ENVIROSCAN

EE-OZ TRAINING STANDARDS AUSTRALIA

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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 and the Department of Education, Employment and Workplace Relations (DEEWR).

The intent of the Report is to alert these three key 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 Technical 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, during 2008 and 2009 EE-Oz actively collected 'grass-roots' industry intelligence from a number of key stakeholder consultation forums, namely: a National Workshop Series; the Annual EE-Oz Conference and associated meetings, and; specific industry/sector meetings.

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 has utilised numerous ITAB reports to Government to inform this 2009 Environmental Scan.

KEY MESSAGES

The 'Top 5' impacts shaping workforce development within the industries under the ISC's coverage in 2008, 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 continue to influence workforce development within the industries, the Global Financial Crisis and the Australian Government's increasing focus on reducing Australia's carbon footprint have had significant impact on the industry in the past 12 months. The natural disasters of early 2009, namely; flooding in Queensland and fires in Victoria will also have a significant effect on the industries over the next 12 months and beyond.

GLOBAL FINANCIAL CRISIS

The Australian ElectroComms industry has not escaped the tightening economy, with Group Training Companies (GTCs) reporting that the slowing of the Construction industry has caused many host employers to return apprentices to the GTC.

The EnergyUtilities companies, however, appear to be in a stronger position. In fact, it has been suggested that Australia's recovery may be a 'utilities led recovery'. In 2008, ABARE estimated that $30-35 billion of new energy infrastructure will be required to 2020.

REDUCING AUSTRALIA'S CARBON FOOTPRINT

During 2008, a number of policy documents and research papers on impacts and responses to climate change were released.

Whilst these well-researched reports are accepted as identifying future trends and needs, the Federal and State governments recognise that if the scale of the changes is to be realised, additional measures to enhance the attractiveness of the associated technologies are required.

Consequently, the Federal and State governments have announced a suite of programs to accelerate the large scale development, adoption, demonstration and deployment of new, clean energy technologies.

EE-Oz Training Standards supports the view that the

Australian energy industries will be vital to the success of the Federal and State climate change strategies.

The current measures are already significantly increasing the demand for trained and accredited renewable energy system designers, installers and smart meter technicians. There are, however, already skills shortages in these areas and consultations with industry have identified growing concern that the skills shortages in the energy sectors will intensify as the nation begins to transform itself to realise a reduced carbon footprint.

The clear challenge for training in the ElectroComms and EnergyUtilities industries in response to the ramping up of the Governments' climate change agenda, is to increase the number of new entrants and up-skill existing workers whilst simultaneously maintaining industry, regulatory, safety and quality standards.

HARMONISATION OF ENERGY TECHNICAL AND SAFETY REGULATION

In recent years, the increasing frequency of extreme weather events, combined with the severity of skills shortages affecting the ElectroComms and EnergyUtilities industries, has resulted in Australia's energy industry organisations being increasingly called upon to assist each other in times of crisis (eg; in the aftermath of storms, floods and bushfires).

In November 2007, the Commonwealth Government committed to work with State and Territory Governments and the energy sector to improve the consistency of state-based regulations that apply to the energy sector.

In the second half of 2008, the Ministerial Council on Energy (MCE) established an 'Energy Technical and Safety Leaders Group' to lead the development of an energy technical and safety regulation harmonisation enhancement plan, consistent with the MCE's Principles, noting, however, the possible overlap with the work of the COAG review of general Occupational Health and Safety regulations.

The work of the MCE and the Leaders Group has gained increased importance since the advent of the January 2009 floods in Queensland and the February 2009 fires in Victoria. In the coming months, all sectors of Australia's energy industries will be called upon to assist in the rebuilding process. This will place additional pressure on the industries. A range of workforce development and training initiatives will be necessary if industry is to realise the requirements of the coming year.

THE ROLE OF VET

If the ElectroComms and EnergyUtilities industries are to adequately respond to increasing government and community pressure, they will require the assistance of their training partners in the VET community.

The majority of ElectroComms and EnergyUtilities sectors will be heavily involved in skilling their workforces in the technologies that will reduce carbon pollution and increase energy efficiency. Other industry sectors (ie; business, health) will be less focused on the technical skills required to work on renewable/sustainable energy technologies and more focused on achieving sustainability outcomes by changing existing work practices to reduce pollution and increase energy efficiency in the workplace.

Hence, there will be differing requirements of the VET system, across the full range of AQF levels, depending on the different needs of industry. One size will not fit all.

Additionally, with the ageing workforces and skill shortages affecting the ElectroComms and EnergyUtilities industries, the Australian Government's 'Skilled Migration' and 'Skilling Australia for the Future' policies are particularly attractive to industry enterprises at the present time.

The implementation of the policies, with focus on 'existing workers' and 'workforce re-entrants', will require Registered Training Organisations (RTOs) to conduct more Recognition of Prior Learning/Recognition of Current Competency (RPL/RCC) and gap training activities than ever before, and do so within the boundaries of new Government service provision and funding frameworks.

The Industry's RTOs are also under increasing pressure from industry to incorporate blended learning into delivery arrangements. Several enterprise-specific training initiatives and industry-wide pilot programs have shown that blended learning solutions can provide an effective and efficient way of delivering knowledge and skills for the ElectroComms and EnergyUtilities sectors. Similarly, e-learning is being increasingly integrated into the secondary school curriculum across Australia. Consequently, there is a growing expectation amongst new entrants to industry and the VET sector that they will receive their training via blended learning methodologies.

The resourcing of training providers with suitable human and physical resources is another key challenge for the VET system and its workforce.

All four industry sectors under EE-Oz's coverage have identified considerable concern regarding the present severity of technical trainer shortages.

Critical to the continued development and success of the Australian ElectroComms and EnergyUtilities industries are skilled, knowledgeable and experienced technical teaching staff.

The shortages are cause for concern, as the technical teaching workforce will be subject to increasing pressure to assist the industries respond to energy efficiency and carbon reduction initiatives in coming years.

Strategies to increase the industry's technical teaching workforce and improve the currency of industry knowledge and skill sets of those already in the system, are required.

Enterprises have identified the need for a campaign to develop suitably qualified and experienced trainers for the industries. EE-Oz, as the national ISC, has identified appropriate training, in the form of a Diploma qualification, to support such a scheme. The training includes technical and theoretical (mathematics and physics) refreshers and the mentoring skills required to work with learners.

This qualification needs to be fully developed and resources provided either directly or via state and territory governments to rapidly implement training programs for VET trainers for the ElectroComms and EnergyUtilities industries.

Overall, developing the skills of existing workers is seen as being able to provide a more immediate solution to the skills gap than waiting for new entrants to exit the training system. The up-skilling of existing energy sector workers through programs such as the Productivity Places Program offers the opportunity to address the current and anticipated shortages.

In the longer term, considerable training of new entrants and the continued up-skilling of existing workers and re-entrants to the industries will be required.

EE-Oz will continue to work with its industry members and training partners to identify workforce development and training solutions to assist the industry's response to the global financial crisis; support carbon pollution reduction through the deployment of renewable and sustainable energy system and energy efficiency technologies, and; respond to the need for infrastructure development and maintenance, whilst simultaneously meeting safety and regulatory compliance requirements.

Image provided courtesy of Intergral Energy

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 Environmental Scan to inform the work of the Department, the National Quality Council (NQC) and the newly formed Skills Australia Board.

All three agencies, and other stakeholders, have acknowledged the value of the real-time industry intelligence provided by the Scan, and for this reason DEEWR has advised that the 'Model 2008' template provided for the 2008 Scans will remain for 2009. However, with Skills Australia's requirements having emerged more clearly in recent months, it is now apparent that specific occupation-based information to support the implementation of the Productivity Places Program is required.

To this end, the Department has requested that the Report incorporate an additional Appendix, namely; Appendix B: Occupations and Qualifications in Demand. This Appendix has been included in this Report.

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).

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

Despite the Global Financial Crisis, global demand for energy is increasing. At the same time, the energy sector is undergoing significant change. The uncertainty of supply, rising costs of energy, 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 to address rising energy costs, and; climate change mitigation policies are driving research and investment into new energy sources and technologies.

In the long term, Australia's global economic prospects are good. Whilst a significant reduction in pace has been evident, continued growth in the emerging Chinese and Indian markets and in the developed European and Asian markets, is expected.

The full affect on Australia of US President Obama's policy to create a new Renewable Energy Industry is currently unknown. A number of industry organisations are, however, starting to consider the possible ramifications.

Similarly, with the current push for a decentralized electricity grid, Australia should consider the experiences of European countries, such as Germany and the Netherlands, who have already progressed down this path, and learn from the organisations who have tackled the workforce development and training challenges decentralization creates.

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 practice
- Responsiveness to policy and acting as an agent for policy implementation

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

- Demand for knowledge and skills
- Skills Shortages
- The Aging Workforce
- New Technologies
- Managing increasing demand whilst meeting regulatory, environmental and safety compliance requirements

Whilst these impacts continue to influence workforce development within the industries, the Global Financial Crisis and the Australian Government's increasing focus on reducing Australia's carbon footprint have impacted the industry in the past 12 months. The natural disasters of early 2009, namely; flooding in Queensland and fires in Victoria will also have significant affect on the industries over the next 12 months and beyond.

THE GLOBAL FINANCIAL CRISIS

The world is now caught in the worst economic situation since the Second World War, a situation that has delivered recessions in the United States, the United Kingdom, Japan and the Eurozone.

The IMF is forecasting advanced economies to contract by 2 per cent collectively in 2009 (www.pm.gov.au).

Initial predictions from Australia's financial institutions during 2008, that Australia would be insulated from the worldwide downturn, with "the effect on Australia likely to be confined to an increase in borrowing costs", were optimistic.

Having first affected Australia's financial services and retail sectors, the Global Financial Crisis is now being felt by broader industry. The start of 2009 saw a significant slowing in the resources sector, slowing of the economy in China and some of Australia's largest companies, including BHP Bilton and CSR, announcing significant job cuts.

Additionally, January 2009 saw the nation's jobless rate climb to a two-year high, with figures showing the biggest fall in full-time employment in six years, as positions were terminated and working hours reduced. The Prime Minister confirmed that "2009 will be one of the toughest years Australia has faced in decades, as the global financial crisis wreaks havoc on Australian jobs" (The Financial Review, 22 January 2009).

The Australian ElectroComms industry has not escaped the tightening economy, with Group Training Companies (GTCs) reporting that the slowing of the Construction industry has caused many host employers to returning apprentices to the GTC.

The EnergyUtilities companies, however, appear to be in a stronger position. In fact, it has been suggested that Australia's recovery may be a 'utilities led recovery'.

REDUCING AUSTRALIA'S CARBON FOOTPRINT

During 2008, a number of policy documents and research papers on impacts and responses to climate change were released, including:

- The Australian Government's Carbon Pollution Reduction Scheme green and white papers
- The Report of the Garnaut Climate Change Review
- The Climate Institute's Defining a national energy efficiency strategy
- The NSW Governments Green Skills Strategy
- The CSIRO's report to the Dusseldorp Skills Forum "Growing the Green Collar Economy: Skills and labour challenges in reducing our greenhouse emissions and national environmental footprint"

Whilst these well-researched reports are accepted as identifying future trends and needs, the Federal and State governments recognise that if the scale of the changes is to be realised, additional measures to enhance the attractiveness of the associated new technologies are required. Consequently, the Federal and State governments have announced a suite of programs to accelerate the large scale development, adoption, demonstration and deployment of new, clean energy technologies.

Federal initiatives include:

- the Mandatory Renewable Energy Target, which will require 20 per cent of Australia's electricity to be generated from renewable sources (ie; solar, wind and geo-thermal) by 2020;
- the introduction of new Solar Credits, which will provide incentives for consumers to install micro-generation units, primarily household solar photovoltaic systems, and;
- bringing forward the $500 million Renewable Energy Fund, that supports the development and commercialisation of advance renewable energy technologies.

The Government will also make substantial investments in Carbon Capture and Storage (CCS) technologies, in order to secure Australia's position as a major energy exporter. These commitments include:

- the establishment of the Global Carbon Capture and Storage Initiative;
- funding of up to $100 million per annum towards a new Global CCS Institute;

- the provision of $500 million over eight years through the National Low Emissions Coal Fund, and;
- the development of a new legal framework for carbon capture and storage through the Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, which Parliament passed early in 2008.

State initiatives include:

- Roll out, through the States, of the Australian Government's National Solar Schools Program and Solar Homes and Communities Plan
- The Queensland Government's Solar Bonus Scheme
- The Victorian Government's additional $72 million to expand the Energy Technology Innovation Strategy to include the Sustainable Energy Large Scale Demonstration Program (SELSDP)
- The Australian Capital Territory's Feed-in Tariff*
- The South Australian Governments Feed-in Tariff*

  * It is likely that other states will be implementing similar feed-in tariff mechanisms in the near future.

The roll out of 'smart meters' is also an important part of the national strategy for the reduction of carbon pollution to address the impact of climate change.

The Ministerial Council on Energy has set targets for the roll-out of smart meters in Victoria and NSW to achieve a target of more than 50% of meters being replaced by 2017. Victoria will commence a full scale roll-out in 2009, with a target completion date of 2013. The Department of Resources Energy and Tourism (RET) has not yet provided details on the timing of the roll-out in NSW.

EE-Oz supports the view that the Australian energy industries will be vital to the success of the Federal and State climate change strategies.

