ENERGY SKILLS

AUSTRALIA

Response to Department of Industry

Issues Paper to inform the preparation of a

Energy White Paper

February 2014

Background

E-Oz Energy Skills Australia (E-Oz) is the Industry Skills Council (ISC) for ElectroComms and Energy Utilities industries. In consultation with Industry employer and employee associations, industry regulators, VET regulators and registered training organisations(RTOs) and Commonwealth, State and Territory government agencies, E-Oz develops and maintains a suite of four nationally endorsed Training Packages which cover the Electrotechnology, Electricity Supply (Transmission, Distribution and Rail), Electricity Generation and Gas Transmission and Distribution sectors.

The Vocational Education and Training (VET) sector covers qualifications under the Australian Qualification Framework (AQF) from levels 1 to 7 (AQF 1 – AQF 7).

These qualifications cover job roles at entry level/trades assistant, licenced trades, post-trade technician officer and senior technical officer/engineering associate and post graduate certificate/diploma levels.

Training and a trained workforce underpins the Australia's capability to build and maintain energy network infrastructure, service consumer demand, disseminate new technology into the community and respond to emergencies to protect our communities and secure energy supply and service.

In response to the issues paper to inform the Department of Industry's *Energy White Paper*, E-Oz tenders the following advice on relevant to the issues paper, particularly in relation to the following aspects which may impact on training standards and training provision and/or are impacted or supported by the development and delivery training to nationally endorsed standards, including:

- Regulatory reform and the role of government
- Workforce productivity
- Driving energy productivity
- Alternative and emerging energy sources and technology

These factors intersect around the main role of the Industry Skills Council which is to maintain, develop and disseminate industry training standards via endorsed national Training Packages. In doing so, the ISC identifies its major drivers as:

- Changes in technology
- Changes in industry regulation
- Changes in industry work practices

Additionally, E-Oz is required to respond to VET policy directions.

For training to support and facilitate changes of the nature outlined above it must take account of the time lags inherent in:

- the training system
- the adoption of new technology
- the introduction of regulatory or legislative changes
- changes in policy direction at national or jurisdictional levels
- the acceptance of changed work practices

In addition to this role in maintaining existing industry training standards, these factors mean the ISC must be highly responsive and prepared to invest effort in meeting predicted change which may be overtaken by further change (e.g. when an emerging technology is replaced by a newer system before it matures) or not implemented at all (e.g. due to a changed policy or regulatory regime).

Accordingly, E-Oz's accepts that some of its activities may not achieve implementable outcomes. However, its brief is to research options and "be ahead of the game".

The combined tasks of maintaining standards and responding to these factors, means that the ISC's work also contributes to the larger scale issues of Energy Security, Growth, Investment, Trade and International Relations.

E-Oz's response is strongly focussed on the role of skills and skills formation as a vital part of economic development and the technical innovation which enhances productivity and outcomes for the community.

The range of activities related to industry innovation or technological change reported below do not represent "picking of winners". The ISC attempts to examine and, where requested/approved by industry, develop appropriate training standards for all technologies/systems which may be regarded as worthy of research and development.

Driving Energy Productivity

- **Supporting energy productivity**
- **Maximising social and economic benefits**
- **Encouraging demand-side participation and energy efficiency to reduce peak energy use**
- **Increase energy efficiency within the transport sector**

The productivity of energy has been at the centre of the energy industry's and therefore E-Oz Energy Skills Australia agenda for industry Training Standards for some time, with a particular focus on energy efficiency and peak energy use (demand).

Energy productivity includes both value added by the consumption of energy and in today's world where waste energy recovery, co-generation and tri-generation systems can be deployed, the value added by reducing or transforming waste energy.

The value of carbon emissions "not produced" or offset by low emission technologies is another measure of productivity which has been broadly accepted by the community.

The level of load placed on an entire network and its capacity to perform under heavy load is another indicator of efficiency. If peak energy use is very high network infrastructure may become overloaded and operate inefficiently to the point of (in some cases) undesirable and catastrophic equipment and network failure. Risk and consequences are high as is community expectation of reliable supply.

