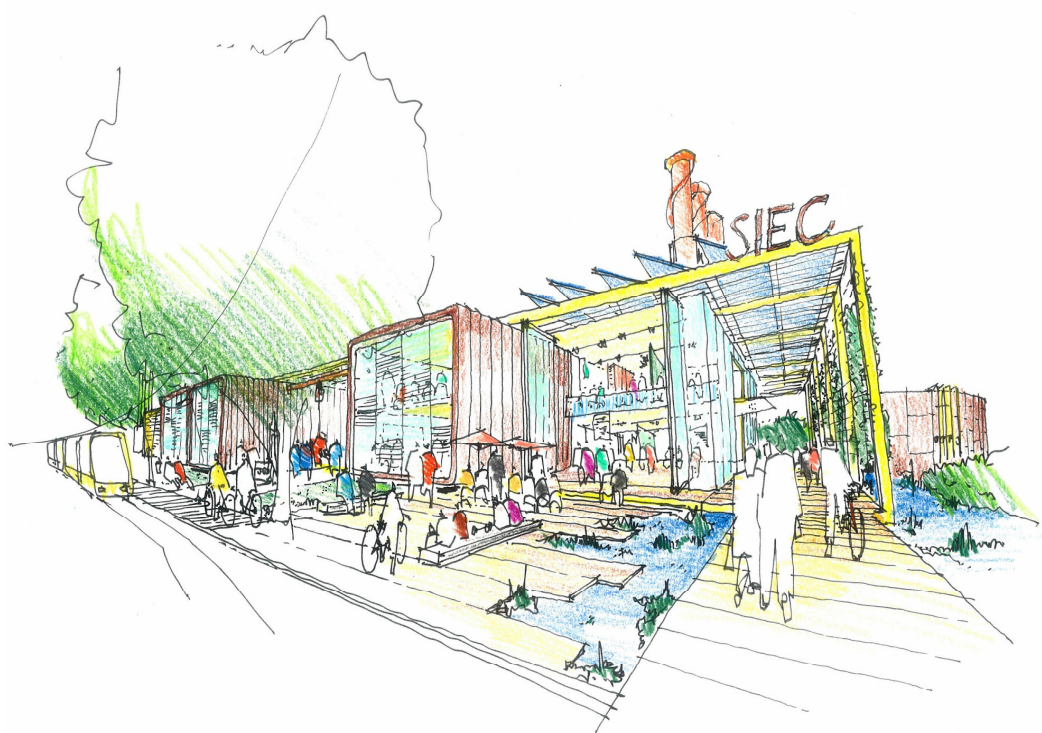


TAFE SA Adelaide South Institute

SUSTAINABILITY INDUSTRIES EDUCATION CENTRE (SIEC)

THE EDUCATIONAL MODEL

ANNEX TO THE FINAL BUSINESS CASE - 8 December 2009



Government of South Australia **tafeSA**

CONTENTS

EXECUTIVE SUMMARY	3
1.THE NEED	4
1.1. Industry Drivers	4
1.2. Sustainability Drivers	5
1.3. Educational Drivers.....	5
2. THE SOLUTION.....	7
2.1. New Educational Paradigm	7
2.1.1 Matching Skills Development to Labour Market Demand.....	7
2.1.2 Contemporary Approaches to Teaching and Learning.....	8
2.1.3 Flexible and Online Learning.....	8
2.1.4 Embedded Sustainability Skills.....	9
2.1.5 New Courses and Skill Sets.....	10
2.1.6 Training Pathways Within SIEC.....	10
2.1.7 Pathways Across the Three Education Sectors	11
2.1.8 Social Inclusion Initiatives	12
2.1.9 First Contact	13
2.1.10 From Theory to Practice.....	13
SIEC Case Study 1: Pathways.....	14
SIEC Case Study 2: Up-skilling Options.....	15
2.2. SIEC Innovation Model.....	16
2.3. SIEC Business Development	17
2.3.1 Measuring SIEC Performance	17
2.3.2 SIEC Customers and Stakeholders	17
2.3.3 SIEC Marketing Strategies.....	18
2.4. Work Practices	20
3. THE PHYSICAL INFRASTRUCTURE.....	22
3.1. Design Influences	22
3.2. Co-location and Linkages	23
3.3. Demonstrator Elements	23
3.4. SIEC Equipment	24
3.4.1 SIEC Equipment Estimate.....	25
3.5. Pathways from SIEC Hubs	25
3.5.1 Water Industry Pathways	26
3.5.2 Sustainable Materials and Green Waste Pathways	28
3.5.3 Design Planning and Development Pathways.....	29
3.5.4 Renewable Energy Pathways.....	30
4. END NOTE	31

THE SIEC EDUCATIONAL MODEL

EXECUTIVE SUMMARY

‘South Australia can only move forward by changing the key elements of the VET system and the way it functions; the way it connects and the way it delivers and by making more efficient use of the resources we have.’

A Skills Strategy for South Australia’s Future¹

The Sustainable Industries Education Centre (SIEC), described in the Full Business Case, provides South Australia with a model that embodies these sentiments. Rather than tinker with the training and education systems of the past – systems designed for an era of classroom based, lecturer driven delivery – the SIEC offers an innovative, creative and collaborative learning environment structured to equip the building and construction, water and renewable energy industries with the knowledge and skills necessary to lead the nation in the use of sustainable technologies.

The educational model underpinning the SIEC is unique not in the scope and breadth of its vision – others have had similar broad based ideals – but in the nature of its design, the flexibility and responsiveness of its operation and its marriage of learning, research, business development and industry engagement.

Australia’s transition to a low-carbon, sustainable economy necessitates the adoption of new and rapidly emerging clean technologies. This, in turn, requires a highly skilled workforce capable of designing, installing, monitoring and maintaining systems, products and processes significantly different from those in common use; so different, in fact, that many have yet to be developed. The creation of such a workforce (as identified in Chapters 3 and 4 of the Full Business Case) requires a new approach to education and training – an approach that looks beyond the traditional vocational silos and modes of delivery and focuses on:

- inter-disciplinary collaboration;
- VET/university cooperation;
- active industry participation and engagement;
- the extensive use of e-learning; and
- the creation of educational/employment programs and pathways within the sustainable industry sector.

The attainment of this vision requires a purpose built interactive infrastructure that both facilitates learning and is part of the learning experience.

The SIEC educational model – with its integration of learning and work, theory and practice, research and application – not only exemplifies the principles promulgated in the Government’s Skills Strategy, it provides an opportunity to display leadership – in education and training, in stakeholder collaboration and, most importantly, in the creation of a sustainable future.

¹ A Skills Strategy for South Australia’s Future, 2008, pg.2

1. THE NEED

TAFE, South Australia's leading provider of vocational education and training for almost 40 years, has an impressive history. Its future, however, relies on its ability to respond appropriately to significant external and internal challenges. These imperatives (outlined in Chapter 3 of the Full Business Plan) are summarised below.

External factors prompting a re-evaluation and assessment of current practices include:

- the critical need to move to a low carbon, sustainable economy;
- the changing nature of workforce skill requirements;
- the transformation of key industry sectors in South Australia, including,
 - building and construction
 - water
 - renewable energy and sustainable technologies;
- Government policies, specifically those pertaining to skills and workforce development and climate change; and
- the changing expectations of learners viz course design and delivery.

Internal factors linked to the economic, social and political items identified above, relate to publicly funded VET infrastructure, and encompass:

- the inappropriate size of TAFE SA's current footprint²;
- ageing, inflexible facilities requiring significant maintenance;
- unnecessary duplication of program delivery within the metropolitan area;
- under utilisation of infrastructure;
- incongruence between existing facilities and contemporary approaches to training and learning; and
- the failure of existing assets/buildings to meet current industry and legislative requirements.

The new educational model developed for the SIEC addresses each of these issues, incorporating innovative and collaborative approaches that target industry, sustainability and educational drivers.

1.1. Industry Drivers

Complex environmental challenges require creative, integrated solutions. There are four key areas that must be addressed if the State is to realise the Government's plans for a green, sustainable future. These areas find form in four distinct 'hubs' within the SIEC: Water; Renewable Energy; Sustainable Materials and Green Waste; and Design Planning and Development. Each hub, located near related industries in the Sustainable Technologies Park (STP), will deliver training that not only targets specific industry and workforce development needs but provides a focus for innovation, multi-disciplinary collaboration and leadership.

Water

Drought, climate change and industry/consumer demands for consistent, reliable water supplies have resulted in a major shift to new delivery technologies (water recycling, stormwater harvesting, desalination etc.). Implementation, however, requires an appropriately trained workforce. At present the industry is struggling to cope with skill shortages, impending retirements of up to half of its worker cohort in the next 10 years and the need for timely, state of the art training.

² A Skills Strategy for South Australia's Future requires TAFE SA to divest itself of 50 000 square metres of asset space, p.30

Renewable Energy

Given the importance of this strategic area to the State's future, the Government has committed to increasing renewable electricity production by 33% in the next decade and allocated an additional \$20 million to facilitate investment. The industry has been particularly affected by the demand for increased grid connect, an expanded focus on small scale installations (following feed-in tariff) and the uptake of smart grid and smart metering technologies.

Sustainable Materials and Green Waste

The building and construction industry is increasingly focused on the development and deployment of clean, green technologies, products and practices. At a practical level this requires knowledge of materials – selection, specification, handling, recycling, reuse and recuperation – environmental management, planning and auditing industry standards, new product development, understanding and addressing whole of life and supply chain issues and forward planning. The industry's ability to implement this environmentally sustainable focus is severely compromised by critical skill shortages.

Design Planning and Development

Sustainability in all its forms is underpinned by planning and development – tasks that encompass commissioning, design, disassembly, the use of geographic information systems, project planning and management.