The current measures are already significantly increasing the demand for trained and accredited renewable energy systems designers, installers and smart meter technicians. There are, however, already skills shortages in these areas and consultations with industry have identified growing concern that the skills shortages in the energy sector will intensify as the nation begins to transform itself to realise a reduced carbon footprint.

The clear challenge for training in the ElectroComms and EnergyUtilities industries in response to the ramping up of

the Governments' climate change agenda, is to increase the number of new entrants and up-skill existing workers whilst simultaneously maintaining industry, regulatory, safety and quality standards.

In the short term, developing the skills of existing workers is seen as being able to provide a more immediate solution to the skills gap than waiting for new entrants to exit the training system. The up-skilling of existing energy sector workers through programs such as the Productivity Places Program offers the opportunity to address these current and anticipated shortages. This is further discussed in Section 2 below.

HARMONISATION OF ENERGY TECHNICAL AND SAFETY REGULATION

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 disasters. Examples include monsoonal troughs, creating 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.

In recent years the increasing frequency of extreme weather events, combined with the severity of skills shortages affecting the ElectroComms and EnergyUtilities industries, has resulted in Australia's energy industry organisations being increasingly called upon to assist each other in times of crisis (eg; in the aftermath of storms, floods and bushfires).

Organisational and operative mobility has been considerably assisted by the National Training Package's nationally endorsed and recognised units of competence, qualifications and assessment guidelines. The industries are comfortable with the Training Packages, however, there are still aspects of industry work practice, training and regulation that are not nationally consistent and this inconsistency affects the ability of workers in one organisation to assist those in another.

In 1994, the Council of Australian Governments (COAG) endorsed the Australian Standard AS2885 Pipelines-Gas and Liquid Transmission as the basis for regulating gas transmission pipelines. The standard is still used by regulators. The Australian Standards Committee AG-008 is now preparing similar performance based standards for the gas distribution industry.

There have been calls for similar standardisation for the electricity networks. National Standards for electricity transmission and distribution are at an early stage of development.

There is presently no national standardisation of technical and safety requirements for the electricity generators.

In November 2007, the Commonwealth Government committed to work with State and Territory Governments and the energy sector to improve the consistency of state-based regulations that apply to the energy sector.

As a first step in the process, on 14 April 2008, the Department of Resources, Energy and Tourism, on behalf of the Ministerial Council on Energy (MCE) Standing Committee of Officials (SCO) held a meeting with energy sector and industry regulatory representatives to discuss the extent of technical and safety regulatory requirements that currently operate at a state/territory and national level, and the extent to which harmonisation has taken place.

Also in April 2008, the Energy Networks Association (ENA) released its policy for technical/safety regulation. This policy seeks increased national consistency of network technical/safety requirements.

At its June 2008 meeting, MCE recognised the importance of technical/safety regulation to enable the provision of safe and efficient energy services and to ensure public and industry operative safety.

MCE also noted that harmonisation of such regulation was important to:

- Lower the compliance burden for multi-jurisdictional operators and
- Facilitate greater labour mobility and swifter emergency response, especially in the context of the industries' current skill shortages.

In recognising this, the MCE approved a suite of principles for the development of a harmonised approach to energy technical and safety regulation, namely;

- Technical and safety regulation is important for public safety and to ensure workers operate within a safe environment and enable the provision of safe energy services, taking into account that energy supply industry assets reside in public places.

• Reducing the cost of regulation and the regulatory burden on business, particularly where regulation affects businesses that work across jurisdictional boundaries, without comprising safety outcomes.

• Enhancing productivity and workforce mobility – enable the delivery of efficient network services; lower the compliance burden for multi-jurisdictional operators; and facilitate greater labour mobility and swifter emergency response, especially in the context of skilled labour shortages.

• Regulatory certainty and consistency across all jurisdictions, to the extent appropriate.

• Energy specific regulation should not duplicate or be inconsistent with general Occupational Health and Safety legislation, and the Council of Australian Governments' (COAG) Business Regulation and Competition Working Group's reforms in the harmonisation of general Occupational Health and Safety laws and regulations. This should take into account that energy supply industry assets reside in public places.

Source: Energy Technical and Safety Leaders Group, Harmonisation of Energy Technical and Safety Regulation, Terms of Reference

In the second half of 2008, the MCE established an 'Energy Technical and Safety Leaders Group' to lead the development of an energy technical and safety regulation harmonisation enhancement plan, consistent with the Principles, noting, however, the possible overlap with the work of the COAG review of general Occupational Health and Safety regulations. The Leaders Group is comprised of representatives from the electricity supply industry (Generation, Transmission and Distribution sectors), gas industry (Transmission and Distribution), Industry associations, Unions, Industry regulators and the Industry Skills Council.

The work of the MCE and Leaders Group has gained increased importance since the advent of the January 2009 floods in Queensland and the February 2009 fires in Victoria. In the coming months, all sectors of Australia's energy industries will be called upon to assist in the rebuilding process. This will place considerable pressure on the industries, which are already suffering from skills shortages and the need to respond to increasing government and community demands. A raft of workforce development and training initiatives will be necessary if industry is to realise the requirements of the coming year.

1.4 THE VET ENVIRONMENT

THE ROLE OF VET IN REDUCING AUSTRALIA'S CARBON FOOTPRINT

The reports listed above all highlighted the importance of vocational training in underpinning the success of greenhouse responses. For example, Section 20.5.5, page 509 of the Garnaut Report addressing the significant risk of Insufficient people and/or inadequate skills base, states that:

"Keeping a strong focus on appropriate education and training will be an important element in the success of the transition to a low emissions Australian energy sector"

Similarly, the Climate Institute's Defining a national energy efficiency strategy, Page 45, calls for:

"a nationally coordinated effort to integrate energy efficiency concepts into courses for the key trades and professions that influence energy efficiency outcomes"

Meeting the challenges of climate change and the shift to a sustainable, low-carbon economy present a significant challenge for the VET sector for two main reasons:

1. Vocational training is the major disseminator of technological change in the economy.
2. The VET sector is a major agent in changing work practices.

The VET sector, therefore, has and must continue to actively engage in facilitating both the dissemination of technologies for sustainability and changes in work practices which contribute to increased awareness of sustainability issues. Much work is underway in response to these issues at both the national and state and territory levels.

Stimulating a response from the VET sector to sustainability issues also represents a challenge to the national training system and national Training Packages.

There is currently a diversity of skill challenges that industry and its training partners face. These challenges differ according to the characteristics and balance of work roles within the industry. Specifically, does the industry

FIGURE 1: SUSTAINABILITY SKILLS BALANCE

| 'WORK SUSTAINABILITY' SKILLS | TECHNICAL SKILLS FOR RE/SE TECHNOLOGIES |
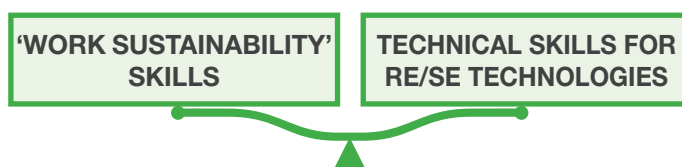
require operatives to 'work in a sustainable manner' (ie; be environmentally responsible in the workplace) or does the industry require operatives to apply technical skills and knowledge to design, develop, install, commission, maintain, repair and/or decommission renewable/ sustainable energy technologies?

Some industry sectors, particularly the energy and construction sectors, are heavily involved in skilling their workforces for the technological changes that will reduce carbon pollution and increase energy efficiency. Other industry sector such as business, health and community services, will focus on achieving sustainability outcomes by changing existing work practices to reduce pollution and increase energy efficiency in the workplace.
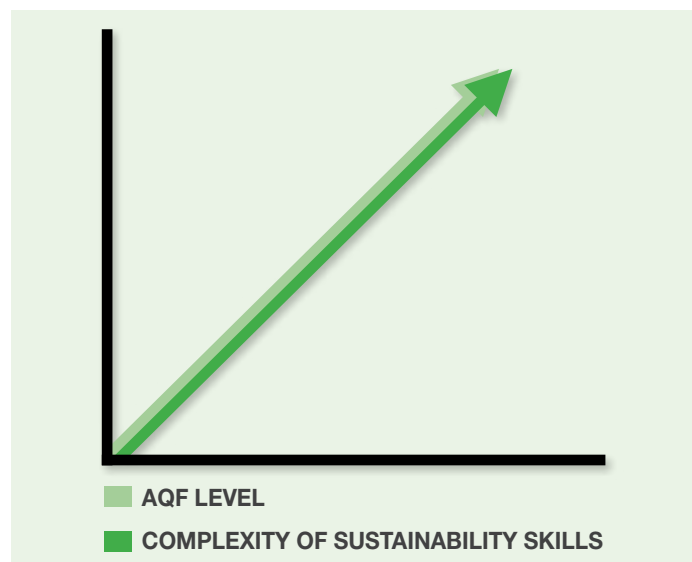
All industry sectors will fall somewhere on the continuum and the mix may change over time, particularly in response to changing external factors and the influence of government policy.

Other factors the national training system must also take into account include:

THE RANGE OF SUSTAINABILITY SKILLS ACROSS AQF LEVELS

Some industry sectors will have a high correlation between the complexity of sustainability skills and the AQF level, particularly where higher level technical skills (e.g. systems design), are required at higher AQF levels. For sectors that have a lesser technical skill requirement, the complexity of sustainability skills will increase at lower rate.

ACCOMMODATING NEW JOBS/ROLES

The rate of emergence of new jobs/roles and the AQF level of same across various industry sectors is also an important factor.

In sectors where significant technological changes are evident, new jobs/roles will emerge across the range of AQF levels. In sectors less impacted by technological changes, new jobs/roles may emerge less frequently and only at higher AQF levels (e.g. new management roles).

CONVERGENCE BETWEEN SECTORS

The interactions within and between industry sectors is also a sensitivity which must be considered. New jobs/roles, convergent technologies and new work practices emerging as a result of responses to climate change will blur and in some cases significantly change traditional interactions within and between industry sectors.

Figure 4 depicts interactions between the emerging renewable/sustainable energy sector and other key industry sectors. As the importance of renewables grows these relationships may change and intensify. Some of the relationships will be cooperative and symbiotic, whereas others may become increasingly competitive.

Whilst the relationships between renewable/sustainable sector and other sectors are highly visible, similar and possibly more complex interactions could be documented for other industry sectors. The dynamic nature of these relationships, which are subject to time and technology shifts, must be taken into account when considering a training response.

FIGURE 2: INDUSTRIES SUPPORTING RE/SE TECHNOLOGIES

- AQF LEVEL
- COMPLEXITY OF SUSTAINABILITY SKILLS

FIGURE 3: INDUSTRIES INCORPORATING 'WORK SUSTAINABILITY' SKILLS

- AQF LEVEL
- COMPLEXITY OF SUSTAINABILITY SKILLS
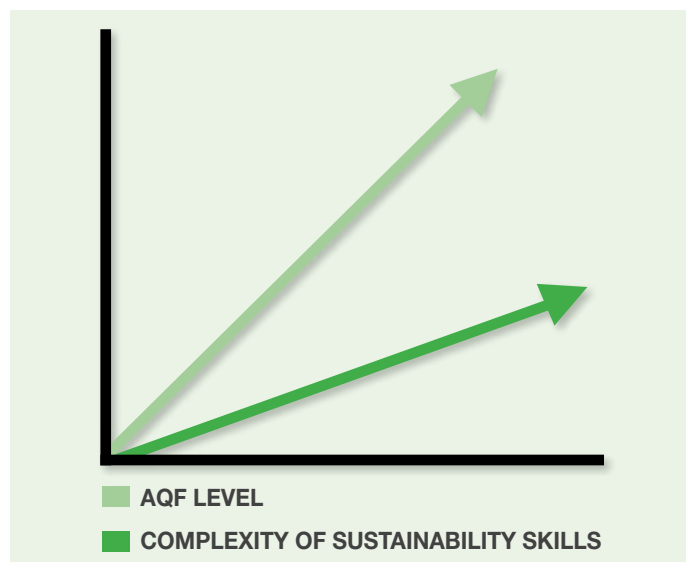
POLICY

In addition to the above is the overarching national policy environment. The policy and implementation strategy for the Carbon Pollution Reduction Scheme (CPRS) is not yet set and industry is not yet in a position to fully comprehend the direct and indirect impacts on individual enterprises, and therefore the necessary workforce development and training responses for same.

Recent changes in the global political and economic landscape cannot be left out of these considerations. The change of leadership in the United States may set a new global agenda on climate change which will have a significant impact on the Australian response. The global financial crisis, accompanied by a reduction in a demand for skilled labour, will provide opportunities for training and skill development in the Australia economy. This may allow our economy to 'catch-up' on identified skill shortages and develop new skills for a low carbon economy.

