over 1000 individuals contributed to EE-Oz Training Standards' 2010/2011 intelligence gathering processes. These individuals represent small, medium and large industry organisations, industry representative bodies (ie; unions, employer associations), Registered Training Organisations, State and Territory Industry Training Advisory Bodies, industry regulatory bodies, Training Authorities and VET support agencies. Appendix B comprehensively details the activities undertaken by EE-Oz to inform this Environmental Scan and the individuals who have provided feedback and information.

2.3 Industry Sector Analysis

2.3.1 The EnergyUtilities Industries

Since the mid 1990s, there has been increased private investment in Australian energy infrastructure. The creation of a National Electricity Market (NEM), the segregation of energy businesses, the elimination of regulatory barriers to interstate energy trade, the establishment of third party access to the services of energy infrastructure and the liberalisation of ownership in the energy sector, all have created opportunities for private sector investment.

The extent of privatisation, acquisition and merger activity in the industry has been an important aspect of market activity over the last few years. The tendency now is towards greater specialisation, with entities concentrating on a particular sector: generation, distribution or retail. Mergers are, however, increasing *within* each of these sectors.

Demand for energy services is projected to rise significantly into the future due to the expansion of world and regional economies and increasing global and regional populations, income levels and demand for modern conveniences, most significantly; air conditioning and integrated 'smart' building systems. Many of the energy utilities are embarking on record capital infrastructure programs to meet this need.

In February 2009, employment in the EnergyUtilities rose to a 25 year high and, although a slight decrease was evident in the 12 months to 2010, employment levels remain at their second highest level in the past 18 years (DEEWR, 2010).

DEEWR predicts employment in the Utilities industries (including Water) to continue to increase at an average rate of 2.4% per annum in the five years to 2014-15. This compares to an average annual growth rate of 1.8% across all industries over the same period.

All-in-all the Australian energy sector is expanding rapidly and changing significantly. This expansion is producing ongoing and increasing demand for skilled workers and training for these workers.

Electricity Generation

Profile

The Generation sector of the Electricity Supply Industry produces electricity for use in industry, business and private homes. The industry is supported primarily by large, state-owned or privatised power stations. Historically, the majority of electricity production in Australia was the preserve of these coal-fired and hydro power stations, ranging in capacity from approximately 5 MW's to stations in excess of 2000 MW's. In recent times, however, Australian electricity production has become more decentralised, with electricity now being generated from renewable energy sources such as wind and solar farms and, to an increasing degree, from domestic, commercial and industrial buildings supplying power 'back-to-the-grid'. This is a significant shift that has occurred over a relatively short period of time.

Operatives employed in the Generation sector may be involved in a wide range of tasks, including, but not restricted to; operation of unit plant from the control room, local operation of plant systems, management and coordination of unit or station operations, mechanical maintenance, electrical maintenance, electronic/ instrumentation maintenance and/or installation of new plant.

The Australian Bureau of Agricultural and Resource Economics (ABARE) has estimated that gross electricity generation in Australia will rise from 907 PJ (252 TWh) in 2004-05 to 1468 PJ (408 TWh) in 2029-30, an increase of 62% over the period.

Additionally, DEEWR predicts that in the five years to 2014-15, the Electricity Generation sector will experience strong employment growth, by 3% per annum, equating to an additional 2400 jobs over the period (DEEWR, 2010).

Drivers

• Clean Energy

Australia presently relies heavily on fossil fuels to meet energy requirements. The large majority of Australia's electricity is currently generated from coal. Although Hydro, Wind and Solar power generation is continuing to grow, coal and gas remain the most cost effective means of supplying electricity in Australia and, hence, are predicted to remain the main fuel sources for electricity generation in the immediate future.

In this context, perhaps the most significant challenge for the Australian energy industry is to ensure a reliable and sustainable supply of energy to meet the needs and aspirations of governments, industries and the community, whilst simultaneously suppling this energy in the most environmentally benign and sustainable way as possible.

The development and adoption of energy efficient and low emission technologies and energy sources is fundamental to maintaining economic growth while reducing greenhouse emissions. The following extract from the Australian Treasury's Intergeneration Report (January 2010) details the Government's current thinking on the matter, "*The expanded national Renewable Energy Target (RET) is designed to ensure that, by 2020, 20 per cent of Australia's electricity supply comes from renewable energy sources. By helping accelerate the deployment of renewable energy, the RET will assist the energy sector transition to the introduction of the CPRS. By 2050, output from the alternative energy sector is expected to be up to 20 times larger under a CPRS and expanded RET".*

In the short term, the reduction in greenhouse gas emissions will be achieved by the use of currently available energy efficient technologies in generation and end use sectors. By means of example, in Queensland, where 90% of current electricity supply is fuelled by coal, electricity generators have adopted the more efficient supercritical boiler technology. Additionally, stations across Australia are expending significant amounts on retrofitting existing systems to meet carbon reduction targets. Similarly, in the future many power stations will incorporate gas-fired generators.

Over the longer term, emissions will be reduced through the further development and commercialisation of energy efficient technologies. These include carbon capture and storage and non-fossil fuel generation technologies such as; solar, wind, water, and the new technologies of geo-thermal, fuel cells, co-generation and tri-generation.

The Australian Government has allocated \$4.5 billion over nine years to its Clean Energy Initiative. The initiative will support investment in low-emissions technologies which enhance Australia's infrastructure and skills capacity.

Specifically, \$2 billion will support commercial-scale integrated projects under the Carbon Capture and Storage Flagship Program, \$1.5 billion will support large-scale solar electricity generation under the Solar Flagships Program and \$500,000 will support the Australian Centre for Renewable Energy's work to promote the development, commercialization and deployment of new and existing renewable technologies (Treasury, 2010).

Carbon capture and storage technologies, involving the separation of carbon dioxide arising from the combustion of fossil fuels, are currently used in industrial processes, but the technology is presently too expensive to implement in power plants.

Solar energy is the world's fastest-growing energy source, with production of photovoltaics (solar cells) doubling every two years. Australian Governments' 'Feedin Tariff' incentive structures have significantly boosted the public's adoption of photovoltaic (solar) cells through government legislation in all States and Territories. Feed-In-Tariffs are a mechanism by which owners of grid-connect photovoltaic solar power systems are paid more than the retail price for any excess electricity production that is fed back into the grid. Feed-In-Tariffs have had significant success in Germany and Spain, and operate in over 40 jurisdictions around the world, now including Australia.

All states and territories in Australia currently have 'Feed-in-Tariff' incentive structures for residential installations (output measured in kW). The Northern Territory also has arrangements for commercial installations (output still measured in kW), however, in February 2011, the ACT Minister for Energy, Mr Simon Corbell MLA, announced that the ACT was the first state or territory in Australia to pass legislation to allow medium scale solar installations (15 megawatt capacity cap) to access the Feed-In-Tariff.

Minister Corbell also announced that the "*The [ACT] Government will also introduce separate legislation later this year to support the development of even larger scale facilities and will then follow this process with an auction for the first 40MW tranche*" (ACT Government Media Release, 17 Feb 2011).

There are currently 64 wind farms in Australia (GeoScience Australia). The 'Top 12' have a generating capacity of 1,721 megawatts (MW) (Table 2), equating to just over 1% of Australia's energy generation. South Australia has more than half of the nation's wind power capacity, Victoria also has a sizeable capacity, with large proposals for expansion.

Wind farm	Installed capacity (MW)	Developer	State
Capital Wind Farm	140		New South Wales
Emu Downs Wind Farm	80	Stanwell Corporation	Western Australia
Hallett Group	298	AGL Energy	South Australia
Lake Bonney Group	278	Infigen Energy	South Australia
<u>Mount Millar Wind</u> <u>Farm</u>	70	Transfield Services	South Australia
Portland Group	132		Victoria
Snowtown Wind Farm	99	TrustPower	South Australia
Walkaway Wind Farm	90	Alinta	Western Australia
Waterloo Wind Farm	111	Roaring 40s	South Australia
Wattle Point Wind Farm	91	AGL Hydro	South Australia
Waubra Wind Farm	192	Acciona Energy & ANZ Infrastructure Services	Victoria
Woolnorth Wind Farm	140	Roaring 40s & Hydro Tasmania	Tasmania

Table 2: 'Top 12' Large Operational Wind Farms in Australia, November 2010.

Source: Wikipedia.

In addition to solar, wind and hydro-electricity generation, there are a number of new and emerging renewable energy technologies. These include geo-thermal, co-generation and tri-generation systems.

Geo-thermal electricity generation is still in its infancy in Australia, however, "Australia's vast hot sedimentary aquifer (HSA) and hot rock resources have the potential to become a significant, secure, renewable base load power source. Preliminary work carried out by Geoscience Australia has suggested that by extracting 1 per cent of the available geothermal energy, 1.2 billion petajoules could be yielded, which is equivalent to 26,000 times Australia's primary usage annual energy" (Ecogeneration, 2010). In 2010, the Australian Geothermal Industry was estimated to include around 50 companies (Ecogeneration, 2010). The majority of companies are involved in 'pegging' ground'. However, the Federal Government has recently funded two commercial-scale projects in South Australia. Funded under the Renewable Energy Demonstration Program (REDP), the projects will use different technologies in two different geological settings to generate geothermal electricity.

In the Australian context, the broad-scale implementation of co-generation and trigeneration technologies is much closer. Cogeneration, also known as Combined Heat and Power (CHP), is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat.

Conventional power plants emit the heat created as a by-product of electricity generation into the environment through cooling towers, flue gas, or by other means. By contrast CHP captures the by-product heat for domestic or industrial heating purposes. CHP use for district heating is especially common in Scandinavia and eastern Europe, with hot water temperatures ranging from approximately 80 to $130 \,^{\circ}$ C.

By-product heat at moderate temperatures (212-356°F/100-180°C) can also be used in absorption chillers for cooling. The production of electricity, heat and cold is called tri-generation.

A Fuel Cell generates electricity through reaction between a fuel and an oxidant in the presence of an electrolyte. Many combinations of fuels and oxidants are possible, however, hydrogen fuel cells are the most comment, whereby hydrogen is used as the fuel and oxygen, from the air is the oxidant. Fuel Cells are commercially available in Australia.

In terms of impact on the industry's workforce development and training; new entrants and existing workers will need to be skilled in the design, development, commissioning, maintenance, repair and/or decommissioning of the new and/or continually advancing technologies.

A key component of EE-Oz's Continuous Improvement activities for the *UEP06 ESI Generation Sector Training Package* at the present time is the development and integration of the necessary units of competence, qualifications and skills sets to assist industry operatives develop the skills and knowledge required to respond to the technological advances associated with reducing Australia's carbon footprint.

To date, the following amendments have been made to the UEP06 Training Package under continuous improvement activities:

- 2 new sustainable work practice units
- 4 new energy management units
- 21 revised technical units
- o 9 new large wind units
- o 12 new co-generation/tri-generation units.

The Package's qualifications have also been amended to accommodate these new and revised units. It should also be noted that 5 new Fuel-Cell units are to be incorporated in the UEE Electrotechnology Training Package.

• Skills and Labour Shortages

a. Current Skills and Labour Shortages

Skill shortages abound in the majority of occupational areas and levels across the sector and the industry's workforce is ageing. In 2010, DEEWR estimated the <u>median</u> age of workers in the Industry to be 46 years (DEEWR, 2010).

Table 1 details workforce categories and occupations in the Australian Electricity Generation sector that are currently experiencing skills shortages. Industry intelligence indicates that these skills shortages will continue into the foreseeable future and may very well intensify as a result of considerable aged retirements expected in the next five years, particularly in the area of power station system operations. Table 1 also details areas of emerging skill shortages.

This detail has been generated from information provided, and validated, by industry and its training partners over the 12 months from February 2010 to February 2011.

b. Barriers to overcoming skills and labour shortages

Privatisation of segments of the electricity generation industry in NSW and Queensland may well disrupt training schemes. The experience in Victoria was that public companies provided stable employment and training for large cohorts of personnel; a system which was not maintained following privatisation. Hence, there is a risk that a change in the pattern of ownership in NSW and Queensland could also impact training programs.

Additionally, workforce development and training in the Australian Generation sector has historically been hamstrung by a lack of take up of the Generation Training Package, stemming from a severe lack of training and assessment resources and a very small number of RTOs with the Package on scope.