1.2. Sustainability Drivers

Sustainable technologies are being developed, tested and marketed at an ever increasing rate. New products, processes and systems are implemented as the demand for more efficient, eco-friendly services spreads throughout the community. To sustain and support industry development the higher education and vocational training sectors need to be both responsive and proactive.

The location of the SIEC within Sustainable Technologies Park, combined with the close collaboration and cooperation between industry, universities and TAFE, will enable staff within the SIEC to:

- identify the skills required to build and maintain sustainable industries;
- target new and emerging needs within these industries;
- design and develop learning programs to train, upskill, demonstrate and communicate relevant knowledge and skills; and
- embed sustainable skills across all industry sectors.

Furthermore the existence of the SIEC with its research and demonstrator elements will assist in the promotion and deployment of new clean technologies to industry.

1.3. Educational Drivers

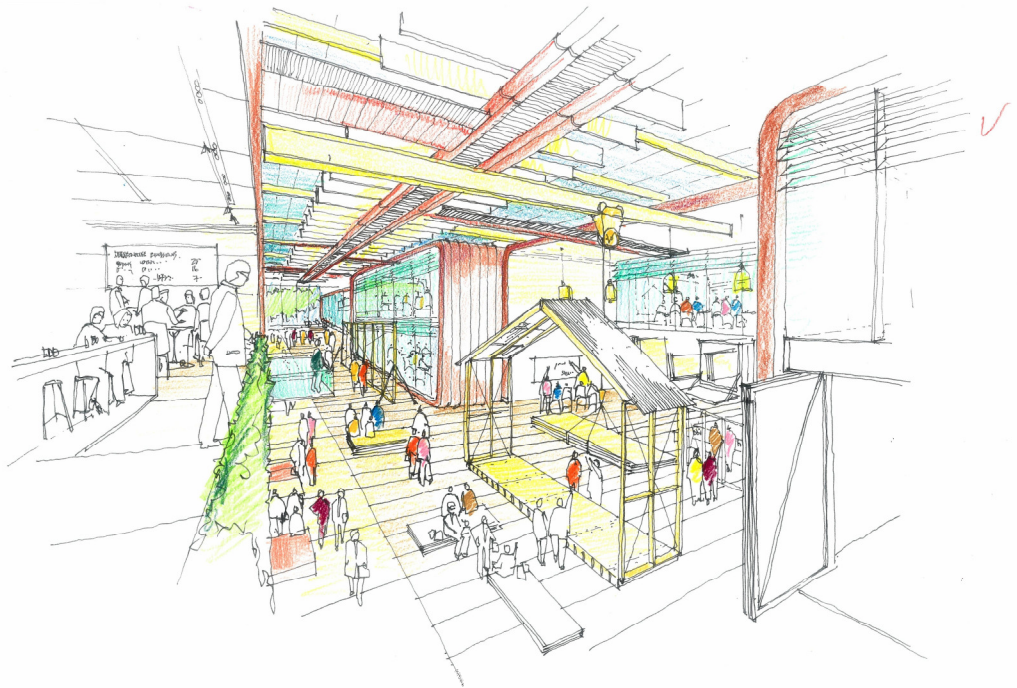
South Australian Vocational education and training in the 21st century has been subject to a number of critical reviews including the Kirby Report (2002), the Schofield Report (2003), the Repositioning TAFE Project (2004-5) and A Skills Strategy for South Australia's Future (2008). Each study has emphasised, with increasing urgency, the need for:

- higher level skills training;
- an expansion of e-learning and greater innovation in delivery;
- a reconfiguration of facilities;
- more effective program coordination;
- the sharing of VET resources and facilities;
- increased Recognition of Prior Learning;
- an integrated approach to the management of infrastructure;
- enterprise, as opposed to industry, training
- increased access and support for those from disadvantaged backgrounds; and
- a well coordinated, systematic approach to life long learning.

Competition within the sector has been encouraged, as has the discernible shift from education and training per se to vocational learning embedded within a business and service framework. Within this context outcomes are measured not on participation or student satisfaction – although both remain important – but on qualifications, employment and the ability of VET to respond quickly, efficiently and professionally to changing industry and learner needs.

The Bradley Review of Australian Higher Education (2008) reinforced these messages, stressing the need for a holistic approach to planning and provision and highlighting the links between higher level skills, productivity and the ability to adapt to the uncertainties of a rapidly changing future.

The SIEC educational model, with its customised physical environment and state of the art sustainable technologies, will meet these needs.



2. THE SOLUTION

The need for change is undeniable. Industry, VET and higher education must alter their practices if they are to overcome the challenges identified in Section 1. The Bonn Declaration (2009) summarises the way forward, emphasising the need to ‘re-orient education and training systems to address sustainability concerns through coherent policies at national and local levels.’

TAFE SA’s **Sustainability Strategy and Action Plan (2009)** will address this requirement by:

- integrating sustainability training into workforce development programs;
- establishing a lead centre for sustainability to:
 - develop the knowledge and skills required to create and maintain a low carbon economy;
 - facilitate the shift towards green practices in building and construction and revolutionise training/learning across associated disciplines;
- ensuring that all new products and services support skills for sustainability; and
- equipping TAFE SA trainers and assessors with the knowledge and skills required to facilitate the development of sustainability skills and address changing labour market needs.

This Plan, along with the vision articulated in Chapter 4 of the accompanying document, forms the basis of the SIEC educational model – a dynamic, innovative model that requires an equally dynamic and innovative infrastructure to fulfil its potential.

2.1. New Educational Paradigm

2.1.1 Matching Skills Development to Labour Market Demand

Tailoring training to industry and workplace requirements is not new. Indeed, TAFE has always consulted with employer groups and organisational bodies on skill needs and program content. The difference here lies in the extent of the collaboration and the breadth of industry involvement. The SIEC Advisory Board will comprise representatives from:

- Industry / Employer Associations;
- universities;
- Department of Further Education, Employment Science and Technology (DFEEST); and
- TAFE SA.

The Board, by virtue of its access to a range of industry networks and enterprises across the building and construction, renewable energy and water industries, will provide direct input from the market place on skilling requirements [Final Business Case (FBC), 3.2.2 & 13.6.5].

This information will ensure the SIEC:

- a) designs and delivers leading edge training tailored to new and emerging needs;
- b) supports workers and enterprises in making the transition to clean sustainable practices, and;
- c) develops higher level sustainability and ‘green’ skills.

2.1.2 Contemporary Approaches to Teaching and Learning

Reforms in the VET sector over the last ten years have moved education and training towards a more responsive and commercial orientation. Competition between providers has been encouraged to ensure services are both cost effective and targeted to customer needs. The result has been greater liaison with industry and a focus on employment and workplace outcomes.

Learning within this environment has become increasingly work-based, workplace focused and more closely linked to industry and enterprise workforce development. The expectation, not unreasonably, is that course content and delivery will be:

- directly relevant to the work context;
- tailored to specific needs;
- built into the job;
- easy to access; and, above all,
- capable of generating measurable returns on the investment.

Flexibility – in delivery, approach and program design – has assumed greater importance with the rise of ICT, the shift towards a more realistic life-work balance and collaborative cross industry ventures. Similarly, the ability to choose courses from across disciplines, to select from an array of learning options, and to have all units and programs linked to career and study pathways are features common to the changing VET landscape.

The SIEC education model incorporates each of these characteristics; its learner centred, work based approach providing participants with industry related and life long learning skills.

2.1.3 Flexible and Online Learning

As technology has advanced, so too has the range and scope of its application within the learning environment. The advantages linked to the uptake of e-learning are well documented [FBC, 4.4.5]. Furthermore, as the technology grows in design sophistication and end point ease of use, so the possibilities increase as to its potential as a learning and management tool.

Flexible learning (including e-learning and on-line learning) will be an essential feature of the SIEC education model, enabling learners to access parts of their training when and where they require. Regional, remote and off-site learners will be able to attend lectures using desk-top video-conferencing technology [8.2]. Individuals studying a course or program will be able to utilise the vast array of interactive tools, resources, guidelines or information packs available through the Knowledge Management Centre and/or online.

TAFE SA has been designing, developing and supporting e-learning for almost two decades, receiving national awards and recognition for its work. These skills will be utilised in its development of the SIEC online environment; work in this area will not begin from scratch. The business and construction program has already created a suite of e-learning products including information packs, learning resources and online assessment activities.

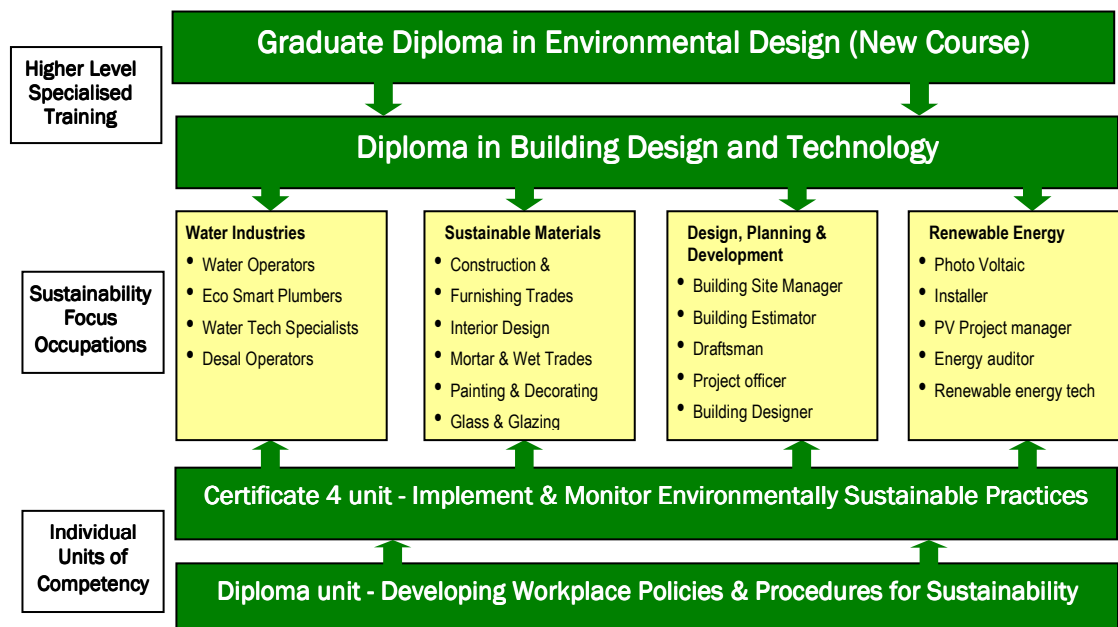
The new technologies within the SIEC will enable a more complete simulation of the work environment and offer improved opportunities for shared learning and social networking [8.3]. Multi-purpose workshops linked to technology ‘commons’ will prompt active and self directed learning. Learners will move between theory (available online via a computer or PDA device) and practice (in the workshops) to use, experience and witness leading edge technologies in operation – technologies contained within the building itself and demonstrated in the Exhibition Centre.