THE ROLE OF ISCS

Whilst some sectors will be able to move forward with some certainty, there is considerable sensitivity around these settings for other sectors. The complex interaction
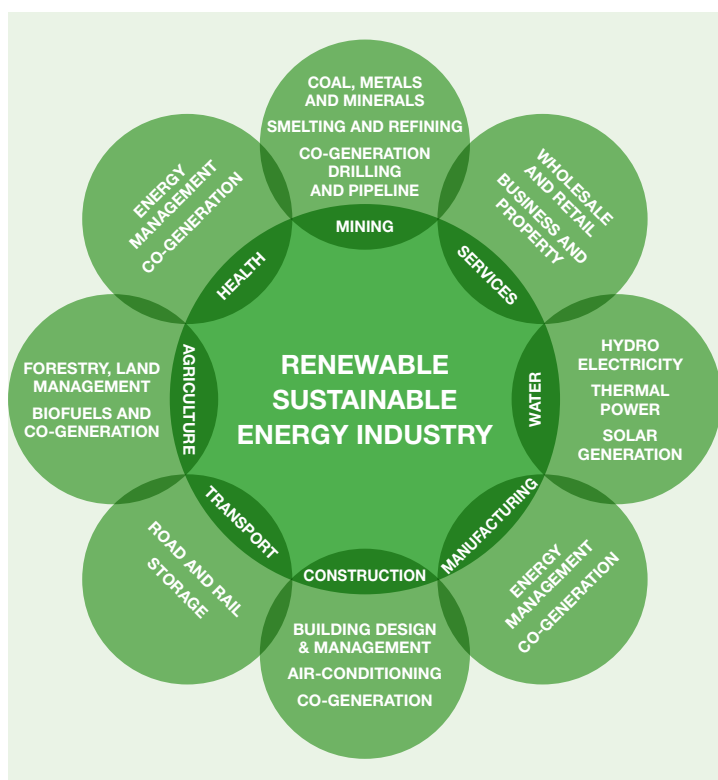
FIGURE 4: INTERACTION BETWEEN INDUSTRIES

of these factors indicates that industry, through the ISCs, is best placed to deal with these issues in identifying and, where necessary, codifying sustainability skills requirements within industry Training Package qualifications and competencies and hence in VET Training programs.

However, the inclusion of appropriate skills for sustainability in existing units and qualifications and the development of new competencies and qualifications to cover new and emerging technologies and the jobs and functions related to these is only part of picture.

The industry research capacity of the ISCs must also be given consideration, as Councils are increasingly being called upon by both industry and government to provide advice on industry policy responses, actions and trends in relation to sustainability issues.

Given the fact that different industries face different sustainability issues stemming from technology, jurisdictional aspects, work practices and state and national policy initiatives, it would be unwise to ask Australian industry to adopt "blanket" approaches to training and skill development for sustainability. The ISCs can assist with identifying workable solutions for each of the industries under their coverage.

RESOURCING OF RTOS

Ensuring training providers have suitable human and physical resources is another key challenge for the VET system and its workforce.

Periods of economic downturn are generally typified by a reduction in investment in training infrastructure. This is counter-productive as inadequate training facilities mean that industry is not well placed to embrace new technology to lift productivity in the face of new economic challenges.

The VET system faces the challenge of providing training in new and emerging technologies to both enhance productivity and meet the challenges of Australia's move to a low carbon economy. This will require new investment in training facilities and equipment to ensure quality training is available to new entrants and existing workers in the energy sectors.

One example is the emergence of the grid connected solar array as a viable renewable energy technology. The Australian government has recently announced its renewable energy certificates and the broadening of eligibility for the incentives to deploy grid connected

solar systems. Additional training is required for industry practitioners to undertake this work.

RTOs wishing to deliver training in grid connected solar systems will need to invest approximately $100,000 per campus to establish suitable training infrastructure.

Many RTOs are already lagging behind in access to equipment to support training in current technologies and face huge problems in obtaining resources to deliver training in new and emerging technologies.

Support materials are also required to ensure the quality of training meets industry requirements. New requirements for sustainable work practices and new technologies need effective training materials to support the implementation of national Training Package units and qualifications.

Additionally, the emergence of the sustainability challenge has exacerbated the problem of obtaining suitably qualified and experienced staff to deliver training. This is particularly evident in the renewable energy and sustainable building sectors where the pace of technological change is rapid and the existing training workforce is aging.

Industry has proposed the development of specialist qualifications to provide pathways for up-skilling existing workers to be able to take on training roles. These qualifications include technical skills as well as program development and delivery skills underpinned by the existing Certificate IV in Training and Assessment.

In the sectors not requiring new technical skills, new and existing training staff will still need professional development in addressing sustainability issues so that they can ensure the maximum return to the community on its investment in training.

These aspects of resourcing must be addressed if Australia is to successfully embrace Carbon Pollution Reduction and move to a low-carbon economy.

RECOGNITION OF PRIOR LEARNING AND CURRENT COMPETENCY

As detailed throughout this report, the Australian ElectroComms and EnergyUtilities industries are currently facing severe skills shortages. To the industry's credit, enterprises are responding by employing large numbers of apprentices. Unfortunately, however, the national growth in demand for energy and the industries' ageing workforces dictate that the skills shortages will continue, if not be exacerbated, into the future.

For this reason, many industry enterprises are currently seeking to retain existing workers and attract skilled migrants and 're-entrants' to their workforces. Hence, the Australian Government's 'Skilled Migration' and 'Skilling Australia for the Future' policies are particularly attractive to industry enterprises at this time.

The policies are, however, placing significant pressure on Registered Training Organisations (RTOs) servicing the ElectroComms and EnergyUtilities industry to respond.

Specifically, the industries' RTO partners are faced with developing change management strategies to facilitate a successful reaction to:

1. The 'ramping up' of the Australian Government's Skilled Migration policy and the need to assist industry enterprises seeking to employ skilled migrants. Greater emphasis will be placed on comprehensive recognition of prior learning/current competency (RPL/RCC) and gap training processes. However, these processes must be undertaken within the Government/Council of Australia Governments (COAG) framework implemented in support of the policy.

2. The implementation of the Australian Government's 'Skilling Australia for the Future' policy, with focus on 'existing workers' and 'workforce re-entrants' which will require RTOs to conduct more RPL/RCC and gap training activities than ever before, again, within the boundaries of a new Government service provision and funding framework.

3. Utilising the inherent flexibility within the 'UE' suite of EE-Oz Training Packages in the context of RPL/RCC and associated gap training service provision.

Under the new 'Skilling Australia for the Future' policy framework, the roles and responsibilities of the 11 Industry Skills Councils, including EE-Oz Training Standards, have been considerably expanded. Under the new funding arrangements, ISCs are required to directly assist industry enterprises develop their workforces through vocational education and training.

Whilst EE-Oz Training Standards has been tasked by the Australian Government to assist industry enterprises meet their training needs, EE-Oz Training Standards recognises that the industries' RTOs will not instantly be ready to service the increased demand for RPL/RCC and gap training activities.

Given the highly technical and resource intensive nature of training for the ElectroComms and EnergyUtilities industries, the large majority of RTOs servicing the industries have a long history in doing so. This is not a training area that RTOs move in and out of readily. However, as has occurred in most technical or trade-based industries, the industries' RTOs have historically concentrated on the provision of training and assessment in the traditional sense (ie; full training programs, apprenticeships etc), rather than the conduct of RPL/RCC procedures and associated gap training activities.

Under the Australian Government's 'Skilled Migration' and 'Skilling Australia for the Future' policies, it will be necessary for RTOs to re-align their strategic directions to respond to increasing Government and Industry emphasis on, and demand for these RPL/RCC and associated gap training activities.

EE-Oz Training Standards has assisted RTOs to address these new requirements through two projects conducted in 2008. The first developed a exemplar 'change management model', the second developed advice and materials to support RTO RPL/RCC processes. These projects are further detailed in Section 5.

INTEGRATION OF BLENDED LEARNING SOLUTIONS

As detailed above, the RTOs servicing the ElectroComms and EnergyUtilities industries' have historically concentrated on the provision of training and assessment in the traditional sense. That is, the integration of on-the-job training in the workplace with off-the-job training, usually provided in a classroom, laboratory or workshop environment.

E-learning delivery arrangements are now being increasingly integrated into the secondary school curriculum across Australia. Consequently, there is a growing expectation amongst new entrants to industry and the VET sector that they will receive their training via blended learning methodologies. This represents an opportunity for industry to take benefit from the familiarity these new entrants have with blended learning as there is no 'technology barrier' to be overcome.

Additionally, in the ElectroComms and EnergyUtilities industries, several enterprise-specific training initiatives and industry-wide pilot programs have shown that blended learning solutions can 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
- assist in alleviating the significant skills shortage of technical trainers by freeing up face-to-face 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.

The Industry also acknowledges that blended learning arrangements can:

- accommodate a range of teaching and learning methodologies, ensuring that learner needs can be catered for more effectively than through traditional or e-learning methods alone
- facilitate formal and informal interaction amongst learners and between learners and trainers via different types of workplace or classroom experiences (ie; formal classes, discussions and/or tutorials) or in a virtual learning community (ie; blogs, wikis, chat rooms, virtual classrooms and/or email communications)
- increase the pace of learning and enable the training of larger numbers of people in shorter periods of time than is possible through classroom training alone.
- make learning more relevant by allowing for learning in context
- allow for knowledge and skills learnt through e-learning to be demonstrated in a classroom or workplace setting.

In acknowledgement of the growing necessity for training provision for the ElectroComms and EnergyUtilities industries to move into the blended learning space, through a series of forums held in the last quarter of 2008, industry and its training partners forwarded a key request of EE-Oz, namely:

- EE-Oz Training Standards take a leading role in coordinating a national industry strategy for the development and implementation of 'blended learning' approaches to training delivery and assessment.

In response, at its meeting of 27 November 2008, the EE-Oz Board endorsed the establishment of a new 'Blended Learning' Standing Committee to action the request. The work of the Standing Committee is detailed in Section 5.

SECTION 2: IDENTIFIED WORKFORCE DEVELOPMENT NEEDS

2.1 INTRODUCTION

For almost two decades, the ElectroComms and EnergyUtilities industries have suffered Skills Shortages at trade-level. The severity of these shortages peaked just after the turn of the Century (2003-2004), after which time, strategies to address the shortages have been exercising the minds of industry employers and representative bodies (ie; Unions, Employer Associations).

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.

A point of interest is that, whilst skills shortages at trade level continue, industry's identification of skills shortages at post-trade level (Certificate IV to Advanced Diploma and above) is more prevalent than ever before, across all industries under the ISC's coverage.

EE-Oz believes that the intensifying skills shortages, particularly those in the area of renewable energy, sector must be urgently addressed through the immediate allocation of a block of Productivity Places Program places to the energy sector industries and further allocations of training places to the energy sector as the full impacts of climate change policy are realised.

The qualifications required to meet the current demand for renewable energy systems technicians are at the Certificate IV – Diploma level and ideally match the intended outcomes of the Productivity Places Program by enhancing the skills of existing workers to meet current and future skills gaps.

EE-Oz, on behalf of the industry, is calling for the identification of Productivity Places Program places to deliver training for 35,000 trade qualified workers in the energy sector as a whole.

Of these, EE-Oz believes that an immediate allocation should be made to the electrotechnology industry sector to meet the identified need for 12,000 tradespeople skilled in grid connected solar energy systems.

A further 23,000 tradespeople will be required across all sectors of the energy industry including electricity generation, transmission and distribution, gas and the Electrotechnology industry. EE-Oz will develop further advice on the priority and targeting of these so that shortages and gaps can be addressed.

In regard to the anticipated skill shortage areas detailed above, EE-Oz has identified and developed industry training standards for these areas and resources now need to be applied to encourage the implementation and delivery of training programs based on these national competency standards.

EE-Oz will continue to work with all stakeholders to facilitate effective training solutions to the looming skills crisis to ensure that Australia achieves its carbon reduction targets and realises the economic, social and environmental benefits from the shift to a sustainable, low carbon economy.

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

Image provided courtesy of Intergral Energy

Critical to the continued development and success of the Australian ElectroComms and EnergyUtilities industries are skilled, knowledgeable and experienced technical teaching staff.

The industries are, however, suffering severe skills shortages in this critical occupational area, with recent studies identifying that more than 60% of the current VET professional workforce servicing the industries are aged 45 years and over, with 25% of these aged 55 years and over.

The matter is cause for concern, as the technical teaching workforce will be subject to increasing pressure to assist the industries respond to energy efficiency and carbon reduction initiatives.

Strategies to increase the industry's technical teaching workforce and improve the currency of industry knowledge and skill sets of those already in the system, are required.

Enterprises have identified the need for a campaign to develop suitably qualified and experienced trainers for the industries.

EE-Oz proposes that a national recruitment project be undertaken to provide pathways for qualified tradespeople to enter the technical teaching domain. Support could be provided in terms of cadetships or study grants or other incentives to stimulate tradespeople displaced by the economic downturn to move into the VET system.

EE-Oz, as the national ISC, has identified appropriate training, in the form of a Diploma qualification, to support such a scheme. The training includes technical and theoretical (mathematics and physic) refreshers and the mentoring skills required to work with young apprentices.

This qualification needs to be fully developed and resources provided either directly or via state and territory governments to rapidly implement training programs for VET trainers for the ElectroComms and EnergyUtilities industries.

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 Technical Advisory Groups (NTAGs) and eleven sector-specific Technical Advisory

Committees (TACs), National Project Steering Committees and other committees of regional, state, national and international significance (refer Figure 1A).

During 2008 and 2009 EE-Oz Training Standards actively collected 'grass-roots' industry intelligence from a number of key stakeholder consultation forums, namely;

1. National Workshop Series

2. Annual EE-Oz Conference and associated meetings

3. Specific Industry/Sector Meetings

EE-Oz Training Standards utilised 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 was a key mechanism in this data collection.

The stakeholder survey was 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 three releases of the EE-Oz E-bulletin in late January and early February 2009. The magazine and E-bulletin is 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 to incorporate in its annual Environmental Scan and other advice provided to Government and industry. EE-Oz's range of activities is comprehensively detailed in its Annual Report.

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 has utilised the various ITAB reports to Government to inform this 2009 Environmental Scan.

As a conservative estimate, well over 400 individuals have actively contributed to EE-Oz Training Standards 2008/2009 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.