The last 12 months, however, has seen increased up-take of the Generation Training Package. This is largely as a result of the introduction of the Commonwealth Government's Enterprise Based Productivity Places Program (EBPPP), which has been accessed by electricity generation organisations in Queensland, New South Wales and the Northern Territory. Under the EBPPP, these organisations are now training operatives against the Certificate III, IV and Diploma in ESI Generation Operations.

Current Skill Shortage Areas	
Trade	All areas (especially mechanical & electrical)
	Electrical Instrumentation & Control Technicians
	Riggers & Scaffolders
	Welders
Technical Officers	Coal-fired Power Station System Operators
	(especially senior operators)
	Gas-fired Power Station System Operations
	(especially Senior operators)
	Commissioning & Protection Technicians
	Electrical Technicians
Engineering	Mechanical Engineers
	Electrical Engineers
	Information Technology Engineers
Training	Industry specialist technical trainers & writers (off-job)
Emerging Skill Shortage Area	35
In addition to the above n	radiated areas of future skill shortages include:

 Table 1: Current and Emerging Skill Shortage Work Categories & Occupations for the ESI Generation Sector

In addition to the above, predicted areas of future skill shortages include:

- New systems/technologies associated with new and emerging technologies to increase energy efficiency and reduce carbon emissions (ie; Large Solar, Large Wind).
 - c. Solutions and potential sources of labour

In recent years, two key solutions to the current situation have been widely supported by industry, namely:

- 1. Source project funding to develop training delivery and assessment support materials
- 2. Ensure inclusion of Generation Training Package qualifications on the Australian Government's Priority Qualifications List for the State/Territory administered Productivity Placement Program (PPP) and Commonwealth/ISC administered Enterprise Based Productivity Places Program (EBPPP)

In regard to point 1, EE-Oz on behalf of the Generation sector, with the support of the Australian Government, through DEEWR, is currently developing training support resources for the Generation Training Package. Work has commenced on the development of materials against qualifications for which there are presently no, or very few, support resources. This work will be extended to the other qualifications in priority order over coming months.

In regard to point 2, a range of Generation Training Package qualifications have been included on the Australian Government's Priority Qualifications List for the PPP and EBPPP initiatives. These include:

- Certificate II in Electrotechnology Electrician
- Certificate III in Electrotechnology Instrumentation and Control
- Certificate IV in Electrotechnology Electrical Instrumentation
- Certificate IV in ESI Generation (Electrical/Electronic)

- Certificate IV in ESI Generation (Operations)
- Diploma of ESI Generation (Systems Operations)
- Diploma of ESI Generation (Operations)

These qualifications cover all the work categories/occupations identified as suffering skills shortages in Table 1 above.

Sources of labour are a particular area of concern for the industry at the present time. The Australian resources industry boom has been a key factor affecting the skills shortage crisis for the sector in recent years. Electricity generators employ personnel particularly suited to occupations within the resources industry; in terms of skills and knowledge, but also in terms of work ethic, occupational health and safety consciousness and industry culture. Consequently, many sector personnel have been attracted to the resources industry. Additionally, with the pending level of aged retirements across the sector, large-scale employment and training of new entrants is required.

Electricity Transmission, Distribution & Rail Traction

Profile

This industry sector covers the transmission and distribution of electricity via overhead and underground lines; cable-jointing, and; rail, light rail and tram traction. Operatives in the industry may be involved in a wide range of tasks, including, but not restricted to; installation, maintenance, servicing, commissioning, network protection, network operation, management, planning and vegetation control.

In recent years, the sector has been significantly affected by:

- Changes in organisational structures (including privatisation and/or corporatization, contracting out and internal reviews/re-structures);
- Changes in work methods, staffing levels and management approaches;
- Restructuring of the energy market;
- The consumer competition policy, and;
- Increasing government and consumer demand for a response to global warming.

Additionally, there has been strong investment in the sector. In the Transmission sector alone, investment in high volume electricity transmission infrastructure is around \$700 million per annum, with real transmission investment forecast to rise by 80% in the next five years, driven largely by transmission network expansion and upgrades.

In the Electricity Transmission and Distribution sector collectively, investment is continuing to grow significantly. By means of example:

- In 2008, ABARE estimated that \$30-35 billion of new energy infrastructure will be required to 2020.
- In July 2009, industry representatives at the Australian Energy & Utilities Summit confirmed that \$97 billion dollars worth of infrastructure development and maintenance is required in the next 5 years.

- In 2010, Mr George Maltabarow, Managing Director, EnergyAustralia identified that EnergyAustralia alone would be investing around \$8 billion in the NSW electricity network over the next 5 years.
- These estimates have now been superseded by the need for the EnergyUtilities to play an integral part in:
 - Recovery activities in light of the Queensland floods, Cyclone Yasi and the Western Australian bushfires.
 - State/Territory and Federal Governments' infrastructure development 'Nation building' initiatives
 - Renewable/sustainable energy initiatives eg; 'Smart Meter' rollout, Solar Energy 'Feed-in Tariffs' etc
 - o National Broadband Network roll-out

The Rail sector too expects significant growth in coming years. Whether it is because of growing community environmental consciousness, rising fuel prices or simply population growth, there is considerable growth in the public transport sector, including trams and trains. Consequently, the current level of capital investment in rail infrastructure, including refurbishment and upgrade of existing infrastructure, is considerable.

Worthy of note is the South Australian Government's intent to invest \$2 billion in the State's public transport system over the next decade, delivering a tramline from the Adelaide City to West Lakes, Port Adelaide and Semaphore, electrification of the major northern and southern rail lines and a modernisation of the ticketing system.

From June 2008, \$648.4 million will be spent over four years for the first stage of the program to rebuild South Australia's rail and light-rail transport infrastructure. Across the board, the increasing number of services currently being delivered and required into the future translates to an increasing number of functions and technologies that industry operatives need to perform and master.

The tasks traditionally inherent to linework, cable-jointing, substation/network installation and maintenance, testing and protection, meter installation and the like will be significantly broadened to accommodate new and emerging 'smart' technologies and systems.

Drivers

EE-Oz and industry research has identified the following aspects as key drivers of the ESI – TDR industry at the present time:

• Managing increasing demand whilst meeting regulatory, environmental and safety compliance requirements

As detailed above, the industry is significantly involved in the maintenance, replacement and refurbishment of ageing assets (overhead and underground) and will be increasingly involved in major new infrastructure and 'roll-out' projects in all States and Territories over coming years. The challenge for the sector's member organisations is to manage their own network infrastructure programs and works associated with Government initiatives whilst simultaneously meeting customer and regulatory expectations, specifically:

- Network reliability, including quality and security of supply to consumers (residential, commercial and industrial);
- Health and Safety of employees and consumers;
- Risk management, and;
- Compliance with regulatory requirements, including the submission of all necessary documentation

These challenges must also be balanced with increasing government and community pressure for all organisations to display a consciousness of their impact on the environment. Enterprises must be seen to be implementing real and workable measures to address this impact and community concerns.

Managing increasing demand whilst meeting regulatory, environmental and safety compliance requirements requires highly skilled and knowledgeable tradespeople, technical officers, engineers, project and corporate managers.

Unfortunately, as detailed below, considerable skills shortages exist in all of these areas and many organisations are concerned that they will not have the capacity to resource the level of internal and government infrastructure works required in the coming years.

• Refresher Training & capacity for the provision of Mutual Aid

It is now widely accepted that one of the key affects of climate change is an increase in the severity and occurrence of extreme weather events with the potential to cause natural and national disasters. Examples include monsoonal troughs, creating cyclones and torrential rain, which in turn leads to flooding, as evidenced in Queensland, and; heat waves and high winds creating perfect bushfire conditions, as evidenced in Victoria and Western Australia.

In recent years, the increasing frequency of extreme weather events, combined with the severity of skills shortages affecting the EnergyUtilities industries, has resulted in Australia's energy industry organisations being increasingly called upon to assist each other in times of crisis.

Organisational and operative mobility has been considerably assisted by the Training Package's nationally endorsed and recognised units of competence, qualifications, assessment guidelines and, more recently, the suite of 'Refresher Training' units and skill sets.

The national standards for refresher training in particular, have enhanced the ability of power workers to move interstate and quickly provide mutual aid following natural disasters and other emergencies. By means of example, following Cyclone Yasi and the Queensland floods, more than 200 operatives including electricians, metering technicians, lineworkers, emergency service operators and other energy workers were deployed from EnergyUtilities in New South Wales and Victoria. Instead of requiring

days or weeks of retraining, these personnel were operational within hours of arrival in the emergency areas.

The process leading to this outcome, has involved unprecedented engagement of Australia's electricity organisations in direct, face-to-face liaison and resulting actions that:

- identified all current training requirements and procedures
- negotiated these into a common set of best-practice outcomes
- allowed cooperation with the Industry Skills Council to have the agreed outcomes reflected in units of competence and incorporated in the National Industry Training Package
- facilitated the development of rules to ensure mutual aid situations could run smoothly, as well as creating increased portability of skills for industry operatives
- developed a mechanism to recognise these arrangements across the industry (ie; a National Skills Passport and national website), ensuring practical, on-the-ground portability of skills
- allowed collaborative development of resources to support training delivery against the units of competency to ensure even greater commonality of outcomes

A meeting of the Technical Advisory Group (TAC) responsible for continuous improvement of the Refresher Training Units has already been held to consider the identified successes and opportunities for improvement of the Units in light of the recent natural disasters. EE-Oz will continue to work in consultation and cooperation with industry to ensure that all necessary industry endorsed amendments are reflected in the Units and Skill Sets.

• Workforce Demographic, Skills and Labour Shortages

a. Current Skills and Labour Shortages

As detailed above, the EnergyUtilities industries are currently suffering from trade skill shortages resultant of a period of low employment and training during the late 1980's and 1990's in which recruitment practices were affected by factors such as privatisation, restructuring of the energy market, the consumer competition policy and increasing demand for a shift in power supply towards renewable resources.

With the wide-ranging changes across the industry, redundancies were offered, often to relatively young lineworker's (35-40 yrs) and positions were not filled, nor new apprentices employed.

Consequently, today's industry demographic is such that nearly half of the workforce is under 35 years of age (due to the broad scale apprentice recruitment drives of recent years) and over half the workforce is reaching retirement age. The result is that many industry organisations have insufficient numbers of senior tradespeople to train and mentor large numbers of apprentices. Hence, the industry's capacity to respond to government, community and its own demands for infrastructure development and maintenance is being hamstrung by an internal unavailability of trainers.

EE-Oz Training Standards

Additionally, given the current industry demographic, the skill shortages at post-trade level, namely; technical officers and para-professional (Engineering) staff, typically at qualification levels Certificate IV to Advanced Diploma and above, is more prevalent than ever before. Consequently, EE-Oz has noticed a significant rise in the up-take of Certificate IV, Diploma and Advanced Diploma qualifications from the UET06 and UET09 Training Packages, as industry organisations respond the need to train more technical officers and para-professionals.

Table 2 details the workforce categories and occupations in the Australian ESI Transmission, Distribution and Rail sectors that are currently suffering from skills shortages and areas where skill shortages are expected in the future. This detail has been generated from information provided, and validated, by industry and its training partners over the 12 months from February 2010 to February 2011. Industry intelligence indicates that the skills shortages will continue in the workforce categories and occupations identified, as a direct result of aged retirements and at least five years of sustained capital works programs.

Hence, the industry will need to continue to recruit, train and retain its workers well beyond the 'real time' requirements. It is worthy of note that no areas of the ESI-Transmission, Distribution or Rail industries are currently suffering decline.

- b. Barriers to overcoming skills and labour shortages
 - Global Skills Shortages

Many electricity supply organisations are seeking to source skilled operatives from overseas as an immediate 'fix' for the existing skills shortages affecting Australian industry.

Recent international industry reports have, however, identified that many other countries with large electricity distribution networks and infrastructure are, like Australia, entering a period of significant up-grade and overhaul. Hence, the evident skills shortages are of a global, rather than national, nature.

Where international operatives can be sourced, and at present this is predominately from South Africa, England, the Philippines, New Zealand and India, a challenge often arises in the application of their knowledge and skills in an Australian workplace; in the Australian context. This particular context gives rise to a gap which is identifiable and for which training can be made available; this gap has been termed the 'Minimum Australian Context Gap'.

Australian industry regulators are particularly concerned that the gap be addressed in trade vocations such as electrical, plumbing, refrigeration and air conditioning and linework, where the work context may differ markedly between countries and where such differences could endanger lives or major systems.

