

Up the Creek Without a Paddle? New industries and the VET system

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Background

The links between VET and industry are perhaps stronger now than they have been for many years. A recent NCVET report (Misko 2001) notes that initiatives to strengthen these links began in the late 1980s. Over a decade on, they are formalised at many different levels of the VET system, and are visible in the composition of the ANTA board, the roles of ITABs, in user choice arrangements, and at the RTO level in arrangements for work placements and the provision of tailored industry or enterprise training.

Through these links, industry has gained a stronger hand in determining what and how much VET is offered and delivery methods and arrangements. VET has moved closer to becoming an 'industry-driven' system in which responsiveness to industry needs is a primary goal.

However, industries differ and perhaps not all have achieved, or even want, the same level of interaction with VET. This paper looks at the case of new industries, which because of their recent gestation do not have the historical ties with the VET system that many other industries, such as building and construction, or tourism and hospitality, have built up over many years. In particular it examines two new industries, *Photonics* and *Renewable Energy*, both of which are experiencing, or predicting, substantial needs for VET-trained technicians.

The research on which this paper is based was an NREC-funded project conducted by the TAFENSW Industry Partnership Centre (Karen Whittingham and Clifford Trood) and CEET (Fran Ferrier). The project aimed to seek out some new industries emerging in Australia, to find out about the skills they will require of their workers, and to identify if, how and when the Vocational Education and Training (VET) system should best respond to their skill needs.

The project was limited to an investigation of industries connected with the *Co-operative Research Centre* program, which is part of the National Innovation System (NIS). The CRC program has a strong commitment to applied research and to the implementation and/or commercialisation of the research outcomes and this provides a fertile environment for new industries. It promotes long-term cooperative relationships between researchers and research groups from universities, government research laboratories (Commonwealth, State and Territory), and the private sector. The relationships promote a flow of knowledge and ideas in both directions so that the

research can seek answers to current problems. End-user involvement in the research also speeds up dissemination of results and implementation/adoption/commercialisation of research outputs.

Most of the CRCs are linked with established industries, either long-standing (eg *Viticulture*) or new (eg *Renewable Energy*) and are working toward improvements for these industries. Generally they aim to improve efficiency, to develop better tools, or to improve the quality of products or services. A large group aim to reform industries through the adoption of sustainable practices (eg *Sustainable Tourism*, *Sustainable Rice*, *Ecologically Sustainable Development of the Great Barrier Reef*.) A small number are connected with industries that are in the early stages of development (eg *Photonics* and LEME - *Landscape Environment and Mineral Exploration* - serving 'Salt-onics' – the desalination industry) and only one - the CRC for *Satellite Systems* – is working in an area where no industry has yet been established.

Few CRCs consider VET as an end-user of their research, or as a mechanism for disseminating information about their research outputs. Thus while they generally have very strong connections with industry they tend to have very poor links with people or organisations in VET. Consequently, problems tend to arise when their work leads to changes in industry that entail new skill needs and training/re-training becomes necessary. Moreover, when connections are sought, the complexities of the VET system, coupled with misunderstanding about the role and capabilities of VET, often create difficulties - sometimes insurmountable.

However, there are three cases in which connections between CRCs and VET are particularly good: *Photonics*, *Renewable Energy* and *Viticulture*. Two of these cases are discussed in this paper. As we will see though, while good connections are evident in both these cases, some problems are still being experienced by these new industries in gaining access to the VET they require.

New industries

In Australia, new industries are supported at the national level through the Federal Department of Industry Science and Resources (DISR), whose *Emerging Industries Section* identifies, assesses and facilitates their development and provides policy advice to government. DISR has adopted a definition of *emerging industries* developed by Michael Porter :

Emerging industries are newly formed or re-formed industries that have been created by technological innovation, shifts in relative cost relationships, emergence of new customer needs, or other sociological (and environmental) changes that elevate a new product or service to the level of a potentially viable business opportunity.

Michael Porter in *Competitive Strategy*, Free Press 1980.

This definition highlights the fact that new industries can spring from many different sources – including the re-formation of existing industries. The two new industries that will be discussed in this paper, *Photonics* and *Renewable Energy* are both the product of

technological innovation and their growth is also being driven by new customer needs (eg the increased need for bandwidth in the case of Photonics and the need for remote area power systems in the case of Renewable Energy). Renewable Energy is also particularly being promoted by shifts in relative cost-relationships and sociological and environmental change.