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. Many of the energy utilities are embarking on record capital infrastructure programs to meet this need.

All-in-all the Australian energy sector is growing rapidly and changing significantly. This is likely to produce ongoing increases in the demand for skilled workers and ultimately training for same.

ELECTRICITY GENERATION

Note: The following information has been compiled from intelligence gained through the above detailed activities (refer Section 2.2). The information has been validated by the EE-Oz Board, Electricity Sector Council and ESI-Generation NTAG members.

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. Electricity production encompasses stations in capacity from approximately 5 MW's to stations in excess of 2000 MW's.

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.

DRIVERS

CLEAN ENERGY

Australia presently relies heavily on fossil fuels to meet energy requirements. Almost 80 per cent of Australia's electricity is currently generated from coal. Wind and solar power combined currently generate less than one per cent, and although the use of renewable sources is expected to grow significantly, coal and gas are by far the most cost effective means of supplying electricity in Australia and predicted to remain the main fuel sources for electricity generation in the foreseeable 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 Government's goal is to achieve a 20 percent share of renewable energy in Australia's electricity supply by 2020. To support this, the Government has set Mandatory Renewable Energy Target (MRET) and is establishing an emissions trading scheme.

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. In NSW, the 'Owen Report' recommended $A3-4 billion be spent on retrofitting existing power stations to meet carbon reduction targets. Similarly, biomass energy contributed 3% to the electricity generated in Queensland in 2003-04 and the Victorian Government has established a biofuels target of 5% of all fuel consumption by 2010.

Additionally, most of the power stations the generation industry is considering for the future involve gas-fired generators.

In the longer term, emissions will be reduced through the further development and commercialisation of currently unavailable/uneconomical energy efficient technologies. These include carbon capture and storage, and more economical non-fossil fuel electricity generation (ie; wind, water, solar).

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. 42% of households in the Northern Territory use solar energy. There are several concentrated solar power (CSP) technologies available, however, at this point in time, the generation and upfront costs are generally not cost competitive. Improvements needed for take up include reduction in set up costs, generation capacity and thermal efficiency of CSP.

In terms of workforce development, new entrants and existing workers will need to be skilled in the design, development, commissioning, maintenance, repair and/ or decommissioning of the new technologies. A key component of EE-Oz's Continuous Improvement activities on 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 develop the skills and knowledge required to respond to the technological advances associated with reducing Australia's carbon footprint.

Unfortunately, however, the industry's workforce is aging, with many operatives now well over the age of 45 and skill shortages abound in the majority of occupational areas and levels across the sector.

SKILLS AND LABOUR SHORTAGES

CURRENT SKILLS AND LABOUR SHORTAGES

Table 1 details workforce categories and occupations in the Australian Electricity Generation sector that are currently experiencing skills shortages. Industry intelligence indicates that skills shortages will continue into the foreseeable future and may very well intensify as a result of considerable aged retirements expected in the next few years. This is 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 2008 to February 2009.

TABLE 1: CURRENT AND EMERGING SKILL SHORTAGE WORK CATEGORIES & OCCUPATIONS FOR THE ESI GENERATION SECTOR

CURRENT SKILL SHORTAGE AREAS	
Trade	All areas (especially mechanical & electrical)
	Electrical Instrumentation & Control Technicians
	Riggers & Scaffolders
	Welders
Technical Officers	Power Station System Operators (especially senior operators)
	Commissioning & Protection Technicians
	Electrical Technicians
Engineering	All areas (especially mechanical & electrical)
Training	Industry specialist technical trainers & writers (off-job)

EMERGING SKILL SHORTAGE AREAS
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

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.

Hence, there is currently very little training being undertaken leading to nationally recognised industry qualifications.

c. Solutions and potential sources of labour

At the 2008 EE-Oz Training Standards Annual Conference, two key solutions to the current situation were widely supported:

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 Productivity Placement Program, namely;

In regard to point 1, EE-Oz on behalf of the Generation sector, with the support of the Australian Government, through DEEWR, is currently investigating the development of a suite of 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 Productivity Places Program. 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.

In regard to potential sources of labour, 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. Now, however, with the downturn in the resources industry, many ex-industry operatives may be seeking re-employment. Skilling of these personnel in the areas currently suffering skills shortages may be a viable solution.

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

Note: The following information has been compiled from intelligence gained through the above detailed activities (refer Section 2.2). The information has been validated by the EE-Oz Board, Electricity Sector Council and ESI-Transmission, Distribution and Rail NTAG members.

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 corporatisation 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
- Increasing government and consumer demand for a response to global warming

Additionally, there has been strong investment in the sector. In the Transmission sector, investment is in high volume electricity transmission infrastructure is running at about $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 the year ending September 2004, the Energy Networks Association reported that approximately $1.5 billion had been spent.
- In 2008, the Energy Networks Association reported that there is currently around $6 billion being spent

annually on Australia's Energy Network operations and extension.

- In September 2006, the Australian Bureau of Statistics identified 'Electricity' to be the third largest engineering construction activity, after mining and roads at $5.9 billion.
- In 2008, ABARE estimated that $30-35 billion of new energy infrastructure will be required to 2020.

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 South Australian Treasurer Kevin Foley's June 2008 announcement that $2 billion will be invested in the State's public transport system over the next decade, delivering a tramline from the city to West Lakes, Port Adelaide and Semaphore, electrification of the major northern and southern rail lines and a modernisation of the ticketing system. The Treasurer confirmed that $648.4 million will be spent over the next 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 workers need to perform and master.

In addition to mainstream linework and cable-jointing functions, powerline workers in some areas are now being called upon to undertake tasks such as substation/network installation and maintenance, specialised testing and protection, meter installation and the like.

The composition of the sector is also expected to change in future years, with a decline in Electrical tradespeople used to undertake activities and, an increase in the number of lineworkers and cable jointers carrying out the work, caused by the growing specialisation of systems.

In the past, there was significant activity in fostering the use of dual-trade electrician/lineworker programs to offset the huge restructuring that had affected the sector. The strategy was seen as a useful mechanism to streamline and

ultimately reduce staff numbers. By multi-skilling individuals, enterprises felt they could get better value for money and appropriate skills sets for the work required. However, with the increased differentiation in electrical competencies caused by changes in electrical licensing and the dedicated lineworker capabilities required by enterprises, the dual-trade model did not eventuate as intended.

More importantly, the increasing capabilities required of lineworkers to meet technological advances and work organisation (reduced team numbers and more responsibility) has required enterprises to review the recruitment strategies previously deployed, with view to selecting staff with very specific qualities. This has resulted in the industry competing with other industries for applicants with the relevant attributes.

Full-time employment is expected to continue as the predominant employment arrangement in the sector. There will also be a re-emergence of direct employment by the sector with less reliance on contracting-out, which has, in recent times, proven less reliable and cost effective than initially envisaged.

DRIVERS

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

WORKFORCE DEMOGRAPHICS

For many years, electricity supply organisations maintained a 1:1 or even 1:2 trainee to qualified line worker ratio. However, with the wide-ranging changes across the industry during the 1990s, redundancies were offered, often to relatively young lineworker's (35-40 yrs) and positions were not filled, nor new trainees 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 over 45 years of age. The result is that many industry organisations have 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.

In light of the above, industry has warned that in the future there is every possibility that new tradespeople, not long out of their apprenticeships, will be required to assume team-leader responsibilities for their crews, including

responsibility for the training and supervision of apprentices.

The ageing workforce, particularly the loss of technical expertise, is an area of particular concern for industry enterprises and the need for succession planning is beginning to exercise the minds of many senior managers.

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 new major infrastructure projects in all States and Territories over coming years.

The Australian Government's implementation of infrastructure projects to stimulate economic growth will be in addition to these.

The challenge for the sector's member organisations is to manage the maintenance and expansion of the network 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 tradespeople, technical officers, engineers and project 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 infrastructure development and maintenance required in the coming years.

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 early 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.

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 (hundreds in the case of the larger Electricity Supply companies) across Australia, the severity of skills shortages in the industry are such that the current apprentice numbers will not cover the aged retirements expected in the next few years.

A particular area of concern to the industry is the significant shortages in 'Glove and Barrier' qualified workers. These tradespeople work on 'live' high voltage lines, the potentially most dangerous activity within the vocation. For this reason, individuals do not usually commence glove and barrier work until 8 or 9 years after commencement (4-5 years after completion of their apprenticeship). Industry employers are particularly concerned there may not be enough senior lineworkers left in 5 to10 years to provide the necessary 'Glove and Barrier' training to those now progressing through their apprenticeships.

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 2008 to February 2009. 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.

TABLE 2: CURRENT SKILL SHORTAGE WORK CATEGORIES & OCCUPATIONS

CURRENT SKILL SHORTAGE AREAS - ESI – TRANSMISSION & DISTRIBUTION	
Below Trade	Vegetation Control workers
Trade	Electrician (especially with HV switching exp)
	Instrumentation & Control Technicians
	Transmission Lineworkers
	Distribution Lineworkers (including HV Live Line workers)
	Cable Jointing (new work & asset improvement, in particular underground cable-jointing. Also specialist cable-jointers, eg; paper/lead)
Technical Officers	Engineering Technicians/officers
	Distribution Designers (design, drafting & construction of new assets and intelligent systems)
	Meter Technicians (next 5 years as 'SMART' metering is introduced, with peak in next 2-3 years)
	Protection & Control Technicians
	Test & Commissioning Technicians
	Substation Technicians
	Project Managers (especially Construction PMs)
	System Operations (incl. Senior plant leaders, controllers)
	Network Operations
	Compliance Officers
Engineers	Electrical/Power Engineering (incl. embedded generation, testing/protection & commissioning, design/planning/ analysis)
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 SHORTAGE AREAS - RAIL	
Trade	Rail Traction Technicians (especially emergency maintenance personnel)
	Signal Electricians
Technical Officers	Signalling & Track Technicians
Engineers	Signals Engineers

EMERGING SKILL SHORTAGE AREAS

- Installation of smart metering systems
- Design and installation 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

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 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 been addressed through suitable and comprehensive training and assessment.

• 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

At the 2008 EE-Oz Training Standards Annual Conference, two key solutions to the current situation were widely supported:

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 Productivity Placement Program, namely;

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 key 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 Productivity Places Program. 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.

It is worthy of note that, Thiess, in cooperation with EE-Oz Training Standards, have secured funding under the Government's National Enterprise Productivity Places Programme Trail initiative to deliver the Certificate III in ESI – Distribution and Certificate III in ESI – Cable jointing qualifications from the Training Package. Eighty (80) operatives will be trained through the programme.

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-to-face trainer time
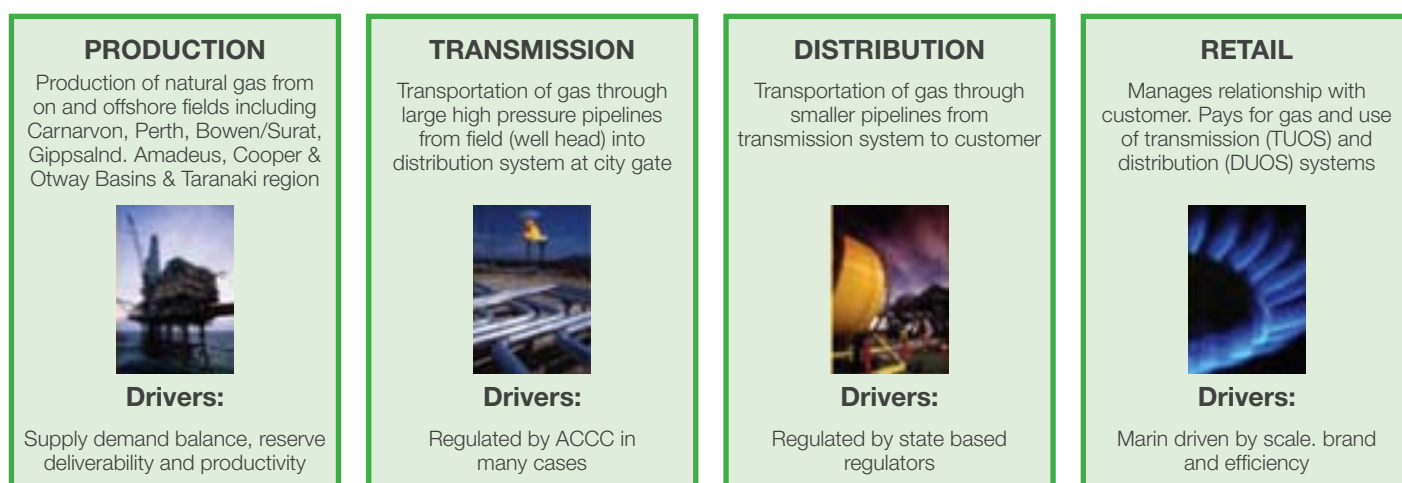
- ensure consistent, high quality knowledge transfer
- more effectively control and track training progress
- facilitate the transfer of knowledge from experienced industry practitioners to the next generation.

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 potential 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.

The industry's highly variable and potentially hazardous work environments demand highly capable and competent personnel. 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. People of this caliber are often difficult to source.