2.1.4 Embedded Sustainability Skills

Core sustainability skills will be embedded in all training (the curriculum to be developed following the current review of apprenticeships and training packages)³; whilst discrete, industry related units will be created to address the specific needs of the building and construction, renewable energy and water industries. These stand alone units include:

- analyse and review water treatment plant technology;
- apply environmental and licensing procedures;
- apply sustainability building design principles to water management systems;
- build thermally efficient and sustainable structures;
- conduct a waste management audit;
- develop landfill rehabilitation plan;
- develop waste management strategies;
- develop workplace policy and procedures for sustainability;
- implement and monitor environmentally sustainable work practices;
- install acoustic and thermal environmental protection systems;
- investigate sustainable water cycle management;
- minimise waste on the building and construction site;
- monitor storage operations for ozone depleting substances and synthetic greenhouse gases;
- participate in environmentally sustainable work practices;
- prevent ozone depleting substance and synthetic green house gas emissions; and
- review and evaluate water and waste water sustainability objectives.

The following diagram illustrates the training framework with sustainability embedded in all courses (via the specific units listed above) and incorporated into new, higher level Diploma and Graduate Diploma qualifications.



³ Green Skills Forum, announcement by Deputy Prime Minister Julia Gillard, M.P.; October 2009 and due for completion March 2010.

Ongoing research and development within the sustainability sector, combined with social and economic pressures for continued innovation, will result in frequent workplace changes. Collaboration between the SIEC and the Industry Associations will ensure all initiatives and modifications are identified and reviewed in light of their implications for sustainability training. This activity will entail:

- indepth examination of all Training Package units to assess current environmental sustainability requirements relevant to the building and construction, water and renewable energy industries;
- development of environmental sustainability competencies, including those required for the assessment of home sustainability and energy auditing;
- the creation of strategies to embed sustainability competencies across all building and construction trades; and
- use of university research to inform sustainable product, materials and process development and associated work related training.

2.1.5 New Courses and Skill Sets

The demand for workers trained in environmentally sustainable practices will require multi-disciplinary approaches to training and the creation of new courses and skill sets. TAFE lecturers, working with industry and the universities, have identified the following qualifications and skills for development:

- Applied Vocational Certificate in Sustainability
- Applied Vocational Diploma in Sustainability
- Graduate Diploma in Environmental Design
- Graduate Certificate in Water Leadership
- Diploma in Hydraulics
- Green Waste Management and the use of recycled materials
- Green Audit of domestic residences
- Grid Connect.

2.1.6 Training Pathways within SIEC

The innovative co-location of the four hubs (Design, Planning and Development; Renewable Energy; Water; Sustainable Materials and Green Waste) not only breaks down the traditional silos that have separated and isolated disciplines, it physically brings together education sectors and trades around the shared theme of sustainability. This proximity, with its resultant exposure to new ideas, opportunities, enterprises and workspaces, will foster learner collaboration within and across the disciplines domiciled in the SIEC hubs [FBC, 6.4.3] enhancing training opportunities and pathways in the process.

At the purely practical level, inter hub collaboration will connect students from across different disciplines for the joint delivery of:

- Environmental Sustainability Design (involving all hubs)
- Ground Water Testing (Water and Design)
- Installation Procedures in Building and Construction (Water, Renewable Energy and Sustainable Materials and Green Waste)
- Permeable Paving (Water and Sustainable Materials)
- Waste Management (involving all hubs)
- Scaffolding – Elevated Work Platform (Sustainable Materials and Green Waste)
- Storm Water Capture and Re-use (involving all hubs).

This multi-disciplinary approach to sustainability will create a workforce capable of contributing to the design, development and maintenance of a low-carbon economy [FBC, 3.2.1].

2.1.7 Pathways across the Three Education Sectors

Clear, accessible pathways between the school, VET and university sectors have long been a goal of State and Commonwealth governments. The SIEC model acts on this objective, linking school students with entry level qualifications to higher level skills training and employment in clean technologies [FBC, 4.2.6].

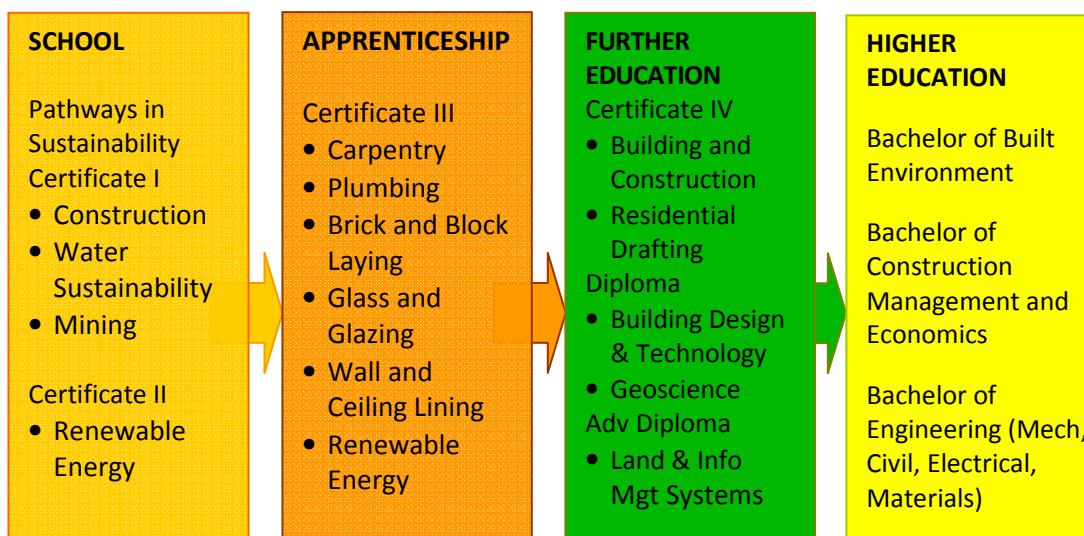


Figure 1: Examples of School to VET to University Pathway

The SIEC will provide a resource for school students studying the South Australian Certificate of Education (SACE); raise awareness of careers in building and construction, water, and renewable energy industries; and demonstrate – via its purpose built infrastructure – the importance of sustainable practices.

The SIEC will also ensure that students completing Diploma and Advanced Diploma qualifications have the opportunity to progress to university studies in the relevant disciplines. It will do this by:

- offering early career counselling and pathway advice;
- encouraging the development of e-portfolios, thus providing students with opportunities to:
 - reflect on work and VET based learning
 - develop career plans and strategic thinking skills;
- specifying credit arrangements that acknowledge prior learning on entry to Associate and Bachelor degrees; and
- providing aptitude testing opportunities (such as the now validated ATN Test used for engineering programs) for program entry to improve the likelihood of success.

New places in Associate Degrees (engineering and built environment) will be made available to students in SIEC progressing directly or indirectly (e.g. through work experience) from TAFE to university. A transition committee, comprising industry association members and university and TAFE staff, will monitor graduate employment targets and accreditation requirements to ensure the best possible educational and employment outcomes.

This movement from one education sector to the other will not be one way. Just as VET students will be exposed to broader design and development concepts and provided with opportunities to progress to university studies, so too will higher education graduates have the chance to develop specific, practical workplace skills by accessing TAFE courses delivered within the SIEC. The SIEC will actively promote this pathway – both in its dealings with graduate students and its liaison with industry professional development programs.

Figure 2 shows the range of programs from which university students might access VET courses in SIEC to develop sustainability skills.