Under the COAG Skills Recognition Taskforce, an agreed scope of work has been nationally developed for each occupation identified above. EE-Oz Training Standards has been involved in this work. Today, any RTO assessing an overseas applicant for an Australian Training Package qualification must ensure that the applicant is technically competent and that the defined Minimum Australian Context Gap has, or can be, addressed through suitable and comprehensive training and assessment.

Current Skill Sho	rtage Areas - ESI – Transmission & Distribution	
Trade	Electricians	
	Instrumentation & Control Technicians	
	Transmission Lineworkers	
	Distribution Lineworkers (including HV Live Line workers)	
	Cable Jointers (new work & asset improvement, in particular underground cable-jointing.	
T 1 1 1 0 00	Also specialist cable-jointers, eg; paper/lead)	
Technical Officers	Control Room/System control officers	
	Engineering Technicians/officers	
	Distribution Designers (design, drafting & construction of assets & intelligent systems)	
	Meter Technicians (next 5 years as 'SMART' metering is introduced, peak in 2-3 years)	
	Trat & Commissioning Traductions	
	Lest & Commissioning Technicians	
	Droiget Managara (
	System Operations (incl. Surjanshart landary construction PMs)	
	Network Operations	
	Compliance Officers	
	Energy Market Operations Officers	
	Instrumentation Technicians	
	Embedded Generation Technicians	
Engineers	Electrical/Power Engineers/incl_embedded_generation_testing/protection &	
2.1.8.1	commissioning, design/planning/ analysis)	
	Construction Engineers	
Inspections/Safety	Electrical Inspectors	
	Safety Managers	
Training	Workplace mentors, trainers& assessors (on-job)	
	Industry specialist technical trainers (off-job)	
Management	Managers with trade backgrounds	
Current Skill Short	age Areas - Rail	
Trade	Rail Traction Lineworkers (especially emergency maintenance personnel)	
	Signal Electricians	
Technical Officers	Signalling & Track Technicians	
Engineers	Signals Engineers	
Emerging Skill Sho	rtage areas	
Installation o	f smart metering systems	
• Design and in	nstallation of grid connected photovoltaic (solar) systems	
• Wind energy systems		
• Energy efficiency management and auditing		
• Energy efficient lighting		
Co-generation and local generation		
Domestic integrated energy management systems		
Commercial/industrial energy management systems integration		
Communications		

Table 2: Current Skill Shortage Work Categories & Occupations

• Lack of mentors/trainers

Critical to the continued development and success of the Australian EnergyUtilities industries is skilled, knowledgeable and experienced technical teaching staff.
However, as detailed above, today's industry demographic is such that the industry has insufficient numbers of senior tradespeople to train and mentor the large numbers of apprentices being employed each year, and those that are still in the industry are quickly approaching retirement age.

c. Solutions and potential sources of labour

In recent years, two key solutions to the current situation have been widely supported by industry, namely:

- 1. Source project funding to develop training delivery and assessment support materials
- 2. Ensure inclusion of ESI TDR Training Package qualifications on the Australian Government's Priority Qualifications List for the State/Territory administered Productivity Placement Program (PPP) and Commonwealth/ISC administered Enterprise Based Productivity Places Program (EBPPP)

In regard to point 1, EE-Oz on behalf of the ESI-TDR Industry, with the support of the Australian Government, through DEEWR, is currently developing a suite of training support resources for the ESI-TDR Training Package. The resources include: Competency Development Plans (CDPs), Learning and Assessment Plans (LAPs) and Task Books (refer Section 5).

Work has commenced on the development of materials against the primary 'high volume' qualification in the Training Package, namely; Certificate III ESI – Distribution. This work will be extended to the other qualifications, in priority order, over coming months.

In regard to point 2, a range of ESI-TDR Training Package qualifications have been included on the Australia Government's Priority Qualifications List for the PPP and EBPPP initiatives. These include:

- Certificate II in Vegetation Control
- Certificate III in ESI- Distribution
- Certificate III in ESI Transmission
- Certificate III in ESI Cable Jointing
- Certificate III in Electrotechnology Electrician
- Certificate IV in Energy Management & Control (incl. HV Switching)
- Certificate IV in ESI Power Systems (incl. live work & specialist c/jointing)
- Certificate IV in ESI Substations
- Certificate IV in Electrotechnology Electrical Instrumentation
- Certificate IV in ESI Network Infrastructure
- Certificate IV in Electrical Installation Inspection & Audit
- Diploma of ESI Power Systems
- Advanced Diploma of ESI Power Systems

Rail, Light Rail and Tram sector qualifications on the Priority List include:

- Certificate III in ESI Rail Traction
- Certificate IV in ESI Power Systems (covers advanced rail traction)
- Certificate IV in Electrical Rail Signaling

These qualifications cover all the work categories/occupations identified as suffering skills shortages in Table 2 above.

Additionally, many electricity supply organisations see 'blended learning' arrangements as an avenue to assist alleviate the skills shortages.

Several enterprise-specific training initiatives and industry-wide pilot programs have shown that blended learning arrangements provide an effective and efficient way of delivering knowledge and skills for the sectors.

The projects have shown that blended learning solutions can:

- be used to successfully train regional-based trainees with substantial cost savings
- alleviate the significant skills shortage of technical trainers by freeing up face-toface trainer time
- ensure consistent, high quality knowledge transfer
- more effectively control and track training progress
- facilitate the transfer of knowledge from experienced industry practitioners to the next generation.

This industry sector has been particularly pro-active in regard to embracing blended learning concepts and integrating blended learning methodologies into its traditional training regimes.

In regard to sources of labour, electricity supply organisations do not generally have difficulty in attracting potential entry-level operatives (eg; Apprentices), with most organisations inundated with applications. Some organisations, have, however, reported difficulty in sourcing applicants of the appropriate caliber for entry into the industry.

In regard to senior personnel, the Australian resources industry boom has been a key factor affecting the skills shortage crisis for the industry in recent years. Electricity supply organisations employ personnel particularly suited to occupations within the resources industry; in terms of skills and knowledge, but also in terms of work ethic, occupational health and safety consciousness and industry culture. Consequently, many personnel have been attracted to the resources industry.

Gas Supply, Transmission and Distribution

Profile

For the purposes of National Gas Industry Training Package coverage, the term 'gas industry' refers to the industry which supplies natural gas, via transmission and distribution pipelines, and Liquid Petroleum Gas (LPG), via cylinders, to a variety of domestic, commercial and industrial customers. It does not refer to the extraction of gas from its source, nor the installation or maintenance of gas appliances within domestic or manufacturing environments (refer Figure 1).

Employment in the industry may involve one or more of the following; design of transmission, distribution, processing and/or storage systems; construction and maintenance of the systems; commissioning and decommissioning of the above systems; metering and billing of customers.

Figure 1: The Gas Industry



Drivers

• Workforce development and training

On 9 February 2010, EE-Oz Training Standards hosted the inaugural Gas Industry Skills Summit. The Summit allowed key industry and training representatives from across Australia to come together to discuss pertinent workforce development and training issues within the Australian Gas Industry. A number of issues were acknowledged at the summit and were identified for future action. Table 3 details the outcomes of the Summit.

Over the past 12 months, EE-Oz has been working in consultation and cooperation with Gas industry organisations and their training partners to address these issues. Particular successes have included:

- Creation of three new sector-specific Technical Advisory Committees (TAC) to assist the Gas National Training Advisory Group (NTAG) ensure the Training Package continues to reflect changing work practices and training needs across all sectors of the industry.
- Engagement of one of the industry's largest employer organisations in the EBPPP program. Under the EBPPP, industry personnel are being trained across three States in qualifications from the Gas Training Package. This is the greatest utilisation of the Training Package by a single organisation since the Package's endorsement in 1998.

Table 3: Ke	v workforce	developmen	t and t	training	issues –	Australian	Gas	Industry
Table 5. Re	y worktoree	ucvenopmen	t anu i	u anning	155405	a usu anan	Jas	maustry

ISSUE	DETAIL
Recruitment- Attracting youth to Industry	 Engaging Youth - Traineeship Schemes Formal Structure of Traineeships may inhibit engagement Engaging mature Trainees Promotion of careers and opportunities within the Industry Changing image of industry to be more appealing
Retention & Skills Recognition for Existing Workers	 Retaining people within industry/workforce Limited facilities – not enough RTOs servicing the industry Industry members are unaware of opportunities for skills recognition Transfer from mature generations to younger generations
Involvement of Gas Industry Leaders & Asset owners	 Engage Industry leaders in Workforce Development Devise strategies or procedures to involve leaders Engage asset owners and contractors equally in the development of the workforce
Government funding initiatives	 Industry unaware of all initiatives available. EE-Oz Training Standards to support industry and keep industry notified and involved
RTOs, Trainers & Increasing Partnerships	 There is currently a lack of RTOs There is currently a lack of trainers RTOs & RTOs engaging trainers Small group of trainers needed to deliver necessary training
	 Flexibility in the delivery of training will increase access Increase partnerships between industry and RTOs Increase partnerships between industry professionals
Training Package	 Too Complex – need to simplify Training Package Industry needs to develop a better understanding Continued involvement of RTOs and Industry in development
Training Resources	 Training Resources are limited Budgets/ Funding for development Training Resources are in industry Identify funding for Other Training Expenses
Minimum Industry Standards	 Cert II or Cert III – most applicable Also call for training at higher vocational levels – Dip & AD
Co-Ordination	Need co-ordination of Standards and regulation

• Regulation

A key driver for the Australian Gas industry at this point in time is regulation. COAG's agreement to move towards National Regulatory Regimes will significantly affect the industry in coming years.

At present, all jurisdictions across Australia have State based Technical Regulators for the distribution sector; operating under differing Acts, Legislation and Regulations but with a high degree of commonality regarding Australian Gas Standards.

There is currently an industry drive for the new gas technical regulation to be centered on output based key performance measures and deliverables.

• Clean Energy

The Gas industry is a major supplier of energy to Australian homes and factories, supplying around 30% of industry energy needs and 20% of domestic needs.

Gas is considered to be the transitional fuel that will help meet Australia's growing energy needs until renewable energy and cleaner technologies become more widely available.

To this end, Government policies are accelerating the implementation of natural gas technologies. By means of example, Queensland has the"13% Gas Scheme", whereby electricity retailers and other large electricity users must source at least 13 percent of their electricity from gas-fired generation. Arrow Energy and ERM Power's coal seam gas-fired Braemar 2 Power Station near Dalby in Queensland was officially opened in late 2009. Arrow is currently supplying approximately 15 PJ/a petajoules per annum (PJ/a) of gas to the power station. Under a 12 year gas sales agreement, two other joint ventures with Shell; Tipton West and Daandine, will contribute another 15 PJ/a (Gas Today).

Coal seam gas already meets 60% of Queensland's total gas needs and offers the possibility of meeting the growing demand for gas across the eastern states.

• Industry growth

"There is more than \$200 billion of work now coming online in terms of Australia's gas infrastructure. This will re-energise the job market, not just back to the level it was, but more so" Regional Director Simon Winfield, Hays Oil & Gas

The final federal environmental approval for the \$50 billion Gorgon LNG Development project was issued in late August 2009 and the final investment decision made in September. The project is now in train and has an estimated economic life of approximately 40 years from the time of start up.

Additionally, in October 2010, the Federal Government announced the approval of two multi-billion dollar liquefied natural gas plants for Gladstone. The Australian Petroleum Production & Exploration Association (APPEA) expects the establishment of an export gas industry in Gladstone will generate 18,000 jobs, billions in export revenues and will establish Queensland at the forefront of efforts to transition the

economies of Asia to a less carbon-intensive future (Energy Source & Distribution, Dec 2010).

Exploration for other coal seam gas reserves is being undertaken in new areas of South Australia, Victoria, Tasmania and Western Australia. The CSIRO estimates the Coal Seam Gas fields of Queensland and New South Wales alone contain enough gas to power a city of one million people for 5000 years.

Looking into the future, the latest edition of the International Energy Agency's annual *World Energy Outlook* forecasts Australian gas production overtaking Norway towards the end of the projection period (2035), making Australia the third largest OECD gas producer, behind the United States and Canada (Energy Source & Distribution, Dec 2010).