FIGURE 5: THE GAS INDUSTRY

PRODUCTION	TRANSMISSION	DISTRIBUTION	RETAIL
Production of natural gas from on and offshore fields including Carnarvon, Perth, Bowen/Surat, Gippsalnd. Amadeus, Cooper & Otway Basins & Taranaki region	Transportation of gas through large high pressure pipelines from field (well head) into distribution system at city gate	Transportation of gas through smaller pipelines from transmission system to customer	Manages relationship with customer. Pays for gas and use of transmission (TUOS) and distribution (DUOS) systems
Drivers:	**Drivers:**	**Drivers:**	**Drivers:**
Supply demand balance, reserve deliverability and productivity	Regulated by ACCC in many cases	Regulated by state based regulators	Marin driven by scale. brand and efficiency

Sectors covered by the UEG06 Training Package

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. Industry 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. Now, however, with the downturn in the resources industry, there is every possibility that experienced ex-industry operatives will be seeking re-employment. Up-skilling of these personnel in the areas currently suffering skills shortages may be a viable solution.

GAS SUPPLY, TRANSMISSION AND DISTRIBUTION

Note: The following information has been compiled from intelligence gained through the above detailed activities (refer Section 2.2). The information has been validated by the EE-Oz Board, Gas Sector Council and Gas NTAG members.

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 5).

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.

DRIVERS

REGULATION

As detailed in Figure 5 above, the key driver for the industry at this point in time is regulation. COAG's agreement to move towards National Regulatory Regimes will affect the industry (refer Section 1).

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 has the potential to be a transitional fuel to help meet Australia's growing energy needs until renewable energy and clean coal technologies become more widely available.

To this end, Government policies are likely to accelerate the implementation of natural gas technologies, which have lower carbon emissions than other fossil fuels.

By means of example, Queensland has introduced 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, thereby, reducing greenhouse gas emissions.

Additionally, coal seam has emerged as a new gas source and is increasing competition. It already meets 60% of Queensland's total gas needs and offers the possibility of meeting the growing demand for gas across the eastern states.

SKILLS AND LABOUR SHORTAGES

a. Current Skills and Labour Shortages

The Gas industry is currently suffering from skill shortages, predominately in the context of a significant lack of competent personnel. The current 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 6 and 7).

- 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.

Table 3 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 3 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 2008 to February 2009.

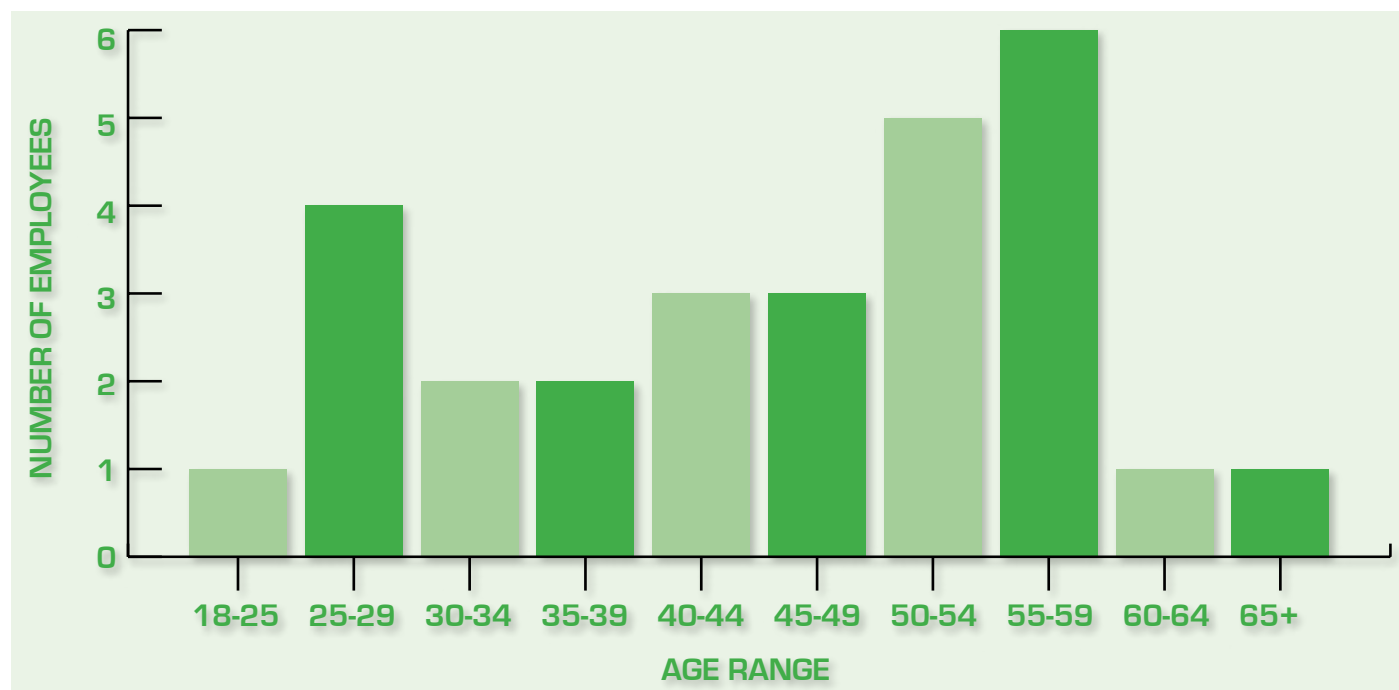**FIGURE 6: CURRENT AGE PROFILE OF THE AUSTRALIAN GAS INDUSTRY**

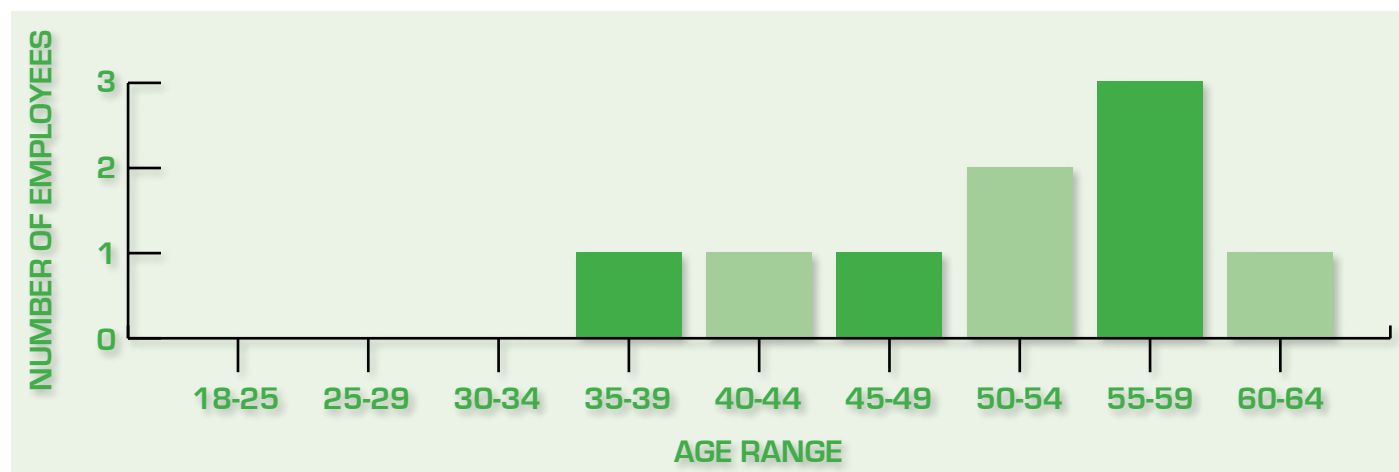**FIGURE 7: CURRENT AGE PROFILE OF AUSTRALIAN GAS INDUSTRY MANAGEMENT**

TABLE 3: CURRENT SKILL SHORTAGE WORK CATEGORIES & OCCUPATIONS

CURRENT SKILL SHORTAGE AREAS – GAS	
Below Trade	Experienced distribution service laying labourers
Trade	Distribution trades
	Transmission trades
	Trades plus (Tradespeople with specialist/advanced technical skills and knowledge)
	Network maintenance workers
	Instrumentation, Electrical, Mechanical and Security Trades
	Data Communications
	Crew Supervisors/Team Leaders
Technical Officers	System Operations
	Leakage survey, CP & Pipeline patrol
	Corrosion Mitigation
	Meter Technicians (next 5 years as 'SMART' metering is introduced, with peak in next 2-3 years)
	Network Controllers
	Network Planners
	Network Customer consultants
	Techs with SCADA knowledge & skills
Engineers	Gas Engineers (civil & mechanical)
	Instrumentation Engineers
	Engineers with Gas industry experience
Other	Trainers
	Regulators
	Project Managers
	Quality control officers
	Manager

EMERGING SKILL SHORTAGE AREAS – GAS
• Meter Technicians(next 5 years as 'SMART' metering is introduced, with peak in next 2-3 years • Electrical Instrumentation Technicians • System Operations (pressure controllers & technicians to support Gas-powered Generators) • Corrosion Mitigation • Electrical 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 and a very small number of RTOs with the Package on scope.

Hence, there is currently very little training being undertaken leading to nationally recognised industry qualifications.

c. Solutions and potential sources of labour

At the 2008 EE-Oz Training Standards Annual Conference, two key solutions to the current situation were widely supported:

> **a**. Source project funding to develop training delivery and assessment support materials
>
> **b**. Ensure inclusion of Gas Training Package qualifications on the Australian Government's Priority Qualifications List for the Productivity Placement Program, namely;

In regard to point 1, 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.

Work has commenced on the two priority qualifications, namely; the Diploma and Advanced Diploma qualifications, for which there are presently no up-to-date support resources, and will be extended to the other qualifications in priority order over coming months. This body of work is further discussed in Section 5.

In regard to point 2, a range of Gas Training Package qualifications have been included on the Australia Government's Priority Qualifications List for the Productivity Places Program. These include:

- 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 all the work categories/occupations identified as suffering skills shortages in Table 3 above.

Additionally, Thiess and Origin Energy, in cooperation with EE-Oz Training Standards, have secured funding under the Government's National Enterprise Productivity Places Programme Trail initiative to partner with GippsTAFE to deliver the Certificate III and IV qualifications from the Gas Training Package. One hundred and fifteen (115) operatives will be trained through the programme; 80 LPG workers and 35 Gas distribution workers.

2.3.2 ELECTROCOMMS INDUSTRY (ELECTROTECHNOLOGY & COMMUNICATIONS)

Note: The following information has been compiled from intelligence gained through the above detailed activities (refer Section 2.2). The information has been validated by the EE-Oz Board , Electrotechnology Sector Council and NETAG members.

PROFILE

The Australian ElectroComms industry is currently understood too employ in excess of 460,000 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 Telecommunications industry. The other main occupational group is 'electrical and electronic associate professionals'.

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. In a study conducted by the Electrotechnology Working Group, it was found that during the 1990s annual growth in Electrotechnology trades averaged 1.3%. Using forecasts prepared for NCVER, the Group concluded that growth in demand for Electrotechnology trades would be almost double this rate during the early 2000s.

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.

Image provided courtesy of Intergral Energy

DRIVERS

ENERGY EFFICIENCY

The Victorian government has estimated that 100,000 domestic dwellings in that state will take-up grid connected solar electricity generation when the premium feed in tariff is offered in 2009. Extrapolating from this figure, a national take-up involving 400,000 or more homes can be expected in the foreseeable future. To achieve this level of uptake, the demand for skilled tradespeople to design, install, integrate and maintain these systems is anticipated to be of the order of 12,000 post-trade (Certificate IV – Diploma) qualified electricians.

It is important to note that these figures are only related to grid connected solar on domestic dwellings and do not include installations on public buildings, schools, hospitals or commercial and industrial premises, which will be significant.

The affect of this initiative is already being felt in the ACT, with the ACT industry regulatory authority reporting that in 2008 there were a total of 30 applications for photovoltaic installations, compared to 500 applications in the first two months of 2009 alone.

In addition to grid connected solar, there are a range of other new technologies, such as geo-thermal generation, smart metering and LED lighting systems, which will also offer significant energy efficiency gains.

The introduction of 'SMART' meters will impact on ElectroComms personnel, particularly those working within the major utilities and gas organisations, for approximately five years from late 2008. This technology will demand operatives develop appropriate knowledge and skills to facilitate the industry's conversion to the 'SMART' meters. This includes the communication and information technology aspects of the advanced interval metering systems.

MAINTAINING PACE WITH OTHER 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 Internet-based 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, or energy efficiency technologies.

BROADBAND ROLLOUT

The chief forecaster of telecoms analyst Ovum, has predicted that the affect of the global financial environment on Australia's telecommunications industry will be mild, with growth and spending slowing, but not declining (EPIC, 2008).

The impact will be substantially lessened by the Australian Government's investment in the National Broadband Network initiative. In 2008, the Government finalised its plan for the initiative. The tender will provide nearly $5 billion to rollout fiber throughout Australia, to 98% of the population.

The initiative will provide business and employment opportunities over the next five years. The key impacts on labour and skill requirements will be felt in areas such as cabling and network and infrastructure planning (EPIC, 2008).

DOWNTURN IN CONSTRUCTION SECTOR

The global economic downturn has significantly impacted the Building and Construction sector, with the credit squeeze leading to a large number of building projects being cancelled or deferred (370O Group & RMIT, 2008). Economic modelers have predicted that over 50,000 jobs will be lost in the Australian Building and Construction sector as a result. This will have a severe impact on apprenticeships. (370O Group & RMIT, 2008).

The down turn in the construction sector is affecting the ElectroComms industry. Using Victoria as an example,

employment in the Victorian building sector decreased by 1.6% in the 2007/08 financial year. This is in contrast to the previous two financial years, where employment in the industry showed substantial growth, with 7.0 and 10.7% increases respectfully (EPIC, 2008).