These vectors are determinants of productivity and the capability of energy systems and networks, from the simplest appliance to the most complex, to be both effective and efficient. Therefore, competency based training standards and training solutions to address these are being embedded in almost every facet of energy sector training.

Overarching principles of energy efficiency and sustainability are embedded in each unit of competency. Training requirements including both the theory and practise included in endorsed Training Package units also specify relevant technical aspects of energy efficiency. These aspects apply to all energy sectors including Electrotechnology, Electricity Supply (Transmission, Distribution and Rail), Electricity Generation and Gas Transmission and Distribution sectors. The requirements are under regular review and new requirements related to technological innovation are incorporated in new or amended components.

Within the energy sector these are codified for systems operators and systems maintainers, building managers, installers and maintenance staff, system designers and specificers.

New smart systems are empowering energy consumers in both commercial/industrial and residential setting to manage their energy use. Deployment of these technologies is increasing where cost benefits are apparent or they are mandated in new construction or rebuild/refits. This is increasing demand for new skills and services including energy assessment and advisory services.

The training implications of peak demand management systems are another area of ongoing development and specific examples of research appear below. (See: Alternative and Emerging Energy Sources and Technology).

The industry is responding to the need for greater consumer/demand side engagement and is working with industry to develop and maintain nationally endorsed Training Standards for energy sector retail operatives so that they may better promote the social and economic benefits of energy efficiency.

Similarly the industry has identified and maintains a suite of technical energy assessment competencies and related qualifications to ensure that industrial, commercial and residential consumers are provided with appropriate technical advice to enable them to maximise energy efficiency.

Recommendations

That to maximise energy efficiency and productivity the energy sector through its Industry Skills Council:

- Continue to embed energy efficiency and sustainability principles and strategies into units of competency it develops and maintains
- Conduct ongoing research on technical aspects of energy efficiency and incorporate related knowledge, skills and work performance capabilities into nationally endorsed units of competency, including those for:
    - systems operators
    - systems integrators
    - facility/building managers
    - installers and maintenance staff,
    - system designers
- Engage with systems and equipment manufacturers to ensure that via appropriate nationally endorsed Training Package standards, skills for the installation, maintenance and integration of new technologies associated with smart systems are available to industry, in a timely fashion.
- Industry continue to maintain and develop appropriate technical and advisory training standards to ensure that the industry has the skills to engage with consumers on energy efficiency and promote the economic and social value of efficient energy use.

Regulatory Reform and Role of Government

- **Reducing unnecessary regulatory burden on business**
- **Streamline project approvals while maintaining environmental safeguards**
- **Greater price transparency**
- **Improving market competition**

The interactions the ISC has with regulatory regimes highlight the role that Australian governments play in the energy sector and the need for ongoing reform.

As the national training standards body E-Oz is required to take into account national and jurisdictional, legislation, regulation and codes of practice and their application in industry, including, but not limited to:

- Workplace Health and Safety acts and regulations
- Electricity and Electrical Safety acts and regulations
- Renewable Energy (Electricity) act and regulations
- Environment and environmental protection acts and regulation
- Heritage and Aboriginal Lands acts and regulations
- Immigration legislation and regulations
- Mutual Recognition Act
- Trans-Tasman Mutual Recognition Agreement

As with many Australian industry sectors, the associated regulations/legislation currently used as the industry regulatory frameworks were established as enterprise, local government or jurisdictional requirements and remain principally managed at the jurisdictional level. This has been very evident in the energy (electricity and gas) supply sectors.

Various bodies have been established to work towards improved coordination or harmonisation of legislative and regulatory frameworks to assist industry to operate more efficiently and provide services to our economy at lower cost through reduced regulatory burden. These include:

- Electrical Regulatory Authorities Council (ERAC)
- Energy Supply Industry Safety Committee (ESISC) (a committee of the Ministerial Council on Energy)
- Gas Technical Regulators Committee (GTRC)
- SafeWork Australia
- National Occupational Licencing Authority (NOLA)
- The Clean Energy Regulator
- Trades Recognition Australia (TRA)

Whilst there have been variously successful attempts at harmonisation, referral of powers or amalgamation, these remain challenging factors when seeking to address training standards and training delivery requirements which, whilst there is variation in legislation/regulation, must be able to be contextualised or adapted to accommodate such variations.