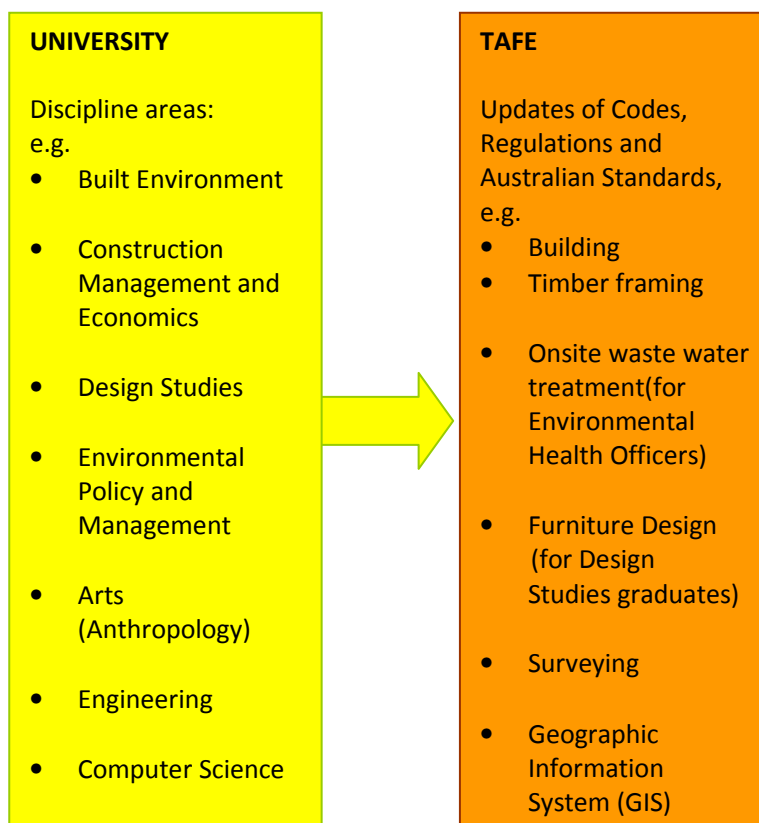


Figure 2: Examples of University to VET reverse pathway

2.1.8 Social Inclusion Initiatives

The Council of Australian Governments (COAG) Participation and Productivity Agenda is committed to enhancing educational, labour market and social participation – a goal that requires the identification and removal of barriers and the facilitation of socially inclusive policies and procedures.

Educational and workplace obstacles facing Australians are many and varied – one of the most significant, however, was highlighted in the Adult Literacy and Life Skills 2006 Survey – the findings revealing that 40% of existing workers and 60% of unemployed Australians have less than effective English language, literacy and numeracy skills.

The Commonwealth government’s target of increasing the proportion of the 25-34 year old population with a Bachelor degree or higher by 2025 to 40% in response to the Bradley Review, is another challenge and will, of necessity, involve attracting a generation of students whose families do not have a background in higher education. SIEC can play a significant role in improving the transition to higher education of VET graduates. These first generation higher education and VET students will require particular support: peer encouragement, group and experiential learning, and learning/study assistance programs where required. The SIEC will be specifically designed to provide such an environment, delivering appropriate, timely and tailored levels of learning support.

The National VET Sector Sustainability Policy and Action Plan (2009-2012) acknowledges the challenges listed above and recognises the importance of promoting social inclusion through the creation of learning and career pathways: the latter encompassing the development of articulation arrangements between the secondary and tertiary sections [Action 2.2.3.4].

In line with the case management strategies articulated in the *Skills Strategy for South Australia's Future* the SIEC will implement each of these policy directions by having Customer Service Officers (CSOs) work with low skilled employees, disadvantaged and disaffected learners and 'new' inexperienced learners at the point of entry. CSOs will oversee the design of learning plans that incorporate timely and appropriate literacy, numeracy and language support. Unlike traditional assistance programs, the SIEC will integrate basic literacy development into the learner's specific field of training: the learning package aligned to jobs within the sustainability sector.

The extensive nature of the language, literacy and numeracy support will prepare those who are educationally disadvantaged for higher level education and training in a number of discipline areas.

Industry and SIEC funded Equity Scholarships will be available for learners from low socio-economic backgrounds.

2.1.9 First Contact

Customer Services Officers are the individual's first point of contact. These highly trained, experienced and knowledgeable professionals provide information about all aspects of the SIEC including its training programs, course combinations and opportunities, facilities, learning supports, delivery mechanisms (this encompasses an introduction to e-learning and use of online resources), the Knowledge Management Centre, assessments, Recognition of Prior Learning and general advice and assistance.

The Customer Service Officer – rather than lecturer and program facilitator – is responsible for the creation and refinement of individual learning plans.

2.1.10 From Theory to Practice

The case studies that follow illustrate the pathways, opportunities and learning support mechanisms that will be available within the SIEC.

SIEC Case Study 1: Pathways

Bob is neither academically focused nor gifted and finds most of his classes boring and irrelevant. Seeking what he believes to be an easy option he undertakes a Certificate I in General Construction (Specialising in Wood Trades - Carpentry, Furnishing and Joinery) through a VET in Schools arrangement with the local campus of TAFE SA. For the first time during his secondary education he actually enjoys classes, discovering that he has an aptitude for learning when the content is practical, active and hands on.

His TAFE lecturer, noticing his interest in the area, tells him about SIEC.

Bob's first visit to the SIEC involves a lengthy meeting with a Customer Service Officer, the creation of a learning plan and his first exposure to e-learning. He's a little nervous about the prospect of using computers to learn but excited by the possibilities of studying a pre-vocational Certificate II in General Construction. He enrolls in the program but quickly encounters difficulties with the maths. He's not sure whether he has the skills to continue, however his lecturer and the Customer Service Officer come to his aid, providing support through the SIEC Learning Commons Maths for Trades learning support program. The program is directly related to his Certificate II and integrates maths training with his Certificate II so he is not singled out for special attention. And, much to his surprise, he finds the use of e-learning, with its strong connection between theory and practice, interesting and easy to use. He eventually completes his training and gains an apprenticeship with a local builder.

Bob's boss, Sam, employs a small team and Bob learns a great deal from observing and working with the other trades people. Bob is a bit of a 'greenie' and, through his employer's membership of the MBA and the organisation's links to SIEC, he receives information about sustainable building and training courses. Having enjoyed his experiences at the SIEC he decides to enrol in a number of short courses while he's completing his apprenticeship – courses delivered over the weekends and in the evenings. The subjects he chooses provide him with the knowledge and skills he needs to select and use sustainable building materials and manage green waste. The training he acquires makes him highly employable.

After a few years of working in the industry, Bob decides to branch out. He is now a confident tradesman with an interest in learning about his profession. He not only enrolls in the Diploma of Building Design and Technology, he decides to open his own small business. In order to do so, however, he is required to be licensed under the Building Work Contractors Act 1995. He subsequently enrolls in the two business electives:

- Establish business, legal and risk management requirements of small business; and
- Undertake financial planning, plan small business finances.

Once again Bob's studies combine an interesting and sometimes challenging array of experiences and approaches. Hands on workshops, small group activities, online and self paced learning, presentations, lectures and research and, throughout it all, constant contact with people in related industries and regular access to the four sustainable industry hubs. Everything in his studies relates directly to the construction industry and to his own developing business. Becoming a Licensed Builder is, for Bob, one of the most rewarding and significant things he has ever done. At the professional level, he knows that he is part of a network of tradespeople, builders and designers who work in the same industry and experience the same business pressures. The SIEC connects and maintains the network.

Years pass and Bob decides that he needs to update and further develop his skills. He therefore enrolls in an Advanced Diploma in Spatial Information Services. He meets with the SIEC Customer Service Officer who informs him that he's eligible for Recognition of Prior Learning (RPL) and arranges an appointment with the learning assessor – the latter finding that Bob meets 40% of the Advanced Diploma requirements. With access to on-line resources available through SIEC, Bob fast tracks his completion of the remaining units with outstanding results.

Having received his Advanced Diploma, Bob earns a place in the Associate Degree in Built Environment offered by the University of South Australia through the SIEC. For Bob, who has always thought that University was the exclusive domain of really smart kids who scored lots of points in year 12, the knowledge that he is eligible to undertake higher education is not only reaffirming, it is too good to resist. Bob studies part time to complete the Associate Degree. In the meantime, his building business continues to prosper and he is now employing apprentices and tradespeople and providing services in environmentally sustainable construction. Bob uses his knowledge and skills in spatial information services to survey building sites and provide data for sustainable energy and water usage design solutions – solutions that characterise the work of global Quantity Surveying organisations.

CONCLUSION

The critical mass of SIEC enables:

1. Learning support to relate directly to the course of study;
2. Learning support to be integrated into theory and practice and not embarrassingly visible or marginalised;
3. Business Skills Development within a familiar environment directly related to the industry; and
4. Individual trades people to maintain contact with their trainers and peers.

SIEC Case Study 2: Up-skilling Options

Pete has worked as a tiling sub contractor for a number of years and, over time, has developed an interest in establishing his own bathroom renovation business. He knows, from reports in the paper, that the Office of Consumer and Business Affairs (OCBA) is concerned about the number of botched bathroom renovations performed by unlicensed tradespeople and he has no intention of becoming one of their number.

Pete wants to offer a quality service; one that focuses on sustainability and water saving techniques, uses and promotes efficient and reliable products and practices and provides customers with a positive experience of 'the trades'. In order to do this he realises he'll have to manage the renovation process from start to finish – a task that requires knowledge and skills in design and planning, costing, quoting, the use of environmentally sustainable materials, fixtures and fittings, project management ...

By the time Pete's listed all the skills required to set up a viable, environmentally friendly business he feels quite despondent. But then he remembers his friend Bob and the successful business he'd created. A phone call to Bob leads him to the SIEC – a place his friend describes as 'a one stop shop training centre for the 21st century'. Bob tells him that SIEC doesn't just focus on teaching about sustainability, it demonstrates it through learning hubs, research areas and purpose built design features. If Pete's serious about starting an eco-friendly bathroom renovation business, then Bob says there's no where better for him to go.

Pete arrives at the SIEC knowing exactly what he wants to achieve but with only a vague idea as to how to get there. The Customer Services Officer talks to him about his goals, employment history and prior training and works with him on developing a specific learning plan that includes:

- Sustainable water and energy management practices;
- Selection of environmentally sustainable materials, fixtures, and fittings including water saving taps, showerheads and dual flush toilets; (This is a short course offered at SIEC for business owners who want to advise their customers how to save energy, water, and the environment.)
- Business units on project management including financial units for small businesses;
- A specialist course in Green Waste Management to enable him to sort, recycle and dispose of various used building materials.