The host employers of many Group Training Organisation (GTO) employed apprentices do not currently have sufficient work for their hosted apprentices and are returning the apprentices to the GTOs. In cases where the GTO cannot find other host employers for the returned Apprentices, the Apprentices are placed on down time. In early February 2009, four ElectroComms industry GTOs had over 100 Electrotechnology apprentices on down time.

In addition to affecting the industry, downtime affects the well-being of the apprentices themselves. Studies have shown that apprentices on downtime generally display a lack of motivation, depression and anti-social behaviour.

EE-Oz sees these periods of downtime as an excellent opportunity to value-add to apprentices' skills by providing them with additional training. Given the anticipated skills shortages in the renewable energy sector, training in renewable/sustainable energy system technologies and practices could be particularly beneficial to the industry as a whole. Similarly, additional training will return a sense of direction and 'self worth' to the apprentices.

EE-Oz would be pleased to work with government to formulate an appropriate resourcing program to enable the industry's GTOs to respond to apprentice down time in such a manner.

THE FEDERAL GOVERNMENT'S STIMULUS PACKAGE

On the 3rd of February, 2009, the Australian Government announced a $42 billion Nation Building and Jobs Plan to support jobs and investment in future long term economic growth.

Key measures funded by the Nation Building and Jobs Plan include:

- Free ceiling insulation for around 2.7 million Australian homes
- Build or upgrade a building in every one of Australia's 9,540 schools
- Build more than 20,000 new social and defence homes
- $950 one off cash payments to eligible families, single workers, students, drought effected farmers and others

• A temporary business investment tax break for small and general businesses buying eligible assets

• Significantly increased funding for local community infrastructure and local road projects

The initiatives in the Nation Building and Jobs Plan are expected to provide a boost to economic growth of around ½ percent of GDP in 2008-09 and around ¾ percent to 1 percent of GDP in 2009-10. Treasury estimates that the Nation Building and Jobs Plan will support up to 90,000 jobs in 2008-09 and 2009-10.

The building, maintenance, upgrading and renewal of school infrastructure across Australia will have significant affect on the demand for ElectroComms and EnergyUtilities trades, including, but not restricted to: lineworkers, electricians, air conditioning/refrigeration mechanics and data communications technicians.

Similarly, the building of 20,000 new social housing dwellings, 802 new houses for the Australian Defence Force and the conduct of urgent maintenance on approximately 2,500 vacant social houses, will call upon the same group of trades.

In addition to the national stimulus programs, the State Governments have also announced policies incorporating increased investment in new infrastructure. By means of example, through its 'Building our industries' policy, the Victorian Government will deliver 1000 kilometres of competitive fibre-optic infrastructure to Victorian regional centres (EPIC, 2008).

Unfortunately, however, the cohort of trades necessary to realise these initiatives are suffering from severe skills shortages, with some industry organisations already claiming that they have insufficient skilled labour to meet the current, let alone increased, levels of demand.

Further, it can be assumed that the Australian Government will require the building and maintenance work undertaken under the Nation Building and Jobs Plan to maximise the utilisation of energy efficient and environmentally sustainable technologies. It can also be assumed that aggregation of incentives will eventuate, such as the combining of the Australian Government's school infrastructure funding with incentives for the installation of photovoltaic panels on school roofs.

In terms of workforce development and training ramifications, skills shortages, the implementation of new technologies and the potential aggregation of incentives by consumers, will require the recruitment and training of new entrants and the up-skilling of existing workers in new technologies.

SKILLS AND LABOUR SHORTAGES

a. Current Skills and Labour Shortages

Table 4 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 4 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.

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

• 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.

c. Solutions and potential sources of labour

At the 2008 EE-Oz Training Standards Annual Conference, two key solutions to the current situation were widely supported:

1. Source project funding to develop training delivery and assessment support materials

2. Ensure inclusion of Electrotechnology Training Package qualifications on the Australian Government's Priority Qualifications List for the Productivity Placement Program, namely;

TABLE 4: CURRENT SKILL SHORTAGE WORK CATEGORIES & OCCUPATIONS

CURRENT SKILL SHORTAGE AREAS - ELECTROTECHNOLOGY	
Retail	Electrical/Electronic Specialist sales
Appliance Service & Installation	Electronic appliance service personnel (requiring a restricted gas license)
	Broadband/Pay TV/Data installers
	Computer Hardware Installers
	Mobile phone/PDA repairers
Trades	Electricians (especially domestic & commercial)
	Electrician plus (Electricians with specialist/advanced technical maintenance skills & knowledge)
	Data Communication Technicians
	Telecommunication Technicians (incl. Wireless technologies & Fibre Optics)
	Electronic Security System Technicians
	Electronic Fire Protection System Technicians (especially personnel with electrical installation skills/knowledge)
	Lift Technician
	Instrumentation Technicians
	Air Conditioning Refrigeration Mechanics (especially; manufacturing & installation, commercial, industrial & marine)
Technical Officers	Research & Development Officers
	Design
	Testing
	Installation
	Maintenance & System Integration
	Network & infrastructure planning (especially in the telecomms sector)
Engineers	Electronics Engineers
	Computer Systems & Software Engineers
	RF Engineers
	Mechtronic Engineers
	Control Engineers (Electrical/AC Refrigeration)
Inspection	Electrical Inspectors (industry requires 20-25% increase in Electrical Inspector numbers)
Management	Project Managers

EMERGING SKILL SHORTAGE AREAS - ELECTROTECHNOLOGY

- Installation of smart metering systems
- Design and installation 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

In regard to point 1, 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 qualifications in the Training Package, namely; the Certificate III Electrician and Certificate III Refrigeration/Air Conditioning trade qualifications. The work will be extended to the other qualifications, in priority order, over coming months.

In regard to point 2, 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
- Certificate 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 4 above.

In terms of labour sources, anecdotal evidence from Victoria, suggests that the industry will be seeking to upskill the ageing electrical contractor workforce to address the shortages of meter technicians expected as a result of the 'smart meter' rollout (EPIC, 2008).

One source of skilled labour is the resources industry. In past years, the Australian resources industry boom has played a key role in intensifying the skills shortage crisis in the ElectroComms industries. ElectroComms 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, in recent years, many ElectroComms personnel have been attracted to the resources industry. Now, however, with the downturn in the industry, many ex-industry practitioners will be seeking re-employment. Upskilling of these personnel in the technologies required for the industry to respond to the Governments' climate change initiatives may be a viable solution.

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
(Source: National Data Collections, supported by EE-Oz Intelligence)

THE ELECTROTECHNOLOGY TRAINING PACKAGE (UEE07)

The first Training Package that contained the vocational standards for the Australian ElectroComms industry was endorsed by the National Training Framework Committee on 21 July 1999 and published by Australian Training Products on 21 October 1999, as the National Electrotechnology Training Package (UTE99). Following its initial release, UTE99 underwent five version changes.

The formal review of the UTE99 Electrotechnology Training Package was completed in June 2005. The UEE06 Training Package was 'conditionally endorsed' by the National Quality Council (NQC) on 8 November 2006 and 'uploaded' to the NTIS in PDF format on Wednesday 24 January 2007 for subsequent utilisation by RTOs.

There was very little uptake up of the conditionally endorsed UEE06 Training Package, as industry and its training partners (public and private RTOs) were acutely aware of, and involved in, work on the Training Package to address the NQC's conditions of endorsement and, for this reason, were reluctant to devote time, effort or resources to prepare for implementation of a Training Package with such a short lifespan.

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.

Delivery of the UEE07 Training Package commenced amongst a small number of RTOs in Semester 2, 2008. A larger number of RTOs commenced delivery against the Training Package in Semester 1, 2009 and it is expected that all RTOs will have completed the transition to the new Training Package by Semester 2, 2009.

Included below is a summary of NCVER statistics for the UEE07 Training Package.

NCVER STATISTICS ON TAKE-UP

The UTE99 Training Package was consistently listed in the NCVER's 'Top 20' Training Packages. For the June 2008 quarter (latest available data), the UEE07 continued this trend, with the Training Package ranked 6th in regard to 'numbers in training' and 12th in regard to 'commencements' by State/Territory.

The number of commencements was consistent with the previous quarter, with no jurisdictions indicating low or no take up. In the 12 months to 30 June 2008, there were 12,500 commencements in the 'trades' category for the 'Electrotechnology and communications sector'. 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).

Electrotechnology enrolments in these RTOs for 2008/2009 were estimated at 1945, with the distribution as follows:

ElectroGroup Training - QLD: 175 (apprentices)

Electro Skills Centre - NSW: Sydney: 250 (CIII), 17 (CII); Newcastle: 120 (CIII)

Electro Skills Centre - ACT: 214 (CIII)

VICTEC / TASTEC – NSW&TAS: 587 (CIII)

PEER - SA: 350 (trainees/apprentices)

NECA College of Electrical Training - WA: 760 (apprentices)

Advanced Training International – NT: 72 (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 'in-house', 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 publicly 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 major utilities, namely; ETSA (SA), Transgrid, Western Power, Country Energy, Energex, Aurora, ActewAGL, Integral, Ergon, Energy Australia, Snowy Hydro, Hydro Tasmania, NT Power & Water and Powercor, will collectively enrol well over 1000 Lineworker and Electrical apprentices in the 12 months to June 2009. Major contractors to the Utilities are expected to enrol no less than an additional 100 apprentices and the Rail sector is expected to enrol approximately 250 apprentices under the ESI-TD&R and Electrotechnology Training Packages.

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.

3.2 EE-OZ TRAINING PACKAGE UTILISATION

3.2.1 UTILISATION FOR ASPECTS OTHER THAN TRAINING DELIVERY

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

1. Traditional training and assessment towards qualifications/statements of attainment
2. Recognition of Prior Learning/Current Competency processes
3. Workforce development (job role modelling)
4. Workforce re-structuring
5. 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 Committee membership numbers are indicated in Table 5 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.

3.2.2 UTILISATION FOR TRAINING DELIVERY

Table 6 details the number of RTOs currently registered as having scope to deliver against the EE-Oz suite of Training Packages.

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. It appears, however, that the number

TABLE 5: CURRENT EE-OZ NATIONAL TECHNICAL ADVISORY GROUP (NTAG) MEMBERSHIP

EE-OZ INDUSTRY NTAG	CURRENT MEMBERSHIP
Electrotechnology NTAG & TACs	72
ESI-TD&R NTAG & TACs	192*
Gas NTAG	15
Generation NTAG	37*

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

TABLE 6: RTOS WITH EE-OZ TRAINING STANDARDS TRAINING PACKAGE ON SCOPE.

EE-OZ TRAINING PACKAGE	RTOS WITH PACKAGE ON SCOPE	
	FEB 2008	FEB 2009
Electrotechnology UEE07	38*	102
(Electrotechnology UTE99)	(121)	(92)
ESI-TD&R UET06	21	37
(ESI-TD&R UTT98)		(28)
Gas UEG06	7	12
ESI-Generation UEP06	24	39

*The UEE07 was still a very new Training Package in 2008, having only been endorsed in November 2007.

of RTOs now registering to deliver against both Training Packages is increasing, with 15 additional RTOs registering to deliver against the Generation Training Package and 5 additional RTOs registering to deliver against the Gas Training Package in the 12 months to February 2009.

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 enterprise.

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, up until recently, 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 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.

3.3 EE-OZ TRAINING PACKAGE APPLICABILITY TO INDUSTRY NEEDS

Through the 2008 Annual Conference and associated NTAG and TAC meetings, other industry-specific meetings held during the year and through surveys distributed via the EE-Oz Magazine and E-bulletin, EE-Oz has sought stakeholder feedback on the applicability of the EE-Oz suite of Training Packages to industry's needs. Stakeholders were asked to rate the applicability of their Training Package using a four point scale, namely; Excellent, Good, Fair, Poor.

ENERGYUTILITIES

For the Gas Industry, 83% of Gas industry respondents considered the Gas Training Package to be 'Excellent' (60%) or 'Good'(23%), 17% considered it 'Fair' and one respondent considered the Training Package to be 'Poor', identifying that a larger number of sector-specific competencies are required.

For the ESI-TD&R Industry, 88% of industry respondents considered the ESI-TD&R Training Package to be 'Excellent'(21%) or 'Good'(67%), 11% considered the Package to be 'Fair' and one industry respondent considered the Training Package to be 'Poor', identifying that there was a need to ensure the underpinning skills and knowledge within the units was more industry-specific.

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.

ELECTROCOMMS

For the ElectroComms Industries, 92% of respondents considered the Electrotechnology Training Package to be 'Excellent'(27%) or 'Good'(65%) and 7% considered it 'Fair'. One industry respondent considered the Electrotechnology Training Package to be 'Poor', identifying that the Training Package was too intent on reflecting industry regulation to the detriment of flexibility.

SECTION 4:
FUTURE DIRECTIONS FOR ENDORSED COMPONENTS OF TRAINING PACKAGES

4.1 RESPONSES TO INDUSTRY'S WORKFORCE DEVELOPMENT PRIORITIES

REDUCING AUSTRALIA'S CARBON FOOTPRINT

EE-Oz has been working with its stakeholders and industry partners to identify training solutions to support carbon pollution reduction through the deployment of renewable and sustainable energy system and energy efficiency technologies.

During 2008, in response to policy directions at both state and federal level, EE-Oz identified nationally endorsed units of competency, skill sets and qualifications to ensure that appropriate skill standards are in place to meet the requirements of industry, the VET system and industry regulators in accrediting and delivering training for energy efficiency.