In addition to these new industry developments, many Industry organisations are also involved in considerable maintenance and upgrade works on existing transmission and distribution pipelines. By means of example, Jemena has upgraded the 797 km Eastern Gas Pipeline to increase the capacity of the pipeline to deliver gas from Victoria to the Sydney market. Simiarly, due to economic and industrial growth in the Gladstone region, Jemena has expanded its 627km Queensland Gas Pipeline. Additionally, AGL Energy has completed the Berwyndale to Wallumbilla Pipeline in Queensland and EPIC Energy has completed an expansion of its South West Queensland Pipeline, with the construction of the 180km QSN link. This expansion enabled the pipeline's connection to EPIC's Moomba to Adelaide Pipeline and APA Group's Moomba to Sydney Pipeline. DBP Transmission in WA is also currently involved in work to increase the capacity of the 1,596km Dampier to Bunbury Pipeline (Gas Today, 2010).

In regard to residential gas distribution, SP Ausnet foresees a potential doubling in the demand for natural gas over the next 15 years, with Victoria and New South Wales expected to be the biggest areas for network growth. Hence, it is not surprising that Jemena and SP Ausnet are undertaking significant rehabilitation and expansion work on their respective gas distribution networks inside New South Wales and Victoria (Gas Today, 2010).

• Smart Grids

There is a general expectation that the future of gas distribution in Australia lies in smarter energy grids. Over time, the grids are expected to include elements such as:

- greater penetration of distributed generation, partnering of gas with renewable technologies to boost reliability of supply;
- more extensive time-of-use gas metering;
- integrated smart metering and household displays that encompass gas, electricity and other utilities;
- introduction of remote monitoring within-network metering to provide gas distribution networks with better information on current network performance and improved system control and maintenance (Gas Today, 2010).

• Skills and Labour Shortages

a. Current Skills and Labour Shortages

Over the last decade, the Gas industry has suffered from skill shortages predominately in the context of a significant lack of competent personnel. This situation has arisen from a number of factors, including:

- *Industry rationalisation / Potential takeovers*. In an uncertain environment, training effort is generally reduced.
- *Splintering/specialisation of workforce* due to trend towards outsourcing and sub-contracting in recent years
- *Limited training opportunities in organisations*. Organisations are characterised by flatter structures and limited time and budgets for training; resulting in reduced opportunities
- *Aging workforce*. By 2013, 47% of gas industry operatives and 65% of those in gas management or leadership roles will be at, or nearing, retirement age (Figures 2 and 3).



Figure 2: Current Age Profile of the Australian Gas Industry

Figure 3: Current Age Profile of Australian Gas Industry Management



The industry is already experiencing the ramifications of large numbers of retirements, including:

- reduced corporate memory
- a lack of senior personnel to move into management roles
- a lack of senior personnel to mentor and train the new generation of operatives
- shrinking skilled labour pools. In the past, the industry's workforce has been relatively mobile, with operatives moving from one organisation to another depending on the opportunities offered. Consequently, for many years, organisations maintained a 'hire rather than train' philosophy. Today, all organisations are suffering from a lack of skilled and knowledgeable personnel.

This lack of senior personnel is causing organisations considerable concern, particularly in light of the significant infrastructure development and maintenance projects being undertaken by industry organisations now and into the future.

This concern is evidenced in the results of a recent global survey from IFS and the International Project Management Association (IPMA), released in September 2010 that indicate a general lack of confidence across the sector in how critical business projects are and will be managed into the future. The survey involved 273 CEOs, COOs and Project Managers; 81 from the Utilities, Oil and Gas sectors across five countries, including Australia. Seventy four percent (74%) of those working in the oil and gas sector identified the ability to manage projects as critical to the future of the business, but only five percent (5%) were very confident of their ability to manage business critical projects in the most efficient way (Energy Source & Distribution, Dec 2010).

The current situation will be significantly exasperated by the pending industry developments in Queensland. The Queensland Industry Training Advisory Board, EnergySkills Queensland, has advised that "*the direct workforce is likely to grow by nearly seven times is current labour contingent*". EnergySkills Queensland has identified the 'priority job roles' to be as follow:

- Drilling Assistants
- Production Technicians
- Maintenance Technicians
- Electrical and Instrumentation Technicians
- Logistics Technicians/Administrators
- Petroleum, Chemical and Mechanical Engineers
- Geologists and Geophysicists

Table 4 details the particular workforce categories and occupations in the Australian Gas industry that are currently suffering from skills shortages. Industry intelligence indicates that skills shortages will continue in the workforce categories and occupations identified. Table 4 also details the areas in which skills shortages are expected in the future.

This detail has been generated from information provided, and validated, by industry and its training partners over the 12 months from February 2010 to February 2011.

Current S	skill Shortage Areas – Gas				
Below	Experienced distribution service laying labourers				
Trade					
Trade	Distribution trades				
	Transmission trades				
	Trades <i>plus</i> (Tradespeople with specialist/advanced technical skills and				
	knowledge)				
	LPG technicians				
	Network maintenance workers				
	Instrumentation, Electrical, Mechanical and Security Trades				
	Data Communications				
	Crew Supervisors/Team Leaders				
Technical	System Operations				
Officers	Pipeline Technicians – Mains, Leakage survey, CP & Pipeline patrol				
	Corrosion Mitigation				
	Meter Technicians (next 5 years as 'SMART' metering is introduced, with				
	peak in next 2-3 years)				
	Logisitics Technicians				
	Network Controllers				
Network Planners					
	Network Customer consultants				
	Regulatory specialists – knowledge of licenses and permits				
	Techs with renewable/sustainable energy knowledge/skills				
	Techs with SCADA knowledge & skills				
Engineers	Gas Engineers (civil, mechanical, petroleum, chemical)				
	Instrumentation Engineers				
	Engineers with Gas industry experience				
Other	Trainers				
	Regulators				
	Project Managers				
	Quality control officers				
	Managers				
Emerging	Skill Shortage Areas – Gas				

Table 4:	Current Skill	Shortage	Work	Categories	& Occupations
					· · · · · · · · · · · ·

Increasing severity of existing skill shortages due to increasing demand for infrastructure development and maintenance and labour force losses due to aged retirements, in addition to:

- Installation of smart metering systems
- Workforce development and training managers
- Regulatory specialists knowledge of licenses and permits
- Technicians with renewable/sustainable energy knowledge/skills
- Corrosion, Instrumentation and Mechanical Engineers

b. Barriers to overcoming skills and labour shortages

In recent years, workforce development and training in the Australian Gas industry has been hamstrung by a lack of take up of the Gas Training Package stemming from a severe lack of training and assessment resources (human, material and infrastructure) and a very small number of RTOs with the Package on scope. The last 12 months, however, has seen increased up-take of the Gas Training Package. This is largely as a result of the introduction of the Commonwealth Government's Enterprise Based Productivity Places Program (EBPPP), which has been accessed by an number of the industry's largest employer organisations.

Under the EBPPP trial program, commenced in 2009, two industry organisations, in cooperation with EE-Oz Training Standards, secured funding to partner with a Victorian RTO to deliver the Certificate III and IV qualifications from the Gas Training Package. One hundred and fifteen (115) operatives are being trained through the program; 80 LPG workers and 35 Gas distribution workers.

Under the formal EBPPP, introduced in 2010, another major industry employer is now training close to 50 operatives against the Certificate III Gas Industry Operations qualification.

c. Solutions and potential sources of labour

EE-Oz on behalf of the Gas Industry, with the support of the Australian Government, through DEEWR, is currently developing a suite of training support resources for the Gas Training Package.

Additionally, a range of Gas Training Package qualifications have been included on the Australian Government's Priority Qualifications List for the State/Territory administered Productivity Placement Program (PPP) and Commonwealth/ISC administered Enterprise Based Productivity Places Program (EBPPP), namely;

- Certificate II Utilities Industry Operations
- Certificate III in Gas Industry Operations
- Certificate IV in Gas Industry Operations
- Certificate IV in Gas Industry Transmission Pipeline
- Diploma of Gas Industry Operations
- Advanced Diploma of Gas Industry Operations

These qualifications cover a large number of the work categories/occupations identified as suffering skills shortages in Table 3 above.

2.3.2 ElectroComms Industry (Electrotechnology & Communications)

Profile

The Australian ElectroComms industry is currently understood too employ in excess of 500,000 people. However, ElectroComms personnel are found across almost all industries, and although concentrations do exist and these are generally recognised, there are many more industry members than statistical records currently reflect.

The industry sector that covers the largest group of Electrotechnology workers is the 'Installation trade services' (ANZSIC 423) group within the major industry division of 'Construction'. Additionally, a large number of ElectroComms workers are employed in the Communications (data and telecommunications) industry. The other

main occupational group is 'electrical and electronic associate professionals'. Figure 2 provides an overview of the industry's breadth of work.

Figure 2: INSERT PICTURE FROM SPRING/SUMMER WIRE

The ElectroComms industries are characterised by a relatively high skills profile compared with the overall Australian labour force. Due to the complex and diverse skills and knowledge requirements associated with the industry, most ElectroComms vocations have an entry level of skill commensurate with an AQF Certificate III or higher qualification. Almost a quarter of the industry's work force is in the 'trades' category, compared with around 13% across the total Australian labour force. In some instances, relevant experience is also required in addition to a formal qualification. The industries also have an above average proportion of workers at the 'Associate Professional' level (typically persons with Diplomas, Advanced Diplomas, or an equivalent) and a below average proportion of 'low-skilled' workers. As a result, approximately 40% of workers in the industries possess a VET level qualification, compared with around 22% of the total labour force.

Industry studies and Australian Bureau of Statistics data indicate strong growth prospects for the ElectroComms industry over the next 5 years, particularly in communications and computer-related vocations.

Similarly, the industry has a role to play in the reduction of greenhouse gas emissions through assisting widespread implementation and use of energy efficient technologies in production and end use sectors, including households, transport, services and industry. Energy efficient technologies across all sectors (particularly residential and services), will require a workforce skilled in the installation and technical support of these technologies.

As the industry continues to change and develop, its personnel too must develop increasingly sophisticated technical skills and problem solving abilities. Apprentices and skilled operatives are expected to build high levels of competency, flexibility, and capability across a wide range of areas, equipment, technologies, processes and procedures and be prepared for continuous development of their knowledge and skills throughout their working life.

Drivers

• Renewable Energy and Energy Efficiency

As detailed above, Australia's transition to a low carbon future will be facilitated by the ElectroComms industries. Specific technologies that will be facilitated by the Electrotechnology sector include:

- Grid connect PV arrays
- Energy rating of buildings
- Building Management systems
- Co-generation systems
- National Broadband Network
- Increased automation, particularly in mining
- Smart wiring systems.

EE-Oz is currently working in consultation and cooperation with industry to that the industry's training package will deliver the outcomes it requires.

• Maintaining pace with technological advances

ElectroComms industry members, regardless of sector or discipline, work in highly technical and continually changing environments. Science and technology continues to influence existing products and trigger new processes and equipment to meet changing global and local community demands. In recent years, the ElectroComms industry has had to adapt quickly to changes in technology, regulatory requirements and customer expectations.

By means of example, the use of 'smart' technologies, such as home automation and the integration of building systems, including electrical, voice, security, fire, air conditioning and data is now commonplace in many sectors of the industry.

Similarly, the advent and introduction of wireless/satellite communication systems has resulted in the need for technicians skilled in the use of computers and Internetbased systems in every day work environments. There has also been an increased focus on diagnostic skills rather that repair skills at this level.

Overall, the ElectroComms industry is experiencing a considerable and increasing demand for 'Trades *plus*' personnel. Specifically, tradespeople with advanced/specialist skills and knowledge in a particular area or technology, such as data communications, instrumentation and energy efficiency technologies.

Skills and Labour Shortages

a. Current Skills and Labour Shortages

Table 5 details workforce categories and occupations in the Australian ElectroComms industries that are currently suffering from skills shortages. Industry intelligence indicates that skills shortages will continue in the workforce categories and occupations identified. Table 5 also details the areas in which skill shortages are expected in the future. This detail has been generated from information provided, and validated, by industry and its training partners over the 12 months from February 2008 to February 2009.