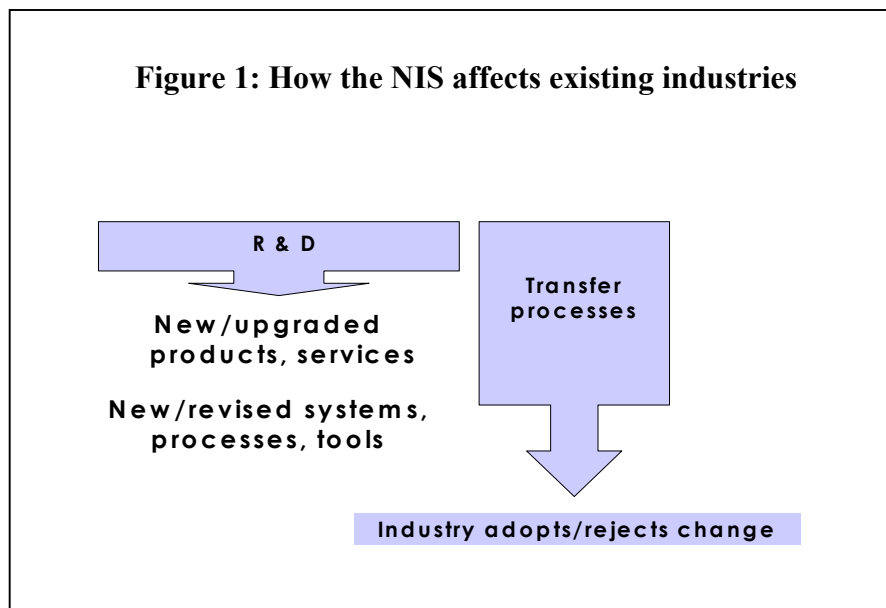
Porter notes that emerging industries face particular difficulties because they operate where there are no established rules to the game. They need to establish some rules that will allow them to compete and prosper. DISR recognises other key characteristics of emerging industries as:

- **Low predictability:** they are difficult to foresee, but obvious in hindsight.
- **Rapid growth:** but they often result from high intensity R&D and have a lengthy gestation.
- **Large and small firms:** there are new firms, spin offs and existing firms entering new areas of business.
- **Reliance on highly-skilled people:** there is need to anticipate future skills sets and requirements. There is a diversity of skills and merging of occupational boundaries.
- **Fragmented unstable markets:** diverse products, frequent product changes. A growing number of firms with widely fluctuating market shares.
- **'Probe and respond' approach:** products and needs are not clearly defined, requiring rapid feedback/feed forward between product and market.
- **Fluid/turbulent:** experimental/dynamic operational styles.
- **Global focus:** they may be 'born global'.
- **Unconventional associations:** capability based.

(DISR 1999a p 8).

Outcomes of National Innovation System R&D

Figure one below provides a simplistic representation of the process by which the research and development performed in the National Innovation System affects existing industries. It shows R&D leading to outputs such as new or upgraded products and services or systems, processes, tools and equipment.