The energy sector may currently be characterised by:

- National markets operations
- A shift from local or jurisdictional operations to multi-jurisdictional operation
- Changing ownership of energy infrastructure, which has traditionally been vested in state and territory authorities, is increasingly corporatised or privatised
- Increased accountability for costs related to infrastructure investments
- Becoming reliant on an increasingly mobile and flexible workforce including skilled migration

As these characteristics become increasingly evident the need for less variability in legislative requirements to enable greater efficiency is very clear.

To further the industry's desire for harmonised legislation and regulation, E-Oz has worked with the principal bodies listed above and peak employer associations including

- Energy Networks Australia
- Australian Pipeline Industry Association
- Gas Energy Australia (formerly ALPGA)
- The National Electrical and Communications Association
- Master Electricians Australia
- The Clean Energy Council

E-Oz has representatives on relevant consultative and advisory committees and has supported improvements to regulatory functions via the development and endorsement of appropriate training standards.

- Energy Supply Industry Safety Committee - a committee of the Ministerial Council on Energy covering Gas, Electricity Generation, Electricity Transmission and Distribution)
- Electricity Supply Industry (ESI) Skills Passport Committee
- Occupational Licencing Advisory Committees
- E-Oz national Training Package Technical Advisory Committees and Training Advisory Groups

The development of training standards and training based responses using nationally endorsed Training Package units of competence and/or qualifications are an appropriate means of disseminating and facilitating regulatory change and/or industry wide approaches where harmonisation is not achievable. There is still additional effort required to take account of jurisdictional variations and achieving acceptance of applicable training standards. Downstream a burden remains on enterprises operating across network and/or jurisdictional boundaries which must accommodate locally contextualised training regimes and/or operating environments as required, to meet regulatory requirements. Where they operate in or provide services to, both the gas and electricity markets, industry enterprises have noted additional complexity

There have been notable successes particularly the work of the Energy Supply Industry Safety Committee on safety case frameworks as a means of harmonisation of operational safety for energy supply enterprises.

The ongoing work of the ESI Skills Passport Committee in developing a national refresher training regime, based on endorsed training standards, to improve the mobility of skills, particularly for

mutual aid in times of emergency. The benefit of this work is accepted by network operators and they have contributed, along with employee representatives and E-Oz to an effective system for the recording and communication the training status of industry operatives against identified “refresher competencies”.

The ESI Passport Committee is seeking to expand this system to introduce new areas of “cross-over” where common approaches to regulatory requirements will support greater mobility and improved productivity. The focus of the Passport Committee is currently on:

Commonality of:

- Formats and use Access Permits
- High Voltage (HV) switching permits
- Authorised recipient
- Guidelines for mutual aid applicable to the use of common permits

Industry through its Skills Council has been seeking additional resources to conduct national research into the relevant requirements and establish a basis for developing acceptable formats and bringing these into effect on a national basis.

The electricity generation and gas transmission and distribution sectors view the work by the Electricity Supply (Transmission, Distribution and Rail) Sector on the passport positively and have requested that such a system be considered for these industry sectors.

The demise of the National Occupational Licencing Authority and the associated agenda for licencing harmonisation was disappointing to the training sector, which had put in a considerable effort through the occupational advisory committees and other consultations conducted under the auspices of the ISC.

Work had progressed on amendments to the various qualifications which lead to licenced outcomes to accommodate the proposed national licence categories. Whilst this work will have some value going forward its full implementation would have been much more effective.

The harmonisation of Workplace Health and Safety (WHS) regulations is also of benefit to industry. With specific implications for electrical work and generalised requirements for other activities e.g. confined spaces, this initiative is currently being analysed and incorporated into national Training Package Standards.

Whilst introduced in 2011-12, lags in amendments to relevant electrical and energy safety legislation and regulations have impacted on the flow of these important changes into national Training Package standards managed by the energy sector industries.