Current Skill Shortage Areas - Electrotechnology					
Retail	Electrical/Electronic Specialist sales				
Appliance Service &	Electronic appliance service personnel (requiring a restricted gas license)				
Installation	Broadband/Pay TV/Data installers				
	Computer Hardware Installers				
	Mobile phone/PDA repairers				
Current Skill Shortage A	reas - Electrotechnology				
Trades	Electricians (domestic, commercial & Industrial)				
	Electricians with Electricity Supply Industry knowledge				
	Rail Signalling Electricians				
	Renewable Energy Electricians (specialists)				
	Energy Efficiency Electricians (specialists)				
	Remote area Generation infrastrucure (specialists)				
	Electrician <i>plus</i> (Electricians with specialist/advanced technical maintenance skills				
	& knowledge)				
	Data Communication Technicians				
	I elecommunication I econicians (incl. Wireless & Fibre Optics - Broadband)				
	Electronic Security System Technicians				
	electrical installation skills/knowledge)				
	Consumer Electronics				
	Lift Technician				
	Instrumentation Technicians (PLCs, Automation, Robotics)				
	Air Conditioning Refrigeration Mechanics (especially; manufacturing &				
	installation, commercial, industrial, natural refrigerants & marine)				
Technical Officers	Research & Development Officers				
Design					
	Testing				
	Drafting				
Installation					
Maintenance & System Integration					
	Network & infrastructure planning (especially in the telecomms sector)				
Engineers	Electronics Engineers				
	DE Engineers				
	KF Engineers				
	Control Engineers				
Inspection	Electrical Inspectors				
Inspection	(industry requires 20-25% increase in Electrical Inspector numbers)				
Management	Project Managers				
Trainers	Trade, post-trade, up-skilling, Engineering, Industrial Trainers				
Emerging Skill Shortage	Areas - Electrotechnology				
Installation of smar	t metering systems				
• Design and installation of grid connected photovoltaic (solar) systems					
Wind energy systems					
Renewable Energy	technology specialists				
Renewable Energy component manufacuturers					

Table 5: Current Skill Shortage Work Categories & Occupations

- Remote area Generation infrastrucure (specialists)
- Co-generation and local generation
- Energy efficiency management and auditing
- Energy efficient lighting
- Domestic integrated energy management systems
- Commercial/industrial energy management systems integration

- Electrical Engineering
- Instrumentation Technicians (PLCs, Automation, Robotics)
- Signalling
- Trade, post-trade, up-skilling & engineering programTrainers
- Drafting
- Communications

b. Barriers to overcoming skills and labour shortages

Like many industries, the ElectroComms industries are suffering from skill shortages. The shortages are, however, more a factor of reluctance on behalf of employers to provide apprenticeship positions than lack of individuals willing to enter the industry. The current situation is the result of:

- Lack of applicants with the required aptitude and level of language, literacy and numeracy skills for entry into the industry. NECA reports that "the attainment of acceptable minimum mathematics skills is an ongoing problem with young applicants" (NECA, 2009).
- Competition and contracting arrangements within the industry leading to a lack of certainty amongst employers of their ability to provide an apprentice with ongoing employment for the nominal four year period
- Lack of employer knowledge and understanding of the apprenticeship system, the documentation that must be completed and the roles and responsibilities of the many agencies involved.

Additionally, employers in certain areas have reported that the re-emergence of activity in the resources sector is causing considerable movement of industry members away from certain jurisdictions. By means of example the NECA 2009 Workplace Projections Report reported "500 electricians leaving Victoria every month to overseas and other Australian destinations like Western Australia and Queensland".

c. Solutions and potential sources of labour

EE-Oz on behalf of the ElectroComms Industry, with the support of the Australian Government, through DEEWR, is currently developing a suite of training support resources for the Electrotechnology Training Package. The resources include: Competency Development Plans (CDPs), Learning and Assessment Plans (LAPs) and Task Books (refer Section 5).

Work has commenced on the development of materials against the key 'high volume' qualifications in the Training Package. The work will be extended to the other qualifications, in priority order, over coming months.

A range of Electrotechnology Training Package qualifications have been included on the Australia Government's Priority Qualifications List for the Productivity Places Program. These include:

- Certificate III in Electrotechnology Electrician
- Certificate III in Refrigeration and Air Conditioning
- Certificate III in Data and Voice Communications

- Certificate III in Computer Systems Equipment
- Certificate III in Appliance Servicing
- Certificate III in Wireless Communications
- Certificate III in Security Equipment
- Certificate III in Fire Protection Control
- Certificate III in Instrumentation and Control
- Certificate IV in Electrotechnology Systems Electrician
- Certificate IV in Electrical Data and Voice Communications
- Certificate IV in Electrical Instrumentation
- Certificate IV in Electrical Air Conditioning Systems
- Certifcate IV in Electrical Rail Signaling
- Certificate IV in Energy Management and Control
- Certificate IV in Renewable Energy
- Certificate IV in Electrical Fire Protection Control
- Certificate IV in Electrical Lift Systems
- Certificate IV in Electrical Installation Inspection and Audits
- Diploma of Research and Development
- Advanced Diploma of Electrical Engineering
- Advanced Diploma of Industrial Electronics and Engineering
- Advanced Diploma of Electronics and Communications Engineering
- Advanced Diploma of Refrigeration and Air Conditioning Engineering

These qualifications cover all the work categories/occupations identified as suffering skills shortages in Table 5 above.

SECTION 3: CURRENT IMPACT OF TRAINING PACKAGES

The following sections provide information on the uptake and utilisation of the EE-Oz suite of Training Packages and the applicability of the Training Packages to industry's workforce development needs. Information is also included on current EE-Oz initiatives to ensure continued responsiveness of the Training Packages to the broad range of influencing factors, from regulatory to learner requirements.

3.1 EE-Oz Training Package Uptake & Client satisfaction levels (Source: National Data Collections, supported by EE-Oz Statistics & Intelligence)

NCVER data for the top 20 training packages by state/territory, as at 31 March 2010 (latest available data) ranks EE-Oz Training Standards fifth, with 31,000 'in-training' against Training Packages in the EE-Oz suite and fourth in terms of 'Commencements by Industry Skills Council' with 10,500 commencements against Training Packages in the EE-Oz suite in the 12 months to 31 March 2010.

The Electrotechnology Training Package (UEE07)

The UEE07 Electrotechnology Training Package, incorporating changes to address the NQC's conditions of endorsement and 'Category 2' changes to maintain pace with technological advances and changes in work practice within the industry, was endorsed by the NQC on 27 December 2007. Version 2 of the Training Package was endorsed in June 2009. Version 3 was endorsed in May 2010 and Version 3.1 of the Training Package was endorsed in August, 2010. This Version incorporates new Skills Sets and amended qualifications required by industry to respond to the Federal Government's policies and initiatives to increase energy efficiency and reduce Australia's carbon footprint.

As at February 2011, 158 RTOs are now delivering from the Electrotechnology Training Package (NTIS, 2011).

The EE-Oz 2010 client base survey identified that 17% of clients believe the UEE07 Training Package to be 'Excellent', 47% believe the Training Package to be 'Good', 30% believe it to be 'Fair' and 5% believe it to be 'Poor'.

Included below is a summary of NCVER and EE-Oz statistics regarding take up of the UEE07 Training Package.

NCVER Statistics on take-up

The UEE07 has consistently been ranked in the 'top 20' training packages in terms of commencements, with the latest available NCVER data (March quarter 2010) indicating the Training Package to be ranked 7th in regard to 'commencements' by State/Territory.

In the 12 months to 31 March 2010, there were 10,600 commencements in the category of 'Electrotechnology and telecommunications trades workers'. EE-Oz Training Standards data indicates that the majority of these commencements were in the Certificate III Systems Electrician qualification, with the Certificate III in

Refrigeration and Air Conditioning and the Certificate III in Data Communications also experiencing significant take-up.

Other RTO delivery

The large majority of Electrotechnology Training Package-based training is delivered by the public provider network (ie; TAFE). There is, however, a number of private industry-specific skills centres, registered as RTOs, also delivering Traineeship (Certificate II) and Apprenticeship (Certificate III) qualifications from the Training Package and 'short course' programs on an as needs basis. There is a private Electrotechnology Industry Skills Centre operating in each State and Territory.

The principal private RTOs registered to deliver from the Electrotechnology Training Package are: ElectroGroup Training (QLD), ElectroSkills Centre (NSW & ACT), VICTEC/TASTEC (VIC & TAS), PEERTEC (SA), NECA College of Electrical Training (WA) and Advanced Training International (NT). As at February 2010 (Semester 1), enrolments in these RTOs were close to 3000 with over 1000 businesses being serviced. Approximately 80% (2400) of the enrolments are Electrotechnology apprentices.

It is also worthy of note that, in light of the current skills shortages and federal government initiatives to address same, EE-Oz Training Standards has noticed increased interest in the Training Package from RTOs who have had no prior history in Electrotechnology training delivery.

The EnergyUtilities suite of Training Packages (UET06, UEP06 & UEG06)

The latest available statistics from NCVER do not include summaries for the ESI-Transmission, Distribution & Rail, ESI-Generation or Gas industry Training Packages.

This is not surprising, as EnergyUtilities industry organisations generally train 'inhouse', with only a small amount of training outsourced to the public sector. Similarly, many enterprises do not report the numbers in training nor do they access public funding for the training provided. For this reason, even if statistics were publically available from the NCVER, they may not be completely indicative of the level of training occurring in the sector.

Based on EE-Oz's current knowledge of training effort within the sector, the ISC would estimate that Australia's 15 major utilities will collectively enrol well over 1000 Lineworker and Electrical apprentices in the 12 months to June 2011. Additionally, major contractors to these EnergyUtilities are expected to enrol no less than 100 apprentices and the Rail sector is expected to enrol approximately 250 apprentices under the National ESI-TD&R and Electrotechnology Training Packages.

In regard to ESI-TDR client satisfaction with the UET09 Training Package, the 2010 EE-Oz client base survey identified that 24% of clients believe UET09 to be 'Excellent', 61% of clients believe it to be 'Good', 12% believe it to be 'Fair' and 3% of clients believed it to be 'Poor'.

EE-Oz Training Standards

For the Gas Industry, 76% of Gas industry respondents considered the Gas Training Package to be 'Excellent' (11%) or 'Good'(65%), 24% considered it 'Fair' and no respondents considered the Training Package to be 'Poor.

Due to the very small number of respondents from the Generation Industry, reliable satisfaction level statistics could not be generated for the Generation Training Package.

In regard to the Gas and Generation industries, as detailed above, these sectors are experiencing considerable difficulty in accessing training due to a lack of RTOs servicing the sectors; a situation that can be directly attributed to critical mass and a lack of training support resources. EE-Oz is currently address the need for training support materials.

3.2 EE-Oz Training Package Utilisation

3.2.1 Utilisation for aspects other than Training Delivery

The EE-Oz suite of Training Packages is used extensively by industry and its training partners for the following activities:

- Traditional training and assessment towards qualifications/statements of attainment
- Recognition of Prior Learning/Current Competency processes
- Workforce development (job role modelling)
- Workforce re-structuring
- Industrial Relations

In light of the above, EE-Oz's industry-specific National Technical Advisory Group and Committee meetings are attended by representatives from RTOs servicing the industry as well as representatives from enterprises utilising the Training Packages for not only training purposes.

Through attendance at the meetings, industry and its training partners receive information on their Training Package, its use and implementation by other organisations and any pending Category 2 changes which may affect the Package's utilisation, for whichever purpose, into the future. The meetings are also utilised by EE-Oz Training Standards to receive feedback from stakeholders on current and emerging industry workforce development and training needs and resultant opportunities for improvement of the Training Packages.

The current membership of EE-Oz's National Training Advisory Groups (NTAG) and Technical Advisory Committees (TACs) indicated in Table 6 below. The numbers confirm that RTOs servicing the industry are not the only users with a serious interest in the Training Packages, rather there are many enterprises also using the Training Packages for reasons other than Training delivery.

EE-Oz Industry NTAG	Feb 2009	Feb 2010	Feb 2011		
Electrotechnology NTAG	72	83	65		
ESI-TD&R NTAG	192*	194*	190*		
Gas NTAG	15	20	19		
Generation NTAG	37*	44*	47*		
EE-Oz Industry TACs	Feb 2011	TACs	Feb 2011		
Gas TACs	12	Vessels, Construction, Systems Ops			
Electrotechnology TACs x 7	394*	Rail Signalling	29		
		Air Con & Refrig	105		
	Electronics	21			
	Electrical, Data, Lifts	71			
	Renewable Energy	74			
	Hazardous Areas	58			
	Instrumentation	36			
ESI-TD&R TACs x 7	381*	Design	26		
		Systems Operations	36		
	Vegetation Control 44				
	Test & Protection	53			
	TDCJLW	121			
	Substations	58			
	Rail Traction	43			

Table 6: Current EE-Oz NTAG & TAC Membership numbers

*some overlap between organisations, but representatives come from different sections within the organisation (eg; Training, Operations, Business Services, HR etc.)