By means of example, following the December 17 2008 announcement of the amendments to the Renewable Energy (Electricity) Act 2000 to allow for Renewable Energy Certificates to be issued to individuals, businesses and community groups who install up to 1.5 Kilowatts of grid connected micro generation capacity (primarily solar photo-voltaic systems), EE-Oz immediately developed a case for endorsement for four revised competencies, three new Skill Sets and one revised qualification to address anticipated training and regulatory requirements generated by this new policy direction.

EE-Oz is currently working to have these Training Package components endorsed so that the VET system can deliver the required training to industry at the earliest possible date. EE-Oz is also preparing advice on the workforce development impacts of this broadening of the Renewable Energy (Electricity) Act 2000.

EE-Oz has also established and is continuously improving training standards for the following technologies:

- Smart metering
- Grid connected photovoltaic (solar) arrays
- Wind energy systems
- Co-generation and local generation
- Use of natural refrigerants and the reclamation of synthetic refrigerants in air-conditioning and refrigeration systems
- Alignment of nationally endorsed competencies and industry accreditations for sustainable energy systems, particularly the Clean Energy Council accreditation for Grid connected photovoltaic systems and the National Electrical and Communications Association Eco-smart electrician.

The development and review of these competencies is ongoing and EE-Oz is monitoring technological change and policy settings in order to ensure that industry is able to access training standards that support the new policies and practices.

EE-Oz is aware that the deployment of new technologies as retrofits, replacements or adjuncts to existing (often antiquated) systems has significant implications for energy efficiency and that training is required to ensure these are appropriately applied.

The scope and scale of the technologies and systems that can be deployed across domestic, commercial and industrial settings to contribute to increased energy efficiency is very broad. In commercial/industrial settings these may require significant capital investment in redesigned, 'whole of premises' installations.

Currently emerging technologies which will contribute to energy efficiency include:

- Distributed generation - local power supply systems which provide on-site generation including micro turbines, heat exchangers, micro wind and solar systems
- Energy efficient Illumination systems including LED lighting and smart lighting systems
- Demand side management via smart meters and integrated data systems
- Electricity supply design and control
- Power system optimisation
- Domestic integrated energy management systems

- Commercial/industrial energy management systems integration

In 2009, EE-Oz will develop new training standards for these new technologies and systems.

EE-Oz 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 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 for efficiencies and savings exist.

Training for the new roles of energy auditor and energy performance manager must be developed as a matter of priority and will seek to progress this work in the first half of 2009.

In regard to 'smart meters', EE-Oz has worked with RET and the Victorian Department of Primary Industries (DPI) to identify 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.

EE-Oz is also working to identify appropriate Skill Sets to meet the needs of suitably qualified tradespersons.

EE-Oz 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. These include:

- 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

EE-Oz has advised DEEWR that approximately 12,000 (FTE) skilled workers will be needed to achieve the roll out of 2.5 million meters in Victoria, on time. EE-Oz will continue to work with RET, the Victorian DPI and Skills Victoria to ensure training is in place to support this roll-out.

ADDRESSING SKILL SHORTAGE AREAS

TECHNICAL TRAINERS FOR THE ELECTROCOMMS AND ENERGYUTILITIES INDUSTRIES

To enable the VET sector to deliver high quality training to industry in both traditional technical areas and the new, emerging and converging technologies for energy efficiency, the sector must have suitably qualified and experienced technical trainers.

The current ElectroComms and EnergyUtilities technical trainer workforce is ageing and the severity of shortages, across Australia, has never been greater.

The particularly technical nature of the industries and the advances in technology that are occurring in response to climate change, dictate that industry trainers must be highly skilled and qualified personnel, able to deliver effective training in accordance with continuously changing technologies and work practices.

Industry is particularly concerned at this decline in the number of ElectroComms and EnergyUtilities industry technical trainers in the VET workforce and has developed a Diploma level qualification to equip industry practitioners to become trainers.

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

4.2 BARRIERS IN THE VET SYSTEM THAT NEED TO BE OVERCOME

PUSH FOR STATE ACCREDITED COURSES

During 2008, significant tensions between the centrality of industry's nationally developed training products, and those developed by local training providers again started to surface as policymakers moved to establish a fully 'competitive market'. 'Unique' product and qualification titles are seen by some providers as their point of difference in an increasingly crowded marketplace.

Australian industry is concerned by this current push for state accredited courses and the ISCs, on behalf of all industry, have collectively provided a response to Government. The following is an extract from the response:

Industry at large welcome competition as a means of encouraging greater flexibility and quality of delivery. But competition is not about the development of locally accredited courses, indeed many argue that the notion of a 'local' market is increasingly obsolete given the nature of industry is globally driven. Quite simply, industry's nationally agreed 'criteria' for skills and knowledge are precisely that, and are not the subject of competition.

Implications of this practice go way beyond wastage of resources, or even the lack of recognition by industry of local programs or the implications for a learner's portability of skills. More broadly this is about the apparent contradiction of a system designed to respond to the greater economic needs of Australian industry and the 'VET industry', an industry which is increasingly geared towards lucrative export markets and fee for service activity based on "a distinguishing product".

Not surprisingly, the notion of contestability and competition place pressure on practitioners to look at the issue of product design through their lens of running a business. It is without doubt a highly charged and sensitive issue but one which must be openly discussed to ensure it does not distort the design of any new model for training products.

Australia's energy industries have only recently emerged from a State accredited model and have now fully

embraced national standards and qualifications. The push for State accredited courses is seen as a significant step backwards and ultimately detrimental to national consistency in training, work practice and safety.

UNCERTAINTY AROUND THE DIRECTION OF VET TRAINING PRODUCTS FOR THE 21ST CENTURY

The NQC has long recognised the policy implications for the National Skills Framework of the COAG human capital reform agenda. In November 2006, the NQC provided advice to the MCVTE on suggested policy priorities for the National Skills Framework to support the second stage of the COAG human agenda reforms. This advice included that 'consideration be given to providing greater flexibility and adaptability within the next generation of Training Packages' and 'building on the current competency approach by incorporating the development of personal capabilities and attributes (eg; employability skills) and placing greater emphasis on cognitive rather than functional (technical) skills'.

In keeping with this advice, as part of the 2007 NQC Work Plan, a number of research projects were conducted to scope and explore the 'next generation' of Training Packages and the construction of the unit of competency. Building on this research, as part of its 2008 Work Plan, the NQC initiated a project designed to develop policy directions for the Council to consider in relation to the next generation of Training Packages through a broad consultative process.

COAG has also been working in this space. At its March 2008 meeting, COAG identified the following key outcomes to boost Australia's workforce participation and productivity:

1. The working age population have gaps in foundation skills levels reduced to enable effective educational, labour market and social participation;

2. The working age population has the depth and breadth of skills and capabilities required for the 21st century labour market;

3. The supply of skills provided by the national training system responds to meet changing labour market demand; and

4. Skills are used effectively to increase labour market efficiency, productivity, innovation, and ensure increased utilisation of human capital.

COAG also agreed to some key policy directions for VET including: *Reforming training products, services, information systems and regulation to meet a more demand and client driven training system.*

Recognising synergies between the NQC's work plan in relation to the next generation of Training Packages and the COAG agenda, 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'.

Late in 2008, key stakeholders, including the ISC's, were asked to respond to the first '*VET Training Products for the 21st Century*' Consultation Paper. The ISC's also participated in a consultation forum on the 16th of December, 2008. During the forum the ISC's confirmed the following:

- There is ongoing support for the architecture of the current VET system, even where changes have been promoted by some sectors of the system.

- Occupational competence should remain the key tenet of the VET system.

- There is a need for the definition of Competence to be kept firmly around the workplace. Creating other definitions will not necessarily lead to significant positive change.

- The argument for greater focus on foundation skills in qualifications needs further analysis.

- Assessment issues remain and will require a sustained debate in the next phase of the project (phase 2).

- The agreed structure of Training Packages still a key issue, particularly the debate around splitting Units of Competence and Training Package advice into separate documents.

- There is growing interest in credit frameworks and nominal learning values to facilitate articulation from VET to the Higher Education sector. There is a need, however, for a systematic approach to credit (such as the credit matrix) to support this articulation. Higher Education components could possibly be included in Advanced Diploma qualifications. Where this is appropriate, there is a need for greater engagement with the Higher Education sector in the Training Package development process.

- The term 'Training Package' is not useful to moving forward and requires change.

- Difficulties with the current model not meeting the needs of all learner groups: i.e. those not engaged in the workplace, are recognised.

The ISCs also confirmed Industry's ongoing concern regarding the threat of fragmentation of the existing system (i.e. implementation of dual systems), particularly through ACPET and TDA's push for more flexible use of Units of Competency to support local programs to meet local needs.

Mr Peter Noonan, Project Consultant, presented the above detailed points at the Joint NQC/COAG Steering Committee Meeting on 28th January 2009.

A second '*VET Training Products for the 21st Century*' Consultation Paper has subsequently been compiled and released (February 2009). In the paper, the Joint Steering Committee has affirmed its ongoing commitment to an industry led VET system. Specifically, the Committee has affirmed the:

- Need for a policy framework which enables VET qualifications and products to:
    - meet the needs of businesses and industry; and
    - equip individuals with broadly based skills and knowledge;

- Continued existence of industry performance standards as the basis of Training Packages; and

- Continued role of industry in defining workplace competence.

EE-Oz Training Standards will continue to participate in discussions around the issue, with view to ensuring that the needs of industry remain at the forefront of considerations.

SECTION 5: FUTURE DIRECTIONS FOR NON-ENDORSED COMPONENTS SUPPORTING TRAINING PACKAGES

5.1 RESPONSES TO INDUSTRY'S WORKFORCE DEVELOPMENT PRIORITIES

REQUIREMENT FOR NATIONALLY CONSISTENT DELIVERY AND ASSESSMENT SUPPORT MATERIALS

DEVELOPMENT OF ELECTROTECHNOLOGY & ESI COMPETENCY DEVELOPMENT PLANS, LEARNING AND ASSESSMENT PLANS AND TASK BOOKS.

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.

1. Competency Development Plan (CDP)

Provide RTOs with a detailed compliance document for each competency standard unit (CSU) in the given Training Package. The CDP provides details of the required knowledge,

skills and experience in the form of a knowledge and skills specification, a work performance specification, and mapping of the performance criteria, critical aspects of evidence and assessment details, including Tables of Specification. The CDP has been developed to support a blended learning approach to delivery and assessment by RTOs.

The assessment details and table of specifications are used to ensure consistency of assessment.

2. Learning and Assessment Plans (LAPs)

The LAP can be used as a training guide by teachers/ trainers. The content clearly identifies knowledge and skills required to be covered.

3. Learners Competency Task Book

The Task Book is a resource that details a wide range of resources based on a blended learning approach. The resource concentrates on educationally strong practical activities, theory delivered with the support of commercially available texts and contains links to web sites and other student support information available on the web.

EE-Oz Training Standards is currently involved in the development of CDPs, LAPs and Task Books for the Electrician, Air Conditioning/Refrigeration and Lineworker trade qualifications. Upon the completion of these resources, development will commence on similar suites for the remaining qualifications in the UEE07 and UET06 Training Packages.

DEVELOPMENT OF GAS SUPPORT MATERIALS

EE-Oz constantly receives requests from industry and RTOs who wish to commence delivery of Gas Training Package qualifications. At present, however, there is little material available to support training delivery and assessment for the industry

Preliminary desktop research has been undertaken into the existing resources identified that there are very few resources available which directly support the UEG06 Training Package and none that support the higher level Diploma and Advanced Diploma qualifications. Industry intelligence has also confirmed that there are very few Gas training resources available in general, and of those that do exist none are current.

Consequently, early in 2008, EE-Oz Training Standards identified a defined and immediate need for nationally

consistent Gas delivery and assessment resources to be developed.

In response, the Australian Government, through DEEWR, under the Skills for the Future – Higher Technical Skills Program, engaged EE-Oz Training Standards to develop training package support materials for the *UEG50106 Diploma of Gas Industry Operations* and the *UEG60106 Advanced Diploma of Gas Industry Operations*.

Through the project, discussions have been held with relevant industry and training stakeholders to identify the type and content of the resources to meet the requirements of the qualifications.

During these discussions stakeholders have indicated support for development of the resources in accordance with the EE-Oz Training Standards delivery and assessment CDP, LAP and Task Book resource templates utilised for the Electrotechnology and ESI-Transmission, Distribution and Rail Training Package qualifications. This support is welcomed by EE-Oz as it will lead to a consistent 'look and feel' for all support materials across the suite of EE-Oz Training Standards Training Packages.

BLENDED LEARNING SOLUTIONS

As detailed in Section 1, through a series of forums held in the last quarter of 2008, industry and its training partners forwarded a key request of EE-Oz, namely:

- EE-Oz Training Standards take a leading role in coordinating a national industry strategy for the development and implementation of 'blended learning' approaches to training delivery and assessment.

Consequently, in its November 2008 meeting, the EE-Oz Board endorsed the establishment of a new Blended Learning Standing Committee.

The Committee is comprised of members from all sectors under the ISC's coverage and aims to develop and implement strategies that will guide industry towards greater collaboration in blended learning arrangements, thereby increasing the quality, effectiveness and value that these initiatives deliver to all industry participants.

The committee's current body of work is described in the following objectives:

- The committee will develop a set of principles for the selection of tools, technologies and approaches for the use of blended learning.

• The committee will consider a range of technologies, approaches and tools and develop guidelines on the preferred tools for use by the industry.

• The committee will develop a model for industry collaboration. Furthermore, the committee will identify several key priority areas for collaboration across the sectors and develop and implement blended learning solutions to demonstrate the industry collaboration model.