E-Oz notes that six states and territories have adopted legislation, regulation and code of practice based on the harmonised models. Industry encourages every effort to ensure that all states and territory adopts the harmonised model.

In the longer term contribution of improved harmonisation of industry regulations to productivity, flexibility and mobility will provide benefits for the national energy sector, which cannot be discounted.

Recommendations

- That, industry through its Industry Skills Council, E-Oz Energy Skills Australia, continue to develop and maintain endorsed industry training standards which take into account the requirements of applicable legislation and regulations including those which provide environmental safeguards
- That training strategies based on endorsed industry training standards be regarded as essential to risk management whilst facilitating the reduction of regulatory burdens on Australian energy sector enterprises
- That E-Oz continues to work with stakeholders on training related identifying opportunities for harmonising legislation/regulation to reduce costs and improve workforce flexibility
- That resources be made available to enable E-Oz to lead industry stakeholders in continuing work associated with improving workforce mobility by enhancing the National ESI industry Skills Passport and associated units of competency to address :
    - Formats and use Access Permits
    - High Voltage (HV) switching permits
    - Authorised recipient
    - Guidelines for mutual aid applicable to the use of common permits
- That industry considers how it may extend the industry skills passport concept to the electricity generation and gas transmission and distribution sectors.
- That work on harmonisation of WHS regulations is continued and that E-Oz incorporates appropriate training responses in nationally endorsed Training Package standards.

Trade and International Relations

- **Growing export markets including value-added products and services**
- **Attracting foreign investment**
- **Encouraging open and transparent international energy markets**
- **Enhancing energy supply security**

The availability of a skilled workforce is a key factor in attracting international investment. Australia's VET system is, because of its national consistency, highly flexible, responsive and extremely well regarded internationally as producing a highly capable, skilled and safe workforce. This represents a comparative advantage for Australia in regard to the systems of training and skills accreditation used by other countries.

The energy sector through its Industry Skills Council, E-Oz, maintains contact with the VET sectors of a range of developed and developing countries to enable the ISC to be aware of trends in energy industry training internationally and benchmark the performance of the Australian system. These include relationships with the VET sectors and energy sector industry stakeholders in the UK, Ireland, the United States, Canada, India, Korea, New Zealand and EU States including Germany, Finland and Belgium.

A particular focus of international exchange recently has been Australia's ongoing success in deploying both large and small renewable energy systems and supporting these by developing an appropriate skills base.

The strength of training through Australia's VET system and the advantages of cultural acceptance of trade and technician level occupations were highlighted in a recent exchange with a Korean delegation. Korean officials acknowledged that a cultural bias toward young people taking degree level engineering qualifications means the Korean economy is reliant on imported skills to carry-out hands-on building and maintenance of energy systems and infrastructure, which, whilst it offers some short term benefits, may not be beneficial in the longer term in regard to energy security and other economic pressures as the developing Asian economies, from which it now draws these skills, drive prices up.

The energy sector like many other sectors is facing the challenges of an aging workforce. This combined with the impact of new technologies in the energy sector means that ongoing co-investment by both industry and government in the maintenance of an energy sector workforce with current skills is vital in our changing economy, operating in highly competitive global market.

A number of programs based on co-investment models, including the National Workforce Development Fund, have produced successful energy sector training programs, especially targeting demand driven, post-trade training. Based on co-investment by the Australian Government and industry, including small to medium enterprises, training in technical areas such as renewable energy, electrical instrumentation and also for hazardous areas electricians to support the expansion of our gas processing capability has been facilitated. The programs have also supported essential business skills such as project management.

Employers who have participated have invested in these programs with a commitment of both time and money, contributing up to 66% of the training cost and ensuring that their employees undertake the requisite on and off the job training to complete the required program.

The continuation of such programs is essential to allow Australia to maintain the advantages it has in its skilled energy workforce supported by its VET system which contributes strongly to the building and maintenance of energy infrastructure and the provision of energy services.