3.2.2 Utilisation for Training Delivery

Table 7 details the number of RTOs currently registered as having scope to deliver against the EE-Oz suite of Training Packages.

EE-Oz Training Package	RTOs with Package on Scope					
	Feb 2008	Feb 2009	Feb 2010	Feb 2011		
Electrotechnology UEE07	38	102	141	158		
(Electrotechnology UTE99)	(121)	(92)	(49)	(32)		
ESI-TDR UET09			16	52		
ESI-TDR UET06	21	37	44	45		
(ESI-TDR UTT98)		(28)	(20)	(13)		
Gas UEG06	7	12	12	11		
ESI-Generation UEP06	24	39	47	47		

Table 7: RTOs with EE-Oz Training Standards Training Package on Scope.

Source: NTIS, February 2011.

The small numbers of RTOs registered to deliver against the Gas and Generation Training Packages has traditionally been a key issue discussed at EE-Oz NTAG, Sector Council and Board level. However, in February 2010, an additional 8 RTOs were recorded as having registered to deliver against the Generation Training Package in the 12 months to February 2010 and this number has been maintained in the 12 months to February 2011.

Anecdotal evidence suggests that the old '*Certificate of Technology*' and internal '*Diploma*' and '*Associate Diploma*' training programs that were relatively commonplace within the Generation sector, are gradually being replaced with National Training Package qualifications at the Diploma and Advanced Diploma level. Similarly, suitably qualified Certificate III level tradespeople in Linework and Electrical areas are up skilling in the specific Generation competencies required by the industry's enterprises.

These statistics are pleasing, however, RTOs servicing the industries are continuing to call for resources and materials to support their training delivery and assessment activities against the Training Packages.

The Electrotechnology industry has a long history of training provision predominately through the public sector. Hence, the State and Territory TAFE systems traditionally funded the development of comprehensive training materials to support the delivery and assessment of Electrotechnology programs within their institutions. These materials were then sold to other training institutions under commercial arrangements. In recent years, however, an increasing number of TAFE systems have reduced or completely disbanded their training resource development functions. The upkeep and currency of available support materials is now beginning to suffer as a consequence.

In the EnergyUtilities industries (ESI-TD&R, Generation and Gas), the majority of training has, and continues to be, provided by enterprises themselves, with only a small amount outsourced to the public sector. As can be appreciated, individual enterprises do not have sufficient resources (financial, temporal or manual) to devote to broad-scale development of training and assessment support materials.

Consequently, whilst industry is supportive of the Training Package, the take-up and delivery of Training Package-based training, has been hamstrung by a lack of available support resources for RTOs servicing, or wanting to service, the industry.

EE-Oz Training, in consultation and cooperation with DEEWR, industry and its training partners, is currently devoting considerable effort to the development of high quality, nationally consistent, training and assessment support materials for utilisation by RTOs across Australia. These activities are detailed in Section 5 below.

SECTION 4 FUTURE DIRECTIONS FOR ENDORSED COMPONENTS OF TRAINING PACKAGES

4.1 **Responses to Industry's workforce development priorities**

EE-Oz Training Standards is assisting the Australian ElectroComms and EnergyUtilities industries respond to their workforce development and training priorities through the ongoing development and amendment of units of competency, qualifications and skill sets inside the national suite of EE-Oz Training Standards Training Packages, namely;

- UEE07 Electrotechnology Training Package
- UET09 ESI Transmission, Distribution & Rail Sector Training Package
- UEP06 ESI Generation Sector Training Package
- UEG06 Gas Industry Training Package

In 2009 and 2010, in addition to the range of continuous improvement activities necessary to maintain pace with technological advances and changing work practices, considerable attention was devoted to the development and amendment of Units, Qualifications and Skills Sets to assist the Industries support the Governments' policies and initiatives to increase Australia's energy efficiency and reduce its carbon footprint.

In 2011, this work will continue, however it will be undertaken against the backdrop of the National Quality Council's (COAG) requirements for:

- Increased Training Package flexibility, as communicated through the *'Products for the 21st Century'* initiative, and;
- The embedding of 'GreenSkills' in all Training Packages.

These requirements and the Industries' workforce development priorities will inform the bodies of continuous improvement work to be undertaken on each EE-Oz Training Package during 2011. This work is comprehensively detailed in the *EE-Oz Training Standards Continuous Improvement Plan – 2011 Update*.

4.2 Barriers in the VET system that need to be overcome

Uncertainty around the direction of VET Training Products for the 21st Century

In mid 2008 a Joint Steering Committee of the National Quality Council and the COAG Skills and Workforce Development Sub Group was established to bring the work together in a joint project '*VET Training Products for the 21st Century*'.

The first '*VET Training Products for the 21st Century*' Consultation Paper was released later that year, with Mr Peter Noonan, Project Consultant, presenting the feedback received at the Joint NQC/COAG Steering Committee Meeting on the 28th of January 2009.

A second '*VET Training Products for the 21st Century*' Consultation Paper was subsequently compiled and released in February 2009. In the paper, the Joint Steering Committee confirmed its ongoing commitment to an industry led VET system.

Throughout 2009 and 2010, the ISCs, including EE-Oz Training Standards continued to participate in discussions around '*VET Training Products for the 21st Century*', with view to ensuring that the needs of industry remain at the forefront of considerations.

The following letter detailing the ISC's collective view on the current situation, was recently forwarded to DEEWR for consideration:



Without prejudice development of design principles and a broad implementation framework to enable a coordinated and fit-for-purpose approach that meets the needs of all industries; and Development of guidance to establish new or revised Training Package Development Handbook policy to ensure collective understanding of how policy should be interpreted and applied. The benefits of real collaboration in moving forward are clear: Consistent understanding of the policy and its implementation across all ISCs and key stakeholders Cost efficiencies generated by collective working and the benefit of cross industry perspectives Supportive environment enriched by information and knowledge sharing Accurate and timely communications with all stakeholders. The second stage of this work will involve individual ISCs undertaking their own analyses at a Training Package, industry or sector level to establish future workplans and balance the extensive work this will generate with current and emerging industry priorities for Training Package continuous improvement. ISCs believe that is also a need for the concurrent development of an appropriate change management strategy in order to gain acceptance by industry of the new design model. Recent discussions between ISCs and DEEWR suggest that additional resources to undertake the extensive work required are unlikely. For most ISCs this will mean integrating the work into the DEEWR/ ISC funding agreement period and that completion of 'streamlining' work for all Training Packages may not be achievable in the NQC's desired timeframe. In summary, our proposal supersedes the notion of four (4) model Training Packages flagged by the NQC in favor of a series of workshops and activities to unpack the new design model and to then work on the redevelopment of Training Packages. ISCs support this approach as outlined above because all ISCs will be involved, as well as the other key stakeholders. We believe that it will ultimately deliver a far more rigorous process and efficiencies across the board. It follows the collaborative DEEWR/ISC approach to policy formation and change management previously used to establish the Model 2008 Training Package Endorsement Process which two years on was independently and successfully evaluated. The ISCs view the proposed strategy as a positive step forward in implementing the NQC decision and seek your support in bringing it to fruition. Yours sincerely W whom Bob Paton Chief Executive - Manufacturing Skills Australia On behalf of the undersigned Chief Executives of the ISCs 3 Mr Arthur Blewitt, Chief Executive AgriFood Skills Australia Mr Rod Cooke, Chief Executive Community Services and Health Industry Skills Council Mr Alan Ross, Chief Executive Construction and Property Services Industry Skills Council

- EE Oz Training Standards
- Mr Michael Hartman, Chief Executive

Mr Bob Taylor, Chief Executive

- Ms Jan Weir, Chief Executive Ms Patricia Neden, Chief Executive
- Ms Jeanette Allen, Chief Executive
- Mr Steve McDonald, Chief Executive
- Mr Geoff Gwilym, Chief Executive
- ForestWorks Government Skills Australia Innovation and Business Skills Australia
- Service Skills Australia Skills DMC

- Transport and Logistics Industry Skills Council

SECTION 5 FUTURE DIRECTIONS FOR NON-ENDORSED COMPONENTS & INITIATIVES SUPPORTING TRAINING

5.1 Responses to Industry's workforce development priorities

Requirement for nationally consistent delivery and assessment support materials

As detailed in Section 3, research conducted by EE-Oz and other research agencies working in the VET space have identified that the take-up of Training Packages is directly influenced by the availability, accessibility and quality of delivery and assessment materials and resources supporting the qualifications within a Package.

The Australian Government has also acknowledged the importance of high quality support materials and, to its credit, has provided funding to the ISCs (through the current 2008-2011 Service Agreement) for the development of same.

For many years, RTOs servicing the Australian ElectroComms and EnergyUtilities industry utilised national modules to support training delivery against the 'UT' suite of EE-Oz Training Packages. With the endorsement of the 'UE' suite, Learning Specifications and Work Performance Specification were implemented to support delivery.

The introduction of AQTF 2007 ushered in the need for the next evolution of EE-Oz Training Package support materials, namely; the development of Competency Development Plans (CDPs), Learning and Assessment Plans (LAPs) and Task Books.

Industry has also committed to the development of these support materials. Included in the new range of resources are:

Competency Level Resources:

- Competency Development Plans
- Learning and Assessment Plans
- Competency Overview
- Competency Assessment Plan
- Knowledge and Skills Specification
- Cluster Assessment Plan

Topic Level Resources:

- Topic Overview
- Topic Learning Activities
- Topic Learner Plan
- Topic Review Questions
- Topic Skills Practice
- Topic Technical Summary

These resources form a comprehensive set of delivery and assessment tools addressing knowledge skills and work performance aspects of competency. The resources are designed to assist the RTO, individual trainers and learners.

Industry believes that deployment of these resources will further increase the quality and consistency of apprenticeship training and skill development, increasing the confidence of industry and the community in training for the energy sector trades.

Implementation of Blended Learning arrangements in the industries under EE-Oz's coverage

Members of the EE-Oz network, and their training partners, have a growing interest in integrating blended learning arrangements into their training regimes. There is also strong interest in collaboration between industry organisations in regard to developing and implementing 'shared' e-learning programs.

At industry's request: *EE-Oz Training Standards has taken a leading role in coordinating a national industry strategy for the development and implementation of 'blended learning' approaches to training delivery and assessment.*

The following structures, documents, forums and resources are the direct result of industry collaboration to implement blended learning since October 2008:

- 1. Formal structures to facilitate collaboration
 - Blended Learning Standing Committee (cross-sector)
 - Blended Learning Consultative Committee (ESI-TDR sector)
 - o Blended Learning Consultative Committee (Electrotechnology sector)
 - Blended Learning AFLF ProjectWorking Group (ESI-TDR sector)
- 2. Guideline Document

The Industry has developed a comprehensive industry-specific document to assist organisations considering integrating e-learning in their training and assessment regimes.

3. Collaborative development of a specifications document to inform the development of a shared e-learning resource

The Industry developed a comprehensive specifications document to guide the development of the first e-learning resource under an Australian Flexible Learning Framework Industry Integration Project.

4. Development of the three e-learning resources under the Australian Flexible Learning Framework Project

Three e-learning resources have been collaboratively developed in accordance with industry agreed specifications. One resource supports the Certificate IV in Substations qualification in the UET09 Training Package. An additional two resources have be developed to support delivery of the two highest volume units in the ESI Refresher Training suite, namely; Pole Top Rescue and Rescue from an LV Panel. All three resources have been made available for utilisation by all ESI organisations through EE-Oz and via the Australian Government's LORN repository.

5. EE-Oz Training Standards Best Practice in E-learning Forum

At the 2009 EE-Oz Annual Conference, in recognition of the considerable developments that had occurred in blended learning over the proceeding 12 months, Industry and its training partners requested EE-Oz host a forum to showcase best practice in blended learning in the Australian ElectroComms and EnergyUtilities Industries. The Forum was held on the 23rd of February, 2010 and was followed by BLCC meetings for both the ESI-TDR and Electrotechnology sectors.

6. Additional evidence of the integration of e-learning in Industry training regimes as a result of collaboration

Since the establishment of the BLSC, BLCC and BLWG structures, EE-Oz has observed an increased sharing of information about authoring systems and learning management systems amongst industry members.