• The committee will co-ordinate bids for funding that will encourage and facilitate broader industry uptake of blended learning.

• The committee will investigate the benefits of, and process for, becoming part of the Learning Object Repository (LORN).

The Blended Learning Standing Committee is supported by the ESI-Transmission and Distribution Blended Learning consultative committee. The ESI industry is perhaps the most pro-active of the industries covered by the ISC in the blended learning space. The Committee is comprised of industry members directly involved in the implementation of blended learning solutions across their respective organisations. Hence, this committee provides valuable insight and 'grass-roots' advice to the Blended Learning Standing Committee.

RECOGNITION OF PRIOR LEARNING

As detailed in Section 1, under the Australian Government's 'Skilled Migration' and 'Skilling Australia for the Future' policies, it will be 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, EE-Oz Training Standards requires the confidence that it has done all it can to ensure the RTOs servicing its industries:

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, EE-Oz with the support of DEEWR, through the Strategic Intervention Programme (SIP) of the National Skills Shortages Strategy (NSSS) has sought to increase the use of industry specific best practice RPL/RCC procedures, gap training and change management models amongst RTOs servicing the ElectroComms and EnergyUtilities Industries.

The project, completed in late 2008, has provided industry's RTOs with a range of exemplar models, support materials and avenues for assistance. A key outcome of the project will be 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.

It is also worthy of note that EE-Oz Training Standards Chair and Executive Officer are members of the Steering Committee for the COAG funded, NSW DET administered and TAFE NSW managed 'Skills Express' project on RPL/RCC for existing workers.

Image provided courtesy of Intergral Energy

RECOGNITION OF PRIOR LEARNING FOR NEW ENTRANTS TO AUSTRALIA

It is widely acknowledged that overseas skilled workers deemed technically equivalent by the VETASSESS Consortium 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)

With focus on the following Electrotechnical trade occupations:

- Electrician
- Electrical Fitter
- Refrigeration and air conditioning tradesperson
- Electrical lineworker
- Electrical cable jointer

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

Consequently, EE-Oz Training Standards is currently involved in the development of:

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 being based on the information contained in the April 2007 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 is being developed for each of the five occupations.**

The Manuals are also based on the information contained in the April 2007 Final Report and provide RTOs with all necessary information regarding:

a. **Establishment of the Training Plan, outlining:**
- what learning is to be undertaken
- what work experiences/practices are to be undertaken
- when it is to be undertaken

- how it is to be undertaken
- the duration of the program, and
- the expectations of the learner in the program
- what contract of training will apply

b. Confirmation of the MACG Training Program with the learner

c. Confirmation of access to the learner's workplace

d. Confirmation of the learner's supervision requirements

e. Conduct of the training and assessment, including;

- Essential Knowledge
- Work experience/performance – To be undertaken in the workplace/s over no less than a 12 month period, under the relevant provisional license noted on the VETASSESS website, issued by the relevant regulatory authority and practiced under appropriate supervision that is in accordance with the requisite regulatory/industry policy and recorded in an approved workplace recording system (eg; profiling)

f. Verification

Completion of a compliance assessment that is in accordance with the relevant regulatory and industry policies and verifies the safety and compliance of work performed autonomously and to the appropriate standards and in the Australian context.

g. Confirmation of completion of training and assessment & Issuance of Certification

Confirmation of completion of training and assessment from evidence confirming competence and issuance of a Statement(s) of Attainment and/or Qualification.

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 are being 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 is being developed for each of the occupations.

The manuals will provide MACG learners with all necessary information regarding what they should expect, what they need to do and who they need to contact upon their arrival in Australia. To further assist the MACG learners, full contact details of all key stakeholders in the 'post-arrival' process are being incorporated in the Manual, including, but not restricted to; VETASSESS, EE-Oz Training Standards, E-Profiling, Industry Regulatory Authorities and Registered Training Organisations servicing the ElectroComms and EnergyUtilities Industries in each State and Territory. Other agency details are also being included in accordance with State and Territory arrangements.

EE-Oz Training Standards enjoys a strong working relationship with VETASSESS and will seek VETASSESS's assistance to provide the correct Manual to individuals upon successful completion of their overseas assessment.

APPENDICES

APPENDIX A: BIBLIOGRAPHY

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ADDITIONAL SOURCES OF INFORMATION:

1. Reports to inform the 2009 EE-Oz Training Standards Environmental Scan from:

- NSW Utilities and Electrotechnology Industry Training Advisory Body
- SA Electrotechnology, Energy and Water Skills Board
- EnergySkills Queensland
- EPIC Industry Training Board, Victoria
- NT Major Industries Training Advisory Council
- WA Information, Electrotechnology and Utilities Industry Training Council
- ACT Utilities & Light Manufacturing Industry Training Board.

2. The Australian Financial Review, Thursday 22 January, 2009

3. Website of the Prime Minister – www.pm.gov.au

4. Industry Skills Councils – Response to the Training Options Paper, Version 1.0.

5. 370 degrees Group Ltd & RMIT University – Projects Group, 2008 Skills Enhancement Pilot, Apprentice 'on-the-job' training whilst on Downtime, suspension and/or cancellation of Training Contract due to economic downturn in the Building & Construction sector, Melbourne.

APPENDIX B: 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.

ACSO CODE & OCCUPATION TITLE	QUAL CODE	QUALIFICATION TITLE	TRAINING PACKAGE	JUSTIFICATION – SPECIFIC OCCUPATION(S) EXPERIENCING SKILLS SHORTAGES
ASCO=2222-11 Sales Representative (Industrial Products)	UEE20607	Certificate II Wholesaling (to be developed)	Electrotechnology	Electrical/Electronic equipment specialist sales
ASCO=2422-11 Vocational Education Teacher	UEE51007	Diploma of Electrotechnology – Technical Teaching (to be developed)	Electrotechnology	Technical Teachers (all sectors)
ASCO=3294-11 Computing Support Technician	UEE30207	Certificate III in Computer Systems Equipment	Electrotechnology	Computer Hardware Installers
ASCO=3122-11 Civil Engineering Associates	UEG50106 UEG60106	Diploma of Gas Industry Operations Advanced Diploma of Gas Industry Operations	Gas Gas	Gas Industry Operations
ASCO=3123-11 Electrical Engineering Associates	TBA	Qualifications in Energy Efficiency Auditing and/or Energy Efficiency Management	TBA	Energy Efficiency Auditors and/ 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 Electrical Engineering Associates	UET50106	Diploma of ESI-Power Systems	ESI-TD&R	Engineering Technicians, Distribution Designers, Meter Technicians, Protection & Control Technicians, Project Managers, System Operators, Compliance Officers, Renewable Energy system technicians
	UET60106	Advanced Diploma of ESI-Power Systems	ESI-TD&R	
	UEP50106	Diploma of ESI Generation (Systems Operations)	ESI-Generation	
	UEP50406	Diploma of ESI Generation (Electrical/Electronic)	ESI-Generation	
	UEE50207	Diploma of Electrical and Instrumentation	Electrotechnology	
	UEE50307	Diploma of Electrical and Refrigeration & Air Conditioning	Electrotechnology	
	UEE50407	Diploma of Electrical Engineering	Electrotechnology	
	UEE50607	Diploma of Refrigeration and Air Conditioning	Electrotechnology	
	UEE50707	Diploma of Renewable Energy Engineering	Electrotechnology	

ACSO CODE & OCCUPATION TITLE	QUAL CODE	QUALIFICATION TITLE	TRAINING PACKAGE	JUSTIFICATION – SPECIFIC OCCUPATION(S) EXPERIENCING SKILLS SHORTAGES
	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 Electrical Engineering Technicians	UEE40307	Certificate IV in Electrical Installation Inspection and Audits	Electrotechnology	Electrical/Safety Inspectors
	UEP40506	Certificate IV in ESI Generation (Electrical/Electronic)	ESI-Generation	Electrical Technicians
ASCO=3124-11 Electronic Engineering Associates	UEE50107	Diploma of Computer Systems Engineering	Electrotechnology	Computer, Electronic, Electrical, Industrial Electronics, Communications and Control technicians
	UEE50507	Diploma of Electronics and Communications Engineering	Electrotechnology	
	UEE50907	Diploma of Industrial Electronics and Control Engineering	Electrotechnology	
	UEE60207	Adv. Dip. of Electronics and Communications Engineering	Electrotechnology	
	UEE60407	Adv. Dip. of Computer Systems Engineering	Electrotechnology	
	UEE60607	Adv. Dip. of Industrial Electronics and Control Engineering	Electrotechnology	
ASCO=3125-11 Mechanical Engineering Associates	UEP50206	Diploma of ESI Generation (Operations)	ESI-Generation	Commissioning & Protection Technicians
	UEP50306	Diploma of ESI Generation (Maintenance)	ESI-Generation	Commissioning & Protection Technicians
	UEG60106	Advanced Diploma of Gas Industry Operations	Gas	System Ops, Leakage survey, network control
ASCO=3125-13 Mechanical Engineering Technician	UEP40206	Certificate IV in ESI Generation (Operations)	ESI-Generation	Operations Technicians
ASCO=4111-11 General Mechanical Engineering Trades	UEG20106	Certificate II in Utilities Industry Operations	Gas	Gas Transmission/Distribution network maintenance operatives (including corrosion mitigation)
	UEG30106	Certificate III in Gas Industry Operations	Gas	

ACSO CODE & OCCUPATION TITLE	QUAL CODE	QUALIFICATION TITLE	TRAINING PACKAGE	JUSTIFICATION – SPECIFIC OCCUPATION(S) EXPERIENCING SKILLS SHORTAGES
ASCO=4111-01 Supervisor, General Mechanical Engineering Tradespersons	UEG40106	Certificate IV in Gas Industry Transmission Pipeline	Gas	Transmission Pipeline Operatives/ Supervisors
	UEG40206	Certificate IV in Gas Industry Operations		
ASCO=4311-11 General Electrician	UEE30807	Certificate III in Electrotechnology Electrician	Electrotechnology	Electrician (all sectors)
ASCO=4311-13 Electrician (Special Class)	UEE40207	Certificate IV in Electrical - Data and Voice ComMs	Electrotechnology	Electricians with specialist/ advanced skills and knowledge (all sectors)
	UEE40407	Certificate IV in Electrical – Instrumentation	Electrotechnology	
	UEE40507	Certificate IV in Electrical – Air-conditioning Systems	Electrotechnology	
	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	
	UEE41107	Certificate IV in Electrical – Lift Mechanic	Electrotechnology	
	UET40206	Certificate IV in ESI-Substations	ESI-TD&R	
ASCO = 4311-15 Lift Mechanic	UEE30807	Certificate III in Electrotechnology Electrician	Electrotechnology	Lift Mechanics
ASCO=4312-11 Refrigeration & Air conditioning Mechanic	UEE31307	Certificate III in Refrigeration & Airconditioning	Electrotechnology	Air conditioning Mechanics
ASCO=4313-01 Supervisor, Electrical Distribution Tradesperson	UET40106	Certificate IV in ESI-Power Systems	ESI-TD&R	Electrical powerline trades supervisors, specialist live line workers, specialist cable-jointers, specialist rail traction technicians, network operators
	UET40306	Certificate IV in ESI-Network Infrastructure		
ASCO=4313-11 Electrical Powerline Tradesperson	UET30106	Certificate III in ESI-Transmission	ESI-TD&R	Electrical powerline tradespeople (transmission, distribution & rail), meter installers
	UET30206	Certificate III in ESI-Distribution		
	UET30306	Certificate III in ESI-Rail Traction		

ACSO CODE & OCCUPATION TITLE	QUAL CODE	QUALIFICATION TITLE	TRAINING PACKAGE	JUSTIFICATION – SPECIFIC OCCUPATION(S) EXPERIENCING SKILLS SHORTAGES
ASCO=4313-13 Cable Jointer	UET30406	Certificate III in ESI-Cable Jointing	ESI-TD&R	Cable-jointers
ASCO=4314-11 General Electronic Instrument Tradesperson	UEE31207	Certificate III in Instrumentation & Control		Instrumentation & control technicians (all sectors)
ASCO=4314-13 Electronic Instrument Tradesperson (Special class)	UEE40407 UEE41007	Certificate IV in Electrical- Instrumentation Certificate IV in Energy Management & Control	Electrotechnology	Instrumentation & Control with and without an electrical license
ASCO=4315-11 Electronic Equipment tradesperson	UEE31407 UEE31007 UEE30507 UEE30907	Certificate III in Security Equipment Certificate III in Fire Protection Control Certificate III in Appliance Servicing Certificate III in Electronics & Communications	Electrotechnology Electrotechnology	Security & Fire Protection system technicians, Appliance servicing technicians (requiring a restricted gas license), general electronics tradespeople
ASCO=4316-13 Communications Linesperson	UEE30407	Certificate III in Data and Voice Communications	Electrotechnology	Data Communications Technicians, Broad-band, Pay TV and Data Installers
ASCO=4316-11 General Communications Tradesperson	UEE31607	Certificate III in Wireless Communications -to be developed	Electrotechnology	Telecommunications Technicians (incl. wireless technologies and fibre optics)
ASCO=4988-11 Power Generation Plan Operator	UEP30106	Certificate III in ESI Generation (Operations)	ESI - Generation	Power Plant Operators
ASCO=4988-01 Supervisor, Power Generation Plant Operator	UEP50106	Diploma of ESI Generation (Operations)	ESI – Generation	Senior Power Plant Operators

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