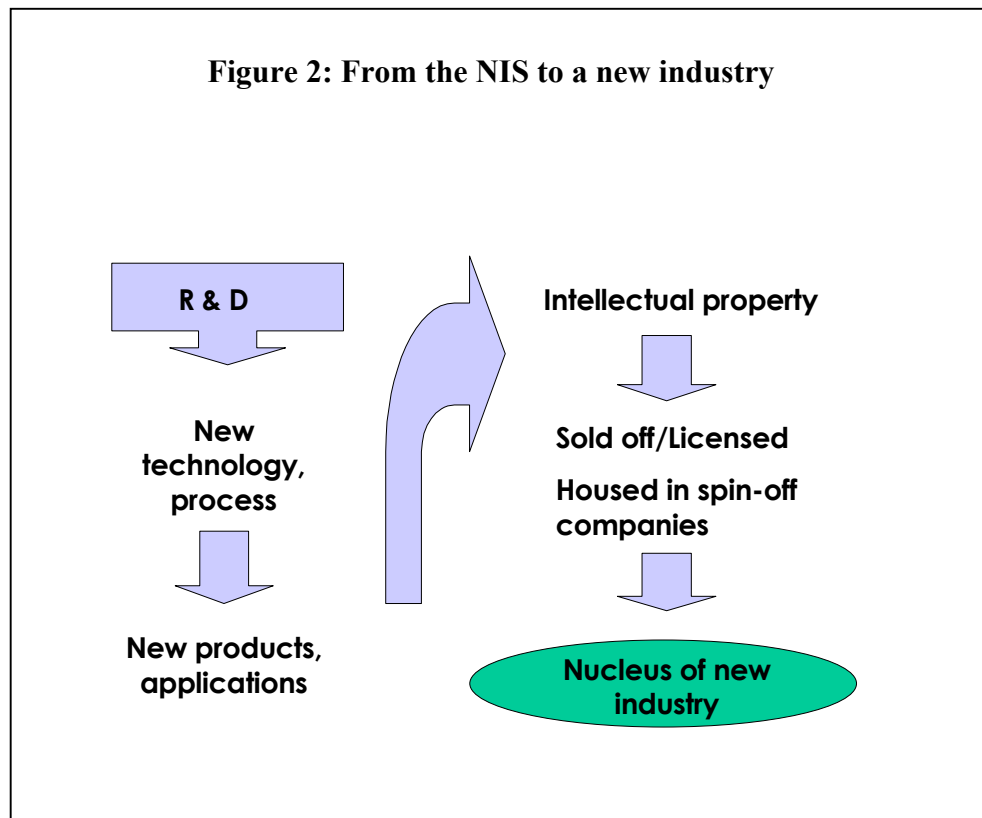
As a simplistic representation the figure does not show the many factors that can affect whether a research output is adopted by industry. Even some of the best ideas emerging from R&D will not necessarily be developed into new products, systems or processes – and in turn some of these will not necessarily be adopted. Among the many reasons for this might be:

- Lack of financial support.
- The skills to develop the ideas may not be available.
- The costs of developing the ideas might be prohibitive
- The end-product might be seen as having only a very small potential market and therefore returns might be judged too small to justify investment.
- Competition from other products etc might be judged as too fierce.
- There may be doubts about the quality of the end-products
- The potential of the ideas themselves may be overlooked.
- Development might have taken so long that potential users have adopted competing products that they are now committed to using. So there is no market.
- Consumers might be resistant to the idea of changing to something new and so industry may be unwilling to invest in it.
- An industry standard might have developed, officially, or informally, around an alternative, thus limiting the market.
- There may be no appropriate existing industry or enterprises with the skills and facilities to manufacture and market a new product.
- A dissemination strategy may not reach those who could use the information.

Figure 2 provides a simplistic representation of the process by which work in the NIS can lead to a new industry. It shows R&D finding a new technology (or process) and embodying this in new products and services. Commercialisation of these products then takes one or more of a number of different routes. The intellectual property may be licensed or sold off to an existing enterprise, or a new enterprise, or group of enterprises,

may be set up to take the products to market. The nucleus of a new industry forms around the new products and the enterprises marketing them.

Again, not depicted are the many factors that can affect this process. Access to the venture capital required to develop, manufacture and market new products in particular will affect whether the new industry gets off the ground or fails in its early stages. Competition (including from other new technologies) may also be a major consideration.



Skill needs

An innovation that is adopted by an existing industry will not necessarily lead to changes in the skills that workers need in this industry. A new product, for instance, may simply add a line to an existing suite of products. Manufacturing this product might be able to draw on existing skills. A new tool, or other piece of equipment also may require only existing skills in order to be used effectively. New or updated skills will be required only where there is a significant difference between the innovation and whatever it replaces or complements.

Some innovations are competency-destroying because they completely replace, rather than amend, whatever already exists. This is the case with some new technologies, and in these cases skill requirements may change substantially. Sometimes a new tool or system will simplify a task that previously could be performed only by experts. This is

happening, for example, with the implementation of some new diagnostic tools in medicine and other fields. As they are being adopted these innovations are freeing up experts for more creative work and enabling workers with lower level skills to take on tasks that in the past required a degree of expertise. This technician will then require some training to perform the task effectively.