Studying through the SIEC not only involves Pete in a diverse array of learning experiences, it provides him with a network of qualified, reliable, professional tradespeople who share his commitment to sustainability – tradespeople he'll be able to use in the future. Indeed, one of the many things he learns is that he'll need to subcontract work to a licensed green plumber – a number of whom he meets at the SIEC.

CONCLUSION

The SIEC enables sole operators and sub contractors to up-skill, commence new business ventures and:

1. Gain the business acumen to establish small businesses employing apprentices and tradespeople;
2. Develop professional networks of qualified and reliable tradespeople;
3. Acquire the specialist knowledge required to advise customers on Green issues; and
4. Maintain a sustainable and profitable business through ongoing interaction and professional development with SIEC.

2.2 SIEC Innovation Model

The SIEC Innovation model, depicted below, combines research, enterprises and training in a unique, collaborative arrangement that will produce substantial benefits not just for the three sectors concerned but for the population of South Australia.

University research, for instance, will inform product development and testing with enterprises supplying the materials, products and systems for analysis, review and improvement. Industry input into current and future directions will be critical.

TAFE, in turn, will interact with enterprises and the universities, providing commentary on products and prototypes, analysing the knowledge and skills required for effective application and identifying possible training implications.

As each sector analyses, reviews and incorporates the comments of their SIEC collaborators, the South Australian public benefits from the advances in sustainable technology, the up skilling and state of the art training of employees, and further refinements and innovations in education and training.

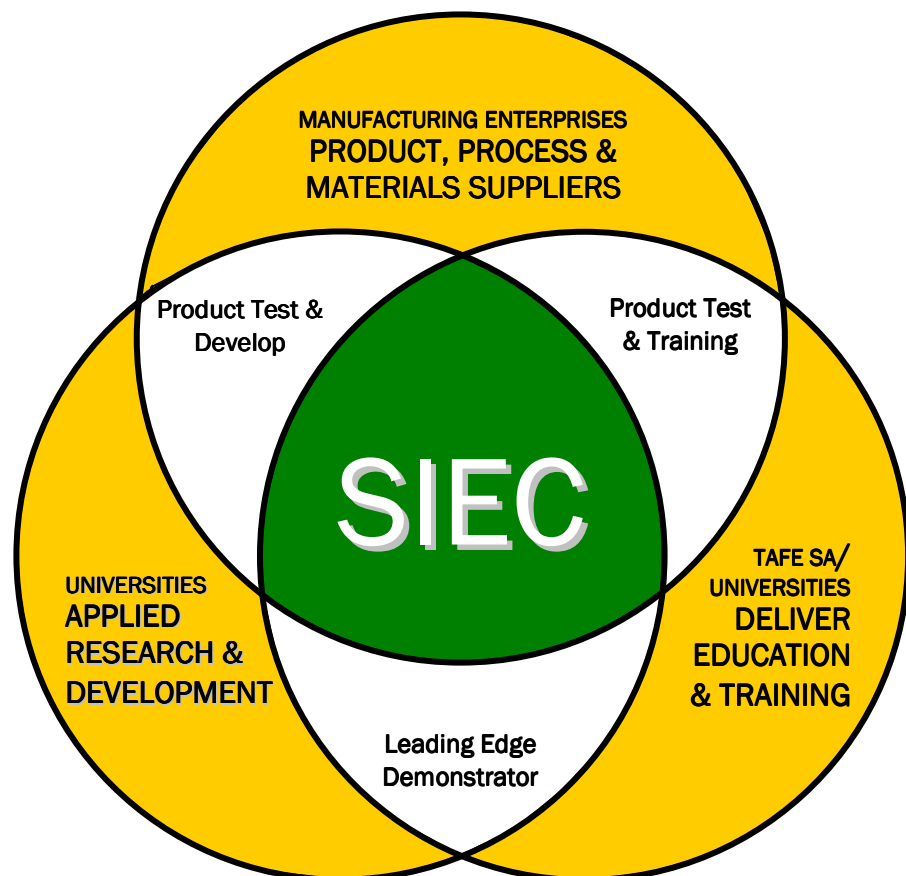


Figure 3: The SIEC Innovation circular model linking research to enterprises to training to research

2.3 SIEC Business Development

The educational drivers identified in Section 1.3 demonstrated the significant shift occurring in the VET sector; workplace learning, training responsive to industry and directly linked to workforce development, increased competition, contestable resourcing arrangements, and the adoption of a business/service orientation.

In light of these changes and the unique possibilities presented by the SIEC educational model, a business and associated marketing plan will be developed for the Centre with a Business Development Manager appointed to oversee all commercial endeavours.

The Business Development Manager will:

- promote all SIEC products;
- attract enterprises to display leading edge materials, processes and products;
- connect enterprises with teaching staff for the design and delivery of tailored training;
- project manage annual SIEC conferences and quarterly seminars;
- maintain linkages and pursue opportunities with the wider Clean Tech Precinct; and
- promote SIEC to schools to maximise pathways.

The manager's achievements will be assessed against such measures as:

- commercial activity as measured by revenue and margin;
- visitor flow through the building – this may include visits by school students; attendance at industry exhibitions; product demonstrations; industry seminars, information sessions
- post trade qualifications delivered;
- enterprises “signing up” through the SIEC web site; and
- volume and quality of favourable press.

2.3.1 Measuring SIEC Performance

It is no longer sufficient to measure training success by how participants feel about their studies, the number of student hours generated or even the unit costs of those hours.

In today's more results driven environment there is a growing expectation that training will deliver economic, strategic and/or competitive value on every investment; and that it be assessed on its business application and achievements.

To fulfil this requirement, SIEC will need to do much more than produce better training courses (although this will occur). Rather than replicate existing systems, the SIEC will develop quantitative performance measures focusing on all aspects of its operation.

2.3.2 SIEC Customers and Stakeholders

SIEC customers fall into the following six inter-related stakeholder categories. Identifying each stakeholder and their specific needs, interests and requirements will enable SIEC to provide timely, appropriate and tailored services.

1. **Individual students and trainees** employed in or wishing to enter employment in:
 - building and construction;
 - related professions and vocations (e.g. engineering and landscaping); and
 - suppliers of products, materials and processes to building and construction industries.

2. **Enterprises providing services to the B&C industry** including:
 - licensed builders (small and large);
 - contractors and sub contractors covering over 20 B&C related trades and vocations; and
 - professional service enterprises (e.g. architects, engineers, planners, quantity surveyors etc).

3. **Enterprises supplying products, materials, processes and technologies to the B&C industry.** These enterprises may be represented directly or through such associations as the:
 - Brick and Block Laying Association of Australia;
 - Wall Tiling Association of Australia; and
 - Glass and Glazing Association of Australia.

4. **Industry and Professional Associations** represent relevant groups of employers including, among others:
 - Master Builders Association;
 - Plumbing Industry Association;
 - unions involved in the industry (e.g. CFMEU);
 - associations of manufacturers and suppliers to the industry; and
 - associations covering the professions in B&C (e.g. architects, engineers, planners, quantity surveyors etc).

5. **Government, Commonwealth and State**, whose status as customer is derived from inter alia:
 - regulator of the building and construction and water industries and national and state training markets;
 - various agencies responsible for licensing across B&C;
 - relevant National Skills Councils;
 - employer in the industry;
 - owner of SIEC; and the
 - facility provided by SIEC as one of a number of instruments for the implementation of related economic, sustainability and Industry policy.

6. **Training Intermediaries**, organisations who will recommend the buying of SIEC training. This includes organisations such as:
 - employment and training brokers;
 - Construction Industry Training Board;
 - Regional Development Boards;
 - schools; and
 - Group Training Schemes.

2.3.3 SIEC Marketing Strategies

Whilst the marketing plan has yet to be developed, it is anticipated that the following items will form part of its platform.

a) Conferences and Seminars

As one of the nation's most innovative and interactive purpose built 'green' facilities, the SIEC will be ideally placed to host annual national and international sustainability conferences, conduct seminars (three a year) and deliver targeted workshops.

These events will be designed to:

- showcase research, demonstrate best practice, display new technology applications and promote learning and business strategies;
- explore global sustainability developments and issues;
- target areas of critical concern to the industry;
- attract recognised leaders within various industry disciplines;

- provide practical support via 'how to' sessions;
- create a more efficient marketplace by bringing together all SIEC customers to facilitate valued and long-term partnerships;
- provide customers with multiple opportunities and ways to reach business prospects (networking);
- assist corporate and government executives with the development of significant training and business strategies and initiatives;
- present case studies of partnerships for developing, delivering, and managing learning services and industry developments; and
- provide participants with new knowledge, tools, contacts and/or practices that will enable them to make a difference.

Such activities will expose SIEC teaching and research staff to the realities of working in sustainability and green skills industries and provide a forum in which they can display their workplace initiatives and practices.

At the local level, workshops and public events will target more specific education and training issues: e.g.

- articulation between school/TAFE/university;
- career advice, personal learning plans, lifelong learning and professional development;
- industry related interests;
- the showcasing of careers in building and construction resulting from successful completion of TAFE/university programs;
- opportunities for international students; and
- formal industry evaluations of TAFE and university teaching and learning content and methodologies.

For the wider community there will be sustainable skills workshops, information sessions and demonstrations of new technologies within domestic and commercial situations.

It is worth noting that although there is a growing trend in America to deliver seminars online – and there are distinct advantages in doing so (less expense; participant convenience; higher return on investment) – the value of physically bringing industry practitioners, specialists, researchers, trainers, learners and government representatives together to explore sustainable practices in a purpose built environment should not be under-estimated.

b) Newsletters, Case Studies and CRMS⁴

The conferences, seminars and workshops described above will be promoted and reviewed in the quarterly electronic newsletter – a newsletter that will also contain articles on innovative practices; successful collaborative ventures and partnerships; individual achievements; industry/university and TAFE ventures; e-learning possibilities; changes in legislative requirements; customer testimonials; examples of multi-disciplinary activities and solutions; and case studies.