Industry members recognise the need for SCORM compliance in authoring tools and Learning Management Systems (LMS) so that members can run each others' programs.

Similarly, there is a growing acceptance that whilst the need for uniformity between LMS systems is not a necessity, there are considerable benefits to be gained in using common authoring tools, particularly where members wish to customise programs to their own requirements.

Recognition of Prior Learning

As detailed in Section 1, under the Australian Government's 'Skilled Migration' and 'Skilling Australia for the Future' policies, it now necessary for RTOs to re-align their strategic directions to respond to increasing Government and Industry emphasis on, and demand for, RPL/RCC and associated gap training activities.

In this light, industry requires the confidence that the RTOs servicing its enterprises:

- 1. Are fully briefed on, comfortable with, and implementing necessary changes to embrace the new service provision demands that will flow from the 'Skilling Australia for the Future' and 'Skilled Migration' policies.
- 2. Have access to a suitable, industry relevant, 'best practice' change management model
- 3. Have access to a suitable, industry relevant, RPL/RCC model.

EE-Oz Training Standards is undertaking activities related to point 1 as part of its current body of work against its 2008-2011 Service Agreement with the Australian Government. Points 2 and 3, while not current components of the Service Level Agreement, will be necessary if the ElectroComms and EnergyUtilities industries are

to reap full benefit from the 'Skilled Migration' and 'Skilling Australia for the Future' policy initiatives.

In this light, during 2009 and 2010, EE-Oz with the support of DEEWR through the Strategic Intervention Programme (SIP) of the National Skills Shortages Strategy (NSSS) has provided industry's RTOs with a range of exemplar models, support materials and avenues for assistance. A key outcome of the project has been an increased number of skilled migrants, existing workers and re-entrants who have accessed the RPL/RCC and gap training services provided by the industry specific RTOs, being engaged by industry.

Recognition of Prior Learning for new entrants to Australia

It is widely acknowledged that overseas skilled workers deemed technically equivalent by the VETASSESS Consortium⁴ and who seek to migrate to Australia and deploy their skills in Australia, have a predetermined training gap known as the 'Minimum Australian Context Gap' (MACG), which must be addressed when the worker reaches Australia.

Late in 2006, the then Department of Employment and Workplace Relations (DEWR), in consultation and cooperation with the then Department of Education, Science and Technology (DEST) contracted EE-Oz Training Standards to produce a benchmark resource outlining the 'Minimum Australian Context Gap' for the following Training Packages:

- Electrotechnology (UEE06)
- ESI Transmission Distribution and Rail Sector (UET06)
- Metals and Engineering (MEM05)

The Departments identified that the target audience for the resource would include government agencies, policy setters, regulators, industry stakeholders, Registered Training Organisations (RTOs) and prospective learners. EE-Oz Training Standards subsequently compiled a comprehensive report entitled:

"Minimum Australian Context Training Gap" advice for selected Electrotechnical CIII qualifications covering the following Occupations:

- Electrician
- Electrical Fitter
- *Refrigeration and A/C Trade*
- Electrical Lineworker
- Electrical Cable Jointer"

The Report was well received by both DEWR and DEST.

In 2008, the newly formed Department of Education, Employment and Workplace Relations (DEEWR) contracted EE-Oz Training Standards to expand on the detail within the Report, specifically in terms of the development of training delivery and assessment resources (training course documentation) and support mechanisms

⁴ The assessing authority gazetted by the Minister for Immigration and Citizenship, which undertakes trade skills assessments under the General Skilled Migration Program (GSM) for selected countries and trade occupations.

(support manuals and profiling cards) to assist RTOs address the 'Minimum Australian Context Training Gaps' identified for the above detailed occupations.

Consequently, during 2009, EE-Oz Training Standards developed the following resources:

- 1. Exemplar training delivery and assessment resources (training course documentation) to address the identified 'Minimum Australian Context Training Gap' (MACTG) for the following occupations:
 - Electrician
 - Electrical Fitter
 - Refrigeration and Air conditioning Trade
 - Electrical Lineworker
 - Electrical Cable Jointer

The resources are based on the information contained in the Final Report and detail:

- delivery and assessment content for the on-the-job component of training
- delivery and assessment content for the off-the-job component of training
- training provision and assessment advice
- 2. Manuals to assist RTOs in their preparation for delivery and assessment of training to meet the MACTG. A dedicated manual has been developed for each of the five occupations.
- 3. 'Profiling' cards to assist RTOs record and monitor the on-the-job skills development of MACG learners. 'Profiling' is the industry and regulator-preferred method for recording learners' on-the-job competency development. Five specifically designed cards have been developed to support RTO management of the MACG process for the five occupations.
- 4. Manuals to assist MACG learners upon their arrival in Australia. A dedicated manual has been developed for each of the occupations.

Additionally, as a means of providing further assistance, EE-Oz Training Standards has recently completed the development of two accredited courses to assist RTOs deliver the Australian minimum context gap for Offshore Technical Skills Record (OTSR) holders of the Certificate III Electrician and Refrigeration and Air Conditioning qualifications from the Electrotechnology Training Package.

Accredited courses to assist RTOs deliver the Australian minimum context gap to OTSR holders of the Certificate III ESI – Distribution and Certificate III ESI – Cable Jointer qualifications are currently under development.

EE-Oz will continue to work closely with all stakeholders to ensure implementation of the courses is streamlined and a consistent approach to the delivery of the identified Australian minimum context gap occurs.

Up-skilling the existing workforce in skills for sustainability

With Australian Government support, during 2010 EE-Oz worked closely with the National Electrotechnology and Communications Association to 'roll-out' 400 training places for Renewable Energy Skills Development across the Australian Electrotechnology industry.

Federal Government Productivity Places Program trial & the Enterprise Based Productivity Places Program

During 2009 and 2010, EE-Oz has been working closely with Origin and Theiss Services to implement arrangements under the Australian Government's National Productivity Places Pilot Program to train 80 Electricity Supply Industry workers and 115 Gas industry workers.

Additionally, in 2010, the Federal Government engaged EE-Oz Training Standards to administer 1390 places and \$4,650,298.00 of government funding under the national Enterprise Based Productivity Places Program (EBPPP).

For some time, the engagement of micro and small businesses in the VET sector has been an area of concern to EE-Oz. The EBPPP initiative has served to address this. As at 30 December, 2010, work under the EBPPP had successfully secured the engagement of more than 591 micro-small organisations across Australia, the majority of which have never previously engaged in VET. It is expected that no less than another 150 micro and small businesses will be engaged in the EBPPP in the first half of 2011, bringing the total number of organisations to over 700.

Workplace English, Language and Literacy (WELL)

Early in 2009, the Australian Government's Workplace English Language and Literacy (WELL) Program was expanded, with funding allocated for an additional 1500 WELL places in 2009/10 to assist employers to improve the language, literacy and numeracy skills of employees aged 25 and over; and 6000 places, over four years, for Indigenous Employment program participants.

To support these initiatives, five Industry Skills Councils (ISC's) were chosen to broker WELL projects across Australia. EE-Oz Training Standards was one of the chosen ISCs. During 2010, EE-Oz worked with the Australian Electricity Supply Industry to successfully establish WELL projects.

Late in 2010, the WELL Broker Progam was extended for another term and EE-Oz has again been engaged by the Federal Government to work with industry to assist workers to improve their English language, literacy and numeracy (LLN) skills in order to help meet their employment and training needs. This year, the scope of EE-Oz's involvement has been extended to include the Gas and Electrotechnology sectors, in addition to the Electricity Supply Industry.

EE-Oz has also been engaged by the Workplace, English, Language and Literacy (WELL) section of DEEWR to trial the replacement of the current national recording system (NRS) details in its training packages with the new Australian Core Skills Framework (ACSF). The project is focusing on 35 units of competence across the

UEE07 Electrotechnology and UET09 ESI – Transmission, Distribution and Rail Training Packages.

EE-Oz has always provided supplementary information for LLN/Core Skills indicators within the endorsed components of its Training Packages and has referenced source NRS/ACSF documents. This practice has been continued with the ACSF, which provides the flexibility to clearly define the scope of the application of Core Skills to a given unit.

This ensures that users of the Training Package have access to sufficient information to make decisions about Core Skills beyond a simplistic Number/Level.

Initially, the ACSF mapping will be incorporated into a selection of competency units and references included in the appropriate Training Package support materials to inform industry of the broader application of the framework.

To date, eighteen (18) units of competency across the Electrotechnology and ESI TDR Training Packages have been drafted to include the five ACSF core skills with supporting contextualised exemplars. On 14 February 2011, the mapping commenced for eight (8) refrigeration units and remaining nine (9) units in the trial are to be finalised by May 2011.

EE-Oz Training Standards is also working with other ISCs interested in incorporating the ACSF into their National Training Packages and using the EE-Oz pilot as a guide through the ISC Foundation Skills Network.

APPENDIX A Report on Continuous Improvement Activity

In the 12 months to December 2010, considerable improvements were made to all four Training Packages in the EE-Oz suite.

The status of the Training Packages, as at 28 February 2011, is as follows:

• UEE07 (Version 3.1) was endorsed on the 4th of August, 2010. This version incorporates amendments required by the Federal Government to meet the new NQC packaging rules and the inclusion of Sustainability Skills. It also incorporates industry endorsed amendments to maintain pace with technological advances and subsequent work practice changes.

UEE07 (Version 4) has been finalised and forwarded to the State Training Authorities for consideration and comment prior to submission to the National Quality Council.

• UET09 (Version 2.1) was endorsed on the 5th of August, 2010. This version incorporates amendments required by the Federal Government to meet the new NQC packaging rules and the inclusion of Sustainability Skills. It also incorporates industry endorsed amendments to maintain pace with technological advances and subsequent work practice changes.

UET09 (Version 3) has been submitted for Quality Assurance analysis prior to distribution the State Training Authorities.

• UEG06 (Version 1.1) was endorsed on the 8th of October, 2010. This version incorporates amendments required by the Federal Government to meet the new NQC packaging rules and the inclusion of Sustainability Skills. It also incorporates industry endorsed amendments to maintain pace with technological advances and subsequent work practice changes. Additional imported Units have also been included to increase the Package's flexibility.

UEG11 (Version 1) has commenced the endorsement process. This version incorporates a review of the qualification structure and includes additional imported units.

UEG11 (Version 2) is currently being developed. This version will reflect a comprehensive EKAS review. It is anticipated that this Training Package will commence the endorsement process in June 2011.

• UEP06 (Version 1.1) was endorsed on the 8th of October, 2010. This version incorporates amendments required by the Federal Government to meet the new NQC packaging rules and the inclusion of Sustainability Skills. It also incorporates industry endorsed amendments to maintain pace with technological advances and subsequent work practice changes. Additional imported Units have also been included to increase the Package's flexibility.

UEP11 (Version 1) – is currently being developed. This version will reflect a complete review of all Certificate III and IV qualifications and EKAS content. It is anticipated that this Training Package will commence the endorsement process in June 2011.

APPENDIX B: METHODOLOGY AND BIBLIOGRAPHY

METHODOLOGY

EE-Oz Training Standards has an extensive and comprehensive formal consultative structure. This consultative structure comprises the EE-Oz Board of Directors, General Standing Committees of the Board, three industry-specific Sector Councils supported by four industry specific National Technical Advisory Groups (NTAGs) and seventeen sector-specific Technical Advisory Committees (TACs) (Figure 3). National Project Steering Committees and other committees of regional, state, national and international significance also contribute to EE-Oz's intelligence base.

Additionally, each year EE-Oz Training Standards actively collects industry intelligence from a number of key annual stakeholder consultation forums, namely;

- 1. National Workshop Series (March, April)
- 2. Annual EE-Oz Conference and associated meetings (Oct)
- 3. Specific Industry/Sector Meetings (April, June, August, Oct)

EE-Oz Training Standards utilises these forums to collect 'grass-roots' intelligence, gauge national client satisfaction levels and identify opportunities for improvement of the ISC's products and services from stakeholders in each State and Territory.

In terms of more formal survey mechanisms, the EE-Oz *Annual Stakeholder Survey* and *Survey to inform the Environmental Scan* are distributed to all National Workshop, Conference and EE-Oz Meeting participants over the year. The surveys are also distributed by the EE-Oz network of State and Territory ITABs, posted on the EE-Oz Training Standards website and included in the Spring EE-Oz Magazine and EE-Oz E-bulletin releases. The magazine and E-bulletin is distributed to over 3000 EE-Oz Training Standards clients.