For all these reasons, it is important when assessing whether new or upgraded skills will be needed as a result of the adoption or implementation of an innovation to consider the particular characteristics of the innovation carefully and to compare it with what already exists. In some cases workers may only need to make minor adjustments. In others, more radical initiatives will be required.

What types of skill needs arise when a new industry is created? DISR suggests that emerging industries are marked by the merging of occupational boundaries and that they require a diversity of skills. Case studies in the new industries connected with the CRCs tend to support the notion that some of the skills required will be generic, common to several (or more) occupations and industries and that industry-specific training may not always be necessary. However, most new industries also want some training that will 'contextualise' generic skills within the new industry framework. In addition, where new technologies are concerned, such as in Photonics, Renewable Energy, Waste Management and 'Saltonics', workers will need to have an understanding of how the technology works and can be used. This can be built on to knowledge and skills in a related field.

Responding to skill needs

Not all skill needs arising from the adoption of innovations in industry will require a formal response from education and training systems. In the case of industries connected with the CRCs, the CRCs themselves are often able to meet the demand for training/re-training through the industry seminars and workshops that are part of their education and training programs, as long as the number of workers required to have new skills is small. However, when industries begin to require many workers with new skills, the CRCs do not have the capacity to meet demand and look to others, such as educational institutions and systems, for assistance.

The CRC for Renewable Energy illustrates this. As industry demand for RE trained workers has grown the CRC has become less and less able to meet this on its own. It has thus taken steps to expand the supply of training by contracting the Renewable Energy Centre at the Brisbane Institute of TAFE to develop its Certificate IV course in Renewable Energy for flexible delivery. The CRC has also sought RTO status in its own right and is developing partnerships with other VET providers.

In the case of new industries, formal education and training have a stronger role in some stages of industry development than others. Based on investigations of new technology industries in the UK, Hendry (1999) suggests that in the early stages of an industry formal education and training systems will have only a minimal role as most skill needs will be able to be met through in-house or informal training:

During the phase when the new hybrid skills are being formed, ...skill development will rely particularly on in-company development to convert people from the pure disciplines they are likely to have been educated and trained in.

The role will strengthen as the industry advances to later stages of development:

As the technology and methodologies become established, this (in-company development) may be externalised into the education and training system. (p 3).

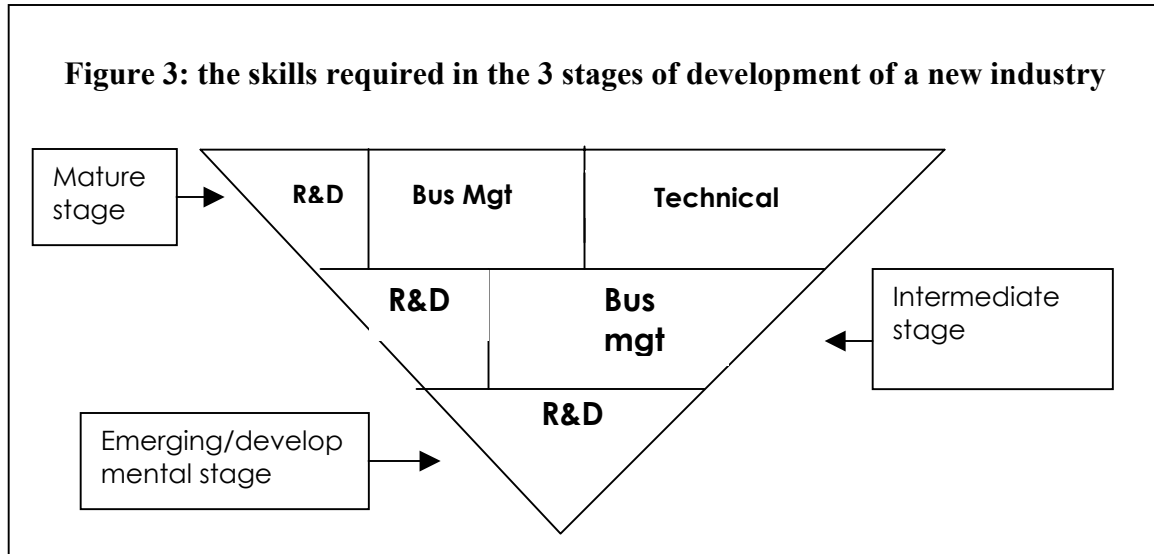
The study of the new industries connected with the CRCs points to three stages in their development:

- *A developmental stage* in which ideas/technologies are still being worked out.
- *An intermediate stage* in which planning takes place for taking new products and services to market.
- *A mature stage* in which the products and services are available on the market.