Case studies provide a useful tool for conveying the myriad possibilities associated with the interdependent and interrelated services and products available through SIEC. The more objective and factual the case study, the more effective its impact. Ideally the SIEC will obtain proprietary permissions to include specific details about a number of different projects – some that work, others that don't – and the factors that led to the outcome.

The SIEC web site (described below) will not be just an information dissemination tool. It will also collect customer information, although in order to do so the individual needs to sign up to receive the electronic newsletter. The details they provide will be automatically fed into the database that will sit behind the SIEC CRMS.

⁴ CRMS, Customer Relations Management System

c) **SIEC web site**

The SIEC web site will provide opportunities for:

- website sponsorships;
- e-mail marketing;
- Google Adwords;
- search engine optimisation;
- direct mail;
- banner advertising; and, of course,
- customer feedback.

d) **Promotional Inducements**

The Exhibition Centre is an important part of the overall learning environment: it offers enterprises the opportunity to display new products, features and systems; it provides lecturers and learners with a physical resource to observe and evaluate; and it presents the general public and other visitors (e.g. school students) with information and ideas about 'green' developments.

Given its importance, the SIEC will provide promotional inducements (to be detailed in the marketing plan) to enterprises choosing to establish displays in the Centre. These may include:

- discounted training places for employees;
- short courses/retraining/up-skilling courses focused on specific proprietary products, materials, processes and technologies; and
- preferential or subsidised short term exhibitor rates.

e) **Referral Generation**

As with all businesses, customer referral will play a major role in attracting new clients. Assuming that the service delivered by SIEC fulfils all expectations and that employers, employees and enterprises are well satisfied with the Centre, incentives could be offered to those who referred new customers e.g.:

- bulk discounts for large customers; and
- rewards (to be determined) for individuals who refer friends, colleagues etc.

f) **Marketing for Sales and Success**

Section 2.3 described the need for business development – a function that will be critical to SIEC's ongoing success. Whilst many of the activities that fall within this brief rely on networking and the creation of interdisciplinary partnerships and collaborative arrangements, there is nonetheless a clear need for more traditional approaches e.g.:

- professional brochures and catalogues;
- a dynamic, attractive and user friendly website;
- a suite of professional sales tools; and
- integration of mail, email, and sales to maximise response rates.

2.4 Work Practices

SIEC is intended to be the exemplar of sustainability in practice; a model of collaboration, cooperation and innovation in learning, research and application.

Fulfilling these ideals will require significant changes in work practices: changes that have not been possible in the current environment with its disparate delivery sites, ageing and inflexible infrastructure and traditional separation of disciplines.

The first and most important step towards achieving the vision underpinning the SIEC is ensuring staff have the knowledge, skills and confidence to work effectively

within the new, purpose built, multi-disciplinary workspace. TAFESA has thus developed a three year workforce development plan for staff within the business and construction programs to:

- up skill all personnel e.g. in new educational principles and practices; cross discipline delivery; e-learning; educational assessment; RPL processes; use of the Knowledge Management Centre etc;
- promote understanding of, and support for, the 'SIEC Sustainability and Safety Code of Practice' throughout the organisation;
- facilitate culture change by eradicating silos and organising cross discipline functions;
- develop workplace analysis and skill identification competencies;
- develop curriculum preparation skills – to ensure staff can respond to multi-disciplinary delivery responsibilities;
- maximise the use of SIEC space in/for learning;
- integrate demonstrator opportunities in delivery; and
- clarify staff roles, responsibilities, individual learner pathway options, work placement and employment, nature and function of support mechanisms

With this degree of extensive preparation, SIEC staff will be able to:

- utilise new teaching methodologies that allow for greater self directed learning (and reduce the need for face to face attendance);
- use e-learning tools and resources to link theoretical components of training to workshop and workplace activity;
- employ blended and flexible modes of delivery to address individual learning needs;
- increase the number of work based assessments;
- offer fast track delivery options (where learners' meet licensing requirements);
- access and employ better processes for RPL;
- collaborate with colleagues across disciplines on different aspects of delivery; and
- organise the delivery of generic competencies (e.g. health and safety, safe work practices, business and communication, team skills etc.) to learners from across different program areas to achieve larger class sizes and better utilise the facility.

Timetabling for the complete facility will pose some interesting challenges – and not just because of the multi-disciplinary nature of the workplace design, the focus on independent and inter-dependent learner directed study, and the use of workshop spaces to reinforce learning. Unlike current VET facilities, the SIEC will have extended opening hours, adopting a 'two shift' model to ensure learners and industry are able to access resources, support and training at times that meet their needs. This particular issue will be addressed in parallel with the design and construct elements of the project.

3. THE PHYSICAL INFRASTRUCTURE

3.1 Design Influences

Significant research has been undertaken on the 'learning' impact of Information, Communication and Educational Technologies. In recent years this has extended into an analysis of the impact of the physical environment and the relationship between pedagogy, space and technologies.

Most recent investigations into learning environments have been conducted by ICT research organisations such as Educause⁵ in the USA (and the Joint Information Services Committee (JISC)⁶ in the UK. Their findings, demonstrating the impact of technologies on both the physical environment and learning experience, have prompted a new approach to design.

Collaborative teaching and learning space development at Massachusetts Institute of Technology (MIT), the University of Queensland and the University of Melbourne, coupled with the Australian Science and Mathematics School at Flinders University, has seen a radically different pedagogical practice emerge – a practice that has influenced the work of architects and designers tasked with creating educational environments.

The creation of learning spaces for the engineering discipline at MIT has particular relevance to the SIEC. MIT focuses on the co-location of Conceive, Design, Implement and Operate Spaces to ensure all key elements of the engineering project cycle are integrated in the learning process. The four hub design proposed for SIEC embraces this concept. Similarly, SIEC's learning model, like that of MIT, will be based on:

- increasing active and hands-on learning;
- problem articulation and solution; and
- exploring the underlying concepts of the tools and techniques of multi-disciplinary sustainability initiatives.

The facility layout and infrastructure – both essential components of the learning framework – will be used to maximise opportunities for:

- cross curriculum collaboration and multi-skilling;
- thematic interdisciplinary approaches to complex problem solving; and
- the use of ICT to support innovative approaches to teaching and learning.

The innovative educational vision of the SIEC requires an appropriate infrastructure – one that will essentially reshape the delivery of education and training to the building and construction industries in SA. In this new model:

- all TAFE SA building and construction programs will be co-located onto the one site to maximise synergy between programs;
- new partnerships and advisory arrangements will occur to ensure industries and enterprises have input into SIEC's management and are able to provide advice on training and workforce development needs;
- a high speed optical fibre broadband network will provide an IT rich environment – this will
 - support increased accessibility;
 - provide links to a network of existing educational providers;
 - enable provision of extensive e-learning resources, thus promoting

⁵ <http://www.educause.edu/Resources/Browse/LearningSpaceDesign/17436>

⁶ <http://www.jisc.ac.uk/whatwedo/programmes/elearningpedagogy/elpconference08/presentations/Theme%201/S1%20discussion%20summary.aspx>

- autonomy and self directed learning;
- there will be space for industry to demonstrate new products and services and deliver sustainability related training programs;
- industry's on site presence will facilitate stronger TAFE/enterprise connections and enhance trainer understanding of enterprise needs; and
- flexible design principles will allow space to be reconfigured as teaching and learning needs change.

3.2 Co-location and Linkages

Co-location and linkages between the Design, Planning and Development, Renewable Energy, Water, Sustainable Materials and Green Waste hubs is fundamental to SIEC's design and will support sustainable building processes and associated training requirements.

The SIEC facility will include Exhibition and industry spaces – locations to be shared by enterprises, Registered Training Organisations and TAFE SA. The close proximity of these different organisations will enable each to receive regular updates on innovative sustainability products and practices and to respond accordingly (i.e. by working together on the development of new competencies).

The facility will deliver sustainability training across all levels of qualifications and short courses. It will provide the building and construction workforce with the tools required to facilitate the design, installation and maintenance of structures that demonstrate best practice in sustainability.

Sustainability concepts and technologies will be embedded throughout training. And, as new products and applications emerge from R & D and are tested and trialled within SIEC, so too will appropriate and timely training be developed to meet workforce needs.

3.3 Demonstrator Elements

The SIEC, as mentioned elsewhere, is not simply a building in which learning occurs; it is an educational tool designed to demonstrate clean technologies and to inspire and intrigue those who observe its inner workings. The core of the building will be transparent, enabling learners (and visitors) to watch the intricacies of the pipe and electrical infrastructure. Furthermore, learners will be able to physically interact with their surroundings by intervening in its operation and monitoring the impact of their actions on building performance.

The demonstrator elements of the building to be used in teaching are many and varied and include:

- filtering of air through vegetation;
- oxygenating reed ponds;
- living walls to serve as filters and insulation;
- operable windows and natural ventilation where appropriate;
- biomass plant to produce carbon neutral electricity, heating and cooling;
- green waste and carpentry wood chip as fuel for the biomass plant;
- wind turbines and solar photovoltaic panels for renewable energy generation on site;
- solar thermal panels for hot water demand;
- efficient energy fixtures;
- maximise daylight harvest;
- efficient lighting;
- efficient water fittings and fixtures;
- wetted roof reducing cooling demand;
- rainwater capture and reuse for potable demand;
- reuse of recycled water for non-potable demand;

- rainwater tanks to be used as thermal mass;
- permeable paving;
- bio swales to treat stormwater;
- reuse of phosphorous and nitrogen captured by bio swales and stormwater treatment;
- reuse of materials;
- reduction of materials by using standard dimensions;
- recycling area and waste elimination systems; and
- worm farm to reuse organic waste and produce compost for landscaping

As an exemplar of sustainability practice, the SIEC will be continually enhanced to display the latest in leading edge technologies, products and processes.