EE-Oz Training Standards is also very fortunate to have strong working relationships with the network of State and Territory Industry Training Advisory Bodies servicing the ElectroComms and EnergyUtilities industries across Australia. EE-Oz Training Standards has formally engaged the ITAB network to provide industry intelligence and utilises the various ITAB reports to Government to inform its annual Environmental Scan and other submissions to Government, Industry and Training agencies.

As a conservative estimate, well over 1000 individuals have directly contributed to EE-Oz Training Standards 2010/2011 intelligence gathering processes. These individuals hail from small, medium and large industry organisations, industry representative bodies (ie; unions, employer associations), Registered Training Organisations, State and Territory Industry Training Advisory Bodies, industry regulatory bodies, Training Authorities and VET support agencies.

FIGURE 3: EE-OZ FORMAL CONSULTATION STRUCTURE



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TVET Australia, 2008, National Quality Council/Council of Australian Governments Joint Steering Council, VET Training Products for the 21st Century, Consultation Paper, 2009, Melbourne.

Additional sources of information:

- 1. The Websites of the following State Government Departments:
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 - SA Dept of Infrastructure & Planning
 - Qld Dept of Infrastructure & Planning
 - WA Dept of Planning & Infrastructure
 - ACT Dept Lands & Planning
 - Tas Dept Economic Development, Tourism and the Arts
 - Vic Dept Primary Industries.
 - o Wikipedia
- 2. The following Conferences and Summits:
 - NSW Infrastructure Summit 2009
 - Energy 21C 2009
 - 7th Annual Australian Energy & Utilities Summit 2009
 - o Big Skills Conference 2009
- 3. The following Magazines, Newsletters & Communiques:

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- o ENA Update February, 2011
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- National Occupational Licensing System Electrical Occupations Interim Advisory Committee Communique #4 on Progress
- o National Rail Safety Regulator 2011 Newsletter January 2011, Adelaide.
- 4. The following Media Releases:
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 - Simon Corbell MLA "Feed-in Tariff extended to include medium scale generation", 17 February, 2011.
 - CEPU "No need for NBN Skills Shortages", 23 February, 2011.

APPENDIX C: OCCUPATIONS AND QUALIFICATIONS IN DEMAND

CROSS-INDUSTRY

Note: Highlighted ASCO codes indicate the closest code available and may not necessarily describe the Industry occupation. Generally, the Gas and Electricity Generation sectors are not well accommodated in the ACSO coding regime. EE-Oz has chosen not to utilise ANZCO coding, as these codes are even less reflective of the Energy Industries' occupational categories, with the entire Gas Supply and Distribution Industry having been omitted. EE-Oz has brought this to the attention of the ANZCO administrators and has recently been engaged by the Federal Government to conduct a comprehensive study of the industry to inform future ANZCO arrangements.

ACSO Code & Occupation Title	Qual Code	Qualification Title	Training Package	Justification -
				Specific Occupation(s)
				experiencing skills shortages
ASCO=2222-11	UEE20607	Certificate II Wholesaling (to be developed)	Electrotechnology	Electrical/Electronic equipment
Sales Representative (Industrial				specialist sales
Products)				
ASCO=2422-11	UEE51007	Diploma of Electrotechnology – Technical Teaching	Electrotechnology	Technical Teachers (all sectors)
Vocational Education Teacher		(to be developed)		
ASCO=3294-11	UEE30207	Certificate III in Computer Systems Equipment	Electrotechnology	Computer Hardware Installers
Computing Support Technician				
ASCO=3122-11	UEG50106	Diploma of Gas Industry Operations	Gas	Gas Industry Operations
Civil Engineering Associates	UEG60106	Advanced Diploma of Gas Industry Operations	Gas	
ASCO= 3123-11	TBA	Qualifications in Energy Efficiency Auditing and/or Energy	TBA	Energy Efficiency Auditors and/
Electrical Engineering Associates		Efficiency Management		or Energy Efficiency Managers

INDUSTRY-SPECIFIC

Note: Highlighted ASCO codes indicate the closest code available and may not necessarily describe the Industry occupation. Generally, the Gas and Electricity Generation sectors are not well accommodated in the ACSO coding regime.

ACSO Code & Occupation Title	Qual Code	Qualification Title	Training Package	Justification –
				Specific Occupation(s)
				experiencing skills shortages
ASCO= 3123-11	UET50106	Diploma of ESI-Power Systems	ESI-TD&R	Engineering Technicians,
Electrical Engineering Associates	UET60106	Advanced Diploma of ESI-Power Systems	ESI-TD&R	Distribution Designers, Meter
	UEP50106	Diploma of ESI Generation (Systems Operations)	ESI-Generation	Technicians, Protection &
	UEP50406	Diploma of ESI Generation (Electrical/Electronic)	ESI-Generation	Control Technicians, Project
	UEE50207	Diploma of Electrical and Instrumentation	Electrotechnology	Managers, System Operators,
	UEE50307	Diploma of Electrical and Refrigeration & Air Conditioning	Electrotechnology	Compliance Officers, Renewable
	UEE50407	Diploma of Electrical Engineering	Electrotechnology	Energy system technicians
	UEE50607	Diploma of Refrigeration and Air Conditioning	Electrotechnology	
	UEE50707	Diploma of Renewable Energy Engineering	Electrotechnology	
	UEE50807	Diploma of Research and Development	Electrotechnology	
	UEE60107	Advanced Diploma of Electrical Engineering	Electrotechnology	
	UEE60707	Adv. Dip. of Refrigeration & Air conditioning Engineering	Electrotechnology	
	UEE60907	Adv. Dip. of Renewable Energy Engineering	Electrotechnology	
	UEE61107	Adv. Dip. of Automated Systems Maintenance Engineering	Electrotechnology	
	UEE61207	Adv. Dip. of Engineering – Explosion protection	Electrotechnology	
ASCO=3123- 13	UEE40307	Certificate IV in Electrical Installation Inspection and Audits	Electrotechnology	Electrical/Safety Inspectors
Electrical Engineering Technicians	UEP40506	Certificate IV in ESI Generation (Electrical/Electronic)	ESI-Generation	Electrical Technicians
ASCO=3124-11	UEE50107	Diploma of Computer Systems Engineering	Electrotechnology	Computer, Electronic, Electrical,
Electronic Engineering Associates	UEE50507	Diploma of Electronics and Communications Engineering	Electrotechnology	Industrial Electronics,
	UEE50907	Diploma of Industrial Electronics and Control Engineering	Electrotechnology	Communications and Control
	UEE60207	Adv. Dip. of Electronics and Communications Engineering	Electrotechnology	technicians
	UEE60407	Adv. Dip. of Computer Systems Engineering	Electrotechnology	
	UEE60607	Adv. Dip. of Industrial Electronics and Control Engineering	Electrotechnology	
ASCO=3125-11	UEP50206	Diploma of ESI Generation (Operations)	ESI-Generation	Commissioning & Protection
Mechanical Engineering Associates	UEP50306	Diploma of ESI Generation (Maintenance)	ESI-Generation	Technicians
	UEG60106	Advanced Diploma of Gas Industry Operations	Gas	System Ops, Leakage survey,
				network control
ASCO=3125-13	UEP40206	Certificate IV in ESI Generation (Operations)	ESI-Generation	Operations Technicians
Mechanical Engineering Technician				
ASCO=4111-11	UEG20106	Certificate II in Utilities Industry Operations	Gas	Gas Transmission/Distribution
General Mechanical Engineering	UEG30106	Certificate III in Gas Industry Operations		network maintenance operatives

ACSO Code & Occupation Title	Qual Code	Qualification Title	Training Package	Justification -
				Specific Occupation(s)
				experiencing skills shortages
Trades				(including corrosion mitigation)
ASCO=4111-01	UEG40106	Certificate IV in Gas Industry Transmission Pipeline	Gas	Transmission Pipeline Operatives/
Supervisor, General Mechanical	UEG40206	Certificate IV in Gas Industry Operations		Supervisors
Engineering Tradespersons				
ASCO=4311-11	UEE30807	Certificate III in Electrotechnology Electrician	Electrotechnology	Electrician (all sectors)
General Electrician				
ASCO=4311-13	UEE40207	Certificate IV in Electrical - Data and Voice ComMs	Electrotechnology	Electricians with specialist/
Electrician (Special Class)	UEE40407	Certificate IV in Electrical – Instrumentation	Electrotechnology	advanced skills and knowledge
	UEE40507	Certificate IV in Electrical – Air-conditioning Systems	Electrotechnology	(all sectors)
	UEE40607	Certificate IV In Electrotechnology – Systems Electrician	Electrotechnology	
	UEE41207	Certificate IV in Electrical – Rail Signaling	Electrotechnology	
	UEE41007	Certificate IV in Energy Management and Control	Electrotechnology	
	UEE41607	Certificate IV in Renewable Energy	Electrotechnology	
	UEE42009	Certificate IV in Electrical – Photovoltaic Systems	Electrotechnology	
	UEE41107	Certificate IV in Electrical – Lift Mechanic	Electrotechnology	
	UET40206	Certificate IV in ESI-Substations	ESI-TD&R	
		Skills Sets in:	Electrotechnology	
		Photovoltaic Design		
		Photovoltaic Installation		
		Photovoltaic Design & Installation		
ASCO = 4311-15	UEE30807	Certificate III in Electrotechnology Electrician	Electrotechnology	Lift Mechanics
Lift Mechanic				
ASCO=4312-11	UEE31307	Certificate III in Refrigeration & Airconditioning	Electrotechnology	Air conditioning Mechanics
Refrigeration & Air conditioning				
Mechanic				
ASCO=4313-01	UET40109	Certificate IV in ESI-Power Systems	ESI-TD&R	Electrical powerline trades
Supervisor, Electrical Distribution	UET40309	Certificate IV in ESI-Network Infrastructure		supervisors, specialist live line
Tradesperson				workers, specialist cable-jointers,
				specialist rail traction technicians,
				network operators

ACSO Code & Occupation Title	Qual Code	Qualification Title	Training Package	Justification –
				Specific Occupation(s)
				experiencing skills shortages
ASCO=4313-11	UET30109	Certificate III in ESI-Transmission	ESI-TD&R	Electrical powerline tradespeople
Electrical Powerline Tradesperson	UET30209	Certificate III in ESI-Distribution		(transmission, distribution & rail),
	UET30309	Certificate III in ESI-Rail Traction		meter installers
		Skill Sets:		
		9 Refresher Training Units and 17 Skill Sets		
ASCO=4313- 13	UET30409	Certificate III in ESI-Cable Jointing	ESI-TD&R	Cable-jointers
Cable Jointer				
ASCO=4314-11	UEE31207	Certificate III in Instrumentation & Control		Instrumentation & control
General Electronic Instrument				technicians (all sectors)
Tradesperson				
ASCO=4314- 13	UEE40407	Certificate IV in Electrical-Instrumentation	Electrotechnology	Instrumentation & Control with
Electronic Instrument Tradesperson	UEE41007	Certificate IV in Energy Management & Control		and without an electrical license
(Special class)				
ASCO=4315-11	UEE31407	Certificate III in Security Equipment	Electrotechnology	Security & Fire Protection system
Electronic Equipment tradesperson	UEE31007	Certificate III in Fire Protection Control	Electrotechnology	technicians, Appliance servicing
	UEE30507	Certificate III in Appliance Servicing		technicians (requiring a restricted
	UEE30907	Certificate III in Electronics & Communications		gas license), general electronics
				tradespeople
ASCO=4316 -13	UEE30407	Certificate III in Data and Voice Communications	Electrotechnology	Data Communications
Communications Linesperson				Technicians, Broad-band, Pay TV
				and Data Installers
ASCO=4316-11	UEE31607	Certificate III in Wireless Communications -to be developed	Electrotechnology	Telecommunications Technicians
General Communications				(incl. wireless technologies and
Tradesperson				fibre optics)
ASCO=4988-11	UEP30106	Certificate III in ESI Generation (Operations)	ESI - Generation	Power Plant Operators
Power Generation Plan Operator				
ASCO=4988-01	UEP50106	Diploma of ESI Generation (Operations)	ESI – Generation	Senior Power Plant Operators
Supervisor, Power Generation Plant				
Operator				