Each of these stages requires different types of skills:

- *Developmental:* The primary need in this stage is for skills in R&D to advance knowledge and to find new applications.
- *Intermediate:* The challenges of planning for successful commercialisation of new products and services require skills in management, in analysing markets and in accessing venture capital. R&D skills continue to be required for further product refinement and new product development, but less so than in the developmental stage.
- *Mature:* Business and management skills remain important and research skills are useful for further development, but there is an increasing emphasis on lower-level and technical skills to support the manufacture, installation and maintenance of products and the provision of services.

These three stages and the skills they require are depicted in figure 3 below.



While a role for formal VET is likely to be strongest in the third of these stages, when demand for technical skills is greatest, the time required to develop appropriate training programs and materials and the capabilities of VET staff to deliver new courses means that planning should ideally start well before this stage begins. However, such forward planning may appear risky to education planners uncertain about the future of a new industry. This caution helps to perpetuate a vicious circle, for the success of a new industry may depend on its access to appropriate skills. DISR indicates that workforce skills will be one of the ‘critical success factors’ for emerging industries such as Photonics in the next decade (DISR 1999a).

Timely VET responses to the skill needs arising from the CRCs work are hampered by the generally poor links that the CRCs have with the VET system and by the failure of the CRCs to identify VET planners, providers, teachers and students as having an interest in their work. Dissemination of research findings and outputs to or through VET is rarely considered by the CRCs and few support activities for this purpose. Similarly, the VET system displays little systematic interest in the work of the CRCs. Some monitoring of developments may take place, but on a small scale. Individuals may be interested – and even involved (eg through professional networks) but alone can do little. Entrepreneurial RTOs may see in the growing demand for training an opportunity to earn some fee-for-service income.

Where the CRC is working on an innovation that is likely to change skill requirements in an existing industry you might expect that industry training boards would have a role in planning for the timely provision of training. However, surprisingly few of the CRCs have an ITAB among its partners or associates. ITABS tend to become involved only once industry has decided to adopt an innovation – and particularly when this creates problems. For instance, the CRC for *Black Coal Utilisation* developed self-guided technologies for retrofitting underground mining transport vehicles. When industry began to implement the new technology it was soon recognised that maintenance staff did not

have the skills necessary to maintain the equipment. The relevant ITAB was then asked to develop appropriate competencies for inclusion in training packages. Some formal involvement by the ITAB in the CRC might have led to an earlier recognition of the training need and expedited the introduction of appropriate training thus enabling the effective use of the technology at an earlier stage.

Of course in the case of new industries there are no specific ITABs and so different problems arise. For both the Photonics and Renewable Energy industries, getting the new competencies they need included in a training package has been an issue of concern. Time has been lost in trying to identify which (if any) of the existing training packages are the most appropriate for their needs and in pursuing contacts with the ITAB concerned. Attempts have returned mixed levels of success. The Australian Photonics CRC, which is the nucleus of the new Photonics industry, describes the system for the development of training packages as ‘unresponsive, unwieldy and dense’, having made many failed attempts to include photonics competencies in the Telecommunications training package. Similarly, confusion about requirements has affected the Renewable Energy industry. Competencies have been included in the Utilities training package but this has closed off access to training, rather than opening it up, which is what the industry wants in order to meet a projected skills shortage.

These experiences highlight the difficulties new industries face in gaining access to publicly-funded training. While their demands for skills are small, new industries are prepared to pay for fee-for-service training – particularly if this will help to establish them on a sound basis. However, as the industry expands and skill demands increase, gaining access to publicly-funded training becomes a higher priority, but is difficult to achieve.