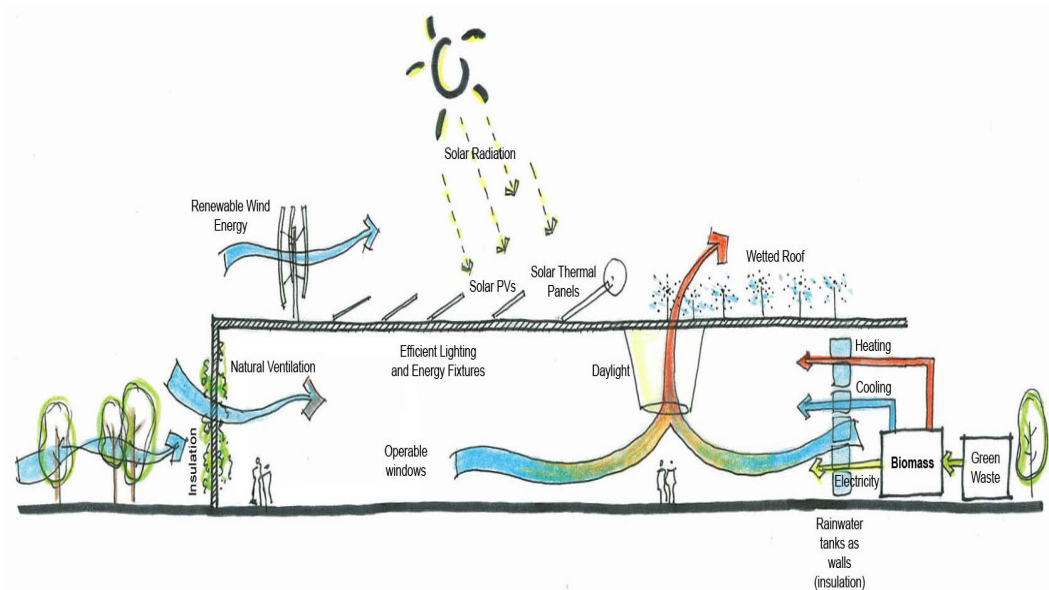
3.4 SIEC Equipment

The table on the following page summarises the major equipment required to deliver vocational education and training at the SIEC. It includes costs associated with relocating existing equipment and the acquisition of new items.

Cost estimates in this table are:

- at current prices;
- escalated in the financial model; and
- a combination of vendor advice, existing plant values and recent acquisitions .

Location in the specific SIEC hub is indicated on the table.



3.4.1 SIEC Equipment Estimate

Project Element	Site	QTY	\$/Unit	Estimate	\$ Sponsor?	\$ Project
Renewable Energy Hub	Clovelly					
fixed frame photovoltaic solar array, inc test points.		1	125,000	125,000		
tracking photovoltaic solar array, solar tracking, inc test points.		1	175,000	175,000		
wind generator, tilting mount, inc test points.		1	250,000	250,000		
inverters, data log/control systems suitable for student use						
	Supply & Install			550,000	(140,000)	410,000
	Clovelly					
Water Industries Hub						
Solar Heating training systems		1	60,000	60,000		
Water conservation (WELS rated valves, tap ware, trg systems)		1	80,000	80,000		
Hydronic / Geo-thermal heating		1	125,000	125,000		
Rainwater Tanks, pumps & associated metering equipment		1	75,000	75,000		
Grey water training systems (Clearview components)		1	100,000	100,000		
Wastewater training systems (Clearview components)		1	100,000	100,000		
Water Ops training - lab equipment for water quality testing		1	250,000	250,000		
Relocate Expense				20,000		
	Supply, Install & Relocate			810,000	(125,000)	685,000
	Clovelly					
Design, Planning & Development Hub						
Take existing specialist equipment. drawing boards, specialist ICT equipment and software, outdoor (field) equipment						
	Relocate			25,000	0	25,000
	Clovelly					
Sustainable Materials & Green Waste Hub						
(1) Waste Management – Shredder Briquette Maker, connected to . .		1	175,000	175,000		
(1) Wood Working Machinery Dust Extraction System		1	850,000	850,000		
(1) Waste Paint and Separation Systems		1	450,000	450,000		
Solvent Recovery System (inc in construction cost)		1	50,000	0		
CNC Beam Saw		1	125,000	125,000		
CNC Router		1	200,000	200,000		
CNC Straightening Moulder		1	170,000	170,000		
Rip Saw		1	28,000	28,000		
Surface Planer 2 x \$20,000		2	20,000	40,000		
Panel Planer		1	30,000	30,000		
Bandsaw 3 x \$15,000		3	15,000	45,000		
Re Saw		1	125,000	125,000		
Overhead Routers 3 x \$50,000		3	50,000	150,000		
CNC Edge Bander		1	120,000	120,000		
Scissor Lift Trim Upholstery Table x 18		1	5,000	90,000		
Scissor Lift Glazing Tables x 12		1	5,000	60,000		
EWP Scissor Lift		1	85,000	85,000		
Boom Lift		1	80,000	80,000		
Scaffolding/Edge Protection		1	30,000	30,000		
Aluminium Cut Off Saws 2 x \$25 K ea		2	25,000	50,000		
Aluminium Router		1	30,000	30,000		
Aluminium Profiler		1	45,000	45,000		
CNC Glass Edger		1	85,000	85,000		
Glass Tilt Tables 2 x \$8 K ea		2	8,000	16,000		
Borer/Inserter 2 x \$8 K ea		2	8,000	16,000		
Post Former		1	30,000	30,000		
Copy Lathe		1	85,000	85,000		
CNC Fabric Cutter		1	120,000	120,000		
Sewing Machines x 15 Trim Upholstery		1	6,000	90,000		
Fork Lift 2 x \$90K ea		2	90,000	180,000		
CNC Sign Cutter		1	120,000	120,000		
Sand Blaster		1	85,000	85,000		
Mortar Mixers 3 x \$30,000 ea		3	30,000	90,000		
Brick saws 5 x \$5 K		5	5,000	25,000		
High Frequency Fabric Welder		1	75,000	75,000		
Flammable Liquid Storage Cupboards 15 x \$3 K ea (inc in		1	3,000	0		
Paint Mixer and Specifier		1	85,000	85,000		
Floor Sanders Belt 2 x \$10,000		2	10,000	20,000		
Rotary Floor Sanders 2 x \$10,000		2	10,000	20,000		
(1) Spray Booths 2xpolish, 1 paint,1upholst, 1 trim		5	100,000	500,000		
sub Total				4,620,000		
plus Relocate Expense				20,000		
less 15 % for items relocated				(471,750)		
less trade ins				(71,000)		
less 10% efficiency factor for installation during construction (1)				(197,500)		
	Supply, Install & Relocate			3,876,250	inc in pricing	3,876,250
	Clovelly					
SIEC ICT Equipment						
New & relocate desk tops, racks, switches, routers and servers.				1,394,000		
wireless technologies, 802.11g compliant (or better)						
cabling CAT 6 or better						
WAN/LAN technologies						
SABREnet connection						
Standard SOE for students & staff						
E-Learning software						
	Supply, Install & Relocate			1,394,000	0	1,394,000
	Croydon					
Heavy Transport						
No new items, all relocate						
60 Items of Fixed Equipment						
30 Items of Mobile Equipment Falcon sedan > Excavator relocate						
	Decommission, Relocate & Re-install			150,000	(40,000)	110,000
	TOTALS			5,551,250	(305,000)	6,500,000

3.5 Pathways from SIEC Hubs

3.5.1 Water Industry Pathways

Workforce Development and Sustainability Needs	Water and Plumbing Industry Related Training Requirements (Qualifications/Courses)	How Does the Infrastructure Address the Needs
<p>Requirement for a greater number of VET in Schools courses need to be auspiced by TAFE SA</p> <p>Lack of identified pathways from School to VET</p> <p>Links to existing environmental courses</p>	<p>Cert I in General Construction (Plumbing) Pre-Vocational VET in Schools</p> <p>Cert I in Water Sustainability (Vet in Schools) Basic water cycle, safety, testing</p>	<p>New facility will showcase and promote VET provision to the school sector and provide pathways that have a sustainability focus</p> <p>Feeder sites will reach a wider audience</p> <p>Auspicing agreements with School sector – Trade Schools for the Future and Trade training Centres</p>
<p>Increased capability to provide water industry training to SA water utilities</p>	<p>Cert II in Water Operations (Traineeship) Environmental procedures, testing, flow control, storage and distribution systems, maintenance</p>	<p>Water Industry Training facility to grow the SA capability to provide water industry training</p>
<p>Requirement for sustainability to be included into all courses e.g. co-generation for gas fitters</p>	<p>Cert III in Plumbing (Apprenticeships and School Based Apprenticeships)</p>	<p>Incorporate sustainability into all units Increase in workplace learning and assessment</p>
<p>Requirement for sustainability to be included into all courses e.g. on site waste water treatment Flexibility in delivery Improved access for regional students</p>	<p>Cert IV in Plumbing (to meet licensing requirements and registration)</p>	<p>Greater flexibility in delivery inc E-Learning</p>
<p>Large number of existing workers without current qualifications</p> <p>Demand from water utilities, local government and industry sectors Staff turn over 10% per year</p> <p>Demand for wider range of competencies than is currently offered</p>	<p>Cert III and IV in Water Operations Test, commission, operate, analyse, control, rectify Treatment, networks</p>	<p>The SIEC focus on water and key partnership with SA Water will grow the SA capability to provide water industry training</p> <p>The SIEC facility will enable a 16% increase in training output including water industry training</p>
<p>Demand for wider range of competencies required to meet specialist skill sets e.g. Diploma in Hydraulics</p>	<p>Diploma of Plumbing Services Plumbing Fire Mechanical Services Management</p>	<p>The use of flexible learning methodologies by SIEC will enable thin markets and specialist skills training to be addressed</p>
<p>Shortage of Para-professionals with qualifications that bridge the gap to university qualifications</p>	<p>Diploma in Water Operations Environmental management policies, plans, procedures Catchment, groundwater management Irrigation operation and maintenance Potable water management</p>	<p>Delivered in partnerships with industry utilising SIEC learning spaces</p>

Water Industry Pathways (cont)

Workforce Development and Sustainability Needs	Water and Plumbing Industry Related Training Requirements (Qualifications/Courses)	How Does the Infrastructure Address the Needs
Lack of pathway to leadership positions	Graduate Cert in Water Leadership Water organisation development Planning, project development, network planning Water and waste water sustainability Water treatment plant technology	To be delivered by a university in partnership with TAFESA Provision of pathway to leadership positions
60 desalination plants, public and private in SA Application of new technologies, products and system design linking plumbing and water industry skills	Water/Plumbing Related Desalination technologies Stormwater harvesting Syphonic drainage Roof plumbing – installation of systems Water Storage, treatment and re-use Grey water systems Dual reticulation Codes and standards Applications – plumbing system design within buildings	Provides the links between the Plumbing Industry and the Water Industry Grows the capability of TAFE SA
'Green' Plumbing courses required for existing workers	Short Courses Solar, Heat Pump and 5 Star Gas hot water systems, Electrical controls, irrigation systems, pumps, storage and water recycling systems Licensing requirements Eco-smart Plumbing Water conservation Energy efficiency Waste water systems Product Information	Delivered in partnerships with industry utilising SIEC exhibition and learning spaces Collaboration with the Plumbing Industry Association, State licensing authorities, technical regulators and suppliers to the industry
SA Water regulator Environmental Health Officers and Inspectors	On site waste water treatment and re-use Australian Standards	SIEC will have a focus on the water industry and will provide for closer relationships with water utilities and local councils

3.5.2 Sustainable Materials and Green Waste Pathways

Workforce Development and Sustainability Needs	Sustainable Materials and Green Waste Skills Training Requirements (Qualifications/Courses)	How Does the Infrastructure Address the Needs
<p>Requirement for a greater number of VET in Schools courses need to be auspiced by TAFE SA</p> <p>Lack of identified pathways from School to VET</p> <p>Links to existing environmental courses</p>	<p>Cert I in General Construction Bricklaying, Carpentry, Joinery, Tiling, Plastering, Wall & Ceiling Lining, Cabinet making, Glass & Glazing, Floor Covering, Furnishing</p>	<p>New facility will showcase and promote VET provision to the school sector and through auspicing arrangements provide pathways that have a sustainability focus</p> <p>Governance arrangements will have relevant State Industry Associations (CITB) representatives to promote engagement and pathways</p>
<p>Increased capability and capacity required to provide industry relevant training to construction industry in SA</p>	<p>Cert II in Construction Sign writing, Civil Construction, Paving, concreting, Glass & Glazing, Furniture Making and Finishing</p>	<p>The SIEC facility will enable a 16% increase in training output including sustainable materials and green waste</p>
<p>Flexibility in delivery</p> <p>Improved access for regional students</p> <p>Incorporation of sustainability skills in water use, selection of paints and their disposal</p>	<p>Cert III in construction Bricklaying/Blocklaying Civil Construction (Plant Operations) Off Site Construction (Sign writing/Computer Operations) Painting & Decorating Stonemasonry (Monumental/Installation) Solid Plastering Wall & Ceiling Lining Wall & Floor Tiling Paving and Concreting</p>	<p>SIEC will have the knowledge component of all qualifications accessible on-line to cater for regional and off-site students</p> <p>Sustainability embedded into all units of competence</p>
<p>Sustainability focus requirement for small business and contractors</p> <p>Flexibility in delivery</p> <p>Improved access for regional students</p>	<p>Cert IV in Business Plan small business finances Establish legal and risk management requirements</p> <p>Short Courses Licensing requirements Codes of practice, regulations and standards</p>	<p>Sustainability focus on legal requirements as well as the competitive advantages of sustainable practice. Possible link to university degree programs.</p> <p>Utilising SIEC exhibition and learning spaces, knowledge and skill up dates on current practice provided by industry personnel</p>

3.5.3 Design Planning and Development Pathways

Workforce Development and Sustainability Needs	Design, Planning and Development Training Requirements (Qualifications/Courses)	How Does the Infrastructure Address the Needs
<p>Lack of identified qualifications and pathways from School to VET</p> <p>More VET in Schools required</p> <p>Links to existing environmental courses</p>	<p>Certificate I in Mining</p> <p>Certificate I in Water Sustainability</p> <p>Certificate I in General Construction</p>	<p>The SIEC will have auspicing agreements with school sector for lower level qualifications that have a focus on sustainability.</p> <p>Pathways to Land Information Management Systems courses</p> <p>Pathways to Certificate III</p>
<p>Wider range of courses to suit individual training plans</p> <p>Improved access for regional students</p> <p>Higher level qualifications to be available</p> <p>Waste management, alternative energy, selection of sustainable materials, WSUD.</p>	<p>Cert IV in Building and Construction Building Estimating Site Management Residential drafting Surveying</p> <p>Diploma in Building Building Design and Technology Surveying</p>	<p>E-Learning to service thin markets</p> <p>Upskilling opportunities in partnerships with industry utilising SIEC space</p> <p>Inter-disciplinary approaches</p> <p>University partnerships will provide support for higher level programs and articulation to Bachelor degree and Associate degree courses</p>
<p>Greater flexibility in delivery required for improved access for regional students</p>	<p>Cert IV in Furnishing Technology Cert IV in Interior Decoration Diploma in Furniture Design and Technology Diploma in Interior Decoration and Design</p>	<p>SIEC will provide a range of e-learning resources that can be accessed from any location and promote self directed and cross program learning</p> <p>Knowledge transfer will be emphasised.</p>
<p>Greater numbers of students requiring knowledge and skills in Land Information Management Systems and Geoscience</p>	<p>Spatial Information Services Geoscience Cert III Cert IV Diploma Advanced Diploma</p>	<p>SIEC will provide individuals with identified pathways utilising entry level school based courses to VET and university qualifications</p>
<p>Up-skilling of existing workers to satisfy demand</p>	<p>Short courses Skill sets</p>	<p>Industry partnerships developed by SIEC will allow for the provision of short courses or skill sets to meet demand for technological updates</p>
<p>Need for higher level qualifications in sustainability</p>	<p>Graduate Diploma in Environmental Design</p>	<p>In collaboration with universities</p>

3.5.4 Renewable Energy Pathways

Workforce Development and Sustainability Needs	Renewable Energy Training Requirements (Qualifications/Courses)	How Does the Infrastructure Address the Needs
<p>Requirement for School sector to engage students with renewable energy career path</p> <p>Only small number of VET in Schools courses auspiced by TAFE SA</p> <p>Lack of identified pathways from School to VET</p>	<p>Cert II in Renewable Energy</p> <p>Cert II in Sustainable Energy (career start)</p>	<p>Governance arrangements will have relevant State Industry Associations (EEWSB) to promote engagement and pathways</p> <p>New facility will have auspicing agreements with School sector – Trade Schools for the Future and Trade Training Centres</p>
<p>Increased capability to provide renewable industry training for new entrants</p>	<p>Cert III in Renewable Energy –Extra Low Voltage</p>	<p>Pathway from School sector - direct entry into course</p> <p>Physical resources and staff capability engaged within SIEC</p>
<p>Flexibility in delivery</p> <p>Grid connect of pV systems</p> <p>Improved access for regional students</p>	<p>Cert IV in Renewable Energy</p>	<p>Pathway provided from Cert III</p> <p>Provision of university equipment and teaching and research facilities</p>
<p>Commissioning and maintenance</p> <p>Design of pV systems Energy Data Management</p> <p>Improved access for regional students</p>	<p>Diploma of Renewable Energy Engineering</p> <p>Advanced Diploma of Renewable Energy Engineering</p>	<p>Pathway provided from Cert IV</p> <p>Articulation into university Bachelor Degrees</p>
<p>Up-skilling of existing workers to satisfy demand</p>	<p>Short courses</p> <p>Install Grid Connect Systems Design Grid Connect Systems Install Stand Alone Power Systems Design Stand Alone Power Systems Training in new technologies such as demand management, smart meters, and distributed power generation that increase energy efficiencies and reduce the carbon footprint of buildings</p>	<p>Courses available with industry sponsorship and teaching input</p>

4. END NOTE

The SIEC project began with a relatively simple goal: to identify the workforce development needs of the business and construction industry as it moves to implement sustainable technologies.

The result – reached after extensive research and comprehensive consultation with stakeholders in industry, government, higher education, VET and TAFE – prompted the development of an exciting and innovative educational model: a model that not only takes business and construction training into the 21st century but provides a template for large scale workforce development initiatives.

Australia, like countries around the world, faces serious environmental challenges. The adoption of sustainable systems, processes and practices is critical to the nation's future. But this cannot happen without research and development, industry support and the creation of a highly skilled workforce. The SIEC educational model, with its multi-disciplinary, customer focused approach, purpose designed infrastructure, use of best practice learning methodologies and creation of education and career pathways, is unique in the scope and range of its vision. It provides an opportunity to display leadership – in education and training; in stakeholder collaboration; and, most importantly, in the creation of a sustainable future.