The availability of a skilled workforce is also an important factor in energy security as has been demonstrated in times of natural disaster e.g. recent bushfires, floods and cyclones. These have had serious economic consequences for segments of the Australian economy. Without the ability to rapidly respond afforded by a skilled workforce, delays in restoring energy networks would certainly increase the economic impact. As noted elsewhere, E-Oz, in conjunction with industry has worked to establish the national ESI Skills Passport underpinned by nation Training Package competencies, which supports skills mobility, mutual aid and emergency response contributing to the security of energy networks.

The other important international aspect in addressing Australia's skills needs has been the development of systems to facilitate the meeting of short term peaks in skills demand via skilled migration.

The rapid expansion of the economy over the past decade especially in the resources sector has highlighted the patchwork of systems which have supported skilled migration under various schemes. This has been particular evident in the area of traditional trades which includes the electrical trades covered by E-Oz. Competition for skills has meant that skilled energy sector workers have been in demand and these shifts in demand needed to be met.

Industry through the ISC has sought develop a unified system which adheres to endorsed industry Training Package standards as the basis for the recognition of existing skills held by migrant workers qualified in their country. This has been supported by the development of appropriate "gap training" to cover the unique skills, knowledge and work performance requirements, particular to Australian industry contexts.

With the cooperation of industry peak bodies, the Australian Department of Immigration and Department of Industry, along with relevant State and Territory regulatory authorities, E-Oz Energy Skills Australia has facilitated the design and development of the Offshore Technical Skills Record (OTSR) and accompanying assessment processes for electrical trades. This has been combined with the endorsement by industry of accredited training programs to cover the unique skills, knowledge and work performance requirements, particular to Australian industry contexts.

This program has been successfully trialled and rolled-out across a number of international locations particularly for those seeking to migrate under Class 457 visas. The current emphasis is on harmonising these processes with those which are applied for Australian citizens, permanent residents and those on other classes of entry visa who are seeking skills recognition and access to licenced work in Australia.

Rigorous processes have been put in place so that the system will support all comers and E-Oz continues to cooperate with and provide advice employers, individuals, industry bodies and government on the implementation and use of these.

Industry's patient effort and cooperation with government to achieve a consistent standard for the assessment of skilled migration applicants, through the application of VET standards, will serve the community well, ensuring that employers can access skills from both locally trained and internationally qualified sources with equal confidence in the skills of worker and their ability undertake safe and reliable electrical work practices to applicable Australian standards.

Further development and the ongoing support of this work will place Australia in strong position to flexibly respond to peaks in skills demand whilst maintaining its investment in a local energy workforce.

Recommendations

- That, industry through its Industry Skills Council, E-Oz Energy Skills Australia, continues to engage with international energy sector an VET sector stakeholders enabling industry to be informed of trends these sectors, especially with regard to emerging technologies
- That industry and government continue to co-invest in demand driven training programs which enhance the Australian energy sectors ability to be internationally competitive and provide essential skills which underpin energy security
- That collaboration been E-Oz, industry regulators, Trades Recognition Australia and the Department of Immigration be continued to ensure nationally consistent standards based of endorsed national Training Package requirements for the recognition of the skills of skilled migrants seeking to work in Australia's energy sector
- The energy sector industries through their ISC, E-Oz Energy Skills Australia continue to work on enhancing skills mobility and emergency response to underpin energy security

Alternative and Emerging Energy Sources and Technology

- **Encouraging competitive renewable, low-emission technologies and alternative energy sources**
- **Supporting research and development for emerging technologies**
- **Encouraging use of competitive alternative transport fuels and electric and biofuel vehicles**

Research conducted for OECD Directorate for Science, Technology and Industry see: *Workforce Skills And Innovation: An Overview Of Major Themes In The Literature* (Toner 2011)and the National Centre for Vocational Education Research (NCVER) see; *VET and the diffusion and implementation of innovation in the mining, solar energy and computer games sectors*, (Toner, Dalitz and Turpin, 2011) emphasises the role of the VET system in developing in a workforce the skills to diffuse and implement technology into the community.

This is recognised through the impact of training in the small scale photovoltaic (PV) generation roll-out across Australia. Driven by consumer demand and associated government incentives, the installation of PV systems has risen steeply from 2009 to now be over 1 million installations nationally.

Industry had identified and codified in the nationally endorsed Electrotechnology Training Package the competencies required for the design, installation and maintenance of these systems, as early as 2004. This enabled industry to respond to the demand, when it came, without having to wait for appropriate training standards to be agreed and endorsed.

Technical skills based on nationally endorsed standards are key elements in the successful deployment of a new, innovative, technology once it is mature. It may be argued that the availability of these technical skills is a precursor to acceptance of a new technology in the market, as investors seek assurance that their capital is protected by adequate support services.

Encouraging competitive renewable, low-emission technologies and alternative energy sources and supporting research and development for emerging technologies is dependent on investors and industry research and development teams communicating the skills needs associated with innovation to industry. Support for the development of any new or amended training standards to ensure the safe and efficient deployment of these systems and technologies, is also required.

Thus, as stated above, a key element of the energy sector ISC's, brief is engaging early with technologies to determine any training needs which may be required to implement the technology at the appropriate scale.

Currently industry through its ISC, E-Oz, is working across a range of technologies and systems in renewables, low emission and alternative energy sources, as well as, smart, energy efficient technologies which impact energy use and related emissions.

These include ongoing work in the areas of:

- Energy efficiency in electricity network design and operations

- The up-skilling and cross skilling of electrical workers to install, operate and maintain off-grid ESI systems in the resources sector including HV and LV Switching.
- Incorporation of energy efficiency advisory skills into competencies for energy retail representatives
- Amendment and further development of skills in electrical, transmission and distribution, gas and air-conditioning disciplines associated to co-generation or tri-generation technologies (combined heat and power).
- Further review and development of existing competencies in control, instrumentation and communications technologies which are being integrated into smart systems for energy management and efficiency, operating via common backbones provided by NBN high speed communications technologies.
- Further development and review of existing renewable competencies especially where these are, as technologies are disseminated, moving from specialist to generalist skills.
- Engagement of stakeholders investing in Biomass based renewables to determine the extent of specific skills needs related to installation, operation, compliance and maintenance.

Research and development activities associated with peak demand management or abatement technologies will be undertaken including competencies in relation to:

- The development, installation, integration and management of smart appliances
- On-gird and off-grid battery technologies
- Combined battery and solar PV

Whilst industry is aware of pilot programs, generation sector stakeholders have not yet placed wave and tidal generation systems on the training agenda beyond research and monitoring of technology development.

Natural gas fuel cell technology has been investigated and preliminary engagement with OEMs and analysis of technical training requirements undertaken. Further work on this will be considered

Other research will investigate skills the needs for engineering staff in the gas and electricity transmission and distribution sectors. The focus will be on VET graduate certificates and graduate diplomas to enable graduate engineers to efficiently adapt more readily to field work in the gas and electricity sectors where they may be undertaking supervisory roles.

As referred to above, (see Regulatory Reform) industry will continue to develop and enhance its preferred training regimes to underpin both skills mobility and mutual aid for emergency response objectives. This will include further work in electricity transmission and distribution and research to support proposed extensions of these objectives into the gas and electricity generation sectors.

This research underscores the role of VET and also highlights the need for ongoing training and skills formation to maintain the capacity to promote innovation in technologies and work practices to achieve national goals in emission reductions, renewable energy capacity and energy efficiency.

Recommendations

- That the ISC's role in research on new energy sector technologies and work practices which enables it to identify an communicate the need for new or amended training and/or technical standards to appropriate industry stakeholders including government, regulators, industry associations and the VET sector.
- That, industry through its Industry Skills Council, E-Oz Energy Skills Australia, continues to engage with industry stakeholders to facilitate the early identification and development of nationally endorsed Training Package qualifications and units of competency to facilitate the dissemination of new technologies and work practices for renewable, low-emission technologies and alternative energy sources.

The Security of Energy Supplies

- **Ensuring reliability and long-term energy security**
- **International agreements and emergency response measures**
- **Addressing infrastructure and supply constraints and barriers to emerging energy sources**
- **Increasing transparency in market conditions**

Australia's energy sector infrastructure and networks are being extended as industrial/commercial demand changes and communities, especially our major cities, grow. Market analysis shows that overall electricity consumption is falling, with gas production being mainly targeted at export and the local gas market situation unclear.

Recently announced closures of coal fired power stations in NSW have been to some extent balanced by the initiation of major solar generation projects. These seemingly competing trends reflect the emergence of new market forces including better informed and more aware consumers.

Anticipating and developing responses for skills needs created by these trends may become more difficult in the short term. There have been a number of false starts as investors and the energy sector industries respond to changing conditions, according to their point of view, by shifting their investment focus.

Under these conditions the meaning of energy reliability, security and emergency response in terms of skills needs may also be shifting. Adverse weather events and bushfires are still the major threats to supply continuity and short term energy security.

As referenced above industry training responses to emergencies, including mutual aid protocols between networks and jurisdictions, along with common standards for the mobility of skills have been progressed. Reviews of existing endorsed Training Package components which underpin these and the research and development of further components to strengthen current protocols is underway.

Longer term energy security and the skills to support it will be a product of technology and systems deployment and trade-offs between emissions levels, efficiency, reliability and associated risk profiles.

The energy sector industries maintain a culture of safety based on the inherent dangers of the products it sells and the high impacts, both economic and social, of significants system failure. Endorsed training standards and training responses represent significant mitigation strategies for current risk profiles.

Factors, related to training and skills, constraining infrastructure development and supply, which present barriers to emerging energy sources/technologies are:

- Under investment in skills
- Investing in the wrong skills
- A failure to identify or predict a skills need
- Loss of skilled operatives
- Reliance on imported skills

As stated above, the energy sector industries actively seek to mitigate these with appropriate research, industry intelligence, competency standards development and review.

A major factor in the availability of skills is the quality and skills of industry (VET) technical trainers and assessors.

This issue of the quality and effectiveness of the development of VET trainer/assessor was highlighted both in the April 2011 Productivity Commission report into the Vocational Education and Training Workforce and the February 2011 Expert Panel's report A shared-responsibility-Apprenticeships for the 21st-century.

Action research conducted as part of the E-Oz's current *Energise Oz Apprentice Progression Management System* pilot has strongly indicated that, with the aging and retirement of long term professional VET teachers, the newer trainer/assessors lack essential technical and pedagogical skills to deliver current standards and adapt to new technologies and systems as they emerge.

Industry is deeply concerned also at the loss of corporate knowledge within training providers seeking to remain in the market place in the face of continued efficiency cuts. This often means that the best (most expensive) training expertise is lost to a system. Increasingly training providers are staffed part-time or sessional trainers. Strong evidence is emerging that this is impacting not just frontline trainer/assessors but the lack of career progression opportunities is directly impacting the management of training provision by skilled and experienced leading trainers or teaching section managers. This is also impacting local engagement with industry and the ability of training providers to be up-to-date with current industry practices and technologies.

In key areas such the electrical trades, which underpin the safe delivery of electricity and electrical services to our community, the quality and skills of industry trainers are paramount to the ongoing productivity of the sector and its capability to disseminate new technologies.

Investment in ongoing professional development of technical trainers is essential to maintain viable skills formation around existing skills needs and to create capacity to respond to innovation in technology, work practices and/or changes to regulatory and policy regimes.

Failure to do so will, over the long term, decrease the ability of the industry to respond and become a barrier to the implementation of new energy technologies and threaten energy security by limiting the skills capability of industry in times of emergency.

Recommendations

- That, government and industry acknowledge the importance of skills formation and availability in:
    - Providing a safe and secure energy supply system
    - Addressing barriers to the take-up of new technology, enabling Australia to securely alter it energy mix
    - Addressing infrastructure and supply constraints
    - Providing for emergency response to underpin supply reliability
- That, as Australia's energy mix changes; industry intelligence and policy directions support the appropriate investments in skills by government and industry.