A major problem is the complexity of the VET system, which leads to problems for those trying to navigate their way through it, newcomers particularly. This complexity slows the development of relationships between VET and the NIS and thus of training for new innovations or whole new industries. The experiences of the CRCs provide many examples. For instance, the difficulties encountered by the CRC for *Weeds Management* in initiating the development of a training package and having it accredited through Murrumbidgee Agricultural College led staff to the view that VET is ‘too complicated’ and ‘a nightmare for people outside the sector’. Similarly, the Wool CRC has been active in developing training resources but has decided not to develop mainstream courses because of difficulties in the VET accreditation process. The CRC for *Ecologically Sustainable Development of the Great Barrier Reef* worked with the VET sector to develop a Heritage Tourism course. Major problems were encountered – the CRC found that ‘working with TAFE is such a long, cumbersome, drawn out process’. The costs of staff and development were high and the convoluted accreditation process worked against rapid development and introduction of courses.

In attempting to assist the Photonics industry, the NSW TAFE Industry Partnership Centre has come to the conclusion that training package development is dependent upon conditions that do not yet exist in this new industry. It requires:

- The existence of companies so that competencies can be determined from underpinning technological knowledge, company processes and production methods.
- An ITAB aware that a new industry cluster is forming.
- An industry able to articulate its needs to the ITAB.
- RTOs with the capabilities to deliver appropriate training.

As it is doubtful that any new industry would be able to fulfil all of these conditions what then can new industries do to obtain the training they need? Given the many difficulties that they face, are new industries are ‘up the creek without a paddle’ in their attempts to access appropriate VET? Before answering this question it is useful take a closer look at the two new industries of Photonics and Renewable Energy.

Photonics

Photonics is the control, manipulation, transfer and storage of information using photons, which are the fundamental particles of light. It is underpinned by knowledge of the principles of light and builds on and extends understanding and use of electronics, lasers and optical fibres.

Through ongoing research and development many potential uses are emerging of photonics technologies in a variety of fields. Telecommunications is the main focus of the work with a major aim being applications that will meet the heavy demands on bandwidth arising from the use of the internet. Sensing devices are also being developed for defence and other industrial applications, including equipment for measuring temperature, strain, electric current, vibration, chemical and biological pollution, and sound. Diagnostic equipment for medical uses is also under development.

The roots of the Australian Photonics industry can be traced back to research conducted in the 1960s into the characteristics of optical fibres. However, Photonics has only begun to emerge as an industry in its own right in the past few years as commercial products and services arising out of more recent research have started to be created and companies have been set up to take them to market. The industry is growing as a whole very quickly and prospects for the future are good, particularly in telecommunications where photonics technologies are replacing existing technologies.

Support for research and development has been critical to the development of photonics. Now conducted primarily in the Australian Photonics CRC, this research was previously conducted by different groups in scattered sites across several universities and enterprises. The CRC created a critical mass of researchers and gave their work a stronger commercial focus that has accelerated industry development. By July 2001, the CRC had over 100 patents filed.

Although no formal industry association yet exists for Photonics, there is a *Photonics Industry Forum* formed under the auspices of the Australian Electrical and Electronic

Manufacturers Association (AEEMA). The forum has a growing number of members, the majority of them SMEs.

The industry is anticipating a substantial need for VET-trained staff. An unpublished survey of 12 Photonics enterprises conducted in 1998 for DISR estimated that if Australia can maintain a market share of 1.2% of the global market by 2010 there will be demand for 24,700 workers specific to the industry and 32,000 in associated industries. Twelve firms alone will create 2750 jobs, of which 1200 (44 per cent) will require skills at VET level.

A study of skills required by new technology industries in the UK (Hendry, 1999) examined the advanced materials, biotechnology and opto-electronics (Photonics) industries and identified three emerging sets of skills required in different measures and degrees of sophistication by different levels of employees:

- ◆ Fundamental understanding of the (specific) materials concerned, with skills in synthesis, design, processing, and fabrication.
- ◆ Skills in supporting infrastructure (generic) technologies such as ultra-precise measurement and testing techniques, modelling and simulation.
- ◆ Project management skills and skills in concurrent engineering, in which a product is designed in close conjunction with the design of the manufacturing process, and customers and supplier are brought into the process early on in order to meet ever-decreasing product development costs.

Awareness in the Photonics industry of its growing need for VET staff – and for appropriate training – has been assisted by links between the Australian Photonics CRC and TAFE NSW. These developed through the co-location of the CRC and TAFENSW Industry Partnership Centre (IPC) at the Australian Technology Park and the participation of the two organisations in a project investigating the future of the industry. The links have culminated in a memorandum of co-operation that provides a framework for the development of VET in the new technology. Its intent is to assist in the transfer of knowledge into the VET system – which until recently had no products or services in this area. It is underpinned by the view that if knowledge of Photonics can be transferred into VET, curriculum development can be accelerated. Thus a gap is less likely to develop between the supply of appropriately trained VET graduates and the demand for them as jobs are created in the emerging industry.

TAFE NSW has now become the major provider of training for the Australian Photonics Industry. A course of 10 modules has been developed with assistance from staff of the CRC and is available on a fee-for-service basis. As a result of its early involvement with the industry TAFE NSW has been able to acquire equipment and supplies at substantially reduced rates or through in kind support. Thus Lidcombe College now has the only VET-based Photonics Laboratory in the country. Additionally, linking with the CRC has provided opportunities for staff to upgrade their professional skills. In 1997 and 1998 the CRC hosted a staff member of Lidcombe College who then prepared the 10 short courses or modules for delivery on a fee for service basis. In February, 2000 the CRC hosted a

staff member of Mt Druitt TAFE, who subsequently prepared a new photonics course that was first offered in the second semester of 2000.

As previously indicated, the IPC has encouraged the CRC to take action to achieve publicly-funded support for training in the Photonics industry. It has introduced the CRC to the structures and mechanisms of the VET system, networked the CRC to main VET stakeholders, discussed the industry's skill needs with senior politicians, VET bureaucrats and managers and lobbied for funding. However, there is still no nationally accredited course in Photonics and there are no relevant competencies in a training package. Both the IPC and the industry are frustrated with the training package process and the need for a specific industry ITAB and training package is being considered.

Both Lidcombe College and Mt Druitt College are endeavouring to increase skills and awareness of Photonics in existing telecommunications students. TAFE NSW Telecommunications and Electrical Engineering Diploma students are undertaking photonics based research projects where there are opportunities. However, this effort will not be enough to meet future skill needs. The Photonics industry is growing in five states (predominantly in NSW but substantially in the ACT and Victoria) This makes it imperative that VET develop a Photonics capability outside NSW.

Thus two important issues for this industry, which anticipates a very high level of future demand for VET-trained labour, are how to get access to training on a broader scale and also how to access to government-funded training. In the absence of an industry-specific training advisory body it also has limited help to navigate the VET system and get the answers it needs.

Renewable Energy

Renewable energy is the term used to describe sources of energy that can be used without depleting reserves. The *Australian Greenhouse Office* lists these sources as sunlight or solar energy, wind, wave, biomass and hydro energy. Renewable energy is used for transport and industry, for electricity generation and in domestic appliances (eg solar hot water).

Until recently the renewable energy industry was a sub-sector of the broader utilities industry, which produces, generates and supplies electricity, gas and water. Progress in developing new technologies (both in Australia and overseas) has led to new products and processes and promoted industry growth. In addition, the industry is expanding as new opportunities open up in both domestic and export markets.

Export potential for renewable energy technologies has emerged in developing countries, particularly for local power generation -an area in which Australia has world leading skills and experience. Within Australia, opportunities for expansion of the industry are increasing primarily in electricity generation and supply. The *Renewable Energy (Electricity) Act 2000*, mandates that by 2010 an additional two percent of Australia's electricity supply must be provided from renewable sources. This target seeks to increase

the contribution of renewable energy sources in Australia's electricity mix by an amount sufficient to power 4 million households.

A National Greenhouse Strategy has also been created by governments, industry and communities to increase use of renewable energy. At the state/territory level, governments are providing information and advisory services, financial rebates and program support. For instance, the Queensland Government offers information about energy smart home design and solar power and rebates for installation of solar hot water services and Photovoltaics (power derived from sunlight). At the local level, some councils also encourage or mandate the installation of solar hot water in new houses.

A Renewable Energy Action Agenda developed by DISR sets an ambitious target of growth for the industry: To achieve a sustainable and internationally competitive renewable energy industry which has annual sales of \$4 billion by 2010.