- That constraints on the national VET system, particularly the availability of qualified and experienced trainers, to deliver skills for the dissemination new energy technology into the economy is a constraint on Australia's energy strategy and must be addressed.
- That the Industry Skills Council, E-Oz Energy Skills Australia, be supported to continue to work with industry to identify and facilitate strategies to meet the professional development requirements for energy sector VET trainers to deliver newly developed and/or amended Training Package competencies and qualifications to support the implementation of new energy sector technologies, including meeting the requirements of applicable legislation and regulations and environmental safeguards

Growth and Investment

- **Supporting growth**
- **Encouraging investment**
- **Reducing costs and barriers**
- **Community engagement**

Technological based, energy solutions which encourage investment and are coupled to reductions in costs and the removal of barriers to accessibility that are also supported community engagement strategies are likely to have positive outcomes. Such solutions can and will facilitate changes in behaviours towards emissions reduction, whilst supporting growth.

Accepting this premise means that to implement technological change the availability of the skills required is paramount, as:

- Encourages investment, both foreign and domestic, as investors will have confidence that projects can be successfully implemented.
- Reduces costs and barriers by ensuring the supply of skills is both sufficient and appropriate for the demand of industry enterprises
- Allows for the dissemination of the technology into the community
- Provides key pay-offs from technological change for communities; new, higher skilled jobs, more efficient energy systems along with increased reliability and sustainability represent positive outcomes for an economy and its communities.

The deployment of technologies for renewable energy and peak demand management together with energy efficient, integrated smart end user systems means that growth can be supported at lower economic and environmental costs.

The information provided in other sections of this document demonstrates that the availability and appropriateness of skills to support the deployment of new energy systems and technologies:

- Supports growth
- Encourages investment
- Reduces costs and barriers
- Engenders community engagement

It is important that the recognition the role of skills development, to endorsed standards, which creates the capacity to respond to current and future technological innovation, be actualised.

The essential service, technology driven, nature of the Energy Sector requires Australia's VET system to be "ahead of the game" to maximise productivity growth in the Australian economy through high quality training. In pursuit of higher quality outcomes and to address issues related to training provision in an environment of rapidly changing technologies the creation of *Energy Sector Skills Centre of Excellence* is considered as a key element of an appropriate response.

An *Energy Sector Skills Centre of Excellence,* created via co-investment by industry and government, which facilitates national and international research and cross discipline collaboration; leverages technological leadership and connects identified skills and expertise, will ensure industry and its training partners can respond effectively to consumer demand whilst meeting the dynamic challenges of expanding renewable energy capacity, innovation for energy efficiency and matching infrastructure development with demand management and technological innovation to support sustainability.

Industry does not see such a *Centre of Excellence* as a bricks and mortar institute centred on a fixed location. Rather the centre must be an industry led, dynamic network of expertise which can respond to and address skills challenges associated with energy industry innovation. The Centre would use the information technology and communications power available over high speed networks to support learning, sharing and collaboration by VET professionals and industry researchers and technical experts.

The Centre would, along with the ISC's development and endorsement of industry technical training standards, ensure there is a building of capability in the industry and the VET sector to support the timely implementation of new technologies, including:

- Trainer professional development
- Teaching/learning resource creation
- Collaborative research capability
- Greater national and international engagement
- Building industry capacity to respond agilely
- Where possible the minimisation of duplication of effort
- Identify and work collaboratively on the removal of barriers to the implementation of energy solutions
- Facilitate greater engagement between the VET sector, energy industry stakeholders and the broader community

Preliminary investigations of the concept of an *Energy Sector Skills Centre of Excellence* evidenced a positive industry and VET sector response including from New Zealand energy sector stakeholders.

Recommendations

- That industry training based on endorsed industry training standards to support the ongoing development and maintenance of a skilled technical workforce be regarded as essential for the Australian economy to contribute to:
    - Energy security and reliability of supply
    - Energy productivity and peak demand management
    - Energy efficiency
    - The management of technological change and innovation
    - International competitiveness
    - The level of foreign investment

  - The deployment of competitive renewable, low emission technologies and alternative energy sources
  - The maximisation of economic and social benefits of energy policy and practices
  - Economic growth and investment
  - The reduces costs and barriers to deploying new technologies
  - Community engagement with energy policy and the implementation of sustainable energy solutions

- That the energy sector be supported to create and operate an *Energy Sector Skills Centre of Excellence.*