Some changes are needed in the industry to take advantage of these opportunities. Australia has abundant renewable energy resources and proven skills in developing the technologies to harness them. It is competitive in many areas and has a competitive advantage in some (e.g. remote area power supply). However the industry has tended in the past to focus on the development of the technology at the expense of attention to markets and customers and has suffered from a poor reputation for the quality and reliability of its products – a problem attributed to a lack of uniform standards and inadequate training. The costs associated with renewable energy are still often higher than non-renewables (particularly capital costs), although the differential is declining. Access to venture capital can also be difficult in the industry, as it lacks a history of strong market growth (DISR 1999). The industry is highly fragmented and diverse. Most firms are SMEs, producing only one or two products – there are only a few large well-resourced enterprises – and different parts of the industry are at very different stages of development. Some are mature and produce and supply commercial products to developed markets (eg solar hot water). Some are in the process of becoming commercial, making the transition from R&D. Others are still in the pre-commercialisation stage, improving and testing the technologies, or setting up demonstrations or pilot plants.

A major concern, identified in the industry Action Agenda is a skills deficit in the medium-long term. An initiative of this agenda is thus to ensure that sufficient skilled people are available to support industry growth'. The Action Agenda suggests some specific actions, including the 'development and accreditation of training programs for persons or companies working with renewable energy products. This should include installers and repairers of equipment. It could also extend to companies providing other services such as consulting advice'. It also suggests that these be integrated into 'national TAFE and university programs to fill identified gaps' and that industry strategies be developed 'to attract, retain and educate people to appropriate skill levels. It also calls for greater industry access to existing skill support mechanisms'.

Training in renewable energy technologies has been offered on only a small scale in VET. Fee-for-service programs have catered to electricians and plumbers interested in adding to their skills or for people from other backgrounds with an interest in the area. For instance, the Renewable Energy Centre at Brisbane Institute of TAFE developed a certificate IV course that has been successfully marketed to people from many backgrounds.

As industry demand for technical skills rises and new technologies and products are being commercialised, this level of provision has become insufficient. The good news is that through the initiative and professional networks of staff working in the Renewable Energy Centre, Brisbane Institute has been able to gain funding from the industry CRC to develop its course materials for flexible delivery – and thus they have become available to a much wider group of clients. The course materials have also been licensed to other VET providers, enabling the Certificate IV program to be offered in each state (flexibly or face-to-face) with better student access to equipment and practical assessment opportunities. Some other TAFE institutes have also begun to recognize the business opportunities and are initiating fee-for-service programs.

On the downside, as a new industry, renewable energy does not have its own ITAB or training package. So when staff from the Renewable Energy Centre at Brisbane Institute were incorrectly advised that their Certificate IV course could not be re-accredited without becoming part of a training package, negotiations were undertaken with the Queensland and National Utilities ITABS and renewable energy units of competence (covering the use of technologies such as Solar Water Heating Systems and Wind Generation) developed for inclusion in the Electrotechnology Training Package. While the staff see this as having some positives, they also believe it has had some adverse effects.

Firstly, they suggest that it is inappropriate to have a multidisciplinary field of study included in a tightly defined industry sector such as electrotechnology because optimal training in renewable energy systems requires integration of knowledge from a number of different fields. Secondly, they note that inclusion in the training package has restricted access by non-electricians to a qualification in renewable energy as Certificate IV qualifications in the training package are accessible only to Certificate III electrotechnology graduates. Thirdly, the electrical underpinning knowledge required for understanding renewable energy systems is dispersed through different qualifications and requires non-electricians to 'pick and mix' to gather that knowledge. Fourthly, it has resulted in confusing alternative pathways through the qualifications and units of competency to gain renewable energy industry accreditation (eg accreditation from the Sustainable Energy Industry Association, which gives businesses and their customers access to government rebates on renewable energy technologies).

Conclusions

Are new industries 'up the creek without a paddle' in getting access to the VET they need to meet their demand for skills?

The evidence suggests that there are some real problems and that much more could be done to assist these industries. In particular, the complexity of the VET system and its accreditation processes remain significant obstacles for these industries and compound the difficulties they face because they lack a dedicated ITAB or other VET champion. The VET system could also improve its links with the NIS and its monitoring of developments that might create a new training demand.

However, in the stories of the Photonics and the Renewable Energy industries there are also some good practices that indicate the significant potential there is in the VET system to respond and adapt to the new. Despite the obstacles that they face both of these industries have been able to develop relationships with the VET system that are helping them to navigate the system and to gain access to the training they need - albeit on a limited basis